

# **WOMEN, HORMONES AND THE MENSTRUAL CYCLE**

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# **Women, hormones and the menstrual cycle**

Herbal and medical solutions  
from adolescence to menopause

Second edition

Ruth Trickey

# *For Kirrian*

First published in 1998  
This edition published in 2003

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National Library of Australia  
Cataloguing-in-Publication entry:

Trickey, Ruth, 1953– .

Women, hormones and the menstrual cycle: herbal and medical solutions from adolescence to menopause.

2nd ed.

Bibliography.

Includes index.

ISBN 1 86508 980 X.

1. Women—Health and hygiene. 2. Menstrual cycle.
3. Hormones. I. Title.

618.172

Set in 11/13 pt Sabon by DOCUPRO, Canberra  
Printed by Griffin Press, South Australia



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# Acknowledgments

I am indebted to the many colleagues and friends who contributed to the more than 70 000 words of new or updated information that was necessary to complete the second edition of this book. Thanks firstly to the other herbalist/naturopaths who I work with at Melbourne Holistic Health Group. Sandra Vilella helped with menopause, osteoporosis and the latest information on the effects of declining androgens in women. Jenny Adams took on the daunting task of researching and collating the large amount of new information on phyto-oestrogens and Karen McElroy collected an equally large volume of the latest herbal medicine research. Sandra, Jenny and Karen also contributed information gained through their clinical and professional experiences and the material provided in the sections on the natural therapists' approach has been contributed to, in no small way, through insights gathered during stimulating discussions at the clinic.

Other herbalists, too numerous to mention, helped in a myriad of ways. Erin Collins helped with herbal research and gathering new information on endometriosis; Nick Burgess provided photos from his extensive collection of medicinal herbs for the front cover; and Michael Thomsen lent some of his files on herbal medicine. Thanks also to Judy Singer, Shu Yi Mann, Jill Birney and Kathleen McPherson.

Many gynaecologists have helped with information and chapter reviews. Principal amongst these are Dr Claire Petterson, so vital for the first edition of the book, who contributed information on drugs, surgery and endometriosis; Dr Catharyn Stern for her generous help on polycystic ovarian syndrome; and Dr Helena Teede for her valuable advice on the amenorrhoea chapter.

Tracey Reeves was my personal assistant and general researcher during a brief sojourn back in Australia and her practical, efficient and good-humoured approach to all things professional and personal saved the day during a two-month period of seven days a week and too many late nights to mention.

Finally, I would like to thank Chris Cooke who helped with graphics, the various computer dramas and who provided some of the best resources of all—words of encouragement, a ready ear, and food on the table.

*Ruth Trickey  
Melbourne*

# Introduction

An earlier menarche, better nutrition, less pregnancies and a longer life expectancy mean that today's woman will have many more periods in her lifetime than her ancestors did. The 'average' Australian woman can expect to menstruate from the age of twelve or thirteen until she is somewhere between 25 and 35 years old. She is then likely to become pregnant two or three times about every two years, breast-feeding for about three to nine months. Following her pregnancies, she can expect her cycle to remain fairly regular until she is about 50 years old when she will become menopausal.

All up, the average Australian woman will have about 30 years of regular menstruation, totalling between 360 and 400 periods.

Compared to this, women from earlier ages started to menstruate around fourteen or fifteen years old and were frequently married soon after. Child bearing began earlier and it was common for women to give birth many times if their fertility was not affected by sexually transmitted diseases, poor nutrition or indifferent health; or if they didn't die in childbirth. Contraception was not as reliable as it is today, and the spacing between pregnancies was influenced by breastfeeding—both because breastfeeding naturally reduced fertility, and because it was commonly held that a breastfeeding woman should abstain from sex. (Sex was believed to bring on a woman's period; and the return of the period was thought to deprive the baby of sustenance by diverting the breast milk—the 'white blood'—from the breasts to the womb.) So, for most of their fertile years, these women were likely to be either pregnant or breastfeeding, and had an average of only 40 periods during their lifetime.

Both the menstrual cycle and menstruation itself are easily affected: diet, lifestyle and stress will all have an impact on the ease and regularity of the cycle. These associations have become less obvious with the modern-day tendency to take an aspirin or go on the Pill the moment the first problem arises. But there is an increasing understanding of the delicacy of the menstrual cycle, of its dependency on nutrition and harmony. Many women want to control or treat their menstrual difficulties with commonsense and commonplace remedies which they can administer themselves, or use non-drug alternatives such as herbal medicines.

This doesn't mean that the Pill or aspirin are wrong—sometimes, and for some women, they are amongst the most convenient or appropriate choices. But it does mean that there are alternatives for those women who want to make it themselves, grow it in the garden, take something more natural, or adopt a lifestyle change.

The medical, surgical and herbal treatments for common menstrual disorders are covered in this book. No one treatment is more or less appropriate than another as an option—simply more or less appropriate for different women and in different situations.

The tenfold increase in the number of periods since the eighteenth century gives rise to more opportunities for problems to manifest, but a woman who is familiar with the events surrounding menstruation and who has access to appropriate information can often prevent a lot of sorrow by attending to deviations from her normal menstrual pattern quickly.

When problems have already arisen (which is, after all, when most of us seek written or professional advice), a range of possible treatments offered by natural therapists and doctors is discussed. This book is not a substitute for individual professional assessment and treatment, but is rather a guide to the options available.

## Note

The information in this book is intended for *practical* application by herbalists and allied health-care practitioners, and may also be of value for those engaged in research or study. It can also be used as a guide to treatments for women suffering from menstrual complaints, but is not intended as a substitute for competent advice and guidance by a qualified practitioner.

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# Section A

## Setting the scene

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# 1

## The history of natural medicine

### Key words

abortifacient

Cold

Dry

elements

Hot

humoral theory

humour

Moist

phenomenology

*pneuma*

*prana*

*qi*

qualities

temperament

vital force

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### THE EARLY TRADITIONS

Three cultures, the Chinese, the Indian (Ayurvedic) and the Greco-Roman, developed and described remarkably similar systems for explaining human physiology and recognising health and disease. These systems had a central ‘elemental’ basis (Air, Earth, Fire, Water, Metal) and a vital force.

Clearly, to oversimplify the comparisons between these traditions does not give credit to the effect of the distinct geographical, cultural and religious convictions that were integral to the evolution of these concepts. However, so remarkably similar were their beliefs that they can be broadly summarised as follows:

- The belief in a vital force as the living and generative energy in the body. The vital force generates heat, circulates throughout the body, and is necessary for life and procreation.
- Deficiencies of the vital force are associated with poor health, slow recovery from illness and early death.

**Table 1.1 The three major medical systems from antiquity**

<b>System</b>	<b>Vital energy</b>	<b>Element</b>	<b>Season or quality</b>	<b>Organ system or constitutional type</b>
Greco-Roman	Pneuma	Air	Hot & Moist/Spring	Sanguine
		Fire	Hot & Dry/Summer	Choleric
		Water	Cold & Moist/Autumn	Phlegmatic
		Earth	Cold & Dry/Winter	Melancholic
Chinese	Qi	Wood	Wind/Spring	Liver
		Fire	Heat/Summer	Heart
		Earth	Damp/Late Summer	Spleen
		Metal	Dry/Autumn	Lung
		Water	Cold/Winter	Kidney
Ayurvedic	Prana	Air	Dry/Autumn	Vata
		Fire/Water	Hot/Moist Spring/Summer	Pitta
		Water/Earth	Moist/Heavy Winter/Spring	Kapha

- Incorporated within this understanding is a wider concept, that the macrocosm (the world) reflects the microcosm (the individual).
- The elements Earth, Air, Fire, Water and (in the Chinese system) Metal and Wood are described as being the constituents of all life forms.
- Ill-health is influenced by the relative preponderance of one or more of the elements.
- All life forms are made of identical ‘elements’ and are subject to the same universal laws, celestial influences and patterns of change.
- Each of these life forms, as part of the greater whole, is in no way superior to any other life form.
- Extremes in environmental factors are evident in many diseases.

The medicine of early cultures was based on observation. Groups of symptoms were seen to form repetitive patterns, and these were related to observed phenomena in the universe. These patterns were associated with environmental factors, and as the philosophies evolved, greater complexity was introduced which described the workings of a vital force, *qi* or *prana*. The humoral theory was the name given to the Greco-Roman system. Much of this system has survived as the traditional Ayurvedic medicine of India and Pakistan (called Unani or Tibb in Middle Eastern countries).

Astrology was intimately connected with the humoral laws: an individual’s physiology and outer anatomy was believed to be continually influenced by the constellations of the zodiac. The humoral fluids, like the ocean tides, were under the dominion of the planets and the moon. Disease, regarded primarily in terms of disturbance of the humoral balance, was caused by a change in the body fluids and could be related either to the positions of the planets or moon, the quality of the diet, or to a loss of body fluids, such as sweat, menstrual blood or

urine. The humoral theory is phenomenological. In other words, it is based on the careful observation and classification of phenomena according to their Qualities and the Elements which govern them. To the modern observer they can be seen as a valid attempt to classify the patient and their condition in order to match an appropriate treatment, or to correct an imbalance.

A diagnosis using the phenomenological approach is based on those things that are apparent during a consultation and unaided physical examination—and *only* those things (blood tests, X-rays and swabs to identify bacteria have no role in this type of diagnosis). The ‘phenomena’ form part of an overall symptom picture which reveals the person’s physical, emotional and constitutional tendencies. Disease and the symptoms of disease are considered to be part of the whole picture, not something set apart.

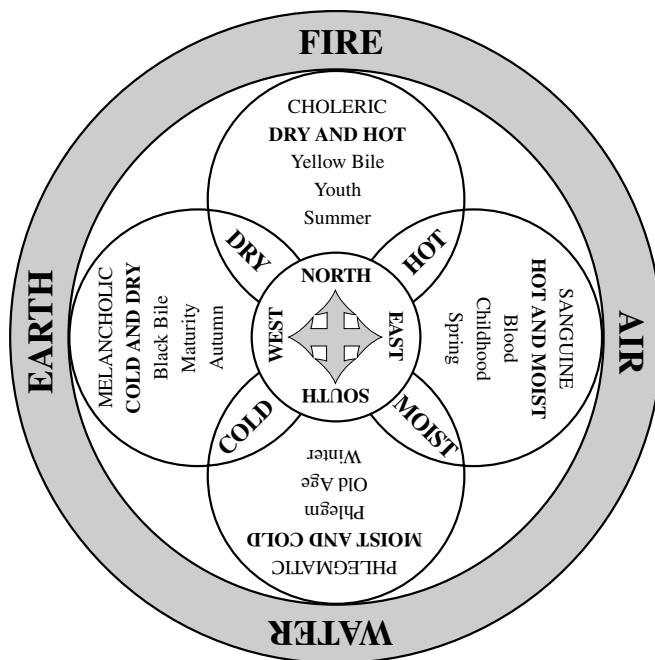
The complaint and the individual are treated simultaneously by counterbalancing the qualities of the disease and the qualities of the individual with the opposite qualities in the herbs to be prescribed. Using the qualities, a herbalist can choose between similar herbs and match them more appropriately to the individual and their condition, limiting side-effects and enhancing the therapeutic outcome.

There is a renewed interest in medical systems based on phenomenology. Chinese medicine, in particular, is seen to be somehow special and better because it follows this approach. Western herbal medicine has also started to rediscover the herbal qualities and their application to contemporary herbal medicine.

As a diagnostic technique, the phenomenological approach could never hope to compete with modern medicine. Instead, both are used by the modern herbalist as the two interwoven strands of diagnosis and treatment. Modern diagnostic techniques are invaluable to diagnose *disease*, but these techniques cannot define all of the symptoms seen in practice. Neither do they acknowledge the concepts of vitalism which in part explain the tendency of individuals to develop disease. Traditional diagnostic techniques fill the gaps in the picture by providing information about the *individual*. A modern-day herbalist uses both to treat the patient and their complaint.

## THE HUMORAL THEORY

The humoral theory evolved over millennia and finally became the dominant explanation of human physiology at almost the same time in history that the Chinese of the Song dynasty (960–1279 AD) were refining the Yin/Yang theory. It developed as a complete system with many interlocking laws which sought to represent physiology as a group of four interactive and mutually opposing elements.



**Figure 1.1 The humoral theory**

‘Humoral’ refers to the semi-gaseous fluids or ‘humours’ and is sometimes translated to mean ‘body fluids’—however, humours cannot be equated to any scientifically identified body constituent. In health, the humours were present in a state of relative balance while in ill-health one of the humours became relatively more dominant. The four humours were Blood, Phlegm, Yellow Bile and Black Bile, and they gave each individual an unique constitutional type or temperament—for example, Choleric people were fiery and quick-witted; Phlegmatic were slow and even-tempered.

The four elements of Earth, Air, Fire and Water together with the four qualities of Hot, Cold, Moist and Dry represented an overall picture of the humoral balance of the individual. The nature or temperament was believed to be directly influenced by the dominant element. A predominance of air was related to Blood and the Sanguine (cheerful) temperament; Fire to Yellow Bile and the Choleric (irritable) temperament; Water to Phlegm and the Phlegmatic (even or unexcitable) temperament; and Earth to Black Bile and the Melancholic temperament.

The elements were also present in food and drink, which were made of varying combinations of Air, Earth, Fire and Water. Everything taken into the body would contribute to the humoral balance because digestion transformed the elements into the appropriate humours. A diet lacking in balance would contribute to disease by affecting the humoral balance. When other factors had initiated the humoral imbalance, the diet could be manipulated to regain health.

Galen (c. 129–c. 200 AD) was responsible for elaborating the Greek concept of the *pneuma*, or vital energy. He described a ‘vital *pneuma*’ as being carried by the arteries to all organs and as the active force involved in respiration and the production of heat and energy. The ‘psychic *pneuma*’ activated the mind and was produced by the vital *pneuma* in the blood vessels in the base of the brain. The transformation of the vital *pneuma* into psychic *pneuma* involved purification through a network of capillaries.

When it came to recognising and treating illness, a diagnosis was made by closely observing the individual for combinations of signs and symptoms. A correlation was made between observed phenomena in the universe and the patterns of disharmony in the person. For example, the observation that fats and oils became thick or hardened with increasing cold was taken as an indication that Cold would cause the body fluids to become thick and movement to be difficult. To treat this condition, Hot remedies were used to counterbalance the Cold. Other observations associated heat with redness, and cold with a purplish discolouration. This led to the association of bright red blood with Heat, and purplish, dark or maroon blood with Cold.

Choosing and categorising herbs occurred in much the same way. Plants which had a pungent and spicy taste were believed to be Heating as well as Drying because heat was seen in nature to dry more efficiently than cold. If a plant grew close to water like the willow, it was believed to be Cooling and Moistening. On the basis of this observation, willow was used for colds, fevers and inflammatory joint problems, to alleviate fever and reduce inflammation in the joints. Today we know that willow is indeed anti-inflammatory, and can reduce temperatures because of its ability to yield salicylate after ingestion.

According to the humoral theory Hot and Cold are the active, primary qualities, and Dry and Moist are the passive, secondary qualities. All of the factors which influence life and health, including the four humours, the elements and temperaments, the organs and the seasons, contain at most two of the qualities. For example, the qualities Hot and Dry are inherent in the Choleric temperament, the Yellow Bile humour, the Fire element and the season of summer.

Schematically, the humoral theory was represented with the qualities and the elements organised around two circles. Each element is composed of two qualities: Fire is Hot and Dry, Earth is Dry and Cold, Water is Cold and Moist, and Air is Moist and Hot.

Affinities between the qualities—Hot, Moist, Cold and Dry—are read clockwise around the circle; while oppositions between these qualities are represented as being diagonally opposite: Hot is the opposite of Cold, and Moist is the opposite of Dry.

Affinities between the elements of Fire, Air, Water and Earth are also read clockwise around the circle. The elements in opposition to

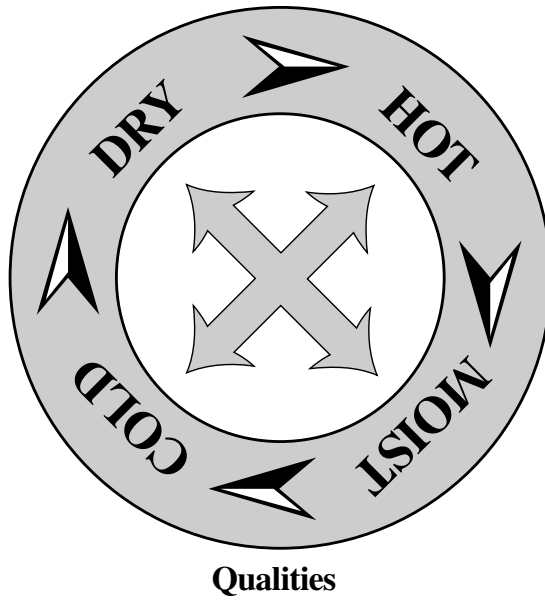


Figure 1.2 The qualities

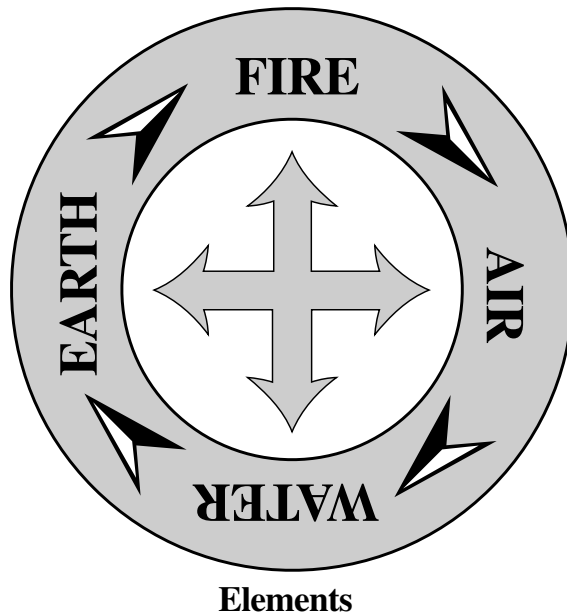


Figure 1.3 The elements



each other are represented as being opposite in the diagram: Fire is the opposite of Water, and Air is the opposite of Earth.

The four elements were believed to form the structure of all earthly objects. Change occurred when the qualities combined in different ways, or the changing proportions of the elements transformed into another humour. This change was governed by the principles of attraction and repulsion, which were respectively believed to be the forces of creation and unity, and of destruction and diversity. (These laws are similar in many aspects to the laws of Yin and Yang.) See Appendix 1 for further details of the qualities, the elements, the temperaments and physiology according to the humoral theory.

## **HERBS: THE EARLIEST MEDICINE**

Herbal medicine is as old as humanity itself. Evidence that plants may have been used as medicines as early as 60 000 years ago came from the recent discovery of the pollens of common plant medicines at the burial site of a Neanderthal man in a cave in Iraq. Marshmallow, grape hyacinth, yarrow, ephedra, all in use today, were placed beside him, perhaps as decorative offerings, or perhaps for his journey to the afterlife.<sup>1</sup>

According to available knowledge, virtually all peoples throughout the world have used some form of plant medicine. Of those societies which still use herbal remedies as their source of medicine, many seem to share common traits. Almost all have an individual to whom the knowledge of specific plants is entrusted and who will pass on the information only to selected initiates. Many make a distinction between men's and women's knowledge and use of medicines.

Over centuries, careful observation revealed that there were optimum times to pick plants and administer medicines according to the phases of the moon, seasons or times of day; and that some parts of the plant were more effective than others. It soon became clear that different plants were more effective when administered in certain ways. Gradually the doctoring and supply of herbs developed into recognised professions: the physician became the early doctor and the apothecary became the pharmacist.

The first recorded herbal text was written in ancient Greece, in the fourth century BC, by Diocles of Carystius, a pupil of Aristotle. Herbals were initially probably written for the apothecaries. In the first century AD, Dioscorides wrote his famous *De Materia Medica*. The selection of plants, many of them previously unknown, and the precise way he wrote his text made the work so popular that it is still copied and quoted today.

Sufficient numbers of the valuable texts from the Arabs, Greeks, Romans and Egyptians have survived to give a good indication of the practice of herbal medicine by the scholarly and educated. But much of the early practice of women's medicine was continued as an oral

tradition. It was either passed on from one initiate to another by the priestesses and wise women, to be used in strict accordance with the current law; or in the case of the common and everyday remedies, passed on from mother to daughter. This seems to have been especially true of contraceptive practices.

Birth control, or the absence of, has always had important consequences for women so it is highly likely they have sought to control their fertility throughout all of history. Certainly there is evidence that rates of reproduction have been limited by one means or another since as early as 200 BC.<sup>2</sup> Restrictions in sexual activity and barrier contraceptives were used, and there is also evidence for the use of herbal remedies as contraceptives and abortifacients from as early as the first Egyptian medical documents.

One of the most compelling written pieces of evidence comes from the writings of Soranus, a Greek writer on gynaecology around 100 AD. He distinguishes between a contraceptive, which ‘does not let conception take place’ and an abortive, which ‘destroys what has been conceived’ and comments that ‘it is safer to prevent conception from taking place than to destroy the foetus’. A number of common plants including pomegranate (*Punica granatum*), the giant fennel (*Ferula opanax*), rue (*Ruta graveolens*), juniper (*Juniperus communis*) and asafoetida (*Ferula asafoetida*) were all mentioned as being in common use in Europe.

But while some writers mention the use of these agents, there is little clear advice on the correct dosage, times of administration or even the way to take the remedies. Were they, for instance, to be used as pessaries, or taken orally? John Riddle, Professor of History at North Carolina State University, who has studied these issues extensively, has a possible explanation:

. . . ancient physicians, all those cited thus far being male, did not fully understand the procedures for taking the anti-fertility agents. In no account, medical or non-medical, is there sufficient detail to permit efficient administration . . . Thus knowledge of anti-fertility plants, and how and when to take them, appears from the evidence—scant though it is—to belong to a female culture. Some of the medicinal plants were also salad plants. The implication . . . is that women were eating plants, such as rue and dill, from the same bowl as men who may not even have been aware of what was going on. One must suppose women knew what to eat, when and how often, and they would appear not to have learned this through books.<sup>3</sup>

Science and medicine have remained sceptical of the effectiveness of plants for contraceptive purposes. In recent times, scientists have found that the seeds of Queen Anne’s lace (*Daucus carota*) have contraceptive qualities and stop implantation of the embryo as well as inhibit the production of progesterone. The regular consumption of the common pea, *Pisum sativum*, is reportedly responsible for the low birth rate in Tibet.<sup>4</sup>

What was once common knowledge about herbal contraception, passed on through word of mouth, is lost to today's herbalist. Early writings and current use both support the view that herbs taken as contraceptives seem efficient, and may even be relatively safe. Further investigation into their mode of action, the correct dosage and timing of administration may yet provide enough information to enable their confident prescription.

In sharp contrast to contraception, fever management was an important aspect of treatment for the early physicians and a vast body of instruction can be found in the literature. Infectious diseases were a cause of high mortality for all, but particularly for the young and the infirm, and prior to the use of antibiotics, even minor conditions had the potential to cause death. Elaborate systems for the differentiation of febrile conditions were developed which were based on removing the offending environmental agent, and stimulating the individual's vitality.

Traditional practices for the management of colds, viruses and flus are still recommended by herbalists: acute illness with high temperatures where the person feels cold are treated with Hot herbs and fluids to encourage a subjective sense of heat and to allow the 'fever to break'. This is in direct opposition to the recommended 'take an aspirin and go to bed' advice commonly given today. Herbalists believe that the body attempts to generate heat to overcome viral or bacterial invasion and that assisting this process may shorten the course of the illness.

All traditional medicine has developed a specific language and philosophy on which to base its diagnostic and treatment rationales. Lack of vitality, catarrhal complaints, lymphatic congestion, toxicity or liverishness are all characteristic of herbal medicine, but are often understood by the public: for example, most of us know about being liverish and have an idea of what it means to lack vitality. In many cultures these concepts become so entwined with the language and a common understanding of health and disease that only a thin line exists between 'commonsense' and the knowledge of the practitioner. As a result, these concepts become difficult to articulate; they are just 'known' and as a result may not be taught or even conceptualised as concise and recurring syndromes.

Constitutional [Holistic] Herb Therapy is widely practised in China, Tibet, India, Japan, and Southeast Asia; its theories and methods have been written about in various Asian languages. The concept is so ingrained in everyday Asian life that herbalists there have not concerned themselves with comparing Constitutional Therapy with other kinds of therapy. As a result, it is not easy to find a book devoted to this subject even in the cultures where it is practised.<sup>5</sup>

Over the past 50 years, herbal medicine in the West has changed its focus from the individual to be more interested in specific constituents and their impact on diseases. Detailed information is now available on the outcomes of a herbal medicine and it is possible to prescribe precisely for a number of complaints. Partly, this has been related to the increasing use of herbal remedies by medical practitioners in Europe and Japan, but it has also been associated with a lapse in the traditional language and philosophy of herbal medicine on which was originally based its rationale for diagnosing and treating disease.

One of the most basic tenets of the natural practitioner is the focus on the individual; on why there is disease, rather than what disease; on the vitality and constitutional type rather than the strain of bacteria, the type of cancer, the exact level of some blood component. To do anything less is to betray those people who have turned to herbal medicine for a more holistic solution to their health care. It is vital that herbalists retain their traditional understanding of patho-physiology. A herbalist without this understanding might just as well be a doctor using herbs.

## **ADMINISTERED FROM HOME . . .**

During the seventeenth century in Europe and America, women who managed large houses, were titled or married to churchmen, saw it amongst their duties to provide basic health care. For these women, it was their religious and social responsibility to attend not only to their families and the members of their household, but also to their neighbours and the local villagers. The apothecaries were often quite a distance away, and the services of a physician were expensive and not always available. 'A good reliable herbal—like a sound basic cookery book—was the first essential of the young housewife . . .'<sup>6</sup> These herbals were used to identify the plants and their uses and to assist with the preparation of the herbal creams, extracts, syrups and poultices.

Some of these women took to their role with vigour and enthusiasm. This was, after all, one of the few pursuits other than housewife open to the women of the time, and many were obviously talented and became well respected. Some had extensive 'still-rooms'; the rooms where they extracted herbal vinegars and wines, made ointments, dried their herbs, distilled oils and made their perfumes, pomades and household goods.

Eventually, books were compiled from the collected recipes and advice of some of the more famous of these women; some became best-sellers. Usually, no distinction was made between books for culinary and medical advice and the manuals written for housewives included mixtures of medical and cookery recipes. *The English House-wife*<sup>7</sup> was one of these books which included advice on common ailments such as toothache, anaemia or 'green sickness', jaundice, epilepsy, diarrhoea, skin diseases and hernias alongside recipes for custards, jams and potted meat loaf.

This tradition was continued in Australia, initially with books

published overseas, such as *The Family Doctor*,<sup>8</sup> but eventually by Australian publishing houses. John Broadbent, ‘practical medical herbalist’ of Melbourne, wrote two for the general market: *The Australian Botanic Guide* (1887)<sup>9</sup> and *Botanic Multim in Parvo* (1899). Although not general household books, both reflected the trend for home treatment which had been employed in the English households.

Many of the books, both those published here and overseas, gave a wide variety of advice on cookery, hygiene and herbal or other remedies for a surprising range of conditions.<sup>10</sup> Mrs Lance Rawson’s book, *Australian Enquiry Book of Household and General Information* (1910),<sup>11</sup> in the tradition of *The English House-wife* encompassed cookery, preserving, embroidery, swimming lessons, farming tips, building and decorating as well as health and hygiene. Even as late as 1939, the *Ladies Handbook of Home Treatment*<sup>12</sup> gave advice on diet, convalescence, douches and instruction for personal hygiene, although by this time, the use of herbal and other natural remedies had disappeared to be replaced by a more chemical approach (the use of mercury, lead, arsenic and copper had been increasingly popular since the late 1500s).

These books are excellent chronicles of the fading tradition of tending to family and friends in the home. Australian women, probably because of their isolation, seem to have been keen advocates of this tradition; utilising common household remedies to make, amongst other things, their own cough medicines, cold and flu remedies or chest poultices. Today, the possibility of treating complaints with common and natural ingredients contributes to the popularity of natural medicine. These remedies, rather than being passed over as ‘old wives’ tales’, are proving to be effective and safe and enable people to once again be involved in their own health care at a fundamental level.

## THE HOLISTIC PHILOSOPHY AND HEALTH

The workings of the human body are much more involved than can be discovered by breaking it down into its constituent parts and placing it under a microscope to see how it works. There are myriad influences on each individual that will contribute to their overall condition. Recently, the holistic philosophy, with its emphasis on the body–mind continuum and a belief in the body to heal itself, has had far-reaching influences throughout medicine. Table 1.2 outlines the major differences between the ‘old’ and ‘new’ paradigms.

‘Holistic’, when that adjective is properly applied to health care, refers to a qualitatively different approach, one that respects the interaction of mind, body and environment. Beyond the allopathic approach of treating the disease and the symptoms of disease, it seeks to correct the underlying disharmony causing the problem.<sup>13</sup>

**Table 1.2 The major differences between the old and new paradigms of medicine and health**

<b>Assumptions of the old paradigm of medicine</b>	<b>Assumptions of the new paradigm of health</b>
Treatment of symptoms	Search for patterns and causes, plus treatment of symptoms
Specialised	Integrated, concerned with the whole patient
Emphasis on efficiency	Emphasis on human values
Profession should be emotionally neutral	Profession's caring is a component of healing
Pain and disease are wholly negative	Pain and disease are information about conflict, disharmony
Primary intervention with drugs, surgery	Minimal intervention with 'appropriate technology', complemented with full armamentarium of non-invasive techniques (psychotherapies, diet, exercise)
Body seen as a machine in good or bad repair	Body seen as a dynamic system, context, field of energy within other fields
Disease or disability seen as a thing, entity	Disease seen as process
Emphasis on eliminating symptoms, disease	Emphasis on achieving maximum wellness, 'meta-health'
Patient is dependent	Patient is (or should be) autonomous
Profession is authority	Profession is therapeutic partner
Body and mind are separate; psychosomatic illness is mental, may be referred to psychiatrist	Body/mind perspective; psychosomatic illness is a province of all health-care professionals
Mind is a secondary factor in organic illness	Mind is primary or coequal factor in <i>all</i> illness
Placebo effect shows the power of suggestion	Placebo effect shows the mind's role in disease and healing
Primary reliance on quantitative information (charts, tests, dates)	Primary reliance on qualitative information, including patient's subjective reports and professional's intuition; quantitative data an adjunct
'Prevention' largely environmental: vitamins, rest, exercise, immunisation, not smoking	'Prevention' synonymous with wholeness: work, relationships, goals, body-mind-spirit

Source: Ferguson, *The Aquarian Conspiracy*<sup>14</sup>

Treating holistically is about treating individuals with conditions and not just about treating diseases. But it is more than that. It is also about validating an individual's perception of their health. Take, for example, the case of a woman with lower pelvic pain. Every reasonable investigation has been performed and nothing is found. Her doctor tells her that there is nothing wrong with her, but from her perspective, she is still in pain. Is it true to say there is nothing wrong? From a holistic perspective there may be no disease, but something *is* wrong because she is experiencing pain and pain indicates some form of disharmony.

This demonstrates another of the important differences between the two paradigms. Medicine usually sees health as an absence of a disease, and defines illness in terms of discernible and diagnosed disease states. Holism sees health as the sense of positive wellness in conjunction with the absence of disease and makes a further distinction between being ill and having a disease. See box 'Signs of health'.

## SIGNS OF HEALTH

What is health? Although we often think of ourselves as being healthy if we're not sick, healthy individuals, along with having no overt signs of disease, no pain, complete digestion and clear skin, show other signs of balance, harmony, happiness and wellness.

This description of health would be recognised by any practitioner or student of traditional medicine, and describes those features of health that we often know, but don't articulate:

- The stature is erect and held with ease.
- The skin is clear, smooth and lustrous. To the touch it is warm, firm and slightly moist.
- The individual is within the normal weight range for their age, build and height.
- The normal body processes such as digestion, evacuation of the bowels, urination and menstruation proceed normally and occur without excessive discomfort.
- The bodily excretions such as sweat, urine, faeces, menstrual blood and saliva are of normal consistency, colour and do not have unusually strong or unpleasant odours.
- The appetite is normal and there is hunger in the mornings.
- The desire for fluids is balanced: it increases in hot weather and with exercise, and the preference is for fluids which are neither too hot nor too cold.
- The emotions are balanced and even. There is neither too much anger, joy, fear, boldness, impulsiveness nor procrastination, and the emotions are maintained in a state of equilibrium.
- Sleep is balanced with wakefulness, and is not interrupted by excessive or disturbing dreaming. Dreams that occur are pleasant, uplifting and filled with optimism.
- The mind is quick, alert and imaginative; the memory is good.
- The limbs move easily, with strength and precision.
- The blood vessels can be seen in the flesh and are neither too deep, nor do they bulge out.
- The hair is lustrous and is neither too thin nor too coarse. It grows in the correct places and does not grey or fall prematurely.

A disease is a condition which can be defined by the presence of a number of reproducible signs, such as abnormal blood tests or X-rays, but illness is a subjective sense of feeling sick or being unwell which may or may not be related to a disease. Functional disorders fall into this category. The organs may not be functioning correctly, but as yet, there are no appreciable signs of changes at a cellular level and routine tests remain within the normal range.

A muscle cramp is an example of this type of problem. The muscle is not diseased, even though the excruciating pain indicates otherwise. Instead, the problem has arisen because the muscle is behaving abnormally. There may be a number of stimuli that have initiated this response, they may be transient and never recur. But the cramp is real and the body is indicating the presence of some sort of disharmony.

Many gynaecological conditions are classed as functional disorders, including most types of period pain and many of the conditions associated with hormone imbalance such as premenstrual syndrome (PMS). Many of the syndromes described by natural therapists are also functional disorders—for example, functional hypoglycaemia and adrenal exhaustion. It is not possible to diagnose these conditions with blood tests, but their response to traditional treatments is reproducible and predictable.

## Complementary medicine

'Never before in history have so much effort and so much money been expended on medical care; nevertheless, there appears to be a constant number of patients whose suffering medical science has been virtually powerless to alleviate . . . In a study of the patients treated by group medical practices in Hamburg, half were classified as chronically ill; 30–40% were said to be suffering from "neurotic ailments", and a mere 10–20% of patients responded "correctly" to the standard medical procedure . . .'<sup>15</sup>

Complementary medicine can be defined as the use of any or all of the possible disciplines of health care, including orthodox medicine, for a particular complaint. The term came into being because the term 'alternative medicine' was so problematic, implying that natural medicine was the alternative to the dominant, orthodox medicine. But the problem still remained. It was natural medicine that was ultimately referred to as 'complementary', rather than all disciplines being able to complement each other.

Increasing numbers of people are using complementary medicine both as an alternative and as an adjunct to orthodox medicine,<sup>16</sup> although many are reluctant to inform their doctors that they are doing so.<sup>17</sup> This reluctance reflects the historically superior attitude of orthodox medicine as being the only proven and valid form of medicine and complementary therapies being the domain of charlatans and quacks. Medicine has taken an authoritative role in the therapeutic process for



so long that it is now difficult for most doctors (and many natural therapists) to be more interactive in their consultation styles.

The best complementary medicine must be interactive. There is no one system of intervention that will work for every person; neither is it reasonable to expect that a condition will always respond favourably to a treatment, even if this has been the case for other individuals many times in the past. It is even possible that someone will respond successfully to a treatment once and then never again, or that they will only respond intermittently.

In an interactive consultation the decision-making can be shared as to which of the complex array of possible disciplines might be useful. Most individuals are familiar with associated causes of their complaint: for example, they know that stress will aggravate their irritable bowel syndrome, but they might also need advice on how to change their diet to improve their condition. Becoming involved in the treatment strategies improves compliance with the treatment, assists positive outcomes and helps people to understand how to intervene on their own behalf when or if the condition arises again.

Most clients have an opinion on the factors contributing to their illness and are usually relieved to be treated with the 'professional as the therapeutic partner' approach described by Marilyn Ferguson (see Table 1.2). Even though the condition may be more complex than can be dealt with using self-care strategies, many are willing to contribute to their eventual recovery. Some explanation and a range of options are usually all that most people ask for. Unfortunately, many practitioners do not seek an opinion from their clients or ask them how they can best be helped, thus missing a valuable opportunity to allow their clients to become involved in their health care.

## Referrals

Although complementary therapists are trained in various types of diagnosis according to their discipline, some diagnostic procedures or investigations are outside the sphere of complementary therapies. Three aspects of examination are not normally performed by natural therapists and referral to a doctor is needed. While this does not constitute complementary medicine, it is desirable that it occur harmoniously:

- Routine screening procedures such as breast examination and Pap smears. Breast and cervical screening programs are offered as free services for Australian women. Cervical screening for dysplasia or cervical cancer will also detect sexually transmitted diseases (except chlamydia) as well as vaginal infections.
- Gynaecological examinations which are performed vaginally and involve internal palpation of the pelvic organs.
- Pathology tests such as blood tests, swabs or urine tests; and radiological examinations such as ultrasounds and X-rays.



## SELF CARE

Self care is an important aspect of health maintenance and the detection of illness. Advice on self care is an integral part of a complementary therapy consultation. Many factors that influence health and disease are under the control of the individual. Therefore an important role of the complementary therapist is to provide information and education about aspects of self care relevant to the condition being treated.

Although this book has a self-care focus it is intended that it be used in combination with consulting a trained practitioner. Each of the conditions has a section which deals with what can be done at home. For some conditions there may be very little, but for others, like endometriosis, the deciding factor between a successful and prolonged reduction in symptoms will often depend upon the self-care aspect of the treatment.

The 'self help' movement started in earnest in the 1970s and was a move to encourage women to take responsibility for their health and to encourage them to become more involved in the decision-making about treatments proposed by their doctors.

Self care is about an individual learning about her own body and learning to recognise early signs that something is changing that may need attention. For example, breast self-examination should be performed after every period—most breast lumps are found by women noticing breast changes. Breast self-examination (BSE) pamphlets are available from most GPs' surgeries and should also be available at natural therapists' clinics. 'The well woman's check list', which describes these procedures, is included in Chapter 3.

## NATURAL MEDICINE IN AUSTRALIA AND THE WESTERN WORLD

The wide range of available health-care practices is a feature of our pluralistic society and currently the practice of complementary medicine is flourishing. It has been estimated that over 50 per cent of the Australian population use some form of complementary therapy and that public spending on alternative medicines far exceeds the patient contribution for all pharmaceutical medicines.<sup>18</sup>

Natural medicine is a generic term that denotes the use of any of the therapeutic disciplines that do not use drugs or invasive techniques. In Australia, the common disciplines are: naturopathy, herbal medicine,

homoeopathy, acupuncture and Traditional Chinese Medicine (TCM), aromatherapy, all of the massage therapies, osteopathy and chiropractic.

The contemporary natural therapist evaluates a broad range of information before making a diagnosis. Traditional theories emphasise the maintenance of *health*; the diagnosis of patterns of disharmony; the understanding of the 'constitutional type'; correct living and a healthy internal environment. Science and modern medicine emphasise an understanding of *disease* and its processes; how to diagnose diseases and then to prescribe specific remedies for its eradication.

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The fundamental principle guiding the philosophy of the natural therapist is the belief in the body's innate capacity to heal and repair itself, given the correct environment (nutritionally, physically and emotionally). The type of treatments suggested will depend on the discipline used by the practitioner as well as their philosophy. Not every practitioner will adopt a holistic approach, nor will they always involve their clients in the decisions about treatments. However, while the actual delivery of the treatment will vary, the belief that restoring the patient to normal health is more important than the treatment of any particular disease will (or should) remain constant.

Practitioners who use natural therapies may specialise in one area, for example, they may be a homoeopath or herbalist; or they may train in a variety of disciplines. A practitioner who uses the multi-disciplinary approach has usually trained as a naturopath. Naturopathy is not made up of a specified group of disciplines and each of the colleges may train their students differently. As such, it is necessary to ask practitioners who call themselves natural therapists or naturopaths which disciplines they use before making an appointment.

The quality of training is extremely varied and at present there are no regulations in Australia governing the practice of natural therapies. (A butcher could prescribe herbs and be within the law!) Currently the issues of regulation and educational standards are under review by a variety of state and Commonwealth government initiated processes. Many practitioners are not happy with the lack of regulation and belong to professional associations as a way of indicating their standard of education and to demonstrate their commitment to improving the status of their profession. A list of the larger associations is provided on page 19.

Table 1.3 gives a brief description of the most common disciplines practised in Australia.

**Table 1.3 The most common natural medicine disciplines practised in Australia and New Zealand**

<b>Discipline</b>	<b>Definition</b>
<i>Naturopathy</i>	The use of any or all of the techniques listed below, usually within a holistic framework
<i>Herbal medicine</i>	The prescription of herbs for the treatment of complaints Prescriptions are usually based on the philosophical doctrine of medical herbalism rather than being used as a substitute for drugs
<i>Homoeopathy</i>	Based on the law of the minimum dose and 'like cures like', homoeopathy is the treatment of disease by minute doses of remedies that in healthy persons would produce symptoms like those of the disease
<i>Acupuncture</i>	The insertion of specialised acupuncture needles to regulate and stimulate the body's energy flow or <i>qi</i>
<i>Traditional Chinese Medicine (TCM)</i>	The use of acupuncture and herbs, and the manipulation of the flow of <i>qi</i> with massage and specific exercises
<i>Aromatherapy</i>	The use of 'essential oils' as therapeutic agents either orally, in an oil burner or applied to the skin
<i>Massage</i>	Massages may be relaxing or 'therapeutic' A therapeutic massage involves deep tissue massage for the relief of injury, muscular spasm and tension A relaxation massage is usually more gentle and is designed to relieve stress
<i>Shiatsu</i>	Pressure-point massage working along specific channels to stimulate energy or <i>qi</i>
<i>Chiropractic and osteopathy</i>	The mobilisation and manipulation of the skeletal structures along with the strengthening and stretching of the muscular components of the body
<i>Mind-body</i>	Techniques such as meditation which emphasises awareness of the connection between mind and body

## Section B

The way things are

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# 2

## Anatomy

### Key words

corpus albicans  
corpus luteum  
endometriosis  
endometrium  
fimbria  
follicle  
follicular atresia  
follicular phase

fornix  
genitalia  
luteal phase  
myometrium  
perineum  
peritoneum  
primary follicle  
secretory phase

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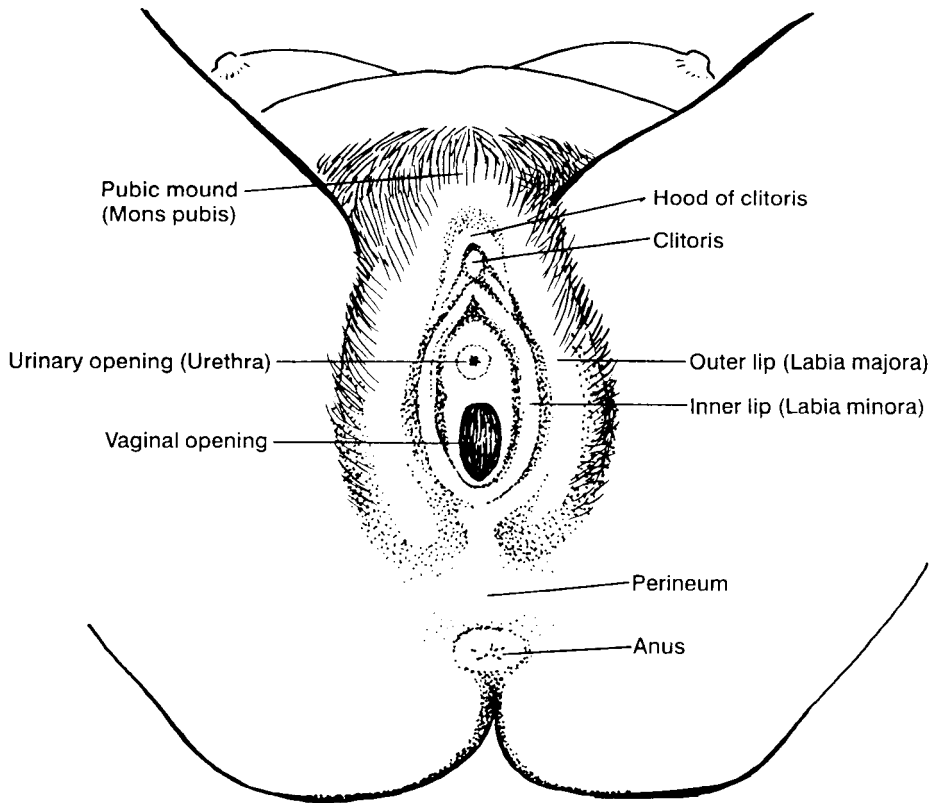
## THE EXTERNAL ORGANS

### The vulva and Bartholin's glands

The vulva is the term for a woman's external genitalia. It is the collective term for the labia minora and majora, the vaginal and urethral openings, the clitoris and the Bartholin's glands. The boundaries of the vulva are the mons pubis (the pubic mound) at the front of the body, and the perineum at the back.

The labia majora are the large fleshy skin folds that encompass the inner structures of the vulva. Pubic hair grows on the external surfaces, and the inner surfaces are lined with mucous membranes which also cover the smaller, inner labia called the labia minora. The mucous membranes are well supplied with small mucous-producing glands which lubricate the area during sexual activity.

The labia minora are joined together at the front to form the covering for the clitoris. This covering is sometimes called the clitoral hood or the prepuce. Within the folds of the labia minora are the



**Figure 2.1 The anatomy of the female genitalia**

urethral and vaginal openings. Also within the labia minora and quite near to the vaginal opening are the Bartholin's glands. These glands also secrete mucus to lubricate the vagina during sexual arousal.

## **THE INTERNAL ORGANS**

### **The uterus**

The uterus is a muscular organ, and uterine muscle—myometrium—is one of the strongest muscles in the body. This organ can stretch to accommodate a developing foetus and rhythmically contracts during childbirth. The strength of the muscular contraction also affects the volume of the menstrual and post-delivery blood loss and has an impact on the severity of period pain.

Normally the uterus is about the size and shape of a slightly flattened pear. Fibroids, polyps, a current pregnancy or repeated pregnancies can all cause an increase in uterine size or shape. These changes might



be discovered during a pelvic examination and will usually require follow-up investigations if this is the first time the change has been discovered. A uterus which is larger than usual is sometimes referred to as a 'bulky' uterus.

The lining of the uterus, the endometrium, is shed as menstrual fluid. It develops due to the influence of the ovarian hormones oestrogen and progesterone. Just after menstruation, during the first part of the cycle, the endometrium is at its thinnest and oestrogen causes the lining to change and develop. If ovulation occurs, progesterone is produced in increasing amounts and the endometrium not only thickens, it changes in structure to become 'glandular'. Regular shedding of the endometrium is an indication of hormonal change, but not necessarily of ovulation as menstruation can occur without prior ovulation.

## **Fallopian tubes**

The Fallopian tubes, otherwise known as the oviducts or egg ducts, are muscular and are lined with microscopic hairs called cilia. Rhythmic contractions along the Fallopian tubes convey the ovum into the uterus. These contractions also partially prevent the 'backflow' of menstrual blood; however, some blood normally flows back along the tubes and into the pelvic cavity during each period. This is called 'retrograde menstruation', and was once believed to be abnormal and the cause of endometriosis. The contractions of the Fallopian tubes are also thought to have a role to play in keeping any infected matter from reaching the pelvic cavity where it could cause peritonitis.

The cilia line the entire length of each Fallopian tube. Like the cilia in the lung, their continual wave-like motion propels any matter in one direction; in this case towards the uterus. Their main function is to assist the ovum to move along the length of the tube and their activity is enhanced by the presence of oestrogen which stimulates increased activity of the tiny hair-like projections. They, like the muscular activity of the tubes, may also be involved in protection against pelvic infection.

On average, the tubes are about 10 cm long and end in small finger-like projections called fimbriae. They are delicate structures, usually in motion, sweeping the ovum into the end of the Fallopian tube. They can create tiny waves and currents in the fluid around the ovary, and the egg is drawn into the end of the tube where the muscular action and the cilia take over. Damage to the fimbriae from infection, surgery, endometriosis or adhesions can dramatically affect the normal functioning of these structures and can cause infertility. Amazingly, it has been shown that the activity of the fimbriae is so pronounced that they can cause the ovum from one ovary to be drawn towards the opposite tube where fertilisation and normal tubal transport can occur.

The tubes are funnel-shaped structures which widen at the ovarian end where they partially encircle the ovary, and narrow at the uterine end where they are only about the width of a fine needle. Fortunately, infection and adhesions are more likely to effect the wider end of the tube, but even so, any alteration of the internal diameter of the tube is likely to affect fertility or increase the chances of an ectopic pregnancy.

## **The ovaries**

There are two ovaries, each oval in shape and about the size of a small, slightly flattened hen's egg. Enlarged ovaries can develop due to conditions such as endometriosis, where the endometrium can implant in the ovarian tissue and form endometrial or 'chocolate' cysts; polycystic ovaries, where there are too many cystic follicles growing in the ovaries; other types of ovarian cysts or ovarian cancer. An internal pelvic examination and an ultrasound can be used to determine whether any increase in ovarian size needs further examination or surgery.

The ovary is not attached to the end of the Fallopian tube, but to the uterus, by the ovarian ligament. This fibromuscular cord attaches the ovary to the uterus just below the entrance of the Fallopian tube. The suspensory ligament of the ovary also attaches the ovary to the side wall of the pelvis and contains the ovarian blood vessels, lymphatic vessels and nerves.

The ovaries and the entire pelvic cavity are covered by a membrane called the peritoneum which can be imagined as two layers of plastic (like cling wrap) lying over the posterior and anterior surfaces of the pelvic cavity with the organs, blood vessels and ligaments in between. In states of ill-health such as infection and bleeding into the pelvic cavity, the peritoneum will become inflamed and/or irritated and will cause the pain characteristic of these conditions.

## **The cervix**

The lower third of the uterus is the tubular cervix, about half of which protrudes down into the vagina; the other half of the cervix is above the vaginal attachment. The cervix is sometimes called 'the neck of the womb' and is important because it is prone to cancerous change. The cervix can also become infected or inflamed and can sometimes bleed. All of these problems can be detected with a speculum examination, a swab to detect bacteria or a Pap smear. This procedure is explained on pages 47–8 in the 'Well woman's check list'.

The cervical opening is normally tightly closed except during childbirth, and allows for the outward passage of the menstrual fluid and the entry of sperm. Women who have not yet given birth have a cervical

opening that is round, but after a vaginal delivery the cervix has a flattened opening.

## **The vagina**

The vagina is situated between the rectum (the opening from the bowel) and the urethra (the opening from the bladder). It is the structure via which the uterine secretions shed during menstruation are conveyed to the outside. Vaginal tissue, being primarily muscular, can also stretch to many times its normal size during the birth of a baby and then return to normal.

The upper portion of the vagina surrounds the cervix, somewhat like an umbrella, and the recesses that are created between the vaginal wall and the cervix are called the fornices. A fornix (plural fornices) is an arch-like space or recess formed between two structures. The fornices are important because they are relatively thin-walled and allow the internal abdominal organs to be felt during a physical examination (sometimes called internal palpation). The posterior fornix, which is formed by the back wall of the vagina and the cervix, is longer than the other fornices and is called the pouch of Douglas. See Figures 2.2 and 2.3.

The pouch of Douglas is lined with peritoneum. This is a common place for endometrial tissue to grow when a woman has endometriosis. Infected fluid or pus can also collect in the pouch of Douglas if a woman has a pelvic infection.

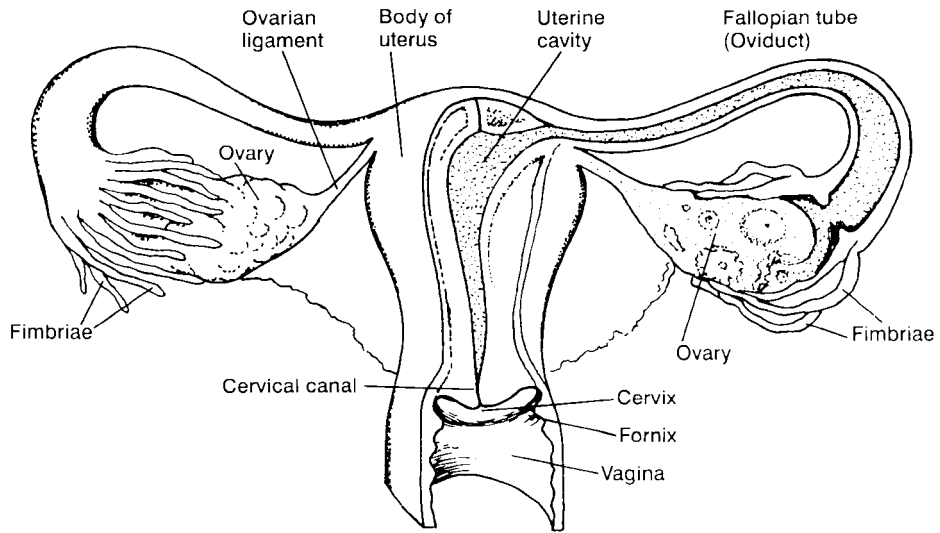
## **THE MICROSCOPIC STRUCTURE OF THE OVARY AND ENDOMETRIUM**

### **Ovary**

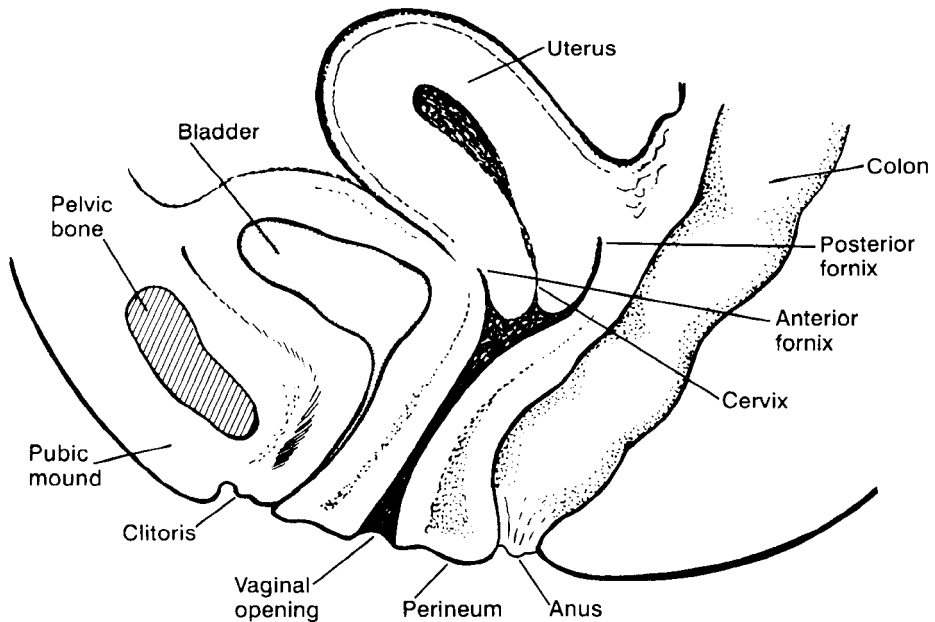
#### **Structure**

The microscopic structures of the ovary are constantly changing. At any time during the menstrual cycle, ova in different stages of development, maturation or disintegration are present. See Figure 2.4.

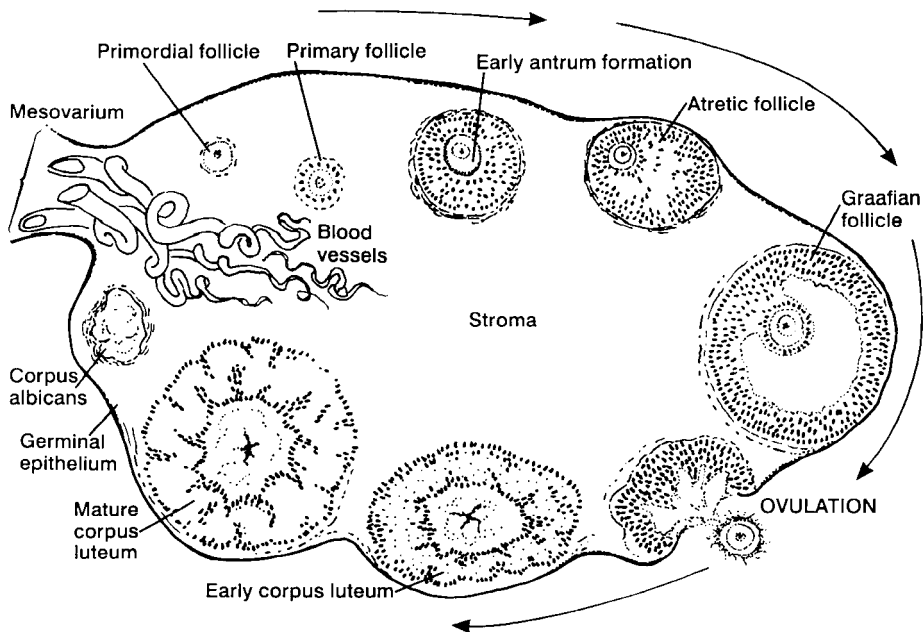
The actual time when a given follicle starts to mature is not known. Some believe that a follicle starts to develop several cycles before the cycle in which it ovulates; others, that maturation starts when obvious changes occur in the late luteal phase of the preceding cycle. A number of the primordial follicles (eggs-in-waiting) start to develop together, but between day eight and twelve in the follicular phase, one has become the primary follicle. The others degenerate and are reabsorbed before



**Figure 2.2 Internal reproductive organs**



**Figure 2.3 Cross-section of the internal reproductive organs**



**Figure 2.4 Ovarian follicle maturation**

reaching maturity (follicular atresia). The primary follicle produces the ovum, which is expelled into the pelvic cavity at ovulation on about day thirteen or fourteen of the menstrual cycle.

The primary follicle containing the ovum grows rapidly and can be seen at ultrasound as a blister-like protrusion on the surface of the ovary. This maturing follicle is also known as a Graafian follicle. The ovum is released gently along with the follicular fluid and does not burst from the enlarged follicle, as was once believed. It is now thought that enzymes ‘digest’ the follicle wall and assist with the rupture of the membrane around the ovum.

The structure left behind, the corpus luteum, is the ‘yellow body’ which secretes the hormones oestrogen and progesterone into the bloodstream. It is by far the largest structure within the ovarian tissue and can be seen on an ultrasound scan. After about fourteen days, the corpus luteum dies and about one day later the period starts. The old corpus luteum becomes scar tissue known as the corpus albicans. Healthy ovaries contain many of these ‘scars’ indicating that ovulation has occurred normally.

Provided ovulation takes place, this same sequence of events recurs every month. As a woman ages and menopause approaches, the follicles are less responsive to the hormonal stimulation. The ovary has fewer primordial follicles left, and eventually no more of them will ripen to produce an ovum.

# Endometrium

## Structure

All the changes in the menstrual cycle are designed to prepare the uterine lining—the endometrium—in case it's needed to sustain a fertilised ovum.

The endometrium is made up of two layers of tissue which merge into one another and appear as one. They are the basal layer—underneath and unchanging; and the functional layer—upper and replenishing.

The basal layer always covers the uterine muscle; it is the underfelt to the carpeting of the functional layer. This basal layer changes very little during a cycle and is not shed during menstruation.

The functional layer changes with hormonal activity during the cycle, and is shed as menstrual blood. Microscopic spiral arteries that supply this layer are shed and rebuilt with every menstrual cycle.

This rebuilding and shedding of the functional layer is caused by the action of the hormones oestrogen and progesterone in three phases—the proliferative, the secretory and the menstrual.

## The proliferative phase

The proliferative phase in the endometrial cycle corresponds exactly to the follicular phase of the ovarian cycle and the production of oestrogen—so when the ovum is maturing, so is the uterine lining. The length of this phase is variable. It starts immediately menstruation has stopped, between about days three and six of the cycle, and is completed when ovulation occurs.

Proliferation of cells is one of the major effects of oestrogen, and this is nowhere more evident than on the endometrial cells which line the uterus. Most of the functional layer of the endometrium is shed during menstruation. The basal layer is then resurfaced by the rapidly growing endometrial cells. Within two days of the end of menstruation, or by about day eight of a cycle, the endometrium has completely resurfaced the uterine wall. During the remaining four days or so before ovulation, the endometrium thickens from about 1 mm at the end of the period to about 6 mm by ovulation.

Endometrial thickening occurs because of a combination of events. Supportive tissue (stroma) in the functional layer becomes thickened and spongy. Glands develop within the stroma, ready to secrete mucus and glycogen which would assist with the growth of any fertilised ovum. See Figure 2.5. Blood vessels start to develop within the endometrium to provide nutrients to the developing tissues—towards the end of the proliferative phase, these small arteries start to show early signs of spiral formation.

## The secretory phase

The secretory phase of the endometrium and the luteal (post-ovulatory) phase of the ovary occur simultaneously. Once ovulation has occurred, the corpus luteum starts to produce large amounts of progesterone. Oestrogen continues to be produced. See Figure 2.5.

Progesterone and oestrogen act together on the already oestrogen-primed endometrium, causing it to become a secretory tissue. The glandular structures enlarge and become more convoluted. They also start to produce and secrete larger amounts of glycogen.

The arteries also develop rapidly during this phase. They become much more tortuous than they were in the proliferative phase and take on the typical spiral shape indicative of progesterone activity. Veins also increase in size and tend to form large venous 'lakes' amongst the endometrial tissue.

The supportive stromal tissue becomes even more spongy and the endometrium thickens further. If fertilisation occurs, the fertilised ovum arrives in the uterus to find the cavity filled with thick glycogen-rich tissue where it can embed and develop. If fertilisation does not occur, the endometrium, which has by now reached a thickness of about 8 mm, will be shed during menstruation.

## The menstrual phase

After about fourteen days of producing oestrogen and progesterone the corpus luteum degenerates and the production of these hormones falls. The endometrium becomes fragile and starts to break down.

A number of factors occur together to initiate the shedding of the endometrium. One of the first is thought to be the loss of the sponginess within the stromal tissue which causes the endometrium to collapse on itself and cut off its own blood supply. Prostaglandins also play a role in the initiation of menstruation. Levels increase during the secretory phase and this stimulates the uterine contractions to become stronger and more frequent. (Very weak uterine contractions occur throughout the whole cycle.) The spiral arterioles are also affected by prostaglandins and tend to constrict and further deprive the endometrium of its blood supply.

The combination of these factors causes the tissue to degenerate and the functional layer comes away from the basal layer of the endometrium. Uterine contractions assist with the expulsion of the spent endometrial lining through the cervical opening and menstruation begins.

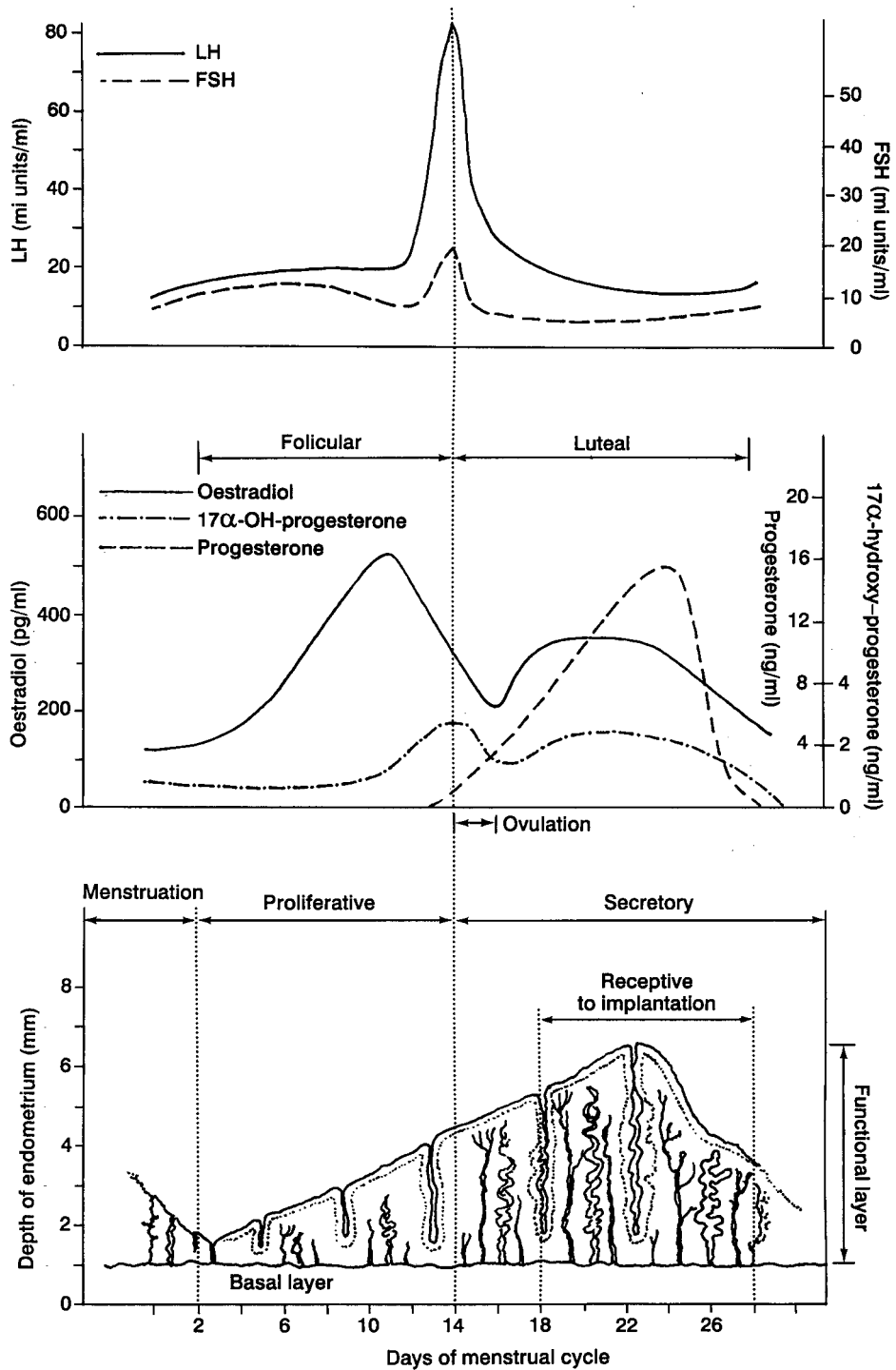


Figure 2.5 The endometrial cycle in relation to plasma levels of ovarian steroid hormones



# 3

## Menstruation and the menstrual cycle

### Key words

adhesions	GnRH
amenorrhoea	(gonadotrophin-releasing hormone)
corpus luteum	LH (luteinising hormone)
embryo	nervine
emmenagogue	prostaglandins
endometrium	ovum
fertilised ovum	spasmolytic
foetus	
FSH (follicle-stimulating hormone)	

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### ATTITUDES TO MENSTRUATION

There are many myths, taboos, mistakes and just plain silly nonsense about periods to be found written, thought or passed on from woman to woman. In the past, ideas about menstruating women and the power of menstrual blood were so extreme that they now seem amusing and quaint. These attitudes have changed for the better, we believe. But have they changed enough?

Around the second century AD, Pliny made his enduring contribution to the understanding of menstruation and its effects. Amongst other powers, he believed a menstruating woman could sour wine, make vines wither, cause fruit to drop from trees, kill bees, blunt knives, discolour mirrors and make dogs rabid. He was by no means the first. Around the fourth century BC, Democritus wrote that ‘a girl in her first menstruation should be led three times around the garden beds so that any caterpillars there would instantly fall and die . . .’<sup>1</sup>

The prevailing belief was that menstrual blood was extremely poisonous and toxic, not only to the menstruating woman but also to anyone else in the vicinity. It was even thought to be the origin of period pain, because its toxicity caused pain by harming the tissues it touched. Having sex with a menstruating woman was also forbidden on pain of death, either by contact with the blood itself, or by Church decree. At any rate, a child born from such an act would be deformed, leprous, have red hair or be a girl!

For centuries the scholar wrote of the inherent weakness and toxicity of women, especially menstruating women. Irrefutable evidence of woman's weakness could be found simply by comparing the male and female anatomy: the male was the standard of normalcy, the female his inferior 'other half'. This could be seen in the anatomy of the male and female genitals—the male perfect and complete with genitals turned outward; the female imperfect, incomplete and with genitals turned inward.

The origin of menstrual blood was comfortably accommodated within the philosophies of the humoral theory which described bodily excretions as the means by which an individual retained a state of homeostasis. Hippocrates (first century BC), and all of the physicians after him, thought of women as Colder and Moister than men. Women, therefore, did not sweat or grow hair on their face or body (both signs of greater body heat—animals grew horns instead) and had to menstruate to rid their bodies of 'unprofitable blood'. This was supposedly substantiated by the observation that women labourers (who sweated) and 'coarse' women (who grew hair and probably had polycystic ovarian syndrome) had lighter periods or did not menstruate at all.

Later, another somewhat contradictory theory was put forward by Galen, in the second century AD. He suggested that women, being weaker than men, could not use all of the blood that they concocted from food, and menstruated regularly to rid themselves of the 'plethora' (excess of blood). He observed that women who ate rich and moist food bled more than women who ate coarse and difficult-to-digest foods. Hunger, he noticed, also affected menstruation, and women who were starving didn't menstruate at all.

Believing as they did that menstruation was necessary to purify the blood, *not* menstruating was viewed with grave concern—a condition requiring prompt action. The popular medical texts of the Middle Ages were crammed with remedies for 'stopped menstruation'. There were believed to be a variety of causes: the blood might be too thick to flow easily, or the uterine muscle too 'tough' to let the blood pass. The unknown author of the *Medieval Woman's Guide to Health* listed diet, stress and overwork amongst the causes of failing to menstruate: 'being awake too much, thinking too much, being too angry or too sad, or eating too little'.<sup>2</sup>

Stoppage of the menses was believed to have frightening consequences: the humoral imbalance created noxious vapours which rose to the head and caused melancholia, suicidal thoughts and insanity, or 'mother fits', a type of epilepsy (the mother was the word for the uterus). The cure was blood-letting, which must have been worse than useless when the cause was anaemia, as it often was. Still, menstruating or at least some form of purgation of the blood was considered necessary for a woman's health, and so blood-letting or leeches were used as treatments until the start of this century.

With all of the beliefs about amenorrhoea, imagine the difficulty when a woman became menopausal. Deprived of the necessary monthly loss, she was believed to become so poisonous that just by looking into the cradle she could damage the eyes of a baby. Menopausal women were often called witches and were thought to be capable of extraordinary feats.

Unusual theories about menstruation prevailed into the nineteenth century. An American medical professor at Harvard wrote in 1873 that although he believed women had the right to do anything they were physically capable of, they should not study. The reproductive system of the female, he said, was incapable of normal development while a woman was engaged in academic pursuits, because the female body was incapable of doing two things well at the same time. This argument was used to deny higher education to women who wanted it.<sup>3</sup>

Myths persist today. Some religions still isolate or ban women from places of worship during menstruation, and chefs have been known to prevent women from entering their kitchen in case they were menstruating and curdled a sauce or a soufflé by their very presence. In the 1970s and 1980s, a number of books on natural therapies advocated the long-term use of the 'pure' fruit and vegetable only diet. One of the benefits of this diet, the authors claimed, was that women who stayed on it long enough stopped menstruating—and menstruation, they would have us believe, was only necessary when a woman's body needed purification. As late as 1993, an American scientist put forward the (new) theory that menstruation was necessary to cleanse the body and remove sperm-borne pathogens.<sup>4</sup>

We modern women menstruate for about three years of our lifetime, about ten times more often than our forebears. Even so, we study and continue to menstruate, and on average our growth isn't stunted and we are quite sane.

It is important that our understanding of menstruation is not tangled up with some outdated notion of the inherent weakness and uncleanness of women. Most of us are quite happy to have a period once a month, despite the slight nuisance value, knowing that our monthly period is a normal biological event.

## THE 'NORMAL' PERIOD

### What is a period?

A period is the regular shedding of the endometrium—the lining of the uterus—which occurs every month for most women. Menstrual loss looks like blood, but is composed of other tissues and secretions from the inside of the uterus. It consists of small amounts of blood from the capillaries that feed the muscular wall of the uterus; mucus from the glandular cells found in the endometrium; small amounts of tissue from inside the uterus; and the remnants from the structures within the endometrium. These elements are all shed during menstruation.

Most textbooks and doctors talk about periods in relation to pregnancy: 'If pregnancy does not occur, menstruation will commence', with the implication that pregnancy is the normal and expected event and that menstruation is the abnormal event. This may be the case physiologically, but many women in our society don't think of menstruation as a missed opportunity to conceive, but rather as a relief because they know they're *not* pregnant.

As menstruation only occurs if a woman is not pregnant, some male authors refer to it as the 'weeping womb', suggesting the womb is shedding tears at the disappointment of a failed conception. Whilst there are numerous women who are trying to conceive, many a woman has shed a tear when her period has failed to arrive. Women are most often relieved when their periods arrive and maybe this is why another universal term is the 'woman's friend'.<sup>5</sup>

Some common names for the period include 'Fred'; 'on the rags' (women used rags before pads and tampons were available, and some still do); the 'curse'; 'that time of the month'; 'women's trouble'; or the 'monthlies'. Younger women seem less inclined to use these terms to describe their periods, perhaps because they have had a more liberal education and feel less embarrassed about menstruating.

## THE MENSTRUAL CYCLE

For all of her menstruating years, a woman produces variable levels of the sex hormones which establish the regular nature of the menstrual cycle. Under normal circumstances, these hormone levels do not fall below a certain level, known as the 'baseline', and it is the hormonal variations *above* that level which create the cyclic variability. The

endocrine glands responsible for hormone production and cycle regulation are the hypothalamus, the pituitary and the ovaries (sometimes known as the 'hypothalamic-pituitary-ovarian unit' or the 'hormonal axis'). See Figure 3.1.

The endocrine glands work together as an integrated unit, sending messages via hormones and utilising a mechanism called the 'feedback loop'. The hypothalamus produces gonadotrophin-releasing hormone (GnRH) which is recognised by the pituitary; the pituitary produces luteinising hormone (LH) and follicle-stimulating hormone (FSH) to signal the ovaries; and the ovaries secrete oestrogen and progesterone which are recognised by the hypothalamus. Fluctuations in the production of the hormones from each of the endocrine glands signals the next gland in the chain to vary its hormone production. This is the feedback loop in action.

The hypothalamus responds to both high and low levels of the ovarian hormones oestrogen and progesterone. When oestrogen drops during the period, the hypothalamus secretes GnRH. This signals the pituitary to release FSH, which is responsible for the initiation of follicular growth in the ovary.

This stage of the menstrual cycle is often called the follicular phase in recognition of the growth of the follicles. Between ten and twenty may begin to develop, but only one of these will become dominant and mature completely to become an ovum, or egg. The others degenerate (this process is called atresia) and by the time of ovulation the mature follicle is the only one to remain.

While the follicles are developing, they produce more and more oestrogen, which stimulates the endometrium to develop or proliferate. This is the origin of another term for the first half of the menstrual cycle: the 'proliferative phase'.

The vaginal secretions are also changing during this phase of the cycle. From being alkaline and very scant, the rising oestrogen levels induce the vaginal secretions to produce more glycogen (sugar). This is acted on by normal vaginal bacteria to produce lactic acid. Vaginal acidity reduces the incidence of infection. The high levels of oestrogen prior to ovulation also convert the mucus around the cervix to copious 'egg-white' secretions referred to as 'fertile mucus'.

Oestrogen levels continue to increase while the ovum develops in the most mature follicle. Eventually, the increasing levels trigger the secretion of GnRH from the hypothalamus which in turn signals a simultaneous surge of both LH and FSH, thought to trigger the release of the ovum. Ovulation occurs, FSH levels drop sharply and LH starts to decline slowly.

Ovulation is followed by the 'luteal phase'. This stage of the cycle takes its name from the corpus luteum, which is the remnant of the follicle where the ovum developed. Under the influence of LH, the

corpus luteum now starts to secrete increasing quantities of progesterone and, after an initial drop, fairly constant levels of oestrogen.

Progesterone further influences the endometrium which started to develop under the influence of oestrogen, causing it to develop glandular structures and blood vessels that are capable of nourishing a developing embryo. An alternative name for this stage of the cycle is the 'secretory phase', in reference to the secretory structures which develop in the endometrium.

LH is in part responsible for maintaining the normal function of the corpus luteum, but increasing progesterone levels lead to a steadily declining production of LH. If fertilisation does not occur, the corpus luteum regresses after about fourteen days, probably due to the activity of prostaglandins. This leads to a decline in the levels of the hormones secreted by the corpus luteum and the eventual shedding of the endometrium, which is at all times dependent on the levels of hormones for its development, health and maintenance. When the level of oestrogen reaches a low enough point, the hypothalamus releases GnRH and the cycle starts again.

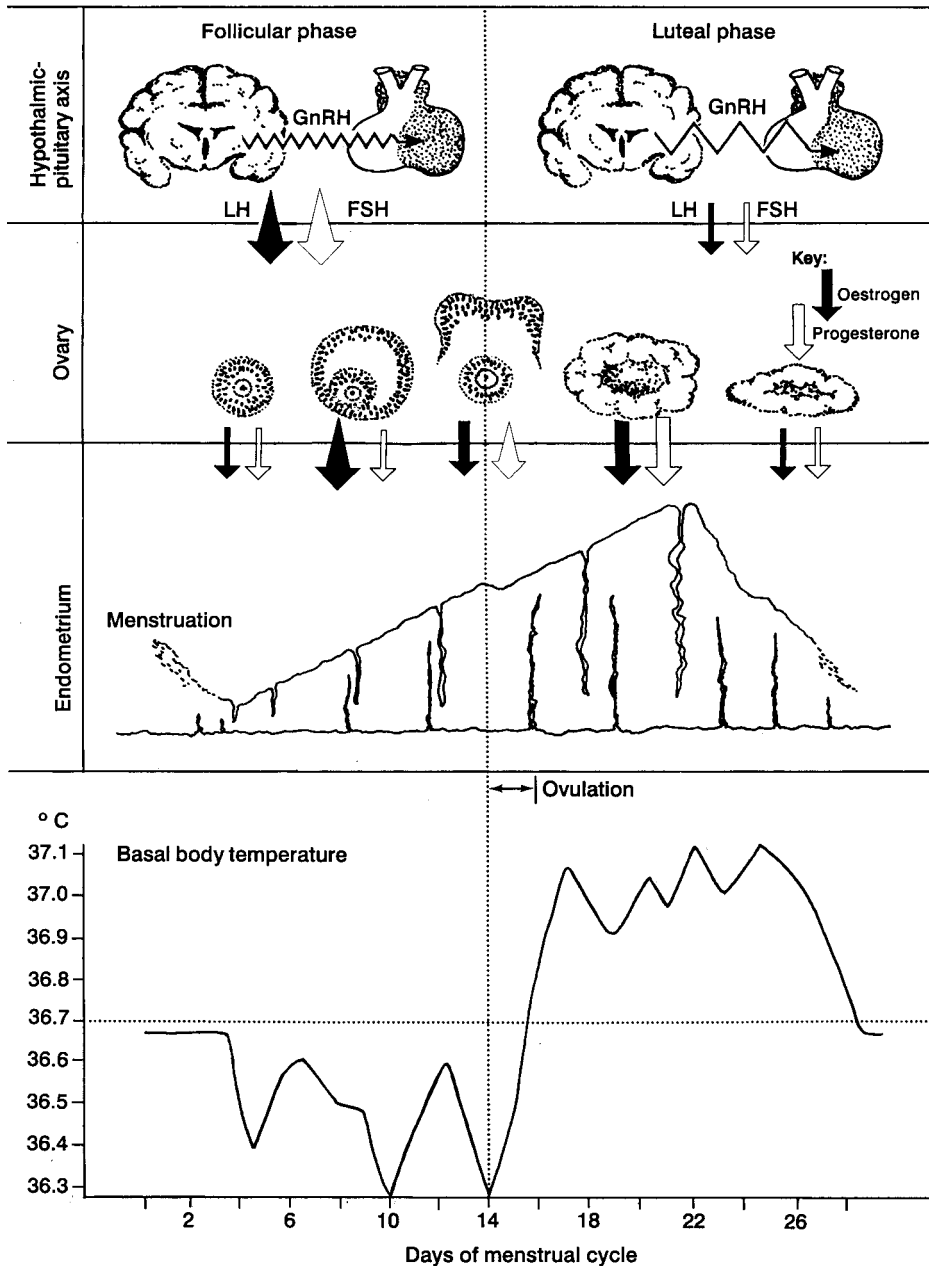
## Counting the days

The first day of the menstrual cycle is always the first day of the properly established period. (Premenstrual spotting is not counted and is considered to be part of the previous cycle.) The days between the first day of the period and ovulation are called the 'follicular phase'. This phase is usually described as being fourteen days long (but varies from woman to woman). When ovulation occurs, the luteal phase begins.

The luteal phase is usually also about fourteen days long and is all of the days between ovulation and the proper beginning of the next period. It seems likely that a healthy corpus luteum is responsible for the accepted normal length of the luteal phase. Corpus luteum is Latin for the 'yellow body', which is the hormone-producing structure left on the surface of the ovary after the ovum has been expelled. Figure 3.1 shows these phases.

## THE RANGE OF 'NORMAL'

'Normal' is a strange term to use for the menstrual cycle and periods, because the range is so wide and there are so many exceptions that fit the description of a 'normal period'. The 'textbook period', so named because it appears in every textbook as the description of a menstrual cycle, is 28 days long with a period lasting three to five days. The inherent assumption is that the luteal phase (the time between ovulation



**Note:** Pulsatile release of GnRH stimulates an increase in LH and FSH by the pituitary in late follicular phase and is followed by a pre-ovulatory surge. Both LH and FSH are low in luteal phase, as shown by arrows in diagram. Oestrogen starts to rise in follicular phase, progesterone in the early luteal phase and both continue to affect the endometrium until menstruation. The temperature reflects the activity of progesterone.

**Figure 3.1** The menstrual cycle

and menstruation) will be fourteen days long, and that the follicular phase (the time when the follicle is maturing between the beginning of the period and ovulation) will also be fourteen days long. Many women do not have this menstrual pattern and it is far more accurate to describe the menstrual cycle in terms of a range of possible times for each event.

The important factors are the regularity of the cycle, the length of the cycle, the length of the period, the amount of pain, and the colour and consistency of the menstrual loss.

## **The regularity of the cycle**

A regular cycle depends on the time of ovulation in a cycle, and on hormone levels. Both of these factors are inter-dependent because failure to ovulate will affect the levels of the hormones oestrogen and progesterone (particularly progesterone in the second half of the cycle) and hormonal imbalance may inhibit the sequence of events which normally initiates ovulation.

The most variable part of the cycle is usually the follicular phase, the time during which the ovum matures in the follicle prior to ovulation. Women at either the beginning or the end of their menstruating life may ovulate erratically. Younger women may not have established regular 'communication' between the hormonal systems in the ovaries and the brain, and so the stimulus to ovulate may take longer than for women with an established cycle. At this age it is also easier for stress or change to interfere with the hormonal interplay and interrupt the regularity of the cycle.

Women who are approaching menopause might experience an irregular cycle because of the diminishing numbers of ovum and the increasing difficulty for the pituitary hormones to stimulate ovulation. Stress is also likely to alter the regularity of the cycle more easily in the years leading up to menopause.

Some women may have a longer or shorter luteal phase than those described in the textbooks. The luteal phase is dependent on a normally formed and functioning corpus luteum which usually survives and produces hormones for twelve to fourteen days before it disintegrates, causing hormone production to stop and menstruation to begin.

## **Missing a period**

Pregnancy is the most usual cause of a missed period if a woman has had unprotected sex. Pregnancy tests are available from chemists, supermarkets or doctors, and will give an accurate result within days of conception. Blood tests can be accurate as early as ten days after fertilisation of the ovum has occurred, but waiting until fourteen days



is usually recommended to be absolutely sure of not getting a false negative test.

Many women who miss a period (and who are not pregnant) fear that they may have some sort of illness, but a missed period is often a hormonal or ovulatory ‘hiccough’ caused by stress. The hormonal axis is very delicate and can be easily interfered with by either pleasant or unpleasant experiences. The same physiological response occurs in times of increased exercise, physical hardship or extremes of emotion, and so trips overseas, weddings, relationship break-ups, shock, grief, falling in love, hard work and illness are all commonly associated with missed periods.

A missed period due to stress is rarely a serious problem and the cycle will usually re-establish a normal pattern once the episode is over (unless the woman becomes so worried about the changes in her cycle that she aggravates the hormone balance by being even more stressed!).

Many women will completely stop menstruating when travelling and for some time after their return home. This can be because of a ‘pleasurable’ stress, but the rapid weight loss due to illness, poor diet or irregular patterns of sleep and activity common amongst travellers may be the real culprits. Women who intend to travel for many months or years may need to be cautious about their lifestyle and dietary patterns so that they maintain a regular pattern and avoid the problems associated with lack of periods, including loss of bone density.

Some women who have irregular periods wrongly assume that they can’t get pregnant, but missing a period or even a series of periods does not necessarily imply infertility. Ovulation can occur spontaneously at any time and a woman can become pregnant if she has not used contraception. The difficulty here, of course, is that the woman who has not had a period for months will not be expecting one, and if she becomes pregnant may not realise for some time. She may discover that she is pregnant when it is too late to safely have an abortion; or she may have behaved in ways that are harmful to a developing embryo. Women who intend to have sexual intercourse but don’t want to get pregnant need to consult a family planning clinic or local doctor about options for contraception.

Missing a period for more than six months is called amenorrhoea and the reasons are dealt with in Chapter 13.

## **The length of the cycle**

The usual range for a menstrual cycle is between 21 and 35 days. This *usual* range is only a guide; some women will have cycles that are regularly longer or shorter than this pattern.

Doctors will often be uninterested in cycle lengths that fall outside the 21–35 day range when women have no evidence of serious disease.

Herbalists, however, may view this as a sign that the body is not functioning as well as it might and will look for more subtle signs of ill health. These might include evidence of stress, poor nutrition, abnormal body weight to height ratio, or poor 'Liver' function (see pages 324–6). If none are evident and the woman is full of vigour with no clinical signs of ill-health, but with a regularly long or short cycle, she is demonstrating her own normal pattern.

There may be health implications from abnormally short or long cycles. Very short cycles can be associated with erratic ovulation and may be an indication of mid-cycle bleeding, which is not really a period at all. Very long cycles can be a problem when women are trying to conceive. Some women will have regularly irregular cycles. This is usually a sign of erratic ovulatory patterns, which, although not 'normal', really doesn't constitute a serious medical problem.

Very short or very long cycles which are accompanied by signs of ill-health indicate a need to consult a health-care practitioner; and so do any deviations from the expected pattern of the woman's own cycle.

## **The duration of a period**

Between three and five days is the accepted duration of a normal period. Periods that last for fewer days may be related to a number of systemic conditions including thyroid disorders, anaemia and low body weight. These and other reasons for light periods will be discussed in later chapters.

Longer periods may be an indication of hormonal imbalance, in particular a failure to ovulate, as progesterone normally helps to stop excess bleeding because of its effect on the uterine lining. Very long periods can also be a sign of systemic disorders and some gynaecological conditions and are discussed under 'Erratic bleeding' (Chapter 12). The length of a period does not include those days when pre- or post-menstrual spotting occurs. Spotting near the time of a period can be an indication of gynaecological problems and may need to be investigated; and any spotting between periods should always be reported.

## **The volume of the flow**

A normal menstrual loss is said to be 50 ml and a heavy period is anything over 80 ml but, because no one measures their menstrual loss and neither do their practitioners, these are mostly meaningless figures. It is far easier to talk in terms of a *need* to change sanitary protection. The word 'need' is important here: the need and not the desire to change is most indicative of the amount of menstrual loss.

Many practitioners are sceptical about the accuracy of a woman's

The weighting given to various degrees of soiling of sanitary pads and tampons to evaluate the arbitrary scoring system used in the pictorial blood loss assessment chart.  
 1 X 10c clot = 2, 1 X 20c clot = 3, 1 X 50c clot = 5; flooding episodes not scored.

	— 1		— 1
	— 5		— 5
	— 20		— 10

Name: Jane Day Start: 1/6/97

PADS	1	2	3	4	5	6	7	8
	//					//		
	//	///	///	//				
	///	//						
Clots/flooding		$\frac{10c}{50c} \times 2$	$\frac{10c}{50c} \times 4$					

TAMPONS	1	2	3	4	5	6	7	8
		//	///	//	//			
		///	//					
Clots/flooding								
Daily total	88	135	59	21	17	7	1	
Total Score: 328								

A pictorial blood loss assessment chart (PBAC) completed by a patient who had menorrhagia and objective measured menstrual blood loss of 287 mL. Her calculated score was 328 mL.

Figure 3.2 Pictorial blood loss assessment chart (PBAC)

self-assessed menstrual loss. A number of large studies show that women who reported excess menstrual loss actually had a huge difference in blood volume when this was measured. Some women who were losing around 10 ml thought that they were bleeding heavily, while other women who had losses in the order of 300 ml thought their periods

were normal. An accurate self-assessment technique is to record the number of used pads using a ‘pictorial blood loss assessment chart’. See Figure 3.2.

## **Pain during the period**

It may be usual for women to experience pain during their periods, but it is certainly not desirable and often not normal. Beware of the comment ‘it’s normal and you’ll just have to put up with it’, or ‘it’s part of being a woman’. No amount of pain is truly normal as the pain response is a survival mechanism indicating that something has gone wrong.

Period pain usually occurs in a cycle only when ovulation has occurred, and period pain often only starts in earnest about two years after the period has begun—that is, after ovulation has become regular. This is why an occasional period can be uncharacteristically pain-free—ovulation failed to occur in that cycle.

Symptoms of pelvic discomfort, heaviness or mild pain during a period are often greatly improved by eating well and exercising regularly, and by stress reduction. Stronger, crampy pain can also be helped by lifestyle changes and, although it seems more serious, this type of pain is not necessarily associated with a gynaecological disease but may be related to abnormal cramping of the uterine muscle caused by a prostaglandins imbalance. This is called primary dysmenorrhoea and is discussed in Chapter 14.

An investigation should be made of any strong pain prior to bleeding, pain which is situated on one side of the body and pain not directly associated with the period. But *any* pain which is worrying or interfering with day-to-day activity warrants investigation and treatment. It’s not a case of ‘grin and bear it’.

### **Heavy loss without pain**

The most usual reason for a painless period with heavy loss (when pain has been a normal feature of a period), is failure to ovulate. This type of bleeding can happen at any time, but is common around menopause. Natural therapists view the associated heavy loss as an indication of a lack of uterine tone and give herbs to strengthen the uterine muscle and the mucus membranes.

### **Heavy loss with pain**

In the past, the menstrual loss was considered to be so toxic that it could cause pain simply by coming in contact with the body parts. The suggested treatments were often diets to cleanse the system, reduce the toxicity of the blood, and thereby control the pain. In many cases

these recommendations would have been successful because altering the diet can change the prostaglandins levels which are responsible for pain.

We know today that both heavy loss and pain can be caused by prostaglandins imbalance and/or over-stimulation of the uterine lining from oestrogens. Herbalists treat these symptoms by regulating the hormones, treating the 'Liver' to improve excretion of oestrogen and modifying the diet to alter the prostaglandins ratio.

#### Very slight loss with strong crampy pain

These symptoms are associated with uterine muscle spasm and prostaglandins imbalance. To a natural therapist, these symptoms indicate the need for medicines to relax and calm the uterine muscle in particular, but may also indicate an overall need for calming and soothing remedies around the time of the period. Spasmolytics and nervines are prescribed for these symptoms.

### **Colour and consistency of menstrual loss**

For natural therapists, the type of menstrual loss is important and is often used diagnostically and as an indication of the type of remedy, or even which remedy, to give.

Medical practitioners are less interested in the exact nature of menstrual loss because medicine does not have a tradition of using this type of information to make a diagnosis or decide between treatments. This does not make one or the other system better or more thorough; they are just based on entirely different systems and require different sorts of information to assist with prescriptions.

The following is a list of *associations* and does not represent a diagnostic system in and of itself. These signs would need to be accompanied by at least two other signs or symptoms of disease before they could be even assumed to relate to a pathology.

#### Bright red blood

Generally bright blood is seen to be an indication that the period is normal, although very bright and fiery-looking blood was historically seen to occur more often when there was too much Heat. This might either be a localised problem—for example, an infection in the pelvic organs—or a tendency to be constitutionally Hot or Choleric.<sup>6</sup> Bright red blood might indicate the need for Cooling herbs or for astringents.

#### Dark, brown or thick blood

Dark blood which is thick, looks too old or is brown is thought to be caused by sluggishness of the menstrual flow. Some women have a very

dark red loss and this is quite normal and indicates that their blood quality is good.

Very sluggish, dark blood indicates a need for uterine tonics which regulate uterine muscular activity; emmenagogues which increase the expulsive ability of the uterus; or spasmolytics which help the uterine muscle relax.

### Watery, thin or pale blood

Very thin (pale pink) blood can mean poor blood quality and indicates a need for blood-enriching herbs, or hormone regulation.

Pale menstrual loss can also be associated with deregulation of the hormone balance—especially when the woman is weak, tired, exercising excessively or eating poorly. Watery menstrual loss is common after surgical procedures which involve the uterus, such as terminations and currettes.

### Clots

Clots generally indicate excessive flow and are formed when the anti-clotting factors normally present in menstrual blood are unable to keep the blood in a fluid state because of the volume of the loss. Clots may indicate the need for an improvement in uterine tone with either emmenagogues or astringents.

## **A period ‘out of the ordinary’**

Most women will have at least one ‘strange’ period in their menstruating lives; some will have many. The cycle may be unusual, the flow different from what is normally expected; pain may be a new or different feature; or the colour and consistency of the flow might change.

The important questions include:

- Is pregnancy a possibility?
- Are there other signs of ill-health?
- Has there been a stressful episode (either pleasurable or difficult)?

If the answer to either of the first two questions is yes, then it is wise to seek medical advice. If the third option is a possibility, relax, wait for another cycle and see what happens. Worrying about an unusual period might delay the onset of the next one.

(A menstrual diary is included on page 127.)

## THE WELL WOMAN'S CHECK LIST

### **Pelvic examinations**

These are performed every year. They involve two procedures, a vaginal speculum examination and an examination of the size and shape of the pelvic organs by hand. Although some doctors will use stirrups, many will ask the woman to lie on her back with her knees bent. Remaining as relaxed as possible will definitely lessen any discomfort and make the examination much easier to perform for the doctor. Although no one's idea of good fun, a pelvic examination should not be overly painful unless the woman has a vaginal or pelvic infection, adhesions or an acute complaint. If it is painful, and the doctor has found nothing wrong, another doctor should be sought to perform the examination in the future.

Vaginal speculum examination is performed by inserting a speculum in the vagina so that the lower portion of the cervix can be viewed. A Pap smear may be taken at the same time.

A bi-manual pelvic examination, so called because two hands are used, is performed to feel the size and shape of the pelvic organs. Two fingers of a gloved hand are inserted into the vagina and the other hand is placed over the lower abdomen. The uterus can be felt between both hands and, if the woman is relaxed, it is fairly easy to tell whether it is normally situated, can move easily, and is the right size. Pain on movement indicating endometriosis, infection or adhesions; unusual swellings; enlargement of the ovaries; uterine fibroids; pregnancy and tumours can be detected using this method.

### **Pap smear**

A Papanicolaou smear (named after the physician who invented it) is used to screen for cervical cancer. Cells are gently scraped from the surface of the cervix with a specially designed wooden spatula, smeared onto a glass slide, 'fixed' with a special chemical (usually sprayed on), and sent to a pathology laboratory for examination. The procedure should be painless, but can be a little uncomfortable, especially if the woman is not relaxed or the doctor is hurried.

The cervical cells are examined under a microscope and graded according to the type of cells and whether they have undergone any changes. Table 3.1 gives the standard classification for cell changes. Pap smears can be inaccurate. The most frequent problem is that the cells are classed incorrectly. A Pap smear result may indicate dysplasia (changed cells) when the correct diagnosis is carcinoma in situ (cancer of the cervix), or carcinoma may really be benign changes. Sometimes altered cells are not detected at all, but this happens much less often. When changes are found in a Pap smear, a colposcopy is suggested.

A Pap smear should be taken every two years unless directed otherwise by the woman's doctor.

**Table 3.1 Standard classification for cervical cell changes**

<b>Class</b>	<b>Common names given to the cell changes</b>
I	Normal, benign cells, negative smear
II	Benign, inflamed, atypical cells, atypical metaplasia
III	Mild or moderate cervical intraepithelial neoplasia (CIN), mild or moderate dysplasia, CIN type I or II
IV	Severe cervical intraepithelial neoplasia (CIN), severe dysplasia, CIN type III, carcinoma in situ
V	Malignant, invasive cancer

### **Breast checks**

Breast checks should involve regular, monthly self-examination after each period (called breast self-examination and often abbreviated to BSE), and an annual check by the woman's doctor. If a doctor does not routinely check a woman's breasts, another should be found.

The examination is performed to detect the presence of lumps or any changes in breast tissue. Most women detect breast changes themselves. They know the 'normal' feel of their own breasts and are in a unique position to detect change and detect it early. About 80 per cent of breast lumps are not cancerous, but even when a breast lump is caused by cancer, the earlier it is found, the better the outlook.

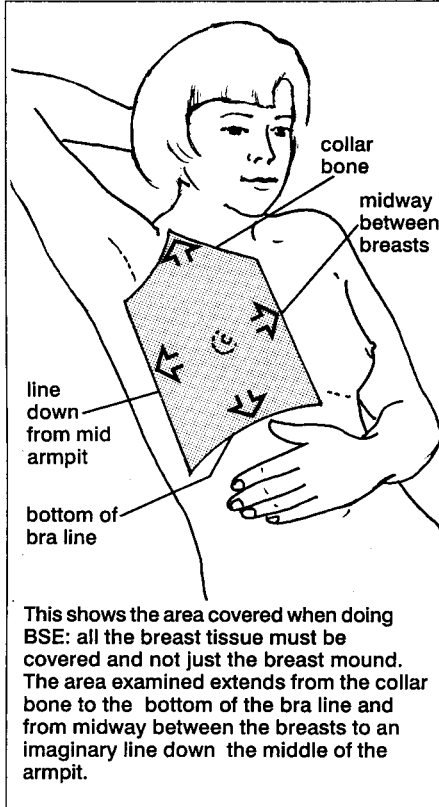
Breast examination involves two phases: visual examination and palpation (physical examination) of the breast tissue. It should be practised after every period, from the beginning of menstruation, and regularly every month after menopause. Figure 3.3 shows the accepted technique for breast self-examination.p

### **Breast screening**

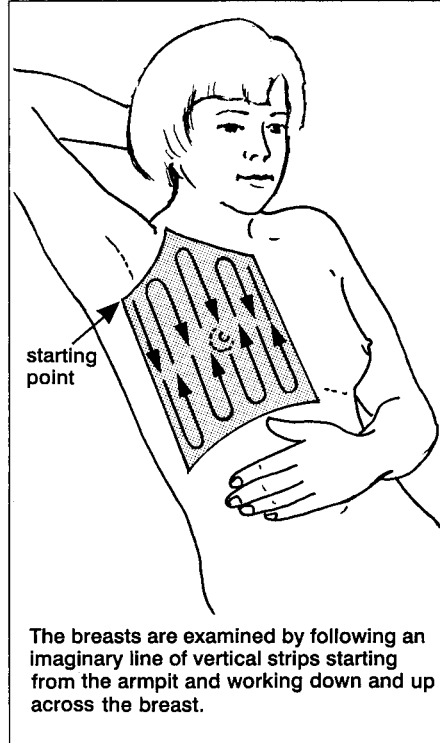
If breast changes are detected on breast examinations the doctor may refer for further investigations such as ultrasound or mammography, or fine needle aspiration biopsy. Mammograms are a low dose X-ray of the breast. They are used for both screening and diagnosis of breast cancer. Women over 40 are eligible for free two-yearly mammograms through Breast Screen Australa, a national program which does not require a doctor's referral. Regular screening is targeted at the higher risk age group between the ages of 50 to 69. Breast density reduces after menopause provided a woman is not on HRT and mammograms tend to be more reliably diagnostic. Regular breast X-Ray screening for women under 50 has not proved effective in reducing the number of deaths from breast cancer. For this reason, women aged between 40 and 49 will not be invited for breast X-ray screening, but may wish to attend if they have a strong family history of breast cancer.<sup>7</sup>



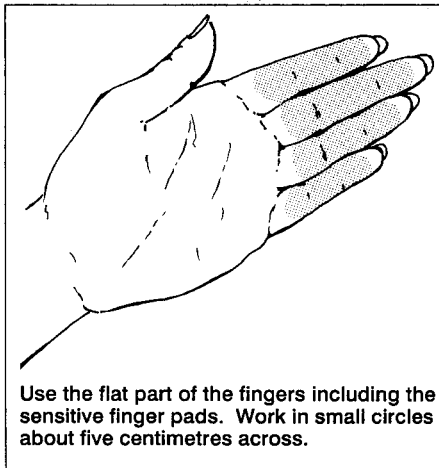
### 1. The map



### 2. The vertical strip



### 3. Feeling the breast

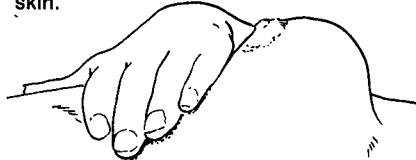


### 4. The pressure

Use two pressures to feel the breast at each spot.



*Feel lightly:* With fingers together and flat, make the first circle with light pressure to feel for anything near the surface of the skin.



*Feel firmly:* At the same spot, make a second circle pressing quite firmly to feel any lump deep in the breast. Firm pressure should not cause discomfort, but the ribs can usually be felt.

Source: Adapted from *The New Breast Self-Examination Technique*, Anti Cancer Council of Victoria

Figure 3.3 Breast self-examination (BSE)

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# Section C

## Maintaining order and balance

Hormones and prostaglandins are both found throughout the body, but are different in that hormones are transported via the bloodstream to act at distant sites (oestrogen to bone, for example), while prostaglandins are produced and act in the same tissue (uterine muscle, for example). Hormones orchestrate the big picture via a continual ebb and flow which ensures that ovulation and menstruation occur rhythmically and regularly.

Prostaglandins are very much more local—the small picture substances. Almost within the time it takes to take one breath, prostaglandins are formed, act and then are broken down again. Their role is to regulate the activity of certain tissues, like muscles, by stepping up or calming down muscular activity.

# 4

## Hormones

### Key words

anabolic	hypothalamus
androstenedione	neurotransmitter
aromatisation	oestradiol
beta-glucuronidase	oestriol
competitive inhibition	oestrone
cortisol	peripheral conversion
deconjugated oestrogen	phyto-oestrogen
dehydroepiandrosterone	pituitary gland
dihydroxytestosterone	pregnenolone
dopamine	prolactin
endogenous oestrogen	receptor site
feedback loop	steroid hormone
glucocorticoids	transcortin
2-hydroxyoestrone	xeno-oestrogen
16-hydroxyoestrone	

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### MAINTAINING AN ORDERLY MENSTRUAL CYCLE

Maintaining hormonal regulation is something like putting on a complicated stage play with each of the different hormones having different roles to play. Hormones—the microscopic substances carried in the blood and detected by blood tests—are the actors, directors and managers in the monthly play called the menstrual cycle. The managers, directors and actors in this play must perform in perfect synchrony for each act to proceed successfully. The hormonal ‘actors’ are all ‘steroid hormones’. The steroids—androgens, oestrogens and progesterones—

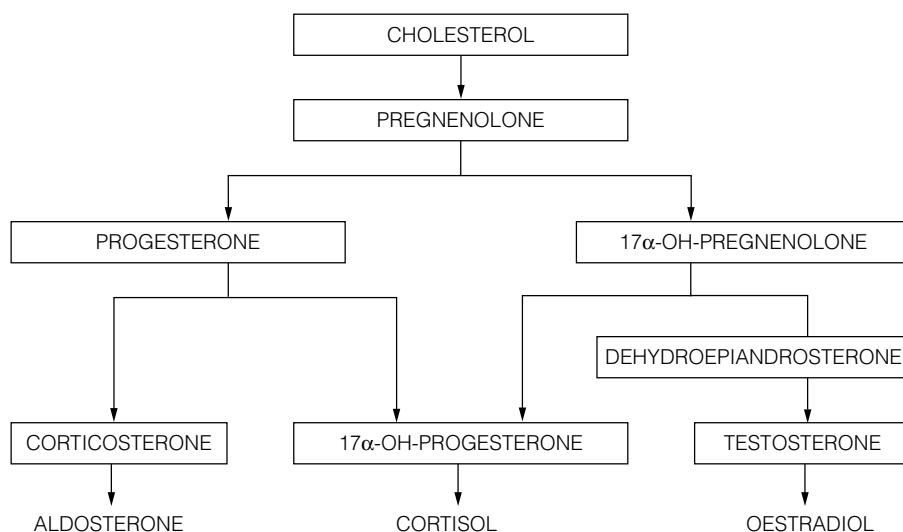
have a central component made from cholesterol and are structurally similar. Each hormone has minor changes in configuration which give it characteristic effects within the body.

In response to a variety of biochemical and other signals, the body metabolises the five major classes of steroid hormones from cholesterol. This may mean that a hormone starts out as pregnenolone (a precursor of progesterone), changes into progesterone, then to testosterone and finally into oestradiol (see Figure 4.1). This cycle might continue with the hormone (seemingly) at the end of the line changing into a different form, into another type of hormone, or being broken down and excreted from the body.

Hormone production is regulated by the ‘feedback loop’. The feedback loop describes the hormonal communication between the hypothalamus, the pituitary gland and the ovaries which controls the level of hormones produced. The level of each hormone constantly see-saws with its hormonal partner. When the level of one hormone rises, information is relayed to turn off the production of its hormonal partner. When the level drops, the feedback control is activated and production of the partner hormone is switched on again. All steroid hormones are regulated by this type of feedback loop.

Two examples include the two major hormones involved in the menstrual cycle, progesterone and oestrogen (actors). Both have ‘trigger’ hormones in the feedback loop (directors).

- Progesterone production is triggered by luteinising hormone (LH) which stimulates the corpus luteum in the ovary to produce progesterone.



**Figure 4.1 Steroid hormone pathways**

- Oestrogen is produced when follicle-stimulating hormone (FSH) stimulates the follicle to produce oestrogen. A rise in oestrogen shuts off the production in FSH; a fall turns it back on again.

Hormones also have a mechanism for interacting with their target cells. To do this, they ‘dock’ onto a specialised part of cells with hormonal sensitivity called receptor sites.

For the ‘menstrual’ play to proceed smoothly, the hormones must remain in some sort of balance with each other, making their entrance at the right time and responding to cues. Oestrogen must remain at suitable levels in relation to progesterone and androgens; and all of the different types of oestrogen should be in balance with each other. For the period to occur at the right time, the balance of oestrogen must drop, then after ovulation, rise again.

## **The managers**

The hypothalamus is situated in the base of the brain and produces a number of ‘releasing’ and ‘inhibiting’ hormones. The manager hormones of most interest in menstrual cycle regulation are gonadotrophin-releasing hormone (GnRH) and prolactin-inhibiting hormone (PIH, also known as dopamine).

### **Gonadotrophin-releasing hormone (GnRH)**

The hypothalamus receives various messages from hormones and chemicals in the blood, and from the nervous system. The hypothalamus processes all of these pieces of information and sends messages to the nearby pituitary gland in the form of intermittent pulses of GnRH every 60 to 90 minutes. The pulsatile release of GnRH increases mid-cycle and around menstruation, indicating to the pituitary that it’s time to increase the production of FSH and LH.

### **Dopamine–prolactin-inhibiting hormone (PIH)**

In non-lactating women, the hypothalamus also secretes dopamine to prevent the production of prolactin (the hormone responsible for breast milk production). Dopamine, a neurotransmitter secreted by the hypothalamus, powerfully inhibits prolactin secretion. A long list of substances, including many drugs, inhibit either dopamine production or uptake, block dopamine receptors, or cause dopamine depletion and can lead to a rise in prolactin.

## The directors

The pituitary gland is also sensitive to messages in the form of hormones and nerve impulses. The pituitary produces the gonadotrophins (FSH and LH) and prolactin—our directors. ‘Gonadotrophin’ is an easier term to understand if it is broken down into meaningful parts. A gonad is the ovary (or the testis in the male) and ‘-trophin’ is a derivative of trophic which means to stimulate or make grow. A gonadotrophin then, is a hormone that stimulates or ‘directs’ the ovarian cells.

### Luteinising hormone (LH)

The levels of LH increase slowly in response to the low levels of oestrogen during the follicular phase of the cycle. These low oestrogen levels are sensed by the hypothalamus which sends GnRH messages of increasing amplitude to the pituitary. Just before mid-cycle, a dramatic surge in both oestrogen and LH, and a corresponding increase in FSH, initiate the beginning of ovulation. The exact mechanism by which ovulation is induced by LH and FSH is unknown, but somewhere between 18 and 36 hours after the gonadotrophin surge, ovulation occurs. See Figure 3.1.

LH stimulates both oestrogen and progesterone production by the ovary. In the luteal phase, the increasing amounts of progesterone inhibit the release of LH from the pituitary gland, and the levels remain low until progesterone levels drop when the corpus luteum degenerates and menstruation begins.

### Follicle-stimulating hormone (FSH)

Follicle-stimulating hormone does exactly what its name suggests it should; it stimulates the growth and development of the ovarian follicle—the structure which contains the developing ovum. Levels of FSH increase in the follicular phase of the cycle and stimulate an increase in the number of oestrogen-producing cells in the developing follicle.

Oestrogen and FSH are connected by the feedback loop—the initial rise in oestrogen triggers the release of GnRH and a surge in FSH. A few hours later, when oestrogen levels are even higher, FSH production is turned off. Just before menstruation, when oestrogen levels fall, the hypothalamus senses the change, sends out GnRH messages to the pituitary and FSH begins to rise again.



## **Prolactin**

Prolactin is the hormone responsible for lactation and affects the breast, stimulating growth during pregnancy and then milk production in response to suckling. Non-pregnant women have low levels of prolactin (inhibited by dopamine from the hypothalamus) which normally increase slightly at night, with stress, and during the luteal phase of the menstrual cycle.

## **The actors**

The ovary and the adrenal gland produce the steroid hormones oestrogen, androgen and progesterone. These ‘actor’ hormones initiate tissue changes within the ovary, the bodily changes associated with physical development and the changes in the endometrium which result in menstruation.

## **Oestrogen**

There are three main oestrogens—oestradiol, oestrone and oestriol. When people talk about oestrogen or oestrogen levels, they usually mean the cumulative effect of these three in the body, even though each one has a different role to play. Oestrogens have hormonal and growth-enhancing effects which are most obvious during puberty when they first stimulate the development of the reproductive system. They are responsible for the deposition of body fat around the abdomen, hips and breasts; and stimulate the growth of the uterine muscle and the lining of the uterus (the endometrium). The maintenance of the structure of skin and blood vessels, and the strength of bones, are influenced by oestrogen throughout life.

One of the most important functions of oestrogen is to stimulate an increase in the number of cells (proliferation) where there are oestrogen receptors. Oestrogen also initiates an increase in the number of receptors on each cell. So not only are there more cells produced in an oestrogen-rich environment, but they also contain more oestrogen receptors. This leads to an escalating ability for oestrogen to stimulate cell growth, and an increased number of places for oestrogens to interact with the cells.

### **The lifespan of the oestrogens**

Every month after the period, the ovaries start to secrete oestrogen in the active form (oestradiol). Some oestradiol is converted into a weaker oestrogen called oestrone, and then both oestradiol and oestrone are

secreted into the bloodstream and travel to oestrogen-sensitive cells to stimulate cell growth. Ovarian oestrogen production reaches a peak just prior to ovulation, then remains elevated during the second phase of the menstrual cycle, and falls just before menstruation.

A second source of oestrogen is derived from the conversion of androgens into oestrone by the aromatase enzyme. This process is referred to as 'peripheral conversion' or 'aromatisation'. Aromatisation occurs in the hair follicles, the skin, the brain, the bone and bone marrow, muscle and fatty tissue. Muscle and adipose (fatty) tissue are the major conversion sites—about 25 per cent occurs in the muscle and 10–15 per cent in the fat. Post-menopausal women derive almost all of their oestrogen (oestrone) from the aromatisation of androgens in fatty tissue and muscle.

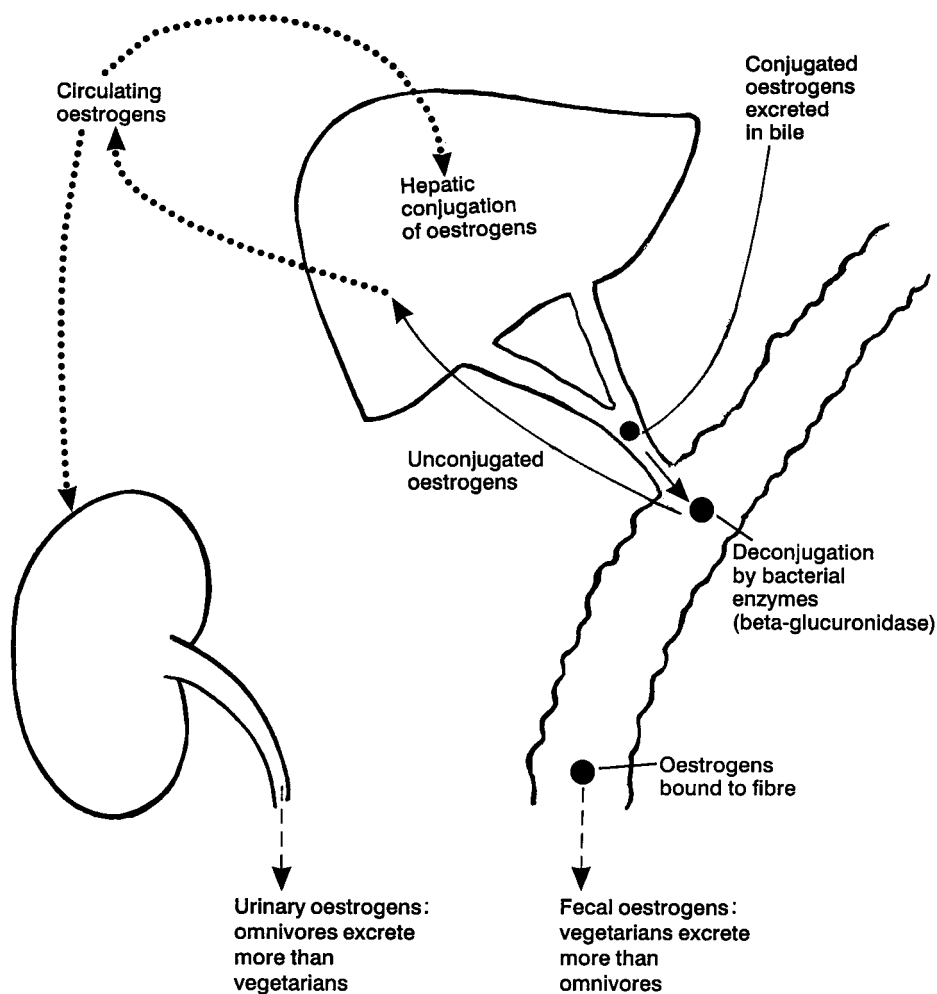
Before menopause most of the oestrogen is manufactured by the ovaries, but a percentage of oestrogen is always contributed by the aromatisation of androgens into oestrone. Thin women who are pre-menopausal may be deprived of this important secondary source of oestrogen and can sometimes develop menopausal symptoms, such as hot flushes and vaginal dryness. They may stop ovulating and menstruating.

Oestradiol is further converted into two types (metabolites) by enzymatic conversion. These are 2-hydroxyoestrone—the 'good' or protective oestrogen; and 16-hydroxyoestrone which is thought to have stronger growth-promoting potential and may even damage cellular genetic make-up—the 'bad' oestrogen. Researchers have found that 16-hydroxyoestrone is in higher concentrations in the breast tissue of women with breast cancer.<sup>1</sup>

These two metabolites cannot be produced at the same time. As yet all of the factors which favour the production of 2-hydroxyoestrone are unknown, however, the levels of 16-hydroxyoestrone have been shown to increase in the presence of chemical contaminants (xeno-oestrogens) which have an oestrogenic effect.<sup>2</sup> They are discussed below.

All of the different sources of oestrogen have the potential to interact with target cells but, eventually, all will pass through the liver. In the liver, oestrogens are changed (conjugated) into different forms which are less active and which are excreted (in the bile) into the intestine. Once there, a number of things might happen. Some of the conjugated oestrogens will be excreted in the faeces in this form, but some will be acted on by enzymes called beta-glucuronidase which are produced by intestinal bacteria. These enzymes have the capacity to change the oestrogen back into an active form (known as deconjugated oestrogen) which might either be excreted in the faeces as well, or might be reabsorbed back into the bloodstream. This is called the entero-hepatic circulation of oestrogen and is shown in Figure 4.2.

All of the oestrogen circulating in the blood will eventually pass through the kidney where it is changed into the very weak oestrogen found in the urine called oestriol. It forms the basis of some pregnancy



**Figure 4.2 The entero-hepatic circulation of oestrogens**

tests and can be used to determine the health of the placenta during pregnancy. Oestriol is a very weak oestrogen, being about 80 times less potent than oestradiol, so while it contributes to the oestrogen pool, in comparison to oestradiol and oestrone its effects are closer to those of some of the plant hormones.

### The 'oestrogen pool'

Any discussion about oestrogen should include not only those oestrogens produced in the body, but also a diverse group of other substances which have oestrogenic effects. These include the phyto-oestrogens produced in plants, which have many desirable and therapeutic attributes; and the less desirable 'environmental oestrogens', which are consumed as foods

or as contaminants of foods, such as pesticides. The oestrogenic effect of all of these different types of oestrogens must be considered in the overall oestrogen equation.

An oestrogenic effect is caused by any substance which has the ability to connect to an oestrogen receptor site. Oestrogen receptors can 'recognise' and accept any substance, even a chemical, which has a molecular structure similar to endogenous oestrogen.

One factor that influences the strength of oestrogen-like substances is the chemical fit between the oestrogenic substance and the receptor site. If the substance is chemically similar to oestrogen and is recognised by the receptor, the oestrogenic effect tends to be stronger—if its chemical structure is less similar to oestrogen, the oestrogenic effect tends to be weaker. Other factors that influence the oestrogenicity of phyto-oestrogens are discussed in Chapter 18.

The phyto-oestrogens can act differently in pre- and post-menopausal women. Although their action is not entirely understood, it is known that they can exert both *oestrogenic* and *anti-oestrogenic* effects. This observation has been made both in *in-vitro* experiments and in women who eat phyto-oestrogens in their diet. Phyto-oestrogens are many times weaker than endogenous oestrogen and they bind weakly to oestrogen receptors.<sup>3</sup> However, this ability to bind means they compete with the body's own oestrogen to occupy receptor sites and can therefore prevent the stronger oestrogens from being able to exert their usual effects. This anti-oestrogenic effect is termed 'competitive inhibition'. Population studies of Japanese women who consume a regular amount of phyto-oestrogens in their diet reveal a lower incidence of breast and endometrial cancer than Western women, in keeping with anti-oestrogenic effects of phyto-oestrogens in pre-menopausal women.

Post-menopausal women, who are relatively oestrogen deprived, can reduce symptoms related to oestrogen deficiency, such as hot flushes, by consuming foods rich in phyto-oestrogens. Once a woman is post-menopausal and has very little oestrogen, plant oestrogens appear to exert an *oestrogenic* effect, as evidenced by their ability to alleviate menopausal symptoms, probably by being the most abundant oestrogen in an oestrogen-poor environment.

The picture with the 'environmental oestrogens' (xeno-oestrogens) is less clear. This large group of chemical compounds includes the pesticides such as endosulphan, toxaphene, dieldrin and chlordecone;<sup>4</sup> the polychlorinated biphenols (PCBs)<sup>5</sup> found in a range of products such as hydraulic fluid, neon tubes and the pesticides DDT and DDE;<sup>6</sup> plastics such as nonylphenol released from 'soft' plastics and modified polystyrene;<sup>7</sup> and bisphenol-A, a plastic found in the 'lacquer' used to coat metal cans for preserved food.<sup>8</sup>

These chemicals are found throughout the food chain and tend to accumulate in fatty tissue. Ingestion of pesticides increases when diets are high in foods from animals at the top of the food chain; for example,

flesh from animals that eat smaller animals, or animals that continually consume contaminated feed or water. Vegetables containing residues of pesticides are likely to contain lower levels, and organically grown produce less again.

Food wrapped or stored in plastic, particularly when the plastic is soft (like food wrap) or has been heated, can easily become contaminated with these xeno-oestrogens. This is a particular problem with high fat-containing foods because xeno-oestrogens are soluble in fats. Xeno-oestrogens can also be taken in by breathing air contaminated by chemicals from industry or the burning of rubbish, or by drinking contaminated water.

The health implications of these chemicals is unknown. Levels of DDT are higher in fibroid tissue than normal tissue<sup>9</sup> and pre-natal exposure may alter sexual maturation of the foetus (particularly males) and influence fertility in later life.<sup>10</sup> Xeno-oestrogens can increase the levels of 16-hydroxyoestrone, the metabolite of oestrogen which has been associated with breast cancer.

Research into the effects of xeno-oestrogens on the risk of developing oestrogen-dependent cancers in women, however, has produced conflicting results. While some researchers found no link between exposure to xeno-oestrogenic insecticides,<sup>11</sup> others have proposed that combinations of these chemicals may have profound biological implications. They found that while xeno-oestrogens singly had little biological effect, combinations of these compounds exerted effects 1000 times more potent than any one chemical alone.<sup>12</sup>

Some research suggests that although xeno-oestrogens have not been proven to cause cancer they may increase the aggressiveness of existing breast tumours. Interestingly, a Danish study showed no link between oestrogen-dependent breast cancer and exposure to dieldrin, but an increased breast cancer risk in women with *non-hormone dependent* (oestrogen receptor negative) cancers, which has yet to be explained.<sup>13</sup>

One class of the xeno-oestrogens is the organochlorines. These substances are known to accumulate in fatty breast tissue and are excreted in breast milk, posing a potential risk to infant health. Some studies have shown that breastfeeding reduces the maternal burden of organochlorines and is correlated with a lower risk of breast cancer. Despite lactation being a route of excretion for organochlorines, it is still considered that the benefits to the baby of being breastfed outweigh the risks.<sup>14</sup>

Endogenous oestrogens are only biologically active during the years of sexual maturity, have a life expectancy measured in days, and fluctuate from month to month with the menstrual cycle. Xeno-oestrogens, however, are ubiquitous contaminants in the food chain. Exposure to them starts with foetal development, they persist in the body for decades, and their levels continue to accumulate with advancing years. It is very likely that all of the effects of environmental oestrogens have yet to be identified.

## Progesterone

Progesterone is the hormonal precursor of many of the other steroid hormones including the glucocorticoids, oestrogen and testosterone, and so plays an important biological role not only in menstruation and reproduction, but also in a number of other metabolic processes.

In the reproductive organs, progesterone is 'secretory'. It stimulates cellular and structural changes in organs containing progesterone-sensitive tissue like the breast and the uterus so that these tissues become capable of secretory functions. In the uterus, progesterone stimulates the production of glandular structures in the endometrium which can produce sugars and also generates the production of blood vessels so that the endometrium can support a developing embryo. When fertilisation does not occur and the corpus luteum degenerates, the level of progesterone falls and the endometrial tissue disintegrates and is shed as menstruation.

In the breast, progesterone initiates glandular changes in the tissue so that the breast is capable of secreting milk. Progesterone also keeps the levels of androgens (circulating in women at low levels) in check—when progesterone levels are high, androgens are low, but once progesterone production slows or stops, as occurs in the post-menopausal years, androgen levels tend to increase. The change in the progesterone and androgen ratio may account for the loss of scalp hair and the growth of facial hairs seen in some elderly women.

Progesterone has other actions that include improved fat metabolism, an increase in bone density, a mood-elevating effect and a natural diuretic action. It also helps to prevent both cancerous and benign breast changes by counterbalancing the effects of oestrogen in the breast, and has the same protective and counterbalancing effect on the endometrium.

Progesterone is also the precursor hormone to the production of corticosteroids, which have many important biological roles throughout the body, including the maintenance of stable blood sugar, the reduction of inflammation and the capacity to withstand stress.

### The lifespan of a progesterone

The primary source of progesterone is from the corpus luteum—the remnant egg sac—in the ovary. Small amounts are also secreted by the adrenal gland. Cholesterol is the starting molecule for progesterone production in both the ovary and the adrenal gland. In a step-by-step process cholesterol is converted into pregnenolone and then to progesterone. The progesterone might then be converted into any one of the other steroid hormones including oestradiol, oestrone, testosterone or cortisone.

Progesterone circulates in the blood and interacts with cell receptors, but eventually it will pass through the liver where it is inactivated and excreted into the bile and urine.

## Androgens

Androgens are hormones, secreted in both males and females, and are the hormones responsible for masculinisation. When the secretion of androgens is inappropriately high, such as polycystic ovarian syndrome (see Chapter 16), abnormalities of the menstrual cycle and the reproductive function can occur, along with male pattern hair growth, deepening of the voice and loss of the female body contours, including a decrease in breast size.

Testosterone is the most abundant androgen found in the blood of normal women. It is also the most potent. Of the total volume, 25 per cent originates from the ovary, 25 per cent from the adrenal gland and 50 per cent is derived from the conversion of other adrenal or ovarian hormones. In muscle, testosterone acts directly on the androgen receptors to produce growth-promoting (anabolic) effects.

There is a natural and gradual decline of androgen production as a woman approaches menopause. Levels of testosterone of women in their forties are approximately half those of women in their twenties. After menopause there is an approximate 15 per cent decrease in testosterone levels and the adrenal glands account for 50 per cent of production of circulating levels. Symptoms suggestive of the natural decline of androgens around menopause are loss of libido, persistent fatigue, and lack of well-being despite oestrogen levels being adequate. This collection of symptoms has been termed 'androgen deficiency syndrome' and remains somewhat controversial, as there is no consensus on the clinical definition. In addition, it is questionable whether blood tests are sensitive enough to measure testosterone at low levels.<sup>15</sup> Androgen deficiency syndrome is discussed in more detail in Chapter 9, 'Menopause'.

Androstenedione is the principal pre-hormone, transformed at several sites including the liver, fat and skin, to re-enter the circulation as testosterone. Conversion is believed to occur in the tissues so that cells which are receptive to androgens have a local supply, ruling out a need for high blood levels of androgens which may have undesirable effects. Androstenedione is produced in both the ovary and the adrenal gland, the amount from each source seeming to vary with time of day and phase of ovarian cycle.

Dihydrotestosterone (DHT) is produced from testosterone and androstenedione and an excess is believed to cause masculinising effects in women such as male-pattern hair growth, acne and hypertrophy (enlargement) of the clitoris.

Dehydroepiandrosterone (DHEA) and DHEA sulphate are secreted by the adrenal gland, with very small amounts also from the ovary. They are less biologically active than the other androgens and their role is not clear, however, levels of DHEA decline with age. Some DHEA is converted into testosterone in the tissues. DHEA sulphate is easily

measured and provides a reliable means for evaluating abnormal adrenal androgen levels.

Androstenediol is moderately androgenic and is the intermediate hormone between the formation of testosterone from DHEA. In hirsute women the levels of androstenediol is twice that of normal women.

## **The carrier proteins**

Most of the steroid hormones circulate in the plasma bound by proteins (albumins and globulins). Each hormone appears to have a specific binding globulin or carrier protein which is responsible for its transport. When the hormones are bound to the globulins, they are less able to interact with target tissues than when they are floating 'free' in the plasma. They are also protected from inactivation and breakdown.

### **Sex hormone-binding globulin (SHBG)**

SHBG is synthesised in the liver and its production is increased by oestrogen, and by an excess of thyroid hormone. It can bind to oestrogens and androgens. A number of factors lower SHBG production. These include obesity, insulin resistance, excessive levels of testosterone, the administration of progestogens, glucocorticoid hormone excess as seen in Cushing's syndrome, growth hormone excess (acromegaly), and thyroid hormone deficiency. The level of SHBG controls oestrogenic activity by reducing the amount of 'free' oestrogen that can interact with target cells.

### **Cortisol-binding globulin (CBG)**

CBG, also known as transcortin, is the carrier protein for both cortisol and progesterone. More than 90 per cent of progesterone is bound to CBG, which regulates the amounts of available progesterone in the same way that SHBG does for oestrogen and androgen.



# 5

## Maintaining hormonal balance

### Key words

basal body temperature  
3 beta-dehydrogenase  
betacarotene  
betaglucuronidase  
competitive inhibition  
coumestrol  
lignan  
luteal phase defect

methionine  
relative hormone  
imbalance  
saponin  
steroidal saponin  
triterpenoid saponin  
xeno-oestrogens

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In health, hormones (and prostaglandins) act together to initiate the responses which culminate in a normal menstrual cycle. Many gynaecological complaints can become apparent when hormone levels change.

These changes can be related to an absolute deficiency of a hormone (when a woman becomes menopausal for example); or a 'relative' deficiency (a hormone may be relatively lower than it ought to be, or relatively lower in relation to other hormones). This is one theory of, for example, premenstrual syndrome (PMS), when relatively low levels of progesterone in relation to oestrogen are thought to give rise to a range of premenstrual symptoms.

On the other hand, hormone levels can be too high, exposure to them can be excessively prolonged, or they can occur at levels that are too high in relation to other hormones. Women with endometriosis and fibroids, for example, are thought to be exposed to relatively high levels of oestrogen for too long. Alternatively, conditions may occur because the growth-promoting effects of oestrogen are not counter-balanced by adequate exposure to progesterone. This is termed 'unopposed oestrogen'.

## TOO MUCH OESTROGEN

### Prolonged exposure to oestrogen

The main reason modern women are affected by more oestrogen is simply that they have more periods per lifetime. The average age of menarche (a woman's first period) is becoming progressively earlier, the average age of menopause is getting later, and women are having fewer children than their forebears.

Oestrogen excess does not occur because the ovaries make too much oestrogen—on the contrary, there is usually a problem with availability and clearance of oestrogen. Symptoms may include heavier than usual menstruation, longer than usual menstrual periods, and premenstrual tension. Increased incidence of menorrhagia, endometriosis, fibroids, fibrocystic breast disease and breast and endometrial cancer have been associated with relative oestrogen excess.

Excessively high levels of oestrogen are comparative and cannot be detected by a single blood test. Researchers speculate that an imbalance may be the mechanism of disease initiation and test their hypothesis by comparing blood levels and/or the length of oestrogen exposure (time when periods started, number of pregnancies, breastfeeding, menopause, etc.) of large numbers of well women with those who have the oestrogen-dependent complaint.

Environmental oestrogens can also be introduced into the body and are emerging as significant risks for disease development.

### Unopposed oestrogen

Oestrogen is proliferative and stimulates growth of tissues that are responsive to it, as occurs, for example, in the endometrial lining. An adequate rise and fall of progesterone is required to facilitate proper shedding at menstruation, which protects against endometrial hyperplasia and cancer. Without adequate levels of progesterone there is also an increased risk of other oestrogen-related conditions including endometriosis and fibroids. In the breast, unopposed oestrogen may increase the risk of breast cancer. Many hormone replacement therapy (HRT) preparations now contain both oestrogen and progesterone, based on the understanding of the protective effects of progesterone in the endometrium.

### Poor clearance of oestrogen

Women today, compared with women of earlier eras, are relatively over-exposed to the stimulatory effects of oestrogen because the modern-

day lifestyle seems to impair oestrogen clearance via the liver and bowel, and favour higher circulating levels of available (biologically active) oestrogens in the blood.

## **Diet and obesity increase oestrogen levels**

### **Diet**

Epidemiological studies have identified diets containing excessive amounts of refined carbohydrate, low levels of dietary fibre and high levels of saturated fats with an increased risk of oestrogen-dependent conditions including cancers.

#### **Fat intake**

Saturated animal fats encourage the growth of intestinal bacteria which produce an enzyme called beta-glucuronidase.<sup>1</sup> This enzyme converts oestrogen into a form that can be re-absorbed from the bowel, and women who eat more fat have significantly higher blood levels of oestrogen than those on low-fat diets.<sup>2</sup> Conversely, reducing fat intake leads to lower oestrogen levels by increasing oestrogen clearance.<sup>3</sup> A high fat intake has been linked with benign breast disease, breast cancer, heavy menstruation, endometriosis and fibroids. See page 369 for sources of saturated fats and tips to reduce dietary intakes.

### **Obesity**

Obesity is not just being overweight or carrying a few extra kilos. Women at increased risk are substantially overweight and are in the highest percentile of the body mass index.<sup>4</sup> Obesity can disrupt the menstrual cycle by interfering with normal ovulatory function and is also associated with elevated oestrogen levels. More fatty tissue means a greater ability to convert androgens into oestrogens in fatty tissue and can lead to an increased risk of breast cancer,<sup>5</sup> fibroids<sup>6</sup> and endometriosis.<sup>7</sup>

There is also a suggestion that the type of obesity may play a role. Women with a high distribution of upper body fat (high waist measurement), tend to have lower levels of SHBG, and therefore more free oestrogen.<sup>8</sup>

## **Dietary and lifestyle changes to reduce oestrogen levels**

### **Diet**

#### **Dietary fibre**

Dietary fibre reduces oestrogen levels in the blood and urine,<sup>9</sup> possibly by influencing the enzyme produced by intestinal bacteria (beta-glucuronidase). A diet which is high in fibre and low in fat reduces both the activity of this enzyme and the amount of deconjugated oestrogen able to re-enter the bloodstream. Vegetarians have significantly lower bacterial enzyme activity than meat eaters because they tend to have a higher fibre diet and a lower intake of fats.

The fibre which occurs as a component of whole food is preferable to fibre-only breakfast cereals which provide no other advantageous nutrients.

Fibre can be either soluble or insoluble. Insoluble fibre cannot be broken down by the digestive system although it is modified by the microflora of the gut. Wheat bran is an example of an insoluble fibre. Soluble fibre refers to fibre that is water soluble, and includes mucilages (as in psyllium husks), pectins (as in skins and rinds of fruits and vegetables) and lignans (as in linseeds). (The soluble fibres have broad-ranging beneficial effects—they lower cholesterol, reduce elevations in blood sugar after eating, make bile more soluble and promote the growth of beneficial gut bacteria.) Lignans exert oestrogenic effects when converted by gut flora to enterolactone and enterodiol. These weak oestrogens are believed to protect against the proliferative effects of endogenous oestrogens and thus, for example, reduce risk of breast cancer.<sup>10</sup>

#### **Cultured milk products and yoghurt**

The bacteria in yoghurt, *Lactobacillus acidophilus*, also reduces the activity of beta-glucuronidase<sup>11</sup> which suggests a positive effect on oestrogen excretion from eating yoghurt and fermented milk products.<sup>12</sup> Researchers found that eating these foods is associated with a lower incidence of breast cancer, which they attributed either to the reduced re-absorption of oestrogen or to other immune-enhancing effects of the *Lactobacillus* bacteria.<sup>13</sup>

#### **Phyto-oestrogens**

Phyto-oestrogens or plant oestrogens have diverse effects on oestrogenic activity in the body. They can prevent oestrogens produced in the body from binding to their receptor sites via a mechanism called 'competitive inhibition'. They are also capable of slowing down the conversion of

androgens to oestrogen that normally occurs in fatty tissue;<sup>14</sup> and they can make oestrogen relatively unavailable by increasing levels of oestrogen's carrier protein, SHBG.<sup>15</sup> When more oestrogen is bound to SHBG less is available to bind to oestrogen receptors.

### The cabbage family

Constituents found in the cabbage family vegetables and herbs (the indoles) can increase the rate at which the liver changes oestrogen into the water-soluble form which can be excreted in the faeces.<sup>16</sup> Indoles also competitively inhibit oestrogen<sup>17</sup> and seem to inhibit the growth of breast cancer cells.<sup>18</sup>

The cabbage family vegetables can be consumed regularly by women who have oestrogen-dependent conditions. They include all cabbages, broccoli, brussels sprouts and radicchio. *Capsella bursa-pastoris* is a medicinal herb from this family which is used for abnormal uterine bleeding.

### Protein intake

Adequate intakes of protein are necessary for the metabolism of oestrogen in the liver.<sup>19</sup> Since many conditions are associated with excess protein intake, it is recommended that protein be taken in the form of grains, legumes, lean meat, fish, organic chicken and eggs, and that it constitute no more than 60 g daily.

### Vitamin B<sub>6</sub>

Vitamin B<sub>6</sub> apparently has indirect effects on oestrogen. In vitamin B<sub>6</sub> deficiency, tissues in the uterus and breast have been shown to have increased susceptibility to the stimulating effects of oestrogen, and B<sub>6</sub>-deficient women with breast cancer have a poorer survival rate.<sup>20</sup> The positive effects of B<sub>6</sub> may occur because the vitamin behaves like a pharmacological agent and alters the bodily changes induced by oestrogen excess.<sup>21</sup>

### Alcohol

The effects of alcohol on oestrogen metabolism and oestrogen-related disorders are complex. Moderate alcohol consumption (one glass of beer, one glass of wine or one shot of spirits daily) has been associated with reduced levels of oestrogen, and a lower incidence of uterine cancer (particularly in overweight women);<sup>22</sup> but an *increased* risk of breast cancer.<sup>23</sup> Women with other risk factors for breast cancer may be wise to keep alcohol intake to a minimum. For other women, especially women with an increased risk of cardiovascular disease, a moderate intake of red wine (one to two standard glasses every second or third day) seems to be beneficial.

## Liver clearance of oestrogens

Natural therapists treat symptoms related to ‘liver congestion’ with bitter herbs or foods (known collectively as ‘bitters’). Bitters increase bile production and dilute the bile salts; they also increase the clearance of cholesterol and, perhaps, oestrogen. Bitters are Cooling and are prescribed for symptoms which indicate excess Heat such as irritability, acid regurgitation, headaches, excessive bright-red menstrual flow, dry stool and facial acne.

The exact mechanism whereby bitter herbs affect the menstrual cycle is unknown. Hepatic conversion of oestrogen may be accelerated, perhaps in conjunction with the increased rate of bile flow known to occur when bitter herbs are taken. Their primary site of action might be to alter the bowel flora. The effects are likely to be quite complex, however, since bitter herbs are a large and diverse group with many different actions. Some are known to have separate effects on the uterus which may act in tandem with any oestrogen-clearing effects. The important bitters for gynaecological complaints are discussed in Chapter 19.

Foods high in methionine assist with the methylation of oestrogen, the chemical reaction the liver uses to break down oestrogen (oestradiol) into the less potent form (oestriol). Beans, legumes, onions and garlic are high in methionine.

## Exercise

Exercise helps with oestrogen clearance, and women who exercise tend to have lighter and less frequent periods.<sup>24</sup> See also pages 225–8.

## TOO LITTLE OESTROGEN

A *relative* oestrogen deficiency occurs when too much oestrogen is removed from the body, too little is recycled via the enterohepatic (entero—bowel, hepatic—liver) circulation, and/or too little of the non-ovarian oestrogen is made in the fat cells. An *actual* oestrogen deficiency occurs after menopause or when there is diminished ovarian reserve, for example, following chemotherapy, irradiation of the pelvis, surgical removal of part of the ovary, and during breastfeeding.

Low bone density, poor fertility and libido, irregular periods, and premature ageing or excessive dryness and brittleness of tissues including vagina, bones and skin, can all occur when oestrogen levels are too low.

### **CASE STUDY: RELATIVE OESTROGEN DEFICIENCY**

Kate's story is a good example of how a relative oestrogen deficiency might occur. She was 24 when she first visited the clinic and had problems associated with vaginal irritation and itching, as well as irregular periods. She had been to a variety of doctors and naturopaths and had been told that she had chronic thrush and that her irregular menstrual pattern was caused by cysts on her ovaries.

She had never responded to any of the medical or natural treatments for thrush, but had never had a swab taken to identify the actual cause of the problem. The origin of her ovarian cysts was also mysterious since she had never had an ultrasound. It seemed like a good idea to suggest that Kate have a thorough gynaecological check-up to identify the causes of her mysterious and stubborn complaints.

The gynaecologist found that Kate didn't have thrush, but had the type of vaginal inflammation seen in menopausal women (sometimes called senile vaginitis). Her irregular menstrual periods were associated with erratic ovulation and low oestrogen levels, not cysts on her ovaries. In fact all of Kate's problems stemmed from a low body weight which was causing signs of relative oestrogen deficiency.

The gynaecologist sent her back to the clinic for some appropriate dietary advice. Within two months of being on a sensible diet and gaining some weight, Kate's vaginal irritation had disappeared and her periods showed signs of becoming more regular.

## **Factors which reduce availability of oestrogen**

### **Body weight**

Body weight 15–20 per cent below the ideal body weight can often cause menstruation to stop and oestrogen levels to fall below normal.<sup>25</sup> The cycle can also become erratic, and fertility and bone density tend to be reduced.

### **Diet**

#### **Fibre**

Eating too much fibre, particularly too many wheat-bran cereals, lowers oestrogen levels and may increase a woman's chances of developing osteoporosis.<sup>26</sup> Fibre taken as part of whole food does not seem to cause this problem.

## Vitamin A deficiency

Vitamin A deficiency causes low oestrogen because of decreased activity of the enzyme 3 beta-dehydrogenase, which is vital to the production of oestrogen (oestradiol) in the ovary. Dietary beta-carotene from orange, yellow and green vegetables or fruits is converted to vitamin A. (Vitamin A supplements containing more than 2500 iu daily are not recommended during pregnancy.)

## Antibiotics

Antibiotics reduce substantial numbers of the intestinal bacteria necessary to convert oestrogen to the more active form for recirculation. Some phyto-oestrogens, especially the lignans, also need bowel bacteria for their conversion into the active, oestrogenic form. Women who are relying on natural oestrogens from these sources may find that antibiotics decrease their effectiveness. Yoghurt and cultured milks can eventually improve bowel colonies, but trying to avoid antibiotics, except in severe infection, is an even better idea.

## Excessive exercise

Over-exercising reduces the levels of circulating oestrogens, and can cause amenorrhoea and low bone density.<sup>27</sup> In addition, excessive exercise when nutrition or energy intake is inadequate in comparison to the energy expended causes amenorrhoea by disrupting pituitary-ovarian function.<sup>28</sup> The level of circulating oestrogens is reduced, as is bone density.

## Smoking

Smoking alters the metabolism of oestrogen so that more of the inactive oestrogen is produced. Women who smoke are relatively oestrogen deficient,<sup>29</sup> and tend to have an earlier natural menopause and an increased risk of osteoporotic fractures.

## **Phyto-oestrogens can reduce low oestrogen symptoms**

Phyto-oestrogens can significantly reduce the low oestrogen symptoms of menopausal women and women with a relative oestrogen deficiency. The isoflavones, coumestrol and lignans can bind to oestrogen receptor sites and are capable of eliciting oestrogen-like effects such as a reduction in



hot flushes and oestrogenic changes in the vaginal mucosa. Steroidal and triterpenoid saponins also seem to have ‘oestrogenic’ and hormone-balancing effects, and many important women’s tonic herbs contain high levels of these saponins. Included in this group are *Cimicifuga racemosa*, *Trillium erectum*, *Dioscorea villosa*, *Aletris farinosa*, *Panax ginseng* and *Glycyrrhiza glabra*. These effects are discussed in Chapter 18.

Saponins in foods and herbs have additional benefits. They seem to improve mineral uptake by causing a mild irritation on the bowel wall, thus making it easier for minerals to pass into the circulation,<sup>33</sup> and they can lower blood cholesterol levels.<sup>34</sup> Dietary sources of saponins include soya products, legumes and potatoes with skins.

Phyto-oestrogens can improve bone density. So far researchers have identified positive effects from Chinese herbal formulas,<sup>30</sup> soy products<sup>31</sup> and coumesterol (a phyto-oestrogen).<sup>32</sup>

More recent research on high dietary isoflavone intake from soy protein has shown an increase in bone mineral density in post-menopausal women but no effect when women are pre-menopausal.<sup>35</sup>

Promensil<sup>TM</sup>, a product containing isoflavones from *Trifolium pratense*, showed a significant increase in bone density in one small trial.<sup>36</sup> Research into the effectiveness of ipriflavone, a synthetic isoflavone, to prevent bone loss in post-menopausal women was also initially promising. A number of early studies showed positive effects, possibly related to increased rates of bone formation.<sup>37</sup> However, it was later shown that ipriflavone did not prevent acute bone loss immediately following oophorectomy,<sup>38</sup> and in another study, a significant number of women developed lymphocytopenia.<sup>39</sup>

Research into the effectiveness of concentrated isoflavone *supplements* has been varied. A placebo-controlled clinical trial using concentrated isoflavone supplements derived from red clover (Promensil<sup>TM</sup>), showed no significant improvement in menopausal flushing compared to placebo,<sup>40</sup> but in a later study also comparing Promensil<sup>TM</sup> to placebo, a 44 per cent decrease in hot flushes was noted in the treatment group.<sup>41</sup>

## PROGESTERONE DEFICIENCY SYNDROMES

After ovulation, the ovary produces progesterone from the corpus luteum which has developed within the mature ovarian follicle. This structure becomes filled with blood containing cholesterol as the precursor to progesterone formation. If pregnancy occurs, the production of progesterone from the corpus luteum continues for about seven weeks; if pregnancy does not occur, the period begins fourteen days after ovulation with the demise of the corpus luteum.

Progesterone is not produced when ovulation does not occur, such as after childbirth, miscarriage, terminations, after stopping the Pill, and

while breastfeeding. Absence of progesterone secondary to ovulatory failure is also seen in dysfunctional bleeding patterns, after stressful events, around and after the menopause and at menarche.

Over the years, numerous attempts have been made to define the relationship between progesterone and gynaecological complaints such as premenstrual syndrome, dysfunctional bleeding patterns, cyclic breast disorders, infertility, endometriosis and fibroids. Although no consensus has been reached, inadequacy of progesterone is thought to be implicated in these conditions at least some of the time. Problems might arise because of faulty progesterone synthesis or availability; an abnormal level of progesterone relative to other hormones; or because tissues lack normal receptivity to progesterone.

The scientific literature describes a number of syndromes that are associated with inadequate progesterone—also known as corpus luteum insufficiency. These are the luteal phase defects which cause identifiable problems with the endometrium and infertility; latent hyperprolactinaemia which can contribute to infertility, PMS and cyclic breast pain; and abnormal tissue receptivity which can lead to problems in any of the progesterone-sensitive tissues. Other mechanisms associated with inadequate progesterone levels relative to oestrogen are covered in the section on unopposed oestrogen on page 66.

### Luteal phase defects

The term 'luteal phase defect' describes inadequate transformation of the endometrium during the secretory (luteal phase) of the cycle that can cause infertility. Luteal phase defects are estimated to affect 3–4 per cent of women who have unexplained infertility and up to 63 per cent of women who repeatedly miscarry.<sup>42</sup> It has also been shown that 6–10 per cent of women who are fertile have an inadequate luteal phase.<sup>43</sup> A number of problems have been described that are associated with a deficiency in progesterone production or with normal levels of progesterone that do not adequately stimulate the endometrium:

### Abnormal follicular development

Inadequate secretion of FSH and LH from the anterior pituitary gland can lead to abnormal follicular development. Normally, FSH stimulates the granulosa cells of the developing follicle to produce oestradiol from androstenedione. A decrease in FSH release results in abnormal follicle development with lower oestradiol levels and decreased progesterone production.

### **Abnormal luteinisation**

LH normally stimulates the theca cells of the developing follicle to produce androstenedione. An adequate LH release can cause a decrease in androstenedione, and also contribute to the inadequate hormone production described above (a decrease in oestradiol and lower progesterone levels). Additionally, a lower than normal LH surge at ovulation causes deficient progesterone due to inadequate luteinisation of the granulosa cells.

### **Luteinised unruptured follicle syndrome**

Luteinised unruptured follicle syndrome is defined as failure of the primary follicle to release its ovum within 48 hours of the LH blood peak. This is coupled with lower luteal-phase concentrations of oestrogen and progesterone. Hormone levels prior to the expected ovulation are normal, suggesting that the problem causing luteinised unruptured follicle syndrome resides in the follicle itself. This syndrome is associated with infertility and may be more common when women have endometriosis.<sup>44</sup>

### **Abnormally low cholesterol levels**

Cholesterol is the vital starting compound for the production of all steroid hormones. Abnormally low cholesterol levels result in low-to-absent progesterone production and luteal-phase defects.

### **Latent hyperprolactinaemia**

Prolactin secretion from the anterior pituitary is inhibited by dopamine and stimulated by thyroxin-released hormone (TRH) released from the hypothalamus. Latent hyperprolactinaemia is diagnosed when an excessive prolactin release is observed following an intravenous injection of TRH. Slightly elevated prolactin levels have been associated with inadequate progesterone production and an abnormal menstrual cycle with a shorter luteal phase.<sup>45</sup> Clinically, latent hyperprolactinaemia is suspected when women present with complaints such as premenstrual breast pain, PMS and infertility.

## **Uterine abnormalities**

Uterine abnormalities cause changes in the blood vessel development and blood flow of the endometrium even in the presence of normal progesterone levels. Fibroids, uterine septa and endometritis are responsible for inadequate development of the endometrium.

## Abnormal tissue responsiveness to progesterone

Another way of explaining how problems can arise with progesterone is the theory that tissues can lack the normal receptivity to a range of hormones that usually have a role in the development or function of those tissues. This lack of receptivity may occur in the developing follicle, the endometrium or other progesterone-sensitive tissues such as the breast. Tissues may lack receptivity to progesterone itself or alternatively may lack hormonal sensitivity to FSH, LH or prolactin, ultimately causing an abnormality in progesterone production.

For example, when the corpus luteum fails to develop because the follicular tissue lacks normal responsiveness to either FSH or LH, lower levels of progesterone will be the result. Alternatively, progesterone receptor binding might be faulty in the endometrium, causing delayed development of this tissue and problems with either fertility or the functioning of the uterine lining during menstruation. In other tissues such as the breast, a lack of progesterone receptivity might cause cyclic breast pain. PMS has also been associated with decreased responsiveness of the progesterone receptor.<sup>46</sup>

## Progesterone and menopause

Progesterone production is reliant on ovulation and the development of the corpus luteum. Beginning during the peri-menopausal years, ovulation rates begin to decline and eventually stop with the onset of menopause. This is the normal biological sequence of events for all women and results in a decline in oestrogen levels throughout the month, along with lower levels of progesterone during the luteal phase of ovulatory cycles. In those cycles where ovulation fails completely, progesterone levels are negligible.

Over the years, attempts have been made to delay this biological certainty and the symptoms that accompany it with HRT. The common prescriptions are some form of oestrogen with progesterone for women who have a uterus, or oestrogen alone for those who have had a hysterectomy. The new form of HRT now being proposed for menopausal symptoms by those who follow the recommendations of Dr John Lee<sup>47</sup> is progesterone (marketed as natural or bio-identical progesterone).

Some women have enthusiastically embraced this form of HRT on the understanding that 'natural' means 'safe'—or that no side effects means an absence of risk. Some natural products are quite unsafe and this may yet turn out to be the case with 'natural progesterone'. In addition, the absence of side-effects in the short term is not a reliable predictor of a lowered risk of disease with long-term use. Women considering taking this form of HRT and practitioners who are advising it should read the section on bio-identical hormones on page 520.

## Making a diagnosis

Progesterone deficiency can be diagnosed clinically or by tests. These range from simply keeping a menstrual diary to taking the basal body temperature, determining the length of the luteal phase and, for infertile women, blood tests for progesterone levels and/or an endometrial biopsy.

A menstrual symptom questionnaire can be filled out daily for one or more months to ascertain the type, severity and timing of symptoms. Symptoms associated with a progesterone deficiency or lack of availability only occur during the luteal phase of the cycle and include tension, irritability, anxiety or other mood changes.

Basal body temperature (taken by mouth) can be used to determine the availability of progesterone in the luteal phase. The temperature is taken first thing in the morning before any activity at all (including talking or rolling over in bed), and represents the temperature when the body is at rest. An old-fashioned mercury thermometer gives the most accurate reading. The slight but detectable rise in the temperature associated with progesterone has been shown to be reliable 77 per cent of the time.<sup>48</sup>

The length of the luteal phase can be measured. The exact date of ovulation is needed and fewer than eleven days from ovulation to the period are highly suggestive of luteal phase defects. Ovulation can be detected using the basal body temperature, a mid-cycle blood or urine test to check for the mid-cycle surge in LH, or an ultrasound scan to view the developing follicle. A scan is the most accurate way of detecting the ovulation date—the least effective way is to subtract fourteen days from the onset of bleeding.

Blood levels of progesterone are usually taken between seven and nine days after ovulation, and readings consistently below 10 nanamol/millilitres are indicative of abnormally low progesterone. However, blood tests to determine progesterone levels are not 100 per cent reliable because progesterone readings fluctuate widely and can range from normal to very low within a short time span.<sup>49</sup>

An endometrial biopsy might also be suggested if women have undiagnosed infertility to evaluate endometrial development—luteal phase defects are associated with slow endometrial maturation. About one-third of all women have abnormal endometrial development, and so the abnormality needs to occur in two or more consecutive cycles before it is considered as a cause of infertility.

## Treatment

*Vitex agnus-castus*, *Paeonia lactiflora* and herbs containing steroidal or triterpenoid saponins are used to regulate ovulation, and therefore



progesterone production. They are all thought to be centrally acting—that is, they work on the hypothalamic-pituitary-ovarian axis.

The saponin-containing herbs are a specialised group of phyto-oestrogens found in many of the medicinal plants used for gynaecological complaints. They have a similar structure to the steroid hormones. Their precise action is unknown, but they seem to interact with receptors in the hypothalamus and pituitary glands and increase fertility and ovulation (and therefore progesterone production). They are primarily indicated to improve levels of progesterone relative to oestrogen. Examples of plants containing saponins are *Dioscorea villosa* and *Tribulus terrestris*. An alternative mechanism of action might be to improve ovarian tissue sensitivity or receptivity to the action of the gonadotrophins.

Linseed meal has a number of positive regulatory effects on hormones and menstrual cycles. The lignans enterodiol and enterolactone are formed in the intestinal tract from precursors in linseed meal. Linseed meal has been shown to increase ovulation rates and lengthen the luteal phase in women with normal menstrual cycles. Although flaxseed (linseed) meal does not increase luteal phase progesterone concentrations, it does increase the luteal phase levels of progesterone relative to oestradiol.<sup>50</sup>

Secondary causes of anovulation and/or relative progesterone deficiency also need to be addressed—stress with nervine tonics, sedatives and adaptogens; low body weight with appropriate diet; excessive exercise with a reduction; and other metabolic or hormonal conditions (for example, thyroid disorders) with medical, herbal or dietary intervention.

Vitamin B<sub>6</sub>, vitamin E, evening primrose oil and magnesium are also used for the symptoms associated with progesterone deficiency.

Some practitioners recommend ‘natural’ or bio-identical forms of progesterone. These are a type of hormone replacement and do not rectify the underlying problems causing the progesterone deficiency syndromes. In fact, because of the feedback response where endogenous hormone level decline in the presence of replacement hormones, the net result is likely to be a lowering of the body’s attempts to secrete progesterone. The decision to use any form of hormone as a replacement, natural or otherwise, must be made according to the desired outcome. Women who are trying to eradicate problems by re-establishing normal hormone levels might be better served by using herbal preparations; those who are interested in symptom control could try either herbs or progesterone; those who have tried herbal treatment and failed to establish a normal cycle should consider hormonal preparations to protect the endometrium. In all cases, the advice of a professional skilled in this area is recommended.

Premenstrual syndrome, benign breast disease, dysfunctional uterine bleeding and endometrial hyperplasia are discussed fully in the appropriate sections.

# ANDROGENS

The androgens are a group of hormones found in both men and women that have masculinising effects. Women usually have much lower levels of androgens than men, but some conditions can give rise to higher than normal levels of androgens in women and lead to erratic menstruation or amenorrhoea. Alternatively, androgens can be lower than normal and might cause some of the symptoms normally associated with the menopausal transition. The effects of androgens, where and how they are produced, are discussed in Chapter 4 'Hormones'.

## Androgen excess

### Causes

A number of gynaecological and other conditions can lead to excess androgen production.

- Ovarian causes:  
Polycystic ovarian syndrome, androgen-producing tumours of the ovary, hyperthecosis.
- Adrenal gland disorders:  
Congenital or adult-onset adrenal hyperplasia, androgen-producing tumours of the adrenal gland.
- Drugs:  
Some drugs can cause androgenising effects and can also interfere with menstrual flow and the regularity of the cycle: Phentoin sodium (Dilantin), and some of the progestogens such as dydrogesterone (Duphaston) and danazol (Danocrine); the corticosteroids and corticotrophins; and the anabolic steroids, such as Deca-Durabolin.
- Metabolic and hormonal states:  
Post-menopause, obesity, Cushing's syndrome.

### Signs and symptoms

The most common effect from elevated androgens is excess hair growth, also known as hirsutism; or excessive scalp-hair loss which is referred to as androgenic alopecia. Acne can also become worse or can be caused by elevated androgens, and in pre-menopausal women, menstrual irregularity or amenorrhoea can also occur.



Hirsutism, also referred to as male-pattern hair growth, is when coarse hair grows on the chin, upper lip, cheeks, around the nipples and between the breasts, the buttocks, lower back and the lower abdomen. Not all hirsutism is caused by high androgen levels, however, and the amount and distribution of hair is an inherited trait. As a rule, dark-haired and dark-eyed women naturally have more body hair than fairer women or Asian women.

Signs which indicate androgen excess can include acne and/or increased male-pattern hair growth at puberty, accompanied by delayed menarche; or when women are past menarche, changes in the amount and coarseness of body or facial hair, especially when this is also accompanied by menstrual irregularity.

Androgenic alopecia is another sign of androgen excess which can occur in pre- or post-menopausal women. It is also known as male-pattern baldness. The hair loss might occur as a generalised thinning all over the scalp or might be localised to the crown. The rate of hair loss is variable and the hair usually becomes thinner and finer. Complete baldness does not occur. Menopausal women can develop androgenic alopecia, facial acne and hair growth even when their androgen levels are not markedly elevated above normal. This is thought to be brought about by the decline in oestrogen levels, which leads to lower SHBG, along with an increase in, or an increased sensitivity to, adrenal androgens.

Signs of severe androgen excess, also known as virilisation, such as enlargement of the clitoris and reduced breast size are rare. Usually, androgen-producing tumours of the ovary or adrenal gland are responsible for the extremely high androgen levels. Some drugs such as danazol can also cause virilisation.

## Diagnosis

The first step is to test for an elevated serum testosterone level and the levels of the carrier protein, SHBG. Serum testosterone is the best indicator of ovarian androgen production and SHBG gives an indication of how much testosterone is unbound and therefore able to exert androgenising effects. The free androgen index (FAI) is a measure of unbound androgens and gives another indication of androgen activity. Ovarian androgen production is elevated in polycystic ovarian syndrome and androgen-producing ovarian tumours.

DHEA sulphate is the most reliable test for evaluating abnormal adrenal androgen levels when adult-onset adrenal hyperplasia or androgen-producing adrenal tumours are suspected. Women with adult-onset adrenal hyperplasia often have a short stature, elevated blood pressure, menstrual irregularities and hirsutism.

In many cases of hirsutism, acne or male-pattern baldness, androgen levels are normal, and the problem seems to arise because of an inherited sensitivity to androgens in the pilo-sebaceous unit. The treatment for elevated androgens or for an increased sensitivity to normal androgen levels is the same.



### ■ ■ The medical approach

The treatment of androgen excess is dependent on the causes. Obesity requires weight loss; post-menopausal women are often prescribed HRT; drugs can be withdrawn or changed; congenital adrenal hyperplasia and adult-onset adrenal hyperplasia are treated with low doses of dexamethasone (a type of corticosteroid). Adrenal or ovarian tumours will usually require removal. Oestrogen may be prescribed to increase levels of SHBG.

The common medications used for hirsutism are either Aldactone (spironalactone), Androcur (cyproterone acetate) or the Pill called Diane which contains a small amount of cyproterone acetate. Aldactone, Androcur and Diane block the effects of androgens by competitive inhibition—these drugs prevent the androgens from being able to interact with tissues which are normally responsive to androgens (such as the hair follicle and the skin) by blocking the receptor sites on the cells.

Some of the new ‘third generation’ Pills—which contain the progestogens norgestimate, desogesterol and gestodene (Femoden, Marvelon, Minulet, Triminulet and Trioden) have low androgen potency. The use of these types of Pill, however, can increase the risk of blood clot formation<sup>54</sup> and they may not be suitable for all women.

Often, when drug regimes for hirsutism are stopped, the hair will grow again, and the drug may need to be continued for long periods of time to successfully control the problem.

The progestogen levonorgestrel, which has androgenising effects, is contained in many oral contraceptives, and in many cases is unsuitable for women with androgen excess. A gynaecologist should be consulted to determine which Pill is suitable when contraception is needed and androgen excess is a concern. The amount of progestogen in the Pill used also influences its androgenic potential. For instance, Triphasil and Triquilar, which have low levels of levonorgestrel, usually do not exacerbate symptoms of androgen excess.

Other progestogens with androgenising effects such as Duphaston, Primolut and danazol are discussed in Chapter 20 ‘Drugs and surgery’.



## The natural therapist's approach

Again, the treatment depends on the cause. Women with polycystic ovarian syndrome (PCOS) will need advice to help to treat insulin resistance, regulate hormonal balance and re-establish regular menstruation. Post-menopausal women can use vegetarian diets<sup>55</sup> and phyto-oestrogens<sup>56</sup> to increase SHBG (which falls in conjunction with the fall in oestrogen levels) to reduce the masculinising effects of androgens. Women who are taking androgenising drugs should be referred to their GP to discuss a change of medication if possible.

Excess male-pattern hair growth or the hair loss associated with androgen excess can be difficult to control. *Serenoa repens* has been shown to improve androgenic alopecia and may also be useful in the management of hirsutism. The *Smilax* species (sarsaparilla) and *Turnera aphrodisiaca* may block the effects of androgens by preventing them from interacting with receptor sites on cells. This is known as competitive inhibition. They are not as reliable, nor do they work as quickly as drugs. When excess hair growth or loss is a serious problem, drugs first, followed by herbal remedies to maintain the status quo, can be the most effective combination.

Another method is to increase the rate at which androgens are converted (aromatised) to oestrogens. *Glycyrrhiza glabra*, and particularly a component of *Paeonia lactiflora* called paeoniflorin, increase the aromatisation process and reduce testosterone levels. Peony and Liquorice Combination, a formula used in traditional Chinese medicine, is suitable for excess production of ovarian androgens, but its effects are often short-lived.<sup>67</sup>

Reducing weight or maintaining an ideal weight will help to control androgen levels when women are obese or have PCOS. Regular meals, a low-fat intake and low glycaemic index carbohydrates (see pages 359–60) will help achieve this. Morning exercise, such as brisk walking or multiple repetitions of weights that increase the heart rate, also increase the rate of weight loss. Losing weight and a high fibre and phyto-oestrogen-containing diet increase the levels of SHBG which binds to androgens, making them relatively unavailable.

When excess hair growth or androgenic alopecia is the primary concern, treatment must be continued for many months, and in some cases indefinitely. It is important that the chosen remedies are considered safe for long-term administration. This is not a condition for self-treatment. The advice of a practitioner with knowledge in this area is essential.

## Androgen deficiency

The term female androgen deficiency syndrome has been recently proposed to describe a number of symptoms observed in women believed

to be associated with reduced androgens. This syndrome is characterised by low libido with decrease in sexual desire, persistent unexplained fatigue, and a decreased sense of well-being in associating with thinning or loss of pubic hair<sup>58</sup>. Reduced assertiveness and diminished muscle mass may follow<sup>59</sup>. The symptoms of androgen deficiency syndrome can occur even when a woman has adequate oestrogen replacement therapy.

As the decline in androgens usually starts well before the menopause, the symptoms usually develop gradually and can manifest as early as the late thirties. Symptoms are more pronounced in women who have had their ovaries surgically removed because of the abrupt loss of testosterone production by the ovaries.

Symptoms of androgen deficiency syndrome may also be seen in women with premature ovarian failure (see page 285). Ovarian failure induced by the use of GnRH agonists for the treatment of fibroids or endometriosis, or following chemotherapy or radiotherapy, may lead to testosterone deficiency. Corticosteroid use can result in reduced adrenal androgen production due to suppression of ACTH.

Oestrogen therapy may also cause relative androgen insufficiency. Oral oestrogens in the form of the oral contraceptive pill (OCP) or as part of hormone replacement therapy have been shown to suppress circulating free testosterone levels. The Pill suppresses ovarian androgen production as well as increasing SHBG.<sup>60</sup> Women in their late reproductive years who are on the Pill may have symptoms of low libido associated not only with age-related declining testosterone levels but also associated with the Pill.

Post-menopausal women may develop androgen deficiency symptoms after commencing HRT. This is associated with a replacement oestrogen-induced increase in SHBG combined with suppression of pituitary LH secretion, which leads to a lessened stimulus for post-menopausal ovarian thecal testosterone production.<sup>61</sup>

## Diagnosis

Diagnosis is based on clinical assessment and biochemical measurements. The biochemical measurements that are recommended are total testosterone, SHBG and free androgen index (FAI). Testosterone assays in current use were designed to measure the normal range of testosterone for men. Currently the normal level of testosterone in post-menopausal women has not been established, nor is there a definite parameter, such as free testosterone level, with an accepted limit below which this syndrome can be diagnosed by blood test results. In addition, the standard assays for testosterone at the lower end of the normal range for the reproductive female are notoriously inaccurate, and do not discriminate low testosterone from mid- to low-normal range.<sup>62</sup> A 'sensitive' testosterone level is considered to reflect the androgen status more

accurately. Blood for testing should be taken before midday and after day seven in menstruating women, to avoid a falsely low reading.

Until highly sensitive assays become routine, androgen deficiency syndrome may be considered in women with characteristic symptoms and who have a total testosterone below 2nmol/L and a normal or elevated SHBG level.<sup>63</sup>



### ■ ■ The medical approach

Testosterone can be given as a tablet, injection, implant, transdermal patch or gel. The effectiveness and safety of most of these therapies has not been established in clinical trials in women. A 1 per cent testosterone cream is available for women in Western Australia, but no long-term studies are available on its use or how the absorption may vary according to where the cream is applied.<sup>64</sup> A small short-term study on the use of a testosterone patch demonstrated an improvement in well-being, mood and sexual function in pre-menopausal women with low libido and low testosterone.<sup>65</sup>

To achieve a good therapeutic response in terms of enhanced libido, it is desirable to restore testosterone levels to the upper end of the normal physiological range for young ovulating women. Symptomatic post-menopausal women on oral oestrogen therapy who have a normal testosterone level but high SHBG, and therefore a low free androgen index, should be changed to non-oral therapy before commencing testosterone. A repeated blood test and clinical assessment after six to eight weeks will be needed to ascertain if testosterone therapy is still necessary. Similarly, taking these women off oestrogens may obviate the need for testosterone therapy.

Androgen replacement may cause undesirable symptoms and women may be concerned about the masculinising effects, including the development of acne, hirsutism, deepening of the voice and excessive libido.



### The natural therapist's approach

As this syndrome is a newly described condition, there are no traditional recommendations for the specific complaint 'female androgen deficiency syndrome'. More commonly, a woman with symptoms corresponding to this syndrome would be advised to eat a nourishing diet, exercise regularly and adopt stress management techniques. Herbal tonics, adaptogens and/or nervine tonics are prescribed as indicated by other symptoms. Herbal aphrodisiacs and herbs with a testosterone-like action are described on page 178 in the section on menopause and low libido.

# 6

## Prostaglandins

### Key words

alpha-linolenic acid	fatty acid
arachidonic acid	gamma-linolenic acid
dihomogamma-linolenic acid (DGLA)	hydrogenated fat
docosahexaenoic acid (DHA)	leukotrienes
eicosanoids	linoleic acid
eicosapentaenoic acid (EPA)	omega-3 pathway
essential fatty acid	omega-6 pathway
	prostaglandins
	thromboxanes
	trans-fatty acid

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### MAINTAINING THE ORDERLY FUNCTION OF THE REPRODUCTIVE ORGANS

The prostaglandins, leukotrienes and thromboxanes—the eicosanoids—are a large family of hormone-like substances involved in the regulation of ovulation, menstruation and labour,<sup>1</sup> as well as many other non-gynaecological events. Usually the production of eicosanoid family members ensures orderly function—when one group causes muscle spasm, another balances that effect by initiating relaxation; when blood clotting is triggered, a balancing anti-clotting response is also initiated.

Sometimes, however, a variety of factors such as infection, inflammation, allergy, hormone variations or poor diet cause production to favour one or more of the family members over the others. These imbalances may be temporary, or continue indefinitely, and are believed to contribute to common gynaecological complaints such as period pain, heavy periods, PMS and endometriosis.

The prostaglandins family can be likened to an extended clan, composed of smaller family groupings like a nuclear family. These families include the prostacyclins and the thromboxanes as well as a group of single individual prostaglandins. Each member of the extended family has a broad role to play. For example, the prostaglandins influence blood clotting, the activity of muscles and the inflammatory responses throughout the body; while the thromboxanes are involved with blood clotting and blood vessel activity.

Members of each of the extended eicosanoid clan are identified by a letter of the alphabet. So, for example, one member of the thromboxane family which is responsible for the clumping together of platelets is known as TX A—part of the A branch of the thromboxane family. The leukotriene from the B branch of its family, responsible for attracting white blood cells to inflamed tissues, is abbreviated to LT B. One of the prostaglandins is known as PG E, but there are many others.

Within the thromboxane, prostaglandins and leukotriene families, each member has its own more detailed role. As with all families, some of the members tend to be nuisances, others are more useful. For example, one of the leukotrienes will start some of the processes associated with inflammation, and another one, either a close or distant clan relative, will have the role of calming everything down.

Finally, to help identify what each clan member does, what they are made from, and what they look like, series numbers are added to the names of the different prostaglandins, thromboxanes and leukotrienes.

- Series 1 are anti-inflammatory, relax muscles and are derived from two fatty acids known as linoleic acid and gamma-linolenic acid.
- Series 2 and 4 come from arachidonic acid, found in the cell membranes of animals, and are largely pro-inflammatory.
- Series 3 and 5 reduce abnormal blood clotting and are anti-inflammatory, and are made from eicosapentaenoic acid (EPA).

## **The key players in the menstrual cycle**

### **Prostaglandins E, series 2 (PGE 2)**

PGE 2 is produced by most tissues in the body and is found in large quantities in the ovarian follicle, the uterus and the brain. In the endometrium, PGE 2 stops platelets from clumping together and dilates blood vessels, leading to heavier menstrual blood loss.<sup>2</sup> In the uterine muscle, PGE 2 strongly increases muscle contraction, while in the Fallopian tube, it causes relaxation.

### **Prostaglandins F, series 2 (PGF 2 $\alpha$ )**

PGF 2 $\alpha$  (the alpha describes the structure of this prostaglandin to a biochemist) increases as the menstrual cycle progresses, possibly because

its production is affected by oestrogen and progesterone. PGF 2 $\alpha$  has the opposite effect to PGE 2 in the endometrium where it causes blood vessels to constrict. In the myometrium, both PGF 2 $\alpha$  and PGE 2 cause muscle spasm and both are elevated when women have dysmenorrhoea.<sup>3</sup>

### Prostaglandins E, series 1 (PGE 1)

PGE 1 is known as the 'good' prostaglandin. Amongst other important functions it stops platelets from clumping; improves sodium excretion, relaxes blood vessels, decreases inflammation, improves the action of insulin and regulates calcium metabolism. The exact role of PGE 1 in the reproductive tract has not yet been determined. It is believed to have a hormone-regulating effect which is most apparent in the luteal phase. It may also reduce tissue sensitivity to prolactin.<sup>4</sup>

### Prostacyclin, series 2 (PGI 2)

Prostacyclin (PGI 2) is produced in the walls of arteries, the uterus, the ovarian follicle and the corpus luteum. It stops platelets from clumping together, dilates blood vessels and relaxes uterine muscle. Thromboxane 2 (TXA 2) has the opposite effect on blood vessels and platelets. It induces platelets to clump and blood vessel constriction. PGF 2 $\alpha$ , which causes uterine muscle to contract, has the opposite effect to PGI 2 on uterine muscle.

### Leukotrienes

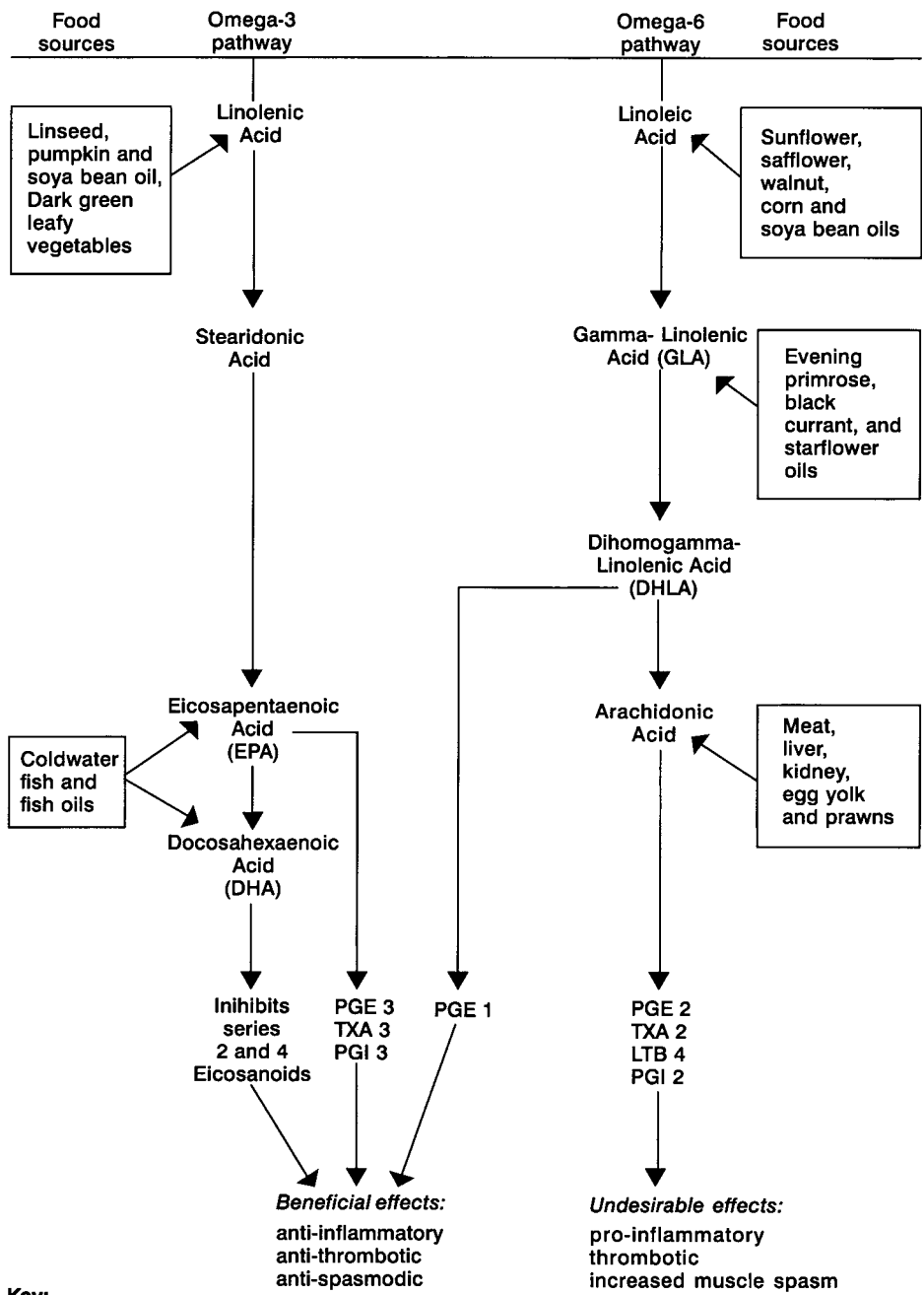
Leukotrienes in general stimulate uterine contraction and the leukotriene families C and D are elevated when women have dysmenorrhoea.<sup>5</sup> Leukotriene B (LTB 4) attracts white cells to inflamed tissues and is elevated when women have endometriosis<sup>6</sup> and may also be involved in breast cancer.<sup>7</sup>

## The omega-6 and omega-3 pathways

The stimulus for production of the different prostaglandins, thromboxanes and leukotrienes is complex. The ratio of each of the different series produced is not solely dependent on the essential fatty acid building blocks. Tissues produce eicosanoids in response to a stimulus— inflammation, for example—and a number of other biochemical and organ-specific events such as menstruation also influences the series of prostaglandins, etc. to be produced.

The two pathways by which the fatty acids from foods are converted into fatty acids which serve as substrates for eicosanoids are called the omega-6 and omega-3 pathways. See Figure 6.1.





**Key:**  
 PG Prostaglandins  
 TX Thromboxanes  
 LT Leukotrienes  
 PGI Prostacyclin

Figure 6.1 Essential fatty acid pathways

## The omega-6 pathway

The omega-6 pathway starts with the essential fatty acid, linoleic acid, which is found as a major component of many seed and vegetable oils, as well as most nuts, organ meats and human milk. Coconut oil and dairy products contain very low levels of linoleic acid.

Evening primrose oil, blackcurrant seed oil and star flower seed oil are also rich sources of linoleic acid as well as gamma-linolenic acid (GLA). These useful supplements can provide a short cut to the production of the series 1 prostaglandins by selectively increasing levels of dihomogamma-linolenic acid (DGLA).

These seed oils have a number of useful features. They are anti-inflammatory and can reduce the severity of eczema, asthma and allergies; they have an important modulatory role in the immune system and seem to be involved in the activity of the T helper lymphocytes; and as well, they inhibit blood clotting, lower cholesterol and have a vasodilatory effect.<sup>8</sup>

Arachidonic acid, which is converted from linoleic acid or consumed as part of the diet, is also part of the omega-6 pathway and is the precursor for the production of series 2 prostaglandins, thromboxanes and series 4 leukotrienes. This fatty acid is found in animal products including meat and eggs, as well as in human breast milk. Arachidonic acid is not an essential fatty acid since it can be synthesised from linoleic acid.

Changing the amounts of starting materials (linoleic acid, GLA and arachidonic acid) is believed to be able to change the ratio of the series 1 to series 2 prostaglandins. If food sources are primarily from the linoleic acid end of the pathway, both the anti-inflammatory and inflammatory series (series 1 and series 2) might be produced. However, if the dietary emphasis is on the arachidonic-containing foods, the pro-inflammatory series 2 effects will be favoured.<sup>9</sup>

## The omega-3 pathway

The first step in the omega-3 pathway is the essential fatty acid, alpha-linolenic acid. It is found in linseed and canola seed oils, walnut oil, soya bean oil and dark green leafy vegetables.

The same sequence of enzymatic reactions found in the omega-6 pathway transforms alpha-linolenic acid into eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). The formation of EPA preferentially increases the production of the series 3 prostaglandins and thromboxanes and the series 5 leukotrienes. EPA acts as a competitive inhibitor in the conversion of arachidonic acid to the series 2 and 4 eicosanoids because both compete for the same enzyme to produce their respective end products. For example, when both arachidonic acid and EPA are available, a balance of pro-inflammatory and anti-inflammatory,

anti-thrombotic and blood-clotting, muscle relaxing and muscle contracting eicosanoids are produced.

The last member of the omega-3 pathway is DHA which also influences eicosanoid production by inhibiting the series 2 and 4 eicosanoids but, unlike EPA, does not serve as a substrate for eicosanoid production.

EPA and DHA have a long list of therapeutic effects which includes the reduction of platelet stickiness and the risk of cardiovascular disease; the reduction of inflammation in conditions like arthritis; and an improvement in conditions associated with allergic responses such as asthma and eczema.<sup>10</sup> These oils also have therapeutic potential in gynaecological complaints.

The conversion of alpha-linolenic acid found in seeds and seed oils into EPA to serve as a substrate for the beneficial series 3 prostaglandins does not seem to proceed efficiently in humans. When volunteers ate a low fat diet and took supplements of either linseed oil or fish oils, the levels of EPA increased more in the fish oil group.<sup>11</sup> The conversion of alpha-linolenic acid from seeds is influenced by the amount of linoleic acid in the diet and better conversion rates are seen when the omega-6 fatty acids, especially linoleic acid, are reduced.<sup>12</sup> Oily, coldwater fish oils seem to be the most beneficial oils for those trying to prevent or treat cardiovascular disease, and may also prove to be more therapeutically beneficial for gynaecological complaints which respond to improved levels of EPA.<sup>13</sup>

Fish oils provide an alternative source of the EPA for the production of the prostaglandins, thromboxanes and leukotrienes. The best dietary sources are the coldwater and oilier fish and shell fish. Fish oils are also available in capsule form to be taken as dietary supplements.

## **Fatty acids for gynaecological complaints**

### **GLA**

A number of gynaecological complaints seem to respond favourably to the fish oils and to the GLA in evening primrose and other seed oils. To gain the best therapeutic effects, however, those foods which selectively increase the series 2 prostaglandins should be avoided where possible. The dietary advice included in Chapter 17 'Food for health' outlines some possible changes that can achieve this.

### **Menorrhagia**

Women with menorrhagia have altered prostaglandin synthesis which includes higher than normal levels of available arachidonic acid and an increased prostaglandins E2 synthesis (PGE 2).<sup>14</sup> This leads to reduced blood clotting, dilated blood vessels, and contributes to abnormal

bleeding. Normally, a percentage of PGE 2 is converted into prostaglandins F2 $\alpha$  (PGF 2 $\alpha$ ), which constricts blood vessels and improves clotting, but this conversion is reduced when women have menorrhagia.

These women also have higher than normal levels of prostacyclin 2 (PGI 2). PGI 2 is another potent dilator of blood vessels and also inhibits blood clotting, leading to increased menstrual bleeding.<sup>15</sup> Prostaglandin-inhibiting drugs, such as Naprogesic and Ponstan, block the conversion of prostaglandins into PGI 2 and can reduce bleeding.<sup>16</sup>

It may be possible to reduce menstrual bleeding by decreasing the dietary fat intake, increasing intake of foods containing the omega-3 oils, and by taking supplements of fish oils<sup>17</sup> or GLA.<sup>18</sup> Both of these oils can reduce the PGE 2 levels in some tissues. Reducing dietary fat lowers oestrogen<sup>19</sup> and, perhaps, arachidonic acid which is the dietary precursor to PGE 2 production. A relative excess of oestrogen may also be a stimulus for PGE 2 and PGI 2 production. Women on a low fat diet often claim that their periods are lighter, but so far there is not enough research to establish which factors are primarily involved in this change.

## Dysmenorrhoea

Higher levels of both PGE 2 and PGF 2 $\alpha$  have been found when women have dysmenorrhoea, and these changes in prostaglandins production can explain the major symptoms of primary dysmenorrhoea, including the increased uterine muscle contractility, the lack of blood flow through the uterus (uterine ischaemia) and the lowering of the pain threshold.<sup>20</sup>

Dysmenorrhoea is more pronounced during ovulatory cycles and is reduced by the Pill, suggesting a relationship between a relative oestrogen to progesterone imbalance and the synthesis of those eicosanoids responsible for muscle spasm. The action of prostaglandins on the uterus is dependent on progesterone levels, and high levels render the uterus resistant to prostaglandins-induced uterine spasm. Dysmenorrhoea occurs when progesterone levels fall just prior to the period.

Leukotrienes also seem to be involved in primary dysmenorrhoea. Women with severe dysmenorrhoea have increased levels of those leukotrienes which increase uterine muscle spasm (C4 and D4)<sup>21</sup>—a diet of oily fish and avoidance of foods rich in arachidonic acid (meat, liver and kidney) reduces the severity of dysmenorrhoea, and improves the synthesis of the series 3 prostaglandins and leukotrienes.<sup>22</sup>

Fish oils seem to be particularly beneficial when dysmenorrhoea has not responded well to the conventional prostaglandin-inhibiting drugs (which do not inhibit the production of leukotrienes). Women taking fish oils at doses between 2000 and 3000 mg per day report a reduction in their dysmenorrhoea.

Many women also take evening primrose oil for dysmenorrhoea and report a reduction in their pain. The reasons for this are unclear, but

may be related to the observed improvement in series 1 prostaglandins levels and a reduction of the series 2 prostaglandins. No studies have specifically looked at these changes in relation to dysmenorrhoea. Improvements in pain are reported from doses ranging from 1000 mg daily for ten days premenstrually to 3000 mg daily all month.

### Hormonal imbalance

One theory of the causes of PMS suggests that when abnormal levels of prostaglandins are produced in the brain, breast, gastrointestinal tract, kidney and reproductive tract, the symptoms of PMS develop. A relationship between the hormones oestrogen and progesterone (relative oestrogen excess) may be one of the factors contributing to this imbalance. Drugs that successfully manipulate or inhibit prostaglandins have been shown to relieve PMS,<sup>23</sup> but have a number of undesirable side-effects and cautions, discussed in Chapter 20 'Drugs and surgery'.

Dietary supplements containing GLA such as evening primrose oil and star flower oil can improve PMS<sup>24</sup> and have far fewer side-effects. They are believed to improve the levels of PGE 1 which reduces the exaggerated effects of prolactin;<sup>25</sup> however, they have not always lived up to expectations and a number of trials failed to show any benefit in relieving the symptoms of PMS.<sup>26</sup>

Suggested doses of between 3000 and 4000 mg of evening primrose oil per day for the entire cycle are often beneficial for PMS, but should be combined with a low animal (saturated) fat diet and an increase in omega-3 oils for best results. In many cases, supplements need to be taken for more than three months before positive results are observed.

### Endometriosis

Women with endometriosis have a prostaglandin and leukotriene imbalance which adversely affects ovulation, fertilisation, embryo development and the motility of the Fallopian tube. The levels of prostaglandins and leukotrienes also influence the degree of dysmenorrhoea.<sup>27</sup>

Women with endometriosis have higher than normal levels of PGF 2 $\alpha$ , but lower levels of PGE 2.<sup>28</sup> The elevated PGF 2 $\alpha$  may contribute to pain. Leukotriene B (LTB 4) attracts white cells to areas of inflammation and is elevated when women have endometriosis.<sup>29</sup> The increased activity of these white cells is thought to contribute to infertility by interfering with either sperm, ovum or the developing embryo.<sup>30</sup>

Rabbits suffering from endometriosis were given fish oils to examine the effects of DHA and EPA on endometriosis. Neither PGE 2 nor PGF 2 $\alpha$  levels increased and the amount of endometriosis was smaller, suggesting that fish oils are useful in treating both the inflammation and the severity of endometriosis.<sup>31</sup>

Both GLA<sup>32</sup> and fish oils<sup>33</sup> reduce the production of LTB 4 and may help with infertility. Star flower, fish and evening primrose oil also improve the ratio of PGE 1 to PGE 2 in white cells,<sup>34</sup> which may contribute to a reduction in inflammation and also improve fertility.

Women with endometriosis who have dysmenorrhoea or problems with fertility will probably benefit more from fish oils than evening primrose oils (or similar). Doses from 2000 and 4000 mg daily are recommended.

### Benign and malignant breast changes

Animal studies have shown that the leukotriene LTB 4 may be involved in the development of tumours of the breast,<sup>35</sup> and that supplements containing linseed oil or fish oils can inhibit both the growth of tumours and the formation of metastasis.<sup>36</sup> Whether this is of practical significance for women is yet to be proved.

Benign breast changes such as premenstrual pain, swelling and increased nodularity, are thought to be related to the inflammatory changes brought about by prostaglandins. The PGE 2 have been shown to increase heat and inflammation in the breast and cause vasodilation. Again an imbalance between oestrogen and progesterone (higher than desirable oestrogen, lower progesterone) has been postulated to cause an oestrogen-directed increase in the synthesis of the inflammatory prostaglandins. A second effect, brought about by inadequate synthesis of PGE 1, is thought to amplify the effects of prolactin on breast tissue, and aggravate swelling and pain.<sup>37</sup>

Oils containing GLA, which selectively enhance the production of the series 1 anti-inflammatory prostaglandins, are prescribed to moderate the effects of prolactin on breast tissue.

# Section D

## Hormonal lifestages

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# 7

## Adolescence

### Key words

androgens  
anxiety depression  
beta-carotene  
chromium  
functional  
hypoglycaemia

menarche  
menorrhagia  
PMS  
premenstrual

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In the years when they are beginning to menstruate, young women experience a range of physical and emotional changes. Some take these changes in their stride and appear not to be affected by them; others have a difficult time coping. Generally, it is not the period itself that causes the problems: the mood swings and physical changes associated with fluctuating hormones have the biggest impact.

The majority of these changes are normal and transitory. Others can be overcome with treatment or altering the lifestyle. This chapter is about signs and symptoms that occur at adolescence; what can be remedied by appropriate self care and which problems may require the assistance of a professional.

### **BODY AND MIND: THE CHANGES**

Menstruation usually begins between twelve and thirteen years, but anywhere between nine and eighteen is considered normal. This is called menarche. Menarche is influenced by inherited factors, but a good diet, plenty of rest and ample exercise are also necessary.

Maintaining a normal body weight is a critical factor. Menstruation starts after a weight of about 47.5 kilograms has been attained, and when the body weight is made up of between 26 and 28 per cent fat.<sup>1</sup>

For menstruation to continue, the weight must be slightly higher than the level at which menstruation commenced. Most women do not drop below this weight unless they become anorexic or seriously ill.

### About nine to eleven years

Physical changes usually start somewhere between nine and eleven years (but between fourteen or fifteen is quite normal).

- Rapid increase in height: The height and consequently weight increase rapidly—often accompanied by clumsiness and alternating bouts of energy and exhaustion. Growth rates are different for all young women and almost all adolescents find these extremely rapid changes awkward and embarrassing. This phase can lead to over- or underweight (not necessarily associated with eating disorders—discussed later in this chapter).
- Changes in body shape: The nipples enlarge, but there is no increase in the size of the breasts; the waist becomes more defined and the hips rounder.
- Growth of pubic hair: Sparse pubic hair appears, which can be a paler colour at first. About two years elapse between the first signs of pubic hair and beginning to menstruate.
- Mood changes: Sudden changes in mood are common such as feeling happy one minute and then sad or grumpy the next (adults have these feelings too, but have had more practice in disguising them). These new feelings might make some young women think that they are going crazy. This entirely normal process is associated with becoming more intensely involved with the world and other people rather than having the more limited focus of a child.

### About twelve to fourteen years

- Changes in body shape: The hips and waist continue to change and the breasts start to develop. The nipples increase in size and become more prominent. The increasing levels of oestrogen cause other changes including enlargement of the labia (vaginal ‘lips’) and the production of vaginal secretions which are clear or slightly whitish.
- Body hair: The pubic hair thickens, becomes darker and coarser. Underarm hair grows about two years after the first pubic hairs became apparent. These changes are related to the normal production of weak androgens (male hormones) by the adrenal glands and the ovaries.

- Skin changes: The skin becomes much oilier, particularly over the chin, nose and forehead, and this sometimes causes pimples. There is a tendency to blush more easily (which passes).
- Changes in mood: It is usual for young women to experience big changes in their moods when they are about to start, or have just started, to menstruate.
- Menstruation: Menstruation starts on average at the age of twelve and a half. Over approximately the first 40 cycles, ovulation and menstruation gradually become more regular. Ovulation does not occur in about 90 per cent of the cycles during the first year after the period starts, and even after four or five years of menstruation, ovulation may not occur during around 20 per cent of the menstrual cycles. The changes associated with menstruation—the cycle, hormones and other physical changes—are described in Chapter 3 ‘Menstruation and the menstrual cycle’.

### About fifteen to eighteen years

- Establishing a regular cycle: Typically, the period becomes more regular and predictable, however, there is usually a wide range of variation in the regularity, heaviness and frequency of menstruation at this age. Some young women have light periods which last for a few days, others might menstruate heavily for more than a week and as a result, can become anaemic.

## WHAT WOMEN NEED TO KNOW

### The menstrual chart

Keeping a record of menstrual patterns can be useful to help a young woman get to know her own cycle. (A menstrual symptom diary is included on page 127, but an ordinary calendar will do just as well.) Day one of the menstrual cycle is counted from the first day of the period, and the last day of a cycle is the day before the *proper* commencement of the next period, not counting any spotting.

Charting helps to predict the mood changes which can occur premenstrually, and can also help to predict the first day of the next period, although initially this will often be quite erratic. If supplements or medication have been suggested to offset menstrual or premenstrual symptoms, keeping good records helps pinpoint the best time to take them, and can also indicate whether they were effective.

It is also useful to chart the number of menstrual days, especially when the period is lasting for more than a week. This is helpful to doctors and natural therapists who can use these records to prescribe accordingly.

## Exercise

Young women are sometimes told that they should not perform a whole range of activities while menstruating, including playing sport, having a bath or washing their hair. This advice originates from the idea that women have to take special care of themselves while menstruating because having a period means being sick. Essentially, though, women should do exactly as they please and whatever feels comfortable when they have their period.

There are two cautions, however. First, getting cold (which may be what the advice to not wash hair while menstruating was all about) can aggravate period pain, and so women who swim may need to be careful about the temperature of the water or the changing rooms. Second, some women experience significantly more pain if they undertake vigorous exercise while they are menstruating. In these instances, exercise is counterproductive and should be stopped. It is certainly not the case that *all* exercise is good for *all* menstruating women.

## Pads or tampons?

When all is said and done this decision comes down to a personal choice. Historically, both pads and tampons have been used as forms of protection—the tampon was written about extensively in history and used to consist of either wool, linen or, in Egypt, rolled papyrus. Both pads and tampons have advantages and disadvantages.

These days pads are thin, absorbent and easy to wear because they have an adhesive strip which attaches them to underwear. They come in a variety of sizes and shapes for heavy days, night-time use, light days and so on, and it is best to experiment with the different shapes and types until a favourite is found.

Some women don't like pads because pads are messy, they think the pad might be visible through their clothes, and they are worried about the odour of their menstrual blood. (Menstrual blood changes in odour when it comes in contact with air.) Odour can be avoided by changing the pad frequently and it is not possible to see the thinner pads through clothing. Some women who have heavy periods find pads much more convenient, and sometimes period pain seems to be aggravated by tampons, making pads a more suitable choice.

Tampons are popular because they are invisible and greatly reduce the possibility of menstrual blood odour. They also make swimming possible during menstruation, which is a distinct advantage if swimming is a favourite sport or if it relieves period pain. For a variety of cultural reasons, some parents do not want their young daughters to use tampons. It can also take some practice to insert tampons correctly.

A tampon *cannot* get lost somewhere inside a woman's body (it is impossible for a tampon to pass through the opening in the cervix), and tampons do not make a woman lose her virginity. The hymen (the membrane which partially covers the vaginal opening until a woman has had sexual intercourse) is not intact when women start to menstruate—otherwise the menstrual flow would not be able to pass through the vagina. The hymen is elastic and stretches to allow a tampon to be inserted. Very slim tampons are also available.

The biggest problem experienced with tampons is inserting them properly. Once in the correct position, a tampon should be hardly noticeable. If discomfort is felt, the tampon should be inserted more deeply in the vagina. The other rare complication from using tampons is toxic shock syndrome.

## Toxic shock syndrome

Toxic shock syndrome (TSS) is a rare condition, but it can have fatal effects which are caused by the release of a toxin from the *Staphylococcus aureus* bacteria (golden staph). The toxin attacks various organs in the body and causes characteristic symptoms including a rash and a high fever. 'Toxic shock' can affect anyone who is infected by golden staph, but the term is most commonly associated with tampon use.

## Risk factors

The exact reasons why some women develop toxic shock syndrome are unknown, although a number of risk factors have been identified.

- Tampon use is strongly associated with the development of toxic shock syndrome, although a few women who have not used tampons have developed the condition, and men and young children can also develop toxic shock syndrome if they have a golden staph infection.
- The absorbency of the tampon may be a factor, but this may be because 'super-absorbent' tampons tend to be left in place for longer which allows time for the bacterial numbers to develop and enough of the toxin to be produced to cause symptoms.
- The type of material used in tampons may encourage bacterial growth. Some researchers believe the absorbent synthetic fibres change the vaginal secretions and allow more bacteria to multiply.
- Women who use tampons for their entire period seem to be at an increased risk of developing toxic shock syndrome. The cause for this is unknown, but again may be related to a vaginal environment which is conducive to bacterial growth.

## Signs and symptoms

- Headaches, sore throat and aches in the joints and limbs, and ‘flu-like’ symptoms are usually the first signs of toxic shock. Typically these start several days after the beginning of the period.
- This is followed by a sudden onset in fever (temperature usually in excess of 39°C) accompanied by vomiting and diarrhoea.
- After about 48 hours, there may be a dramatic drop in blood pressure which causes the symptoms of shock. These are sweating, paleness, dizziness, collapse and sometimes disorientation or loss of consciousness.
- A skin rash often accompanies these symptoms. The skin becomes red and then peels as though it is sunburned.
- Sometimes the kidneys are affected and fail to produce urine.

## Prevention

- Not using tampons will dramatically reduce the chances of developing toxic shock syndrome, but since it is a very rare condition, this is hardly necessary.
- Changing tampons regularly—at least every four hours—may help to reduce the incidence.
- Using the smallest size of tampon that will absorb all menstrual loss in a four-hour time span will reduce the tendency to leave a tampon for long periods of time before changing it.
- The super-absorbent tampons are associated with the highest risk, possibly because of their composition.
- Don’t leave tampons in overnight. A whole night is too long to leave a tampon in place and women who use tampons during the day and pads at night have a lower incidence of toxic shock.
- Toxic shock syndrome became much more prevalent when synthetic fibres were used in tampons and so there is a possibility that natural fibres, such as cotton, may reduce risk. Tampons made from organic and untreated fibres are now sold, but there is not yet proof that they are any better.

## Treatment

Toxic shock syndrome is an acute medical emergency, and women who develop these symptoms should go immediately to a hospital for evaluation. Any tampon should be removed immediately. Toxic shock syndrome is treated with antibiotics and is likely to require admission to hospital. This is *not* a condition to be treated by natural medicine.

## Getting to know what is normal

One of the difficulties about getting periods is knowing what is normal. It’s no use comparing stories with friends because everyone is so

different. Help or advice should be sought if any of the following symptoms are noticed:

- Any sudden changes in the menstrual cycle such as the period becoming erratic when it was once regular; periods becoming suddenly very heavy or very light.
- Excessive pain during or before each period or new and unusual pain associated with the period.
- Abnormally heavy or long periods. An abnormally heavy period means needing to change pads or tampons every two hours; abnormally long is longer than seven days.
- Any unusual spotting between the periods.
- A yellowish or smelly vaginal discharge, or any vaginal itch or soreness.

## **Diet during puberty**

Diet during puberty is a vexed issue. On the one hand there is the tendency for young women to want to ‘go on a diet’ because of body image concerns, while on the other, there is the dramatic increase in the nutrient requirement during this time of rapid physical maturation. It is often a time when girls cut back on sport. The dual aims of maintaining normal weight and getting enough of the vital nutrients can only be achieved by that oldest of combinations—regular exercise and a balanced diet.

The rapid growth rate during this time means a young woman’s mineral requirements escalate dramatically. Zinc, iron, magnesium and calcium are in especially high demand. (Information pages on zinc can be found on page 112, iron on page 248, magnesium on page 361 and calcium on page 199.)

Surveys have shown that up to 85 per cent of women do not get enough zinc.<sup>2</sup> Zinc helps to prevent the development of acne, and may be especially useful when acne is excessively inflamed. It is an important component of collagen and plays a vital role in the metabolism of hormones linked to sexual maturation.<sup>3</sup> It is necessary for the formation of insulin and tends to help prevent sugar cravings and blood sugar fluctuations.

Calcium is essential during puberty because of the rapid growth of bones. A young woman’s calcium requirements increase by 50 per cent (from 800 mg per day to 1200 mg) during these years. Calcium is better absorbed and maintained in bone when magnesium intake is normal. Researchers found that around 40 per cent of women do not get enough magnesium from their diets<sup>4</sup> and about 30 per cent of young women (between 18 and 29) do not get enough calcium either.<sup>5</sup>

Iron deficiency is also common and is associated with anaemia,

fatigue, reduced resistance to infection, dizziness, faintness and poor concentration. Iron requirements increase during adolescence because of the increase in muscle mass and blood volume; and because of the increased requirements associated with menstruation—during a period between 15–30 mg of iron are lost. In general the iron absorption from animal sources is twice that of vegetable sources.

The physical changes can be very taxing on the body and result in episodes of exhaustion. When these occur, it is a good idea to get more rest by going to bed by 10 pm. Energy drinks after school, plenty of vegetables and, of course, limiting junk food, will also help. Follow the diet in Chapter 17 ‘Food for health’ for a balanced eating regime.

## **COMMON PROBLEMS DURING PUBERTY**

### **Mood changes**

Depression and anxiety are the most common mood changes experienced during the years when the menstrual cycle and hormones are becoming established and regular. This can be related to the hormonal fluctuations (somewhat like being premenstrual all the time), or to other factors which become harder to deal with because of the additional stresses of puberty.

Often other people recognise that someone is depressed before the depressed person does. Sometimes the person just feels out of sorts or doesn’t want to do anything, and because of their depression, they find it difficult to understand their own behaviour. Always seek professional advice for the treatment of anxiety or depression. The symptoms of depression might be:<sup>6</sup>

- Feeling sad, tearful or crying easily or crying at things that would not normally cause tears or sadness—while watching TV, for example.
- Finding less or no pleasure in activities that used to be fun or feeling as though these things are boring, too hard or silly.
- Feeling irritable or agitated most of the time with everyone, including the cat.
- Feeling unwell more than usual—for example, suffering from headaches or stomach-aches that are not usual or increasing in frequency.
- Not coping with school work, or being absent from school more than usual.
- Having difficulty with concentration, daydreaming or fantasising excessively about better things/times.
- Feeling bored, tired or sleepy all the time.
- Sleeping poorly, dreaming excessively or having nightmares; being tired during the day and wide awake at night; wanting to sleep all the time or not wanting to get out of bed.



- Not eating properly, tending to miss meals, binge eating, unusual appetite or lack of appetite.

Feeling depressed is the usual response to stress, changes, disappointment or loss. A list of the common causes of depression is included below.

Feelings of anxiety can sometimes be hard to identify. It is common for young women to think that they are being silly, boring, that they're going crazy or 'losing the plot' when in fact they are suffering from anxiety. Most of the time, when the major changes in their lives are put into perspective, they realise that a little anxiety is normal under the circumstances. Some of the common symptoms of anxiety are:<sup>7</sup>

- Feelings of losing control, going crazy, that something traumatic is going to happen, such as someone close may die.
- Fear of unusual things that have never been worrying before, such as going shopping, driving in the car, going out with friends, having to talk in front of the class at school.
- Anxiety attacks with symptoms like rapid heart beat (palpitations) which may be accompanied by dizziness and extreme fear. This might start suddenly and for no apparent reason, such as when trying to get to sleep.
- Experiencing shortness of breath, difficulty taking a deep breath or sighing a lot.
- Trembling and shaking, feeling faint and dizzy.

Like depression, anxiety is a physical and emotional response people can develop, especially when confronted by a succession of new events. It is also fairly common to experience episodes of 'floating anxiety' or 'non-specific dread' that don't seem to be related to any specific event. These feelings can sometimes be associated with physical changes like premenstrual syndrome (see below), but might also be related to the memory of an anxious event.

Sometimes the symptoms of anxiety and depression occur together and the person then has what is called anxiety depression. Depression, anxiety and anxiety depression during puberty are all usually 'reactive', meaning that they occur as a reaction to too many stresses, changes and unsettling events occurring together.

Following is a checklist of the common events that can trigger any of these symptoms. Experiencing even one of these can lead to anxiety and/or depression around puberty.

- A persistently heavy workload at school, especially when there is difficulty keeping up with the work.
- A relationship break-up, or a severe disappointment concerning a close friendship or relationship.
- Failing an exam or getting low marks after working hard on a project.

- Being teased or otherwise targeted at school.
- Death of someone close.
- Continual tension between parents, or between one/both of parents and the adolescent.
- Major family changes or problems, such as separation, divorce, a much-loved brother or sister leaving home, a family member ill or with a drug problem, family financial problems, or unemployment.
- Other upsetting tensions at home.
- Moving house and/or moving to a new school.
- Being unwell or needing an operation.
- A difficult personal crisis.

Sometimes depression can become very serious and the individual might even become suicidal. If this happens, they are less likely to be able to have a reasonable and objective understanding of what is happening, and family members or friends are often the ones who will need to coax the person into getting some professional help. Symptoms might be:<sup>8</sup>

- An obvious personality change, being difficult to get along with or rebellious, or being withdrawn and introverted.
- Severe changes in eating or sleeping patterns.
- Not caring about personal appearance, dressing sloppily and being careless about hygiene.
- Saying or feeling they're a horrible person, that they're not worth having around, that they're poisonous or rotten inside, or that they are the cause of someone else's problems.
- Having an unreasonably low self-esteem, being unable to take praise or feel as though they can achieve anything worthwhile.
- Using/abusing drugs or alcohol, getting 'out of it' to feel better.
- Saying that no one cares about them, that they wish they were dead, that nothing matters any more, generally having a bleak outlook on the world.
- Giving away their treasured possessions, getting their affairs in order.
- Suddenly becoming unreasonably and unrealistically happy after having been depressed for a long time.



#### ■ ■ The medical approach

Some doctors may suggest counselling or may arrange long consultations so they can counsel the patient themselves. Sometimes drugs are necessary, but should only be used as a last resort. The prescription of drugs for depression and psychiatric disorders is a specialty area and it is wise to consult a psychiatrist who is likely to be able to make the best decision about the suitability of drugs for each case. Psychiatrist's fees are covered under the Medicare system.



## The natural therapist's approach

It is not advisable to treat severe depression, anxiety and suicidal feelings with herbs or supplements alone. Referral to a doctor, psychiatrist or counsellor should also be arranged.

The nervines are the group of herbs used and of these the best herb for depression is *Hypericum perforatum*. This herb is known as a nervine tonic and tends to work well in combination with other herbs that have a calming effect.

*Piper methysticum* is excellent for anxiety, and is available through practitioners. Other anti-anxiety herbs are *Verbena officinalis*, *Scutellaria laterifolia*, *Matricaria recutita*, *Passiflora incarnata*, *Zizyphus spinosa*, *Valeriana officinalis* and *Eschscholtzia californica*.

Vitamin B complex is a general nerve tonic especially where stress, overwork or too much study are causing the nervousness. Vitamin B complex is a good idea before exams to maintain mental clarity, especially if exams fall on premenstrual days.



## Self care

Depression and anxiety are very rarely related to just one thing like physical problems or stress, and so it is wise to look at all of the possible contributing causes and not target only one area. Sometimes the stresses aren't going to go away for a long time and it may be necessary to consult a counsellor or therapist for some practical suggestions for coping with the problem.

Sometimes mood swings can be aggravated by, or related to physical problems like PMS (see Chapter 8); or sometimes the physical problems arise as a result of the effects of stress on the body—getting an ulcer is an obvious example. Some of the common physical causes for anxiety or depression might be related to hormonal imbalance, 'burn out' or hypoglycaemia. If this is the case, these will need to be treated as well so that there is an 'all-round' improvement.

### Exercise

LSD—not the well-known hallucinogenic drug, but long, slow, distance exercise—is very useful for improving the response to stress. It is described on page 225.

### Eating well

Eliminate junk food and any foods or drinks which contain caffeine. Follow the hypoglycaemic diet (pages 150–2) if blood sugar problems are contributing to the symptoms.

## Reducing tension and improving sleep

The section on stress in Chapter 10 is well worth reading in conjunction with this chapter. It outlines some self-help advice on reducing tension, improving concentration and how to get better quality sleep.

### Talk it over

Encouraging the person to talk about problems with friends and family is usually a good idea. If friends and family are unhelpful or seem inappropriate, the school counsellor, a trusted teacher or their health-care practitioner may either be able to help or suggest someone who can.

## Hormonal imbalance

The types of feelings women experience when they are premenstrual are very similar to those of anxiety or depression. These are known as PMS. A woman with PMS is likely to have one or more of the following:

- Symptoms which disappear as soon as menstruation commences.
- Symptoms which are only evident in the last part of the menstrual cycle—that is, in the week or ten days before the period starts. Physical symptoms which most women experience when they are premenstrual include breast tenderness, bloated lower abdomen, pelvic discomfort or pain, clumsiness or headaches.

## Hypoglycaemia

Hypoglycaemia, or inappropriate fluctuations in the blood sugar, can lead to feelings of depression and anxiety. Following the hypoglycaemic diet for several weeks will lead to a rapid improvement in symptoms if the mood swings are related to abnormal blood sugar fluctuations.

## Acne

About 50 per cent of young women between the ages of fourteen and seventeen (and about 75 per cent of young men) develop acne. Usually by twenty the problem has cleared up, but sometimes acne continues into later life. Acne is embarrassing and can severely diminish self-esteem so it is advisable to try to prevent it and to treat any sign as quickly as possible.

Acne is not caused by 'dirty' skin, poor hygiene or oily hair on the face. The real causes of acne are related to the increased levels of

androgens (male hormones) around puberty, thickening of the tissue around the openings of pores in the skin, bacteria which grows on the surface of the skin, and inflammation which occurs as a result of the bacterial infection.

The curious thing about acne is that some people have hormonal imbalances, but don't get any pimples. When researchers look at the levels of androgens in the blood if someone has acne and compares these to someone who does not, the levels are the same. This may be related to the individual's sensitivity to androgens—some people's skin just seems to be more likely to respond adversely to androgens.

Another reason that androgens may cause acne is because weak androgens can be converted into stronger ones in the hair follicle. This does not result in large amounts of androgens in the blood—the effect is much more localised—but the increased levels in the skin can cause an increase in sebum production, and acne. This seems to be an inherited trait.



#### ■ ■ The medical approach

Topical applications include retinoic acid (tretinoin or Retin A) for non-inflamed lesions; or lotions containing antibiotics such as clindamycin, for inflamed lesions. An older preparation, benzoyl peroxide, which comes as a cream, gel or wash, is still suggested by some doctors. Newer preparations which contain glycolic acid (often called fruit acid) are gentle skin 'peels' to remove dead skin and keep the pores open.

Sometimes these lotions or creams can cause inflammation of the skin (contact dermatitis) and they should be stopped until the reaction settles down. Reducing the frequency of applications sometimes solves this problem.

Oral treatments for acne include antibiotics or isotretinoin (Roaccutane). The common antibiotics used include tetracycline (Mystelin, Tetrex, Vibra-Tabs, Minomycin) or occasionally erythromycin if pregnancy is a possibility or the patient is allergic to tetracycline. The most common reasons that antibiotics do not work is because they are not given for long enough or are not given at high enough doses. To be effective antibiotics need to be given for at least six to eight months and doses may need to be adjusted if an adequate improvement does not occur. They should be taken half an hour before food to increase their efficacy.

Isotretinoin (Roaccutane) can only be prescribed by a specialist dermatologist: it has a number of common side-effects including cracked lips, facial dermatitis, severely irritated conjunctiva and eyelids, nose bleeds from dry and sore nasal passages and certain forms of eczema. Some people also develop photosensitivity and sunblock must be used to

reduce risk of sunburn. Muscle and joint pains can sometimes occur and rarely, bony outgrowths can develop throughout the skeleton. The blood lipids usually become abnormal, and occasionally the liver enzymes are also affected, but return to normal after stopping the medication. Women taking Roaccutane must be on the Pill or use another suitable contraceptive such as a diaphragm because of the certainty of foetal abnormalities if pregnancy occurs.

Although there are very severe side-effects from this drug, it has made the treatment of serious acne much more reliable. Prior to this drug, scarring and cystic acne were difficult to treat with antibiotics alone and adolescents were faced with prolonged and serious acne that could not be treated effectively.



### The natural therapist's approach

The natural therapist's approach combines diet, supplements, hygiene, hormone regulation, skin healing and bacterial control. Different combinations of treatments seem to be effective for different people, so getting it right can be complex.

Eliminating one supposedly problematic food group, like chocolate or sugar, from the diet has been shown time and again to be ineffective in the treatment of acne. But comprehensive diet changes are not a waste of time—they do, however, have to take several factors into consideration.

The diet should include plenty of fresh fruit, vegetables and fibre, but be low in fat and refined sugar. Foods which have high levels of beta-carotene, such as yellow and orange fruit and vegetables and dark green leafy vegetables, and zinc should be included to reduce inflammation, assist with healing and to help regulate hormone levels.

Zinc seems to be very useful in acne, especially where the lesions are excessively inflamed. This is assumed to be related to the general wound-healing properties of zinc, but this mineral also has diverse effects on hormone levels including normalising oestrogen production and reducing excessive androgen levels.<sup>9</sup>

Chromium, from brewer's yeast, improves acne.<sup>10</sup> Yeast products can aggravate, or occasionally cause problems with vaginal candida (thrush) and gut disturbance from yeast overgrowth, especially if antibiotics or the Pill are taken at the same time. Giving brewer's yeast with yoghurt prevents these problems from developing.

Acne that worsens just prior to the period is often helped by vitamin B<sub>6</sub>, either alone, or better still with B complex or zinc. Some women take 50–100 mg of vitamin B<sub>6</sub> with 1 teaspoon of brewer's yeast in the week or ten days prior to their period and find this regime very useful.

A number of herbs are routinely prescribed by herbalists for acne. These include *Echinacea angustifolia*, *Calendula officinalis* and *Arctium*

*lappa*. *Vitex agnus-castus* is also useful when there is severe acne associated with hormonal irregularities, but should only be professionally prescribed.

Antibacterial face washes containing tea-tree oil (such as Blackmores' Tea-Tree Face Wash) are useful. Some people develop a contact dermatitis from tea-tree oil products and will need to stop using them. A good homemade face pack can be made from 2 teaspoons yoghurt, 1 teaspoon honey and 1 teaspoon lemon or orange juice. For skin that is very dry, add a drop of olive oil. Apply to the face for 30 minutes, and then wash off with warm water.

Stress can aggravate acne, perhaps because stress can disrupt the normal hormonal balance (see Chapter 10). Following the ideas for stress relief may help to improve acne that worsens during difficult times.

## Menstrual problems

### Heavy bleeding and erratic cycles

Very heavy periods (menorrhagia) which occur for many months can lead to anaemia. The cause of the problem should be established before any treatment is started. Usually the history (the signs, symptoms and events that accompany the complaint) are sufficient and a physical examination is not needed.

Menorrhagia and erratic cycles are usually caused by hormonal fluctuations and erratic ovulation. Very rarely, a congenital blood-clotting disorder—von Willebrand's disease—is diagnosed for the first time during adolescence because it causes menorrhagia.

After a few years, when hormone production is more reliable, the cycle will develop its own rhythm without any external interference. It is rarely necessary to interfere with ovulation—either to make it more regular with herbs, or to stop it altogether with the Pill (although doctors often suggest the Pill for heavy bleeding). Because stress can delay ovulation, measures to reduce stress might also be appropriate (see Chapter 10).

The sorts of natural remedies outlined in the section on functional menorrhagia (Chapter 11) can be used to control symptoms when needed. *Vitex agnus-castus* is not appropriate for adolescent menorrhagia, except in a very limited number of cases. *Never* self-prescribe this herb because it requires a lot of skill and knowledge to get the dose and timing right.

### Period pain

Ginger tablets, commonly sold for travel sickness, can help with period pain. They are easy to take and are available in blister packs

(Blackmore's Travel Calm Ginger™). Some young women find two tablets (400 mg) 3–4 hourly are as effective as conventional pain killers. Period pain is discussed in Chapter 14.

## **ZINC FOR GROWTH AND DEVELOPMENT**

### **Sources**

Oysters, fresh	45.0–75.0	Peanuts	3.0
Clams	21.0	Chicken, dark meat	2.85
Wheat bran	16.0	Walnuts	2.25
Wheatgerm	13.0	Bread, wholewheat	1.65
Brazil nuts	7.0	Shrimp or prawns	1.15
Ginger root, dried	7.0	Egg, whole	1.10
Meats, muscle	4.5–8.5	Milk, low-fat	0.75
Parmesan cheese	4.0	Oatmeal, cooked	0.5
Peas, dried	4.0	Carrots, raw	0.5
Hazelnuts	3.5	Sardines	3.0

### **Deficiency signs and symptoms**

- Slow growth
- Infertility/delayed sexual maturation
- Hair loss
- Skin conditions of various kinds
- Diarrhoea
- Immune deficiencies
- Behavioural and sleep disturbances
- Night blindness
- Impaired taste and smell
- Impaired wound healing
- White spots on fingernails

### **Conditions which may be caused by zinc deficiency**

- Frequent or severe infections
- Many skin problems
- Delayed wound healing
- Post-operative complications
- Congenital malformations
- Psychiatric disorders
- Dandruff, hair loss
- Impaired glucose tolerance
- Connective tissue disease
- Reduced appetite

### **Inadequate dietary intake of zinc may be due to**

- Anorexia nervosa, fad diets, weight-reducing diets
- Exclusion diets for food allergies



- Strict vegetarianism
- A restricted protein diet
- Long term intravenous therapy or nasogastric tube feeding
- Alcoholism

**Zinc absorption may be impaired because of**

- High fibre diets
- Iron tablets
- Coeliac disease
- Low or absent gastric acid levels
- Alcoholic cirrhosis
- Pancreatic insufficiency
- Advanced age when zinc absorption is diminished

**Zinc requirements are increased in the following conditions**

- Burns, starvation, diabetes mellitus
- Diuretic use
- Use of penicillamine
- Chronic blood loss or renal dialysis
- Exfoliative dermatitis, excess sweating
- Irritable bowel syndrome, intestinal parasites and hookworm
- Alcoholism
- Liver disease, including viral hepatitis
- Chronic diarrhoea and ileostomy fluid loss
- Surgery and trauma

**Specific conditions with an increased need**

- Cancers
- Growth spurts and puberty
- Pregnancy and lactation
- Psoriasis

# 8

## The menstruating years and PMS

### Keywords

aldosterone	latent
bitters	hyperprolactinaemia
cortisol	mastalgia
dopamine	norepinephrine
endorphin	(noradrenaline)
epinephrine	prolactin
functional	prostaglandin
hypoglycaemia	phyto-oestrogen
glucose tolerance test	

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### THE PREMENSTRUAL SYNDROMES (PMS)

PMS is the term used to describe a number of symptoms that collectively occur during the luteal phase of the menstrual cycle and abate with the onset of the period or very soon afterwards. This complaint affects a large segment of the female population during their reproductive years.

Physical discomfort and changes in mood and behaviour are not peculiar to the modern woman; they have been associated with menstruation since ancient times. Originally, these sorts of symptoms were thought to have quite bizarre origins. One of the more colourful was the theory of the ‘wandering womb’—the womb was believed to wander through the body looking for a baby. While on its journeys, it might cause symptoms of ‘hysteria’ (*hystera* is Greek for uterus) and suffocation, if it occupied the chest, or a choking sensation if it lodged in the throat. Of course, when back in its rightful position, the symptoms would resolve and menstruation would start, which added further fuel to the idea of the wandering womb.

There are a number of characteristics of classical PMS. Symptoms are only seen during those cycles when ovulation has occurred, are ‘cured’ by menstruation, and also stop following surgically or medically induced menopause. For a diagnosis of PMS to be made, there must be a symptom-free interval during the follicular phase of the menstrual cycle. A woman can develop symptoms at any time between puberty and menopause, but women tend to begin to seek treatment more often in their early to middle thirties. Obstetric and gynaecological events such as childbirth or a diagnosis of endometriosis are often anecdotally linked to the onset of symptoms. While one or several hormonal factors have been suggested as the cause, tests have not been developed to identify which group of hormones create the symptoms, and many of the explanations remain speculative.

One of the biggest changes in the diagnosis and treatment of PMS came about in 1983 when psychiatrists defined the diagnostic criteria for what was then called late luteal phase dysphoric disorder, experienced by the small subset of women who presented with severe PMS. This name was later changed to premenstrual dysphoric disorder (PMDD) and has been estimated to affect between 3 and 8 per cent of women.<sup>1</sup> With the differentiation between PMS and PMDD came more focused treatments for those women with PMDD and the general trend in the direction of specific anti-depressants for this complaint.<sup>2</sup>

For women and their clinicians it is essential to differentiate between the three syndromes that can worsen premenstrually—PMS, the more severe premenstrual dysphoric disorder (PMDD), or premenstrual magnification of a pre-existing complaint such as depression or irritable bowel syndrome. Many other conditions, such as diabetes, anaemia, abnormal thyroid function or other endocrine abnormalities, might mimic some of the features of PMS without actually worsening premenstrually and should also be excluded as a cause of the symptoms.

## **The symptoms**

Despite a lack of understanding of the causes of PMS, a great deal is known about how it makes a woman feel. A staggering 150 different symptoms have been recorded in association with PMS. Luckily, no one gets all of them at once. Most women have a group of complaints that recur, but sometimes a new symptom might be apparent. Symptoms might also change after a major biological event—such as the birth of a child—and women tend to develop different types of symptoms as they approach menopause. For example, headaches can become more prevalent.

But it is the timing, rather than the exact nature of symptoms, that is the most important indicator of PMS. The diagnostic criteria for PMS is that symptoms must be absent in the first week after menstruation

and before ovulation; and that the onset of the period must lead to relief in the severity of symptoms. If a woman does not report this pattern, other causes of her symptoms must be sought.

The most common and recurring physical and emotional symptoms are shown in table 8.1.

**Table 8.1 The common symptoms of PMS**

<b>Physical</b>	<b>Emotional and mental</b>
<ul style="list-style-type: none"> <li>• Abdominal distension</li> <li>• Breast swelling</li> <li>• Headaches</li> <li>• Abnormal appetite</li> <li>• Fatigue and weakness</li> <li>• Cyclic weight gain</li> <li>• Fluid retention</li> <li>• Premenstrual acne</li> <li>• Joint pains and/or backache</li> <li>• Pelvic discomfort or pain</li> <li>• Change in bowel habit</li> <li>• Palpitations</li> <li>• Dizziness or fainting</li> <li>• Altered libido</li> </ul>	<ul style="list-style-type: none"> <li>• Nervous tension</li> <li>• Mood swings</li> <li>• Irritability</li> <li>• Anxiety</li> <li>• Depression</li> <li>• Tearfulness</li> <li>• Angry outbursts</li> <li>• Confusion</li> <li>• Aggression</li> <li>• Lack of concentration</li> <li>• Forgetfulness</li> <li>• Insomnia or excess sleepiness</li> </ul>

## **Incidence**

PMS affects a large segment of the female population. Many women do not consult practitioners for help, often believing that there is little to be done. Cross-cultural studies have indicated changes in the frequency of symptoms, but not the in type: Japanese women rarely complain of breast symptoms; Nigerians often complain of headaches;<sup>3</sup> Anglo-Australian women have more psychological symptoms, but Greek, Vietnamese and Turkish women living in Australia have more physical symptoms.<sup>4</sup>

## **THEORIES ABOUT THE CAUSES OF PMS**

The many theories of causes of PMS include abnormal hormone levels, discrepancies in prostaglandins or neurotransmitters, nutrient deficiencies or inappropriate diet. In most cases, there has been an attempt to link these causes with treatment recommendations. Psychological factors have been suggested and recently, there has been a shift of focus in favour of a multi-factorial model that incorporates hormonal, dietary, lifestyle and emotional factors as the cause of the symptoms that develop. The symptoms and perhaps the cause also change according

to physiological events like menarche and menopause, or after the birth of a child.

Currently, however, management of PMS cannot be aimed at rectifying a well-defined abnormality. Despite many thousands of researchers looking for an explanation we are no are no closer to finding an answer or answers that can explain all of the physical and emotional changes that a woman experiences premenstrually.

With the huge range of presenting symptoms that go under the general heading of PMS, it is very likely that this is a complex multi-factorial condition with a number of interrelated causes. Some of these causes suggest treatment possibilities; some are likely to be academic. The continuing lack of consensus on either cause or treatment leaves the onus on practitioners to devise a regime that best suits the constellation of symptoms described by each woman.

## **Hormonal factors**

### **An abnormal reponse to normal hormone fluctuations**

Symptoms may be related to central neurotransmitter changes that occur in response to normal fluctuations in hormone levels. This theory is described in more detail in the following section on central neurotransmitters. It explains why hormone abnormalities have been difficult to elucidate; and why therapies designed to alter hormone levels or stop ovulation can be useful to reduce symptoms of PMS.

Premenstrual dysphoric disorder (PMDD) is also thought to be caused by alterations in central neurotransmitters, especially serotonin, triggered by changes in the normal circulating levels of oestradiol and progesterone.<sup>5</sup> The same theory has been proposed to explain the mood changes seen when women develop PMS during the peri-menopause. Whether these changes are responsible for all mood changes seen when women have PMS is unknown.

### **Oestrogen/progesterone ratio imbalance**

This theory proposes that oestrogen is too high in relation to progesterone. One study showed a relationship between worsening PMS symptoms and high levels of both oestrogen and progesterone in the luteal phase. When oestrogen and progesterone were lower, more positive moods were reported. The authors postulated that oestrogen excess increased feelings of irritability, aggressiveness and anxiety by increasing the availability of noradrenaline in the brain.<sup>6</sup>

The fluid retention of PMS was thought to be caused by progesterone deficiency. Progesterone inhibits the activity of aldosterone which

promotes the retention of sodium and water. When progesterone levels are low, fluid retention worsens.

This theory has largely gone out of favour because studies of hormonal profiles when women have PMS have been conflicting, showing either lower progesterone,<sup>7</sup> higher oestrogen;<sup>8</sup> or that both oestrogen and progesterone levels were normal.<sup>9</sup>

## Progesterone receptors

Another theory is that PMS is not caused by abnormal hormone levels, but by an abnormal *response* to normal hormone levels.<sup>10</sup> In particular, the progesterone receptors, may be faulty and unable to transport the progesterone into the cell.<sup>11</sup> (See also pages 73–5.) The adrenal hormones, norepinephrine and epinephrine, which are elevated during stress, also block these receptors and make them even less responsive to progesterone.<sup>12</sup>

Progesterone receptors are found in all areas susceptible to the symptoms of PMS, including the brain, nose and respiratory passages, uterus, skin, eyes and breasts; many of the progesterone receptors are dependent on oestrogen for their initial activation, suggesting a receptor ‘priming’ problem. PMS also tends to worsen around times of hormonal chaos (puberty, menopause and following pregnancy) when the oestrogenic activation of the progesterone receptors is likely to be inadequate.<sup>13</sup>

## The adrenal hormones

Abnormal communication between the adrenal gland, the hypothalamus and pituitary glands may contribute to PMS. The adrenal gland secretes the hormones cortisol and aldosterone which seem to be implicated in some of the common symptoms.

Cortisol is often elevated during depression and anorexia nervosa, but studies on depressed women with PMS indicated that they tended to have a *lower* than normal level of this hormone.<sup>14</sup> This has been related to the intermittent and cyclical nature of PMS—when the hypothalamic-pituitary unit sends continual messages to the adrenal gland as occurs in depression; for example, the level of cortisol increases; but when the messages only occur some of the time during the menstrual cycle, the levels of cortisol remains lower than normal.<sup>15</sup>

The hormone aldosterone maintains normal levels of sodium and water in the body and plays an important role in the regulation of blood pressure and fluid balance. It has been implicated in the fluid retention of PMS.

Stress can affect aldosterone secretion by triggering the pituitary secretion of the adrenocorticotrophic hormone (ACTH), which stimulates an increased secretion of hormones from the adrenal gland. Stress (and severe blood loss) also trigger a chain of events (known as the renin-angiotensin system) which starts with the production of an enzyme in the kidney (renin) and also culminates in an increased production of aldosterone.

Magnesium deficiency (to be discussed later) and low progesterone (already discussed) also influence the activity of aldosterone. Oestrogen also has an effect—when oestrogen levels are high, aldosterone levels also increase, adding weight to the oestrogen to progesterone ratio imbalance theory that suggests fluid retention occurs because of changes in aldosterone levels secondary to low progesterone levels.

Despite the apparent validity of the aldosterone theory, it has been difficult to verify by testing aldosterone levels. Some women were shown to have increased urinary excretion of aldosterone premenstrually, but their blood levels were no different from those of control women.<sup>16</sup>

## **Prolactin**

The hormone prolactin is thought to cause some of the symptoms of PMS, particularly breast soreness and swelling. Prolactin is secreted by the pituitary gland and is normally elevated in breastfeeding women. Women with PMS are believed to develop an excessive sensitivity to normal prolactin levels. The term 'latent hyperprolactinaemia' has been coined to describe this state.

Again, however, the picture is unclear, and although some of the drugs and herbs used for the symptoms of PMS influence prolactin levels, no studies have conclusively shown that the prolactin levels of women with PMS are dramatically higher than in other women.<sup>17</sup>

## **Central neurotransmitters**

### **Serotonin, noradrenaline and dopamine**

Ovarian hormones have an effect on many neurotransmitters in the brain, but interactions between oestrogen, progesterone and serotonin, noradrenaline and dopamine are of most interest in PMS. Serotonin regulates mood and a number of other functions, including memory, pituitary hormone secretion, appetite and sexual urges. Depleted levels increase feelings of depression. Noradrenaline is involved in the expression of vigilance and motivation, and high levels can induce feelings of

hostility and irritability. Together, serotonin and noradrenaline have effects on anxiety, irritability, pain, cognition, mood and emotion. Dopamine improves feelings of relaxation and mental alertness, but when levels are low, anxiety, irritability, tension and mood swings are likely to result.

Oestrogen and progesterone receptors are found in serotonin-producing neurons in the brain. Neuronal growth, as well as all of the functions of the serotonergic pathways, is sensitive to the presence or absence of these ovarian hormones.<sup>18</sup> Women with PMS may have abnormal functioning of the serotonergic system, which, at least some of the time, seems to be related to lower serotonin levels and altered serotonin transmission.<sup>19</sup>

Oestrogen increases the production rate and receptor density of serotonin, as well as that of dopamine,  $\beta$ -endorphins and noradrenaline, while progesterone may have the opposite effect and reduce these neurotransmitters.<sup>20</sup> In part, this seems to be related to the effects of oestrogen and progesterone on monoamine oxidase (MAO) such that oestrogen decreases, while progesterone increases, MAO activity. In the presence of high levels of oestrogens, the decreased activity of MAO reduces the catabolism of neurotransmitters and thus increases their availability in brain centres; conversely, high levels of progesterone (and progestogens) reverse this effect.

Oestrogen is also believed to enhance the deactivation of dopamine,<sup>21</sup> and this may be another mechanism whereby luteal phase hormone changes can affect mood. Dopamine is also known as a prolactin inhibiting factor because of its effect on prolactin. This raises the possibility that there is an interaction between breast discomfort, prolactin, dopamine and oestrogen. Other aspects of central nervous system physiology, including receptors for GABA as well as receptors for the different metabolites of progesterone, and the neurotransmitter glutamate are also responsive to cyclical variation in oestrogen and progesterone, and may be collectively or independently responsible for dysphoria and PMS symptoms.<sup>22</sup>

Many of these theories remain speculative, and interest has focused on serotonin and the treatment possibilities seen with the use of SSRIs. The normal fluctuations in oestrogen levels that occur in the second half of the cycle are thought to enhance or even trigger the abnormal functioning or transmission of serotonin in susceptible women. As already described, increasing levels of oestrogen in the luteal phase could also inhibit the deactivation of noradrenaline and influence serotonergic pathways, thus contributing to symptoms of heightened mood such as aggression, irritability and anxiety and lead to the alterations in mood seen in PMS. Declining oestrogen during peri-menopause seems to lead to lower levels of serotonergic activity, which might contribute to the depression and mood changes that are common during this phase.



## Endorphins

Endorphins are natural opiates produced in the brain which can elicit a sense of well-being, but when too low may cause PMS. Opiate and endorphin withdrawal cause similar symptoms to PMS and provide an attractive explanation for some of the seemingly diverse and unrelated symptoms seen when women are premenstrual.<sup>23</sup>

Endorphins may also regulate the release of pituitary hormones.<sup>24</sup> When endorphin levels are high, the levels of luteinising hormone are low, but when a drug like the opiate antagonist naloxone is given, LH levels increase,<sup>25</sup> suggesting an opioid chemical in the pituitary is affecting the production of gonadotropins.

## Other factors

### Prostaglandins

The symptoms of PMS occur in many parts of the body and are similar to the symptoms caused by the actions of prostaglandins. As a result, prostaglandins have become guilty by association without a mechanism of action having ever been proven.<sup>26</sup> Therapies that successfully manipulate<sup>27</sup> or inhibit<sup>28</sup> prostaglandins can relieve PMS, adding more fuel to the theory.

### Candida

Candida overgrowth (also known as systemic candida or candidiasis) is believed to cause symptoms of PMS because of the toxins that the yeasts produce in the bowel. This is a very popular theory amongst some natural therapists, but is difficult to validate, and a mechanism for the purely cyclic nature of PMS has never been adequately explained. Yeast overgrowth could occur, however, because of the hormonal imbalance associated with changes in oestrogen levels. If so, then candida is only one of many syndromes that can arise as a result of these imbalances.

## Nutrients

The popular theory that nutrient deficiencies cause PMS has not been substantiated. Deficiencies of vitamin B<sub>6</sub>,<sup>29</sup> vitamin E,<sup>30</sup> and vitamin A<sup>31</sup> were not found amongst PMS sufferers. This does not necessarily imply a lack of effect—nutrients taken at larger than dietary doses are capable of improving symptoms of disease and seem to improve PMS, and some

nutrients may moderate imbalances in hormone levels or rectify other problems.

## Vitamin B<sub>6</sub>

Vitamin B<sub>6</sub>, or pyridoxine, is one of the most popular treatments for PMS and is believed to improve many of the abnormal hormone levels associated with it.

Vitamin B<sub>6</sub> improves depression and anxiety associated with the use of the Pill,<sup>32</sup> and because of this a role was assumed for depression in PMS. It is also necessary for the formation of serotonin and dopamine, which reduce levels of the hormones prolactin and aldosterone associated with breast pain and fluid retention.<sup>33</sup> Low B<sub>6</sub> levels may be associated with a relative deficiency of dopamine, which may lead to feelings of anxiety and irritability.<sup>34</sup>

Vitamin B<sub>6</sub> is a co-factor in the production of essential fatty acids and the series 1 prostaglandins, and is also known to normalise low intracellular magnesium levels in women.<sup>35</sup> Finally, a B<sub>6</sub> deficiency increases the responsiveness of oestrogen-sensitive tissues making them more sensitive to the proliferative effects of oestrogen.<sup>36</sup>

Despite these hypotheses, numerous studies have failed to show a 'better than placebo' result from administration of vitamin B<sub>6</sub>. The ambiguous results may have been the result of questionable trial designs which failed to include enough women or to give B<sub>6</sub> at large enough doses or for long enough, and did not differentiate between women who had PMS and those who had other cyclic mood alterations.

Vitamin B<sub>6</sub> given at high doses (between 2 and 6 g for more than twelve months<sup>37</sup>) can cause sensory neuropathy (a type of reversible nerve damage) which has also dampened enthusiasm for its use.

On the positive side, some larger studies have shown a positive effect with B<sub>6</sub> in doses ranges from 40 to 200 milligrams daily,<sup>38</sup> or when 300 milligrams is given in conjunction with other nutrients and a healthy diet.<sup>39</sup> At these doses, and for short periods of six months or less, sensory neuropathy has not been seen.<sup>40</sup>

## Calcium

In one study calcium supplements relieved symptoms of water retention, mood changes, food cravings and pain in women with PMS;<sup>41</sup> and in another, calcium with vitamin D improved menstrual migraine.<sup>42</sup> Calcium is an important supplement and steps should be taken to ensure that a woman is consuming the recommended daily intake for her age. In our clinic we find that women generally consume no more than 500 mg of calcium as an average daily intake; and often around 300 mg

when they are dieting or have eliminated dairy products from their diets. Supplements are often necessary to ensure adequate intake.

## Magnesium

Magnesium deficiency has been associated with depression<sup>43</sup> and depleted levels of dopamine.<sup>44</sup> Dopamine improves feelings of alertness and relaxation, but low levels lead to tension, irritability and anxiety. Magnesium deficiency can also cause increased aldosterone secretion and fluid retention but, in a strange twist, aldosterone increases magnesium excretion via the kidneys. As a result, bigger and bigger losses of magnesium lead to increased aldosterone production and so on. Magnesium levels are best reflected by testing the red blood cell rather than serum levels.<sup>45</sup>

Magnesium is also necessary for normal sugar metabolism. A deficiency leads to increased insulin secretion<sup>46</sup> and may cause blood sugar instability premenstrually.

Low magnesium may be related to the diet. Magnesium absorption may be reduced by excessive consumption of dairy products, and excretion is increased by refined sugars. Some women with PMS were found to eat more dairy products and refined sugars than non-sufferers.<sup>47</sup>

PMS sufferers have pronounced premenstrual fluctuations in their magnesium levels,<sup>48</sup> and magnesium supplements reduce PMS symptoms such as aches and pains, depression, irritability, mood swings and fluid retention.<sup>49</sup> Magnesium deficiency has been shown to be more prevalent amongst women with menstrual headaches and migraines, particularly when calcium levels are relatively high in relation to magnesium.<sup>50</sup> In fact, magnesium is one of the unsung heroes in the treatment of PMS, and it invariably helps with symptoms. An information page on magnesium is included on pages 361–2.

## Vitamin E

Vitamin E improves benign breast disorders and pain,<sup>51</sup> and also improves tension, irritability, incoordination and other physical symptoms associated with PMS.<sup>52</sup> Doses between 150–600 IU are beneficial. While the mechanisms of action are not known, vitamin E can modulate the production of prostaglandins and contribute to an overall anti-inflammatory activity. Vitamin E may also improve the oestrogen to progesterone ratio in women with mammary dysplasia.<sup>53</sup>

## Vitamin A

Large supplemental intakes of vitamin A have been linked with improved PMS symptoms since at least 1937.<sup>54</sup> The reasons given for vitamin A helping the symptoms of PMS range from inactivation of the hormones thyroxine and oestrogen in the liver to a direct anti-oestrogenic effect.<sup>55</sup> Large doses can quickly result in vitamin A toxicity and are toxic during pregnancy. They should only be taken under strict supervision. Recent trials have included vitamin A as a component of treatment and in much smaller (and safer) doses.<sup>56</sup>

## Omega-6 essential fatty acids (EFAs)

Evening primrose and star flower oil have been the subject of numerous clinical trials which have yielded ambiguous results. These nutrients do not seem to work in isolation and require adequate levels of zinc, magnesium, and vitamins C, B<sub>3</sub> and B<sub>6</sub>.<sup>57</sup> In fact, many of the reported successes of evening primrose oil occurred when women took either B<sub>6</sub> or a multivitamin at the same time.<sup>58</sup> EFAs' role in PMS is discussed on page 93.

## Diet

### Blood sugar levels

PMS is often associated with symptoms of hypoglycaemia, such as sugar cravings; and with faintness, weakness and irritability when meals are delayed. Research in the 1940s and 1950s showed that women with PMS frequently had an abnormal glucose tolerance test (GTT) premenstrually and a normal GTT after the period.<sup>59</sup> Some researchers have suggested that this change in glucose tolerance may be linked with the luteal rise in oestrogen levels;<sup>60</sup> others have proposed that progesterone cannot be transported into cells which do not contain sugar, and that progesterone levels drop because breakdown speeds up after a large meal.<sup>61</sup> Later research has been unable to demonstrate a hypoglycaemic change amongst premenstrual women. Diets like the hypoglycaemic diet on pages 149–52 improve symptoms of PMS, but this may be more because of a healthier eating regime than any change in blood sugar regulation.

## Psychological factors

### The biopsychosocial model of PMS

The biopsychosocial (biological, psychological and social) model of PMS proposes that biochemical changes are the essential first step in its development, but that both social and psychological factors also have an impact.<sup>62</sup> Under this model, women become symptomatic when the appropriate social or psychological stressors ‘tip the scales’ and increase the individual’s vulnerability to hormonally induced changes in neurotransmitters.

This model comfortably accommodates the intermittent nature of the PMS experienced by some women. The belief is that in symptomatic months, stressors are sufficient to bring about problems with neurotransmitters and therefore lead to PMS, while in less stressful months hormonal changes are not in themselves sufficient to elicit these symptoms. Treatment relies heavily on managing stress (rather than emphasising the regulation of hormonal imbalances) with lifestyle changes that improve the sense of well-being such as exercise, yoga, tai chi, meditation and taking time to ‘smell the roses’.

### Depression

Depression has been described as the most commonly encountered women’s health problem in the Western world.<sup>63</sup> Two observations have raised the possibility that PMS is a variant of depressive illness. First, there appears to be a relationship between prior depressive illness and the incidence of PMS; as well, many depressed women report PMS symptoms.

An episode of major depressive illness increases a woman’s chances of developing PMS and PMDD,<sup>64</sup> and an association has been observed between mood changes at menopause and a prior history of affective disorder. Many women who have had post-natal depression develop PMS with mood changes, or even PMDD, when menstruation recommences.

On the other hand, women who are anxious and/or depressed report more PMS symptoms, and large numbers of women with PMS have been found to be moderately or severely depressed.<sup>65</sup>

Post-menopausal women report fewer episodes of depression, however, indicating that hormone fluctuations play a role. In addition, a study that divided women into three groups—a ‘pure’ PMS group, a group with premenstrual aggravation of pre-existing depression and a ‘non-PMS’ group—found that the pure PMS group had fewer incidents of prior depression and exhibited less neurosis than the premenstrual

aggravation group.<sup>66</sup> This indicates that depression and PMS might co-exist but are not necessarily related, and that premenstrual aggravation of depression should be considered as a distinct entity (see pages 139–40).

## **Genetic factors**

Genetics may influence the tendency for women to develop PMS. In twin studies there is a high concordance rate amongst identical twins when compared with non-identical (fraternal) twins and other siblings.<sup>67</sup> There also seems to be a familial link to PMS and to other illnesses such as major depression.

## **DIAGNOSIS**

There are no blood tests that can diagnose PMS. The best method of diagnosing probable PMS is to use a prospective menstrual symptom questionnaire which categorises the classical symptoms (see Table 8.2). The questionnaire should show the typical variations in timing that suggest PMS—symptoms are absent for the week following the period, but appear at any time in the two weeks preceding menstruation, and then decline at the beginning or in the first days of the period. Three distinct symptom groups have been described. Some women report more symptoms around ovulation and the week after; others are symptomatic in the premenstrual week only; while yet others report symptoms from ovulation through to the first days of the period. Symptoms should recur during at least two menstrual cycles. A completed menstrual symptom diary that does not reveal this pattern is indicative of diagnoses other than PMS.

Merely asking a woman to recollect her PMS symptoms is unlikely to give a reliable impression of the severity of PMS, or to indicate whether she has PMS or another complaint—some symptoms are likely to be forgotten, others to be overstated and yet others assigned less importance than they should have.

The menstrual symptom questionnaire has benefits in addition to its diagnostic value. It can be used to assist a woman come to terms with a diagnosis other than PMS because of the visual evidence that symptoms are not actually becoming worse before the period. On the one hand, a woman can use the questionnaire as a means of establishing times when symptoms are likely to be severe and use this to change her lifestyle appropriately, either by adopting the recommended dietary and other changes, or by scheduling fewer activities to help minimise stress or other influences that might be exacerbating her symptoms.

**Table 8.2 Menstrual symptom questionnaire**

NAME: \_\_\_\_\_ AGE: \_\_\_\_\_ MONTH: \_\_\_\_\_

Date																																									
Day of cycle	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36					
Menstrual flow																																									
<b>PMS with mood changes</b>																																									
A {	Nervous tension																																								
	Irritability																																								
	Anxiety																																								
	Insomnia																																								
	Crying/Sadness																																								
B {	Depression																																								
	Social withdrawal																																								
↑	Lack of interest in life																																								
	<b>PMS with food cravings</b>																																								
	Craving sugar/carbs																																								
	Headache/migraine																																								
	Irritability if hungry																																								
	Fatigue																																								
<b>PMS with fluid retention</b>																																									
	Breast fullness																																								
	Abdominal bloating																																								
	Weight gain																																								
	Swollen hands & feet																																								
<b>PMS with pain</b>																																									
	Period pain																																								
	Breast pain																																								
	Aches and pain																																								
<b>PMS with depletion</b>																																									
}	Tiredness																																								
	Mental fatigue																																								
	Hot flushes																																								
	Headaches/migraines																																								

**Grading of menstruation**

- 0—none
- 1—slight
- 2—moderate
- 3—heavy
- 4—heavy and clots

**Grading of symptoms**

- 0—none
- 1—mild—only slightly aware of symptom
- 2—moderate—aware of symptom, but does not interfere with activities

- 3—severe—continually aware of symptom, but not disabling
- 4—very severe—disabling and unable to function

## TREATMENT

For the past 50 years or more, most treatment recommendations for women with PMS have been developed to reflect a theoretical cause. These might include, for example, hormones for a hormonal imbalance or supplements for a nutrient deficiency; essential fatty acids for problems with prostaglandins; or anti-depressants for abnormalities in central neurotransmitters. However, because none of these irregularities individually gives rise to the constellation of symptoms that make up PMS, and because many of the proposed causes have been found to be implausible, treatment recommendations in recent years have tended to focus more on symptoms rather than on an evidence based approach.

In addition, the underlying causes seem to be different for a number of sub-groups of women with PMS and treatments may need to be adapted accordingly. For example, women in the peri-menopause seem to experience more mood changes, which may occur in relation to decreasing levels of oestrogens; women who have experienced post-natal depression seem to have a heightened tendency to PMS and PMDD, women with pre-existing depressive or other mood disorders may become worse around the premenstrual weeks. All of this points to a need for consulting practitioners to take the constellation of presenting symptoms and the possible underlying causes into account for each and every woman and then devise a treatment that will effectively improve that woman's condition.



### ■ ■ The medical approach

The medical treatment of PMS either concentrates on symptom relief or on the manipulation of the hormonal axis. As symptom relief is not an acceptable option for many women and hormonal manipulation frequently carries many unwanted risks, many medical practitioners adopt a conservative approach which comprises some or a number of the recommendations listed below in 'A natural approach', and suggest drug therapy only for those women who do not respond to these safer methods.

Many hormonal medications are used in PMS: some to stop ovulation, others to improve the hormonal profile. These drugs include the Pill, GnRH agonists, Danazol, oestradiol patches or implants, progestogens and progesterone. (These are discussed in Chapter 20 'Drugs and surgery'.) Surgery to remove the ovaries is sometimes suggested as a radical last option; however, it is unacceptable to most women to trade the symptoms of PMS for those of premature menopause as well as the risk of loss of bone density.

Other common treatments are the diuretics; but these drugs will not improve all symptoms of PMS and have been shown to be useful only



for those women who gain weight premenstrually.<sup>68</sup> A series of pre- and post-menstrual weight measurements is necessary to identify those women with weight gain who qualify for the use of diuretics, and those women who have bloating from other causes.

Prostaglandin-related treatments are also suggested. These include mefenamic acid (Ponstan) and naproxen sodium (Naprogesic, Naprosyn, Anaprox), as well as evening primrose oil. These types of treatments are more successful for the treatment of symptoms related to pain than for mood changes, and therefore have limited application. Evening primrose oil is discussed on pages 90 and 93 and the prostaglandin-inhibiting drugs on pages 523–5.

Psychotropic drugs (anti-depressants and anxiolytics) have been the subject of intensive research since 1994 when psychiatrists defined PMDD and became involved in the treatment of premenstrual mood changes. One type of anti-depressant drug, the selective serotonin-reuptake inhibitors (SSRIs) accounted for only 2 per cent of prescriptions for PMS in 1993 but rose to over 16 per cent by 1998, becoming the second most commonly recorded treatment for PMS.<sup>69</sup> The effects of the common classes of psychotropic drugs on PMS—the tricyclic antidepressants, the SSRIs and the anti-anxiety drugs (anxiolytics) are described on pages 526–7.



### A natural approach

Despite the many theories proposed, many now believe that PMS occurs because of an aberrant response to *normal changes* in the levels of oestrogen and progesterone. Consequently, some sort of hormone modulation is often suggested to influence these hormonal fluctuations and improve symptoms. In many cases, hormone modulation is all that is necessary.

For other women, a more complex approach may be required, for example when sugar cravings, pain or moderate to severe anxiety or depression accompany the classic PMS symptoms. In these cases, hormone modulation can be combined with appropriate treatment for the particular complaint.

In all cases, correctly diagnosing the origin of the accompanying symptom is the key to successful treatment. Some symptoms—headaches, irritability, depression, for example—may have multiple associations. The menstrual symptom questionnaire has some symptoms appearing in more than one grouping for this reason and can be used as a diagnostic tool to categorise symptoms and improve insight into the type of treatments required for an individual.

Lifestyle and dietary changes are helpful and should be recommended as a first line of treatment for all women with PMS. Exercise, dietary

restrictions or additions, and stress management techniques are outlined in the self-care section on pages 141–2.

## Hormone modulation in PMS

Hormone modulation is a helpful first line of treatment for those women who have some troubling, but mild symptoms of PMS. *Vitex agnus-castus* and *Paeonia lactiflora* are two effective herbs to relieve symptoms. Rectification of latent hyperprolactinaemia has been suggested as one possible explanation for the positive effects seen with *Vitex* (see pages 450–4). Increased entero-hepatic recycling of oestrogens may also play a role. Many women respond to the dietary or lifestyle corrections found in the self-care section on pages 141–2.

### Symptoms

- Mood swings
- Fatigue
- Breast fullness or heaviness
- Abdominal bloating

### Treatment

- Lifestyle changes as outlined in the self-care section.
- *Vitex agnus-castus* extract, 1:2:40 drops every morning, starting on the first day of the cycle and continued for between three and six months. It is specifically indicated for progesterone deficiency and for latent hyperprolactinaemia.
- *Paeonia lactiflora* is often prescribed with *Bupleurum falcatum* and *Angelica sinensis* for menstrual irregularity accompanied by premenstrual anxiety and irritability. *Paeonia* must be prescribed at appropriate dosages to be effective (see pages 454–6).  
Also worth considering:
- Vitamin B<sub>6</sub> 100–200 mg, or vitamin B complex containing 50 mg of vitamin B<sub>6</sub> for ten to fourteen days before the period.
- Bitters can be suggested to aid liver clearance of oestrogens (see pages 326 and 483–9).

## PMS with mood changes

Some women respond adversely to hormone fluctuations by developing symptoms of anxiety or depression. These mood change symptoms can be arranged into two categories—one consisting of symptoms relating primarily to anxiety or heightened (negative) affect; the other to the more classical depressive symptoms, when withdrawal and fatigue

predominate. Most women will not fit neatly into one category or the other, and a certain amount of overlap can be expected in symptom reporting and in the menstrual symptom questionnaire. The grouping of symptoms establishes an overall impression of either anxiety or depression so that treatment can be directed at the relevant presentation.

Increasing levels of oestrogen in the luteal phase are thought to inhibit the deactivation of noradrenaline and influence serotonergic pathways, thus contributing to symptoms of heightened mood such as aggression, irritability and anxiety (category A). Treatment for this group concentrates on moderating the effects of increasing oestrogen levels by encouraging improved entero-hepatic recycling and improving progesterone levels.

Women who are peri-menopausal often experience more category B depressive symptoms, which might be triggered when low levels of oestrogen adversely influence serotonin. Those women who report having premenstrual mood changes at any time during their life are more likely to present with similar symptoms at the time of the menopause.<sup>70</sup> Depression and withdrawal can also occur if oestrogen levels are inadequate when a woman has diminished ovarian reserve, is breast-feeding, over-exercising or underweight (see ‘Too little oestrogen’, pages 70–3).

Another group who also experience category B symptoms are those women who are generally depleted and who are described by natural therapists as suffering from adrenal exhaustion. The treatment for PMS in conjunction with either low oestrogen or adrenal exhaustion is outlined in the section below on ‘PMS with depletion’.

### *Symptoms*

#### **A**

- Nervous tension
- Irritability and angry outbursts
- Anxiety
- Crying
- Increased sense of vulnerability
- Insomnia

#### **B**

- Depression
- Social withdrawal
- Lack of interest in daily life
- Sadness
- Waking through night

### *Treatment*

Hormone modulation will need to either reduce adverse effects of increasing oestrogen (pages 66–70), address problems associated with declining oestrogen (pages 70–3) or rectify adrenal exhaustion (page 215). This should be combined with:

- Dietary changes to increase the serotonin precursor tryptophan, such as increased frequency of smaller volumes of food; no sugar or refined carbohydrates; regular protein intake at each meal with

increased consumption of fish, legumes, egg, lean meat and/or low-fat yoghurt.

- Reduced intake of caffeinated drinks and alcohol.
- Herbal anxiolytics may be indicated for the increase in anxiety and/or irritability. These herbs are usually commenced in the luteal phase of the cycle, just prior to the expected onset of symptoms and include: *Lavandula officinalis*, *Valeriana officinalis*, *Scutellaria laterifolia* or *Eschscholzia californica* for anxiety.
- *Withania somnifera* for anxiety with exhaustion.
- *Anemone pulsatilla* tincture for tension headache with nervousness, especially when combined with *Passiflora incarnata*.
- *Betonica officinalis* is used for headache and anxiety states, especially in combination with *Scutellaria laterifolia*.
- *Hypericum perforatum* may be indicated in category B symptoms but, unlike anti-depressant drugs which are often used during the luteal phase of the cycle only, *Hypericum* should be taken all month for best results.
- Psychotherapy and counselling have been shown to improve mild to moderate depression and anxiety as effectively as anti-depressants. Various types of counselling and psychotherapy techniques are theoretically useful for women with PMS, although there have been few suitable studies to evaluate these techniques. One study looked at the effectiveness of cognitive behavioural therapy in PMS and found that it was useful in improving symptoms.<sup>71</sup>

## PMS with food cravings

Sugar cravings and/or excess intake of refined carbohydrates, causing a sugar-induced sensitivity to insulin, may be both a cause and effect of premenstrual sugar cravings. The hypoglycaemic chart on page 149 can be filled in during the premenstrual week and just after the period to establish the presence and/or severity of symptoms. Abnormal glucose tolerance may be worsened by a magnesium deficiency, an imbalance in prostaglandins or prolonged stress. Changes in serotonin levels are also associated with sugar and carbohydrate cravings.

Migraines or headaches are commonly seen in conjunction with sugar cravings and careful differentiation of the underlying phenomena is required. Oestrogen fluctuations, sinusitis, food allergies, neck and back problems, and weather changes can all trigger migraines and may need to be considered as causes instead of poor glucose tolerance (see pages 138–9).

## Symptoms

- Craving for sweets and refined carbohydrates
- Increased appetite

- Fatigue
- Headaches or migraines
- Irritability, especially when hungry

### Treatment

Treatment for hormone modulation combined with:

- Magnesium: 200–800 mg daily of elemental magnesium in the form of magnesium phosphate, aspartate, orotate or chelate.
- Restricted sugar, refined carbohydrate and salt intake combined with small, frequent meals, and adequate protein and complex carbohydrates as outlined in the hypoglycaemic diet on pages 150–2.
- Dietary and herbal bitters to regulate glucose tolerance (see page 326).
- Nutrients that improve glucose tolerance such as zinc 20–50 mg per day, chromium 50–400 mcgm daily and manganese 10–20 mg daily may also be indicated.

### PMS with fluid retention

Fluid retention is thought to be brought about by an increase in circulating aldosterone levels. Aldosterone may be elevated in response to the lower progesterone secretion, elevated oestrogens, magnesium deficiency, serotonin or dopamine irregularities, or stress. Prolactin may be implicated when breast symptoms predominate.

### *Symptoms*

- Breast fullness
- Weight gain
- Abdominal bloating
- Swollen extremities

### *Treatment*

Treatment for hormone modulation combined with:

- Magnesium: 200–800 mg daily of elemental magnesium in the form of magnesium phosphate, aspartate, orotate or chelate.
- *Taraxacum officinale* leaf as a tea is a mild diuretic and reduces fluid retention. This herb should be taken in the morning.
- *Vitex agnus-castus* is specifically indicated as a herbal hormone modulator for premenstrual breast pain or swelling.

## PMS with pain

An increased sensitivity to pain is believed to be associated with prostaglandins imbalance. One explanation is that an excessive dietary intake of animal fats provides the precursors for the series 2 prostaglandins. Alternatively, rising oestrogen levels in the luteal phase can favour the production of these pro-inflammatory prostaglandins (see page 87). Cyclical breast pain is discussed in more detail later in this chapter.

### *Symptoms*

- Breast pain
- Dysmenorrhoea
- Reduced pain threshold
- Aches and pains

### *Treatment*

- Magnesium reduces sensitivity to pain in doses of 200–800 mg.
- Essential fatty acid supplements, such as evening primrose oil or star flower oil. Daily doses of 3 g of evening primrose oil containing 216 mg of linoleic acid and 27 mg of gamma linoleic acid. The supplements can be taken all month or from mid-cycle until menstruation to rectify the deficiency of PGE 1.<sup>72</sup> Vitamin B<sub>6</sub> and zinc are necessary co-factors in the production of the series 1 prostaglandins.
- Restricted animal fats, but increased intake of raw vegetable and seed oils to selectively decrease the dietary precursors of series 2 prostaglandins and increase the series 1 prostaglandins.
- Vitamin E, between 100–600 IU per day, can also positively influence prostaglandin ratios. Doses of vitamin E 400–800 IU per day are necessary to treat breast tenderness.
- *Tanacetum parthenium* is a prostaglandin inhibitor and is useful for dysmenorrhoea and migraine headaches.

## PMS with depletion

One group of PMS symptoms seem to be related to lower levels of oestrogen, as is common in the peri-menopause, when a woman is underweight, exercising excessively, or has diminished ovarian hormone reserves for other reasons (see pages 70–3). This group of women most commonly report premenstrual symptoms of depressive mood change (see category B symptoms in Table 8.2 ‘Menstrual symptoms questionnaire’) in association with other low-oestrogen symptoms such as hot flushes, migraines, fatigue, memory loss and poor word-finding.

Herbs for hormone modulation are those that regulate the fluctuations in oestrogens and promote ovulation and therefore progesterone

production where possible. Dietary phyto-oestrogens reduce symptoms associated with oestrogen decline when consumed regularly.

Another group of depleted women are those experiencing extreme stress leading to 'burn out' or adrenal exhaustion. These women might develop concurrent mood changes from either category A or B in Table 8.2 'Menstrual symptoms questionnaire', depending on whether they are in the 'resistance' or 'exhaustion' phase of the stress cycle (see Figure 10.1, page 211). There is considerable overlap in symptoms with those seen when oestrogen is low—for example, both groups can experience hot flushes, physical fatigue and poor cognition. The history and other accompanying symptoms will determine the direction of the treatment.

Hormonal modulation for women who develop PMS in conjunction with adrenal exhaustion should combine the adrenal adaptogens and tonics with nervine tonics and anxiolytic herbs to counteract the adverse effects of stress on the nervous system (see Chapter 10 'The usual suspects'). Lifestyle changes as outlined in the self-care section should also be adopted.

### *Symptoms*

#### **Low oestrogen**

- Category B mood changes
- Fatigue
- Poor word-finding, memory loss
- Hot flushes and night sweats
- Headaches or migraines

#### **Adrenal exhaustion**

- Category A & B mood changes
- Fatigue
- Mental fatigue, poor concentration
- Hot flushes and night sweats

### *Treatment*

#### LOW OESTROGEN

Hormone modulation with:

- Phyto-oestrogens from dietary sources (see Chapter 18, pages 394–419) are an essential part of the treatment plan. Linseeds are indicated because they are believed to improve ovulation rates and therefore have the capacity to normalise both oestrogen and progesterone levels. Eating soya products seems to improve memory<sup>73</sup> and can also reduce hot flushes.
- The herbs which contain steroidal saponins such as *Asparagus racemosus* and *Dioscorea villosa*; or herbs with triterpenoid saponins, of which the most important is *Cimicifuga racemosa*. These herbs improve symptoms associated with low oestrogen levels.
- *Glycyrrhiza glabra* can also be useful, but is contraindicated when fluid retention accompanies symptoms.

- The Chinese herbs *Angelica sinensis* combined with *Paeonia lactiflora* are of benefit for peri-menopausal women or when oestrogen levels are low for other reasons.
- *Cimicifuga racemosa* and *Lavandula officinalis* are indicated when premenstrual headaches are caused by a rapid drop in oestrogen levels.

#### ADRENAL EXHAUSTION

Hormonal modulation with:

- Adrenal adaptogens and tonics, including *Eleutherococcus senticosus*, *Panax ginseng*, *Codonopsis pilulosa*, *Schizandra chinensis* or *Panax quinquefolia*.

#### MOOD CHANGES

Hormone modulation with:

- Nervine tonics and/or anxiolytics are often recommended for the fatigue and insomnia that frequently accompanies hormone and mood changes. Examples include *Lavandula officinalis*, *Withania somnifera* and *Scutellaria laterifolia*.
- *Hypericum perforatum* is often suggested for depressive symptoms in conjunction with hormone-modulating herbs.

## PREMENSTRUAL DYSPHORIC DISORDER (PMDD)

A subgroup of women with PMS, estimated to be between 3–8 per cent, have symptoms primarily related to a serious mood disorder.<sup>74</sup> This condition is a more severe variant of PMS, and is characterised by symptoms of irritability, anger, internal tension, dysphoria and mood lability.<sup>75</sup> It is referred to as premenstrual dysphoric disorder (PMDD) and should be suspected when symptoms are rated as very severe in Table 8.2 the ‘Menstrual symptom questionnaire’ (grading 4).

### Symptoms

An outline of the types and severity of symptoms required for this diagnosis was first described in an appendix to the 1994 *Diagnostic and Statistical Manual of Mental Disorders, 4th Edition* (DSM-IV)—see Table 8.3. For a diagnosis of PMDD to be appropriate, the symptoms must be confirmed by prospective daily ratings during at least two consecutive symptomatic cycles. At least one of the symptoms must be severe depression, anxiety, mood lability or anger.

Women with PMDD are severely troubled by the mood changes that occur premenstrually, to the point of severe disruption to their ability to perform daily tasks at work or in the home, unlike women with PMS who may report the same symptoms but of a less disabling nature.<sup>76</sup>



The mood changes seen in both PMDD (and PMS) must be differentiated from premenstrual magnification of an underlying major psychiatric disorder.

**Table 8.3 DSM-IV criteria for Premenstrual Dysphoric Disorder<sup>77</sup>**

- A. In most menstrual cycles of the past year, five (or more) of the following symptoms, which begin during the last week of the luteal phase (after ovulation) and end in the follicular phase (menses), were present most of the time and absent in the week post menses. At least one of the symptoms must be 1, 2, 3 or 4.
1. markedly depressed mood; hopelessness; self-deprecating thoughts
  2. marked anxiety, tension, feeling 'keyed up' or 'on edge'
  3. marked affective lability (feeling suddenly sad or tearful; increased sensitivity to rejection)
  4. persistent and marked anger, irritability, or increased interpersonal conflicts
  5. decreased interest in usual activities
  6. difficulty concentrating
  7. lethargy, easy fatigability, or marked lack of energy
  8. marked change in appetite, overeating or specific food cravings
  9. hypersomnia or insomnia
  10. sense of being overwhelmed or out of control
  11. physical symptoms such as breast tenderness or swelling, headaches, joint or muscle pain, bloating, weight gain
- B. The disturbance markedly interferes with work, school, usual social activities, and relationships with others.
- C. The disturbance is not merely an exacerbation of the symptoms of another disorder, such as major depressive disorder, panic disorder, dysthymic disorder, or a personality disorder.
- D. Criteria A, B and C must be confirmed by prospective daily ratings during at least two consecutive symptomatic cycles.

## Treatment

For women with PMDD, anti-depressant drugs are an appropriate consideration in keeping with the severity of their symptoms. The favoured medical treatment is the class of drugs known as selective serotonin reuptake inhibitors or SSRIs.<sup>78</sup>

Trials involving Zoloft,<sup>79</sup> Cipramil<sup>80</sup> and Luvox<sup>81</sup> were positive, indicating that many, if not all, of the SSRIs are likely to be beneficial in the management of PMDD. Efexor (venlafaxine), a new-generation anti-depressant that selectively inhibits serotonin and norepinephrine reuptake was also shown to be useful in the management of PMDD.<sup>82</sup> Many of these drugs have been successful when used in the luteal phase only, and trials are ongoing to determine whether this is a realistic option for all women with PMDD.

Not all women are comfortable with the psychotropic drug option and will want to try herbal medication as a first line of treatment. It is questionable whether herbs will be effective for all cases of PMDD, given that symptoms can be very severe, and a decision to use herbs will need to be made on a case-by-case basis. *Hypericum perforatum* would be the herb of choice, and is frequently prescribed with *Withania somnifera*, an anxiolytic such as *Lavandula officinalis*, and a hormone-

modulating herb such as *Vitex agnus-castus*. Unlike the SSRIs, this regime should be taken all month to bring about positive results, and if improvement has not occurred within two cycles, an alternative treatment should be sought.

Although the primary symptoms of PMDD are mood-related, many women also experience other symptoms that may need management with the strategies outlined in the section on PMS—‘A natural approach’ on pages 129–36. Lifestyle and dietary changes are also important, as are recommendations that women with PMDD seek appropriate counselling or psychotherapy.

## **(PRE-)MENSTRUAL MAGNIFICATION**

Many complaints can become more severe or occur more frequently during the luteal phase of the cycle. This is known as menstrual distress syndrome, or alternatively as (pre-)menstrual magnification. The most common disorders are migraines, depression, infections, irritable bowel syndrome and hypoglycaemic symptoms. Less common are various types of epilepsy, allergies, asthma and chronic fatigue or other fatigue syndromes.

### **Headaches and migraines**

More than 50 per cent of migraines or headaches experienced by women occur around menstruation and ovulation. One possible explanation is that the drop in oestrogen known to occur at these times in the menstrual cycle leads to lower levels of serotonin. Regulating oestrogen levels seems to be able to reduce the incidence of migraines by influencing one of the subtypes of serotonin receptors responsible for preventing serotonin-induced blood-vessel spasm and inhibiting the pro-inflammatory changes that cause the pain of migraines.

However, oestrogen fluctuations are only one of a number of triggers for migraines. Most women who have menstrual migraines also experience migraines at other times during the cycle, indicating that their migraines are caused by factors other than changes in hormone levels. The common triggers are blood sugar fluctuations; muscular tension and structural problems in the neck and upper torso; food allergies; sinusitis; motion from travelling in car, bus or boat; various weather patterns; and changes in sleep cycles.

In other words, many women who experience menstrual migraines have menstrual magnification of a pre-existing migrainous problem that is exacerbated by the changing levels of oestrogens. It is therefore appropriate to suggest some intervention that will assist with changes in hormones, while primarily focusing on identification and rectification

of the underlying triggers. Treatments can therefore be complex, and in addition to hormone modulation might involve appropriate dietary changes (hypoglycaemic diet, exclusion of identified food triggers), chiropractic or osteopathic treatment for neck and back problems, appropriate remedies for chronic sinusitis and introduction of stress-management techniques.



### ■ ■ The medical approach

The most common medical treatment for menstrual migraines is either oestrogen patches to regulate oestrogen levels, or the Pill; however, some women develop migraines while taking the sugar pills (with no hormones) triggered by the drop in oestrogen levels. Peri-menopausal women are usually given oestrogen patches because the levels of oestrogen remain more stable than when oestrogen is taken orally. Some women will continue to experience migraines if the dose is too low while others might experience symptoms if the dose is too high, particularly if there are additional surges of endogenous oestrogen. The progestogens necessary for women who have a uterus can exacerbate migraine, but this can be reduced with low-dose continuous patches where possible.<sup>83</sup>



### A natural therapist's approach

To control menstrual migraines, a herbalist might suggest *Vitex agnus-castus* in combination with *Cimicifuga racemosa* throughout the cycle. *Tanacetum parthenium* is also useful as a prostaglandins inhibitor that can reduce incidence and severity of migraine headaches. *Lavandula officinalis* and *Verbena officinalis* are useful as relaxing nervines, while *Corydalis ambigua* is an effective anodyne. Magnesium supplementation may help because of the tendency for levels to be low amongst migraine sufferers premenstrually.<sup>84</sup>

A trial examining the effectiveness of soy isoflavones in combination with *Angelica sinensis* and *Cimicifuga racemosa* decreased migraine incidence by more than half, pointing to a possible hormone modulating effect of isoflavones and the two herbs.<sup>85</sup> Women who have migraines also frequently have lower levels of the anti-inflammatory prostacyclin PGI 2. Fish oils may improve the ratio of this protective prostaglandin and help to reduce the incidence of migraine<sup>86</sup> (and period pain<sup>87</sup>).

## Depression and anxiety

Women with depressive disorders or anxiety states often report a worsening of symptoms during the premenstrual phase of the cycle, and

some women will make an initial contact with a practitioner believing these symptoms to be PMS. As might be expected, a prospective questionnaire over several cycles will indicate the presence of mood changes all month and should make differentiation between PMS and depression or anxiety relatively easy. Women with premenstrual magnification of psychiatric conditions may require some hormone modulation, but their primary treatment should centre on the management of the affective disorder.

## **Increased infection rate**

Many women suffer from an increased rate of infections during the luteal phase of the cycle. Problems might include genital or facial herpes; sinusitis; increased rate of colds and upper respiratory tract infections; recurrent non-specific flu-like symptoms such as chills and fever, swollen glands, sore throat (especially amongst women with chronic fatigue syndrome); urinary tract infections and vaginal thrush.

In some cases hormone modulation alone is sufficient to correct this situation and herbalists often prescribe *Vitex agnus-castus* until improvement occurs, usually within the first three cycles. Some women will require additional herbs or supplements to improve immune response, and these might include *Echinacea purpurea* or *E. angustifolia*; zinc and vitamin C; or *Hypericum perforatum* as a specific treatment for herpes simplex virus. Fungal infections may also require dietary modification such as restricted sugar and alcohol intake.

## **Irritable bowel syndrome (IBS)**

IBS can aggravate during the luteal phase of the cycle and cause pelvic pain that can be confused with gynaecological problems such as endometriosis. Hormone manipulation may be required, but most often symptoms will abate with the regular use of the seed breakfast as outlined on pages 296–7.

## **Functional hypoglycaemia**

Hypoglycaemic symptoms often mimic PMS, but many women have symptoms all month that worsen premenstrually, indicating that they have an ongoing problem with poor glucose tolerance. These women should try the hypoglycaemic diet outlined on pages 150–2 before adopting strategies to modulate hormone levels.



## Diet

Bitter foods, cabbage family vegetables and a high fibre intake can help to modulate rising oestrogen levels in the luteal phase of the cycle. Another dietary intervention to control PMS symptoms is to increase the intake of complex carbohydrates and to eat more frequently—a ‘grazing’ or hypoglycaemic diet (see pages 150–2). This helps to reduce the food cravings many women experience premenstrually. The positive effects may be related to normalisation of glucose tolerance as well as to indirect influences on progesterone or serotonin. One theory is that progesterone cannot be transported into cells which do not contain sugar, and that progesterone levels drop because breakdown speeds up after a large meal.<sup>88</sup> Another is that the levels of serotonin are stabilised by eating foods rich in the amino acid tryptophan.

When fluid retention, bloating, breast soreness or heaviness and weight gain are prominent symptoms, salt intake should be restricted and dietary potassium in the form of vegetables, grapefruit juice and bananas increased. Most processed cheese is high in sodium and should also be restricted.

Women who experience breast soreness, muscle or joint pains or period pain respond well to reducing animal fats, processed vegetable oils, coconut and peanuts; and increasing the intake of foods containing essential fatty acids and vitamin E.

Coffee, alcohol, sugar and chocolate aggravate feelings of depression, irritability and anxiety, as well as worsening many breast symptoms. Restriction or complete avoidance is warranted during the premenstrual phase. Limiting these foods might also improve insomnia.

Many of the symptoms of PMS have been attributed to magnesium deficiency. Where this is the case, it may be beneficial to eat more magnesium-containing foods (see pages 361–2) and restrict dairy products in the diet. On the other hand, a good calcium intake has also been shown to be beneficial. A calcium information chart is included on pages 199–200. Both calcium and magnesium are essential for bone health for all women and an adequate intake of both should be maintained throughout life.

Sleep disturbance accompanying PMS can be managed by adopting a regular pattern of getting to sleep and getting up. This helps to rectify poor sleep latency—the tendency to get to sleep and then wake a few hours later. Alcohol, sugar and caffeine also aggravate this problem. Eating a protein-rich meal at night, such as fish and vegetables, rather than rice or pasta, can also be beneficial.

Phyto-oestrogens are indicated for PMS associated with the perimenopause and improve symptoms thought to be associated with a rapid decline of oestrogens just before the period such as headaches, migraines and depression.

## **Exercise, stress management and other techniques**

Women with PMS who use long, slow, distance exercise or yoga seem to be able to handle the physical changes much more capably than women who do not incorporate these lifestyle activities in their daily life. Exercise minimised negative mood premenstrually,<sup>89</sup> and a better effect was noticed amongst those women who were categorised as high exercisers compared with those who exercised less often.<sup>90</sup> Another study found that aerobic exercise reduced fluid retention.<sup>91</sup>

Suitable stress management techniques such as meditation, and counselling are also useful. Women with PMS improved with progressive muscle relaxation in conjunction with guided imagery.<sup>92</sup> An interesting study of the use of foot, ear and hand reflexology showed that women who received pressure to actual reflex points responded significantly better than women who were given treatment of incorrect reflex points.<sup>93</sup> Acupuncture and massage<sup>94</sup> are also very effective techniques to relieve the severity of PMS.

## **CYCLICAL BREAST COMPLAINTS**

Cyclical breast changes and pain are common complaints. Half of all women complaining of PMS have breast pain, unless they come from Asian countries like Japan where the incidence is very much lower.<sup>95</sup> The pain can be associated with lumps, breast enlargement, nipple soreness, a sense of warmth or burning, increased 'ropiness' when the breast is palpated, and soreness or congestion into the armpit. The symptoms may effect one or both breasts. Lumpiness or structural changes can also occur without any pain; however, the most common symptoms are pain and lumpiness in the upper, outer quadrant of both breasts, which occurs in the luteal phase of the cycle.

## **Disease or normal changes?**

When examined, individual women's breasts show a wide variation in nodularity and other structural changes which occur as a result of *normal* cyclical effects of oestrogen and progesterone. Oestrogen is 'proliferative', or makes cells in the breast grow in size and number. Progesterone changes the cells which line the ducts so that they become 'secretory' and able to produce milk if pregnancy occurs. The blood

supply to the breast is also enhanced by progesterone and this leads to a greater amount of fluid build-up in the breast tissue because some of the fluid in the blood vessels seeps into the surrounding tissues.

During the period, there is a time of relative cellular dormancy when the proliferative glandular tissue stimulated by both oestrogen and progesterone involutes. For reasons which are not entirely clear, this process of involution can be incomplete, leading to breast changes which range from palpable breast lumps to microscopic changes in the breast tissue.

Fibrocystic breast disease was once the term used to describe these findings and is sometimes still used as a diagnosis.<sup>96</sup> Fibrocystic breast disease technically means ‘fibrous and cystic breast changes’, but many women who have been given this diagnosis have breast changes which fall within the normal range of cyclic proliferation and involution already described. Additionally, some women with breast pain have neither of these changes, while women who *do* have fibrous and cystic changes might have little or no pain.

Terms such as benign mammary hyperplasia, mammary dysplasia and benign cystic hyperplasia, which technically only apply to those changes detected microscopically, are also sometimes used.

Understandably, this leads to a lot of confusion and concern as many women equate these types of diagnoses with malignancy. Medically, the *favoured* term is ‘aberrations of normal development and involution’ (ANDI); however, to avoid confusion and unnecessary concern, many practitioners will use simple terms such as cyclical breast pain, mastalgia or non-specific breast lumpiness to describe *to the woman* the benign changes which occur before her period.

## Diagnosis

A woman might visit her practitioner after discovering a discrete lump or generalised breast lumpiness; with a complaint of cyclic or persistent breast pain; or a combination of these problems. The possibility of cancer can be a major concern for a woman who discovers breast lumps, but many women simply want some sort of treatment for bothersome pain and are convinced that their problem is ‘just hormonal’. For a diagnosis of a purely cyclic and benign complaint to be given, however, all other possible causes of the symptoms must be first excluded.

Diagnosis usually proceeds down a fairly well-worn path. When a woman has a symptom of breast pain only, her breasts should be examined *after* the period to rule out the possibility of breast lumps. Many women palpate their breasts when they experience discomfort—before the period—precisely the time when non-cyclical changes are most difficult to find.

When women have breast lumpiness, referral for a breast examination should be arranged after the period *if the problem has not been resolved*. All breast changes which persist after the period—even if they

have the characteristic ‘hormonal’ pattern of worsening premenstrually—need thorough evaluation. The current myth that lumps that are painful, or symptoms that worsen premenstrually, will not be cancerous, is incorrect. Up to 10 per cent of women with cyclical breast changes may also have cancer.

There is absolutely no problem in waiting until after the period to re-examine breasts, even when breast cancer is a distinct possibility, because all changes take many months to develop. It is much easier to find breast changes when palpating breasts in the post-menstrual phase, and there is less likelihood of making an inaccurate diagnosis.

When a woman or practitioner feels a woman’s breasts, they might find either generalised lumpiness, a dominant lump, or an area of thickening which is quite different to the rest of the breast tissue.

### **A dominant lump or area of thickening might be:**

- Cancer, which is often an immobile, hardened, non-discrete area.
- A well-defined breast lump, which might be a fibroadenoma, a cyst or a lipoma.
- A less well-defined area of thickening or lumpiness.

The discovery of a dominant lump suggests the need for referral to a breast clinic or specialist to rule out the possibility of breast cancer. On average, one in every five breast lumps discovered is malignant, and the incidence of malignancy increases with age.

Investigations for these findings are fairly routine:

- mammogram and/or ultrasound
- needle aspiration and histology
- lumpectomy and biopsy.

More commonly, breast changes will be cyclical and present as a *generalised* lumpiness of the breast, which represents a normal variation of hormonal activity in the breast. These changes may require no further investigation apart from regular monitoring.

## **Causes**

As with PMS, the cyclic nature of mastalgia suggests variations in ovarian hormones as the cause of the symptoms.<sup>97</sup> Adding weight to this theory, women taking hormone preparations that contain oestrogens or progestogens also suffer from breast pain, and stopping these medications can result in markedly reduced symptoms.<sup>98</sup> It is also possible that elevated prolactin is responsible for structural changes in the breast and breast discomfort. Despite these theories, no hormonal changes have



been consistently identified that can explain the existence of premenstrual breast pain.<sup>99</sup>

There is also a strong possibility that an oestrogen-induced increase in the pro-inflammatory (series 2) prostaglandins may increase blood-vessel dilation and give rise to breast pain. Diets high in omega-6 polyunsaturated vegetable oils and animal fats, but low in essential fatty acids, may also be responsible for, or exacerbate, the increase in pro-inflammatory prostaglandins. On the other hand, women with cyclic breast disorders may have low serum levels of the (anti-inflammatory) series 1 prostaglandins,<sup>100</sup> which may in turn increase sensitivity to prolactin and contribute to pain. Coffee consumption, which also triggers pro-inflammatory changes, has been linked to breast pain and breast changes.<sup>101</sup>

Cyclic breast pain also seems to be affected by lifestyle factors. One Australian study found that women who developed mastalgia exercised less than other women, and had either not breastfed or had done so for less than two months.<sup>102</sup>

When pain is severe enough to warrant treatment, it is wise to wait and monitor the symptoms with a menstrual chart (see page 116) for two cycles first. This not only provides a record of the frequency and severity of the symptoms, it can also help to monitor the effectiveness of subsequent treatment. As many cases of mastalgia are short-lived, expensive or unnecessary treatments may also be avoided.



## ■ ■ The medical approach

Bromocriptine reduces prolactin levels and breast soreness; Danazol also has a high success rate (around 70 per cent), but both drugs are accompanied by many unwanted side effects. GnRH agonists improve mastalgia by inducing a menopausal state, but also have side-effects. Tamoxifen is an anti-oestrogen and can lower prolactin levels. It is effective in reducing cyclical breast pain, although long-term safety in pre-menopausal women has not been proven. It is usually only recommended when all other drugs fail.

Between 70–90 per cent of women on the Pill have a much lower incidence of cyclical breast complaints, especially when the oestrogen level in the Pill is low.<sup>103</sup> However, some women on these medications experience more breast pain.<sup>104</sup> Women who are 40 and older, or who have abnormal HDL:LDL cholesterol ratios should take between 400–1200 IU vitamin E while on this regime to prevent the progestogen-induced reduction in HDL and increase in LDL.<sup>105</sup>

Progestogens such as Provera have been shown to reduce symptoms.<sup>106</sup> Various trials on progesterone ('natural' progesterone) found no difference in response rates between progesterone and placebo.<sup>107</sup>

Controversially, antibiotics are sometimes suggested, despite a lack of rationale in the treatment of cyclic breast pain.<sup>108</sup> These drugs are discussed in Chapter 20 'Drugs and surgery'.



### The natural therapist's approach

Natural therapists believe that cyclical breast disorders are caused by a number of inter-related hormonal factors which culminate in pain, swelling and tissue changes. Principal among these are the changes caused when oestrogen levels increase in the luteal phase of the cycle without adequate levels of progesterone, and a prostaglandins-induced sensitivity to prolactin.

Improving oestrogen–progesterone balance is achieved by restricting fats and increasing fibre; using herbs such as *Paeonia lactiflora* and *Vitex agnus-castus* to improve progesterone levels (discussed in Chapter 19 'Herbs'); increasing phyto-oestrogens to compete with the more active endogenous oestrogens, especially linseeds (which additionally improve the oestrogen–progesterone ratio); and using bitter foods and herbs for oestrogen clearance.

*Vitex agnus castus* is one of the most reliable herbal treatments for the control of premenstrual mastalgia and also seems to reduce the incidence of premenstrual breast lumps. Positive effects can be expected within the first two cycles, although very occasionally some women experience a temporary increase in breast discomfort and fullness when first started on *Vitex* that usually settles in one to two cycles.

The Chinese herbal formula Cinnamon and Hoelen Combination (Gui Zhi Fu Ling Tang) is also effective. A clinical trial assessing the efficacy of this formula in the treatment of premenstrual breast complaints found it to be effective for pain in 88 per cent of women, and to reduce the size of breast lumps in 40 per cent of the women treated. Positive effects were seen in the majority of cases within the first cycle. The formula is believed to act as a weak GnRH antagonist, reducing levels of LH, FSH and oestrogen, and may also act as a weak anti-oestrogen by actively competing with oestrogen in breast tissue.

A variety of supplements are regularly suggested for breast pain, including the omega-6 essential fatty acids which are found in high quantities in evening primrose, star flower, black currant and borage seed oils. Enthusiasm for their use has continued even though studies have found that there is a substantial delay between commencing treatment and a reduction in symptoms—up to three months in one study<sup>109</sup>—and that less than half of all women who take these supplements respond favourably.<sup>110</sup> The recommended dose of evening primrose oil for breast pain is 3000–4000 mg per day.<sup>111</sup>

Vitamin B<sub>6</sub> is also commonly recommended; however, the only controlled study for cyclic mastalgia compared 100 mg B<sub>6</sub> daily and placebo for two months, and found no difference between the two treatments.<sup>112</sup> Thiamine or vitamin B<sub>1</sub> has also been used for breast pain since World War II, when prisoners of war who developed gynaecomastia (excessive development of the breast in males) responded to treatment with vitamin B<sub>1</sub>. Vitamin B<sub>1</sub> is necessary for the hepatic metabolism of oestrogens, and since relative oestrogen excess may be responsible for cyclic breast disorders, the use of B<sub>1</sub> has continued. Doses of between 60–100 mg per day are usually recommended, and although improvement is occasionally reported, no double-blind studies have been published.

Better results can be expected with vitamin E. A study of vitamin E, 600 IU per day, reduced breast pain in 85 per cent of women;<sup>113</sup> in another, vitamin E improved the oestrogen to progesterone ratio in favour of progesterone.<sup>114</sup> Combining vitamin E with 25–50 mcgm of selenium is also beneficial.

A French trial showed that a standardised extract of *Gingko biloba* (containing 24 per cent *Gingko* flavone glycosides and 6 per cent terpenoids) was an effective treatment for breast pain. The double-blind study monitored 165 women over two menstrual cycles who took 160 mg per day of the standardised extract or placebo from day 16 of the menstrual cycle through to day 5 of the following cycle.<sup>115</sup> *Gingko biloba* decreases abnormal capillary permeability, increases capillary resistance and reduces oedema. The terpenoids also counter the effects of the pro-inflammatory platelet-activating factor (PAF) which may also contribute to tissue swelling.

Some women may develop breast lumps because of an underactive thyroid gland. This may be sub-clinical (not detected with blood tests) and manifest as a low basal body temperature, increased sensitivity to cold and erratic menstrual cycles. Hypothyroidism causes levels of SHBG to fall, which may contribute to a greater availability of oestrogen. These women often respond to iodine-containing herbs such as *Fucus vesiculosus*, or the addition of seaweeds to the diet.

Additional benefits are also seen when herbs which improve lymphatic drainage are prescribed. These include *Calendula officinalis*, *Viola odorata*, *Phytolacca decandra*, *Galium aparine*, *Stillingia sylvatica* and *Trifolium pratense* (which has the additional benefit of containing phyto-oestrogens). These herbs are believed to improve the removal of cellular debris during normal involution of breast tissue in the menstrual phase of the cycle.

Topical applications of creams containing *Zingiber officinale* 15 per cent and *Phytolacca decandra* 10 per cent (as tinctures), applied twice daily, also improves pain and breast lumpiness.



## Self care

Some of the best results clinically and experimentally have been associated with dietary change involving reduced fat intake.<sup>116</sup> Fats to avoid include saturated fats such as those found in full-cream dairy products and meat; and those from coconut, avocado and peanuts. A group of women who were counselled to reduce dietary fat intake and substitute kilojoules with complex carbohydrates were shown to have substantial reductions in breast swelling and tenderness.<sup>117</sup>

Because oestrogens can increase the pro-inflammatory (series 2) prostaglandins, oestrogen modulation may be useful. Increased fibre improves oestrogen clearance, and the cabbage family vegetables improve liver conjugation of oestrogens. A diet which contains very little fat, is high in fibre, contains large amounts of phyto-oestrogens, vegetables, grains and legumes is our recommendation. Depending on complicity, dietary intervention may be the best and only intervention needed.

Avoiding methylxanthines (caffeine, theobromine and theophylline) in tea, coffee, cocoa and cola drinks also leads to dramatic improvements in many cases. Exercise also reduces breast pain and regular exercise throughout the cycle is beneficial.<sup>118</sup>

## FUNCTIONAL HYPOGLYCAEMIA

Hypoglycaemia means low blood sugar and the term 'functional' refers to an inability of the blood sugar stabilising mechanisms to function in an appropriate manner, leading to poor glucose tolerance.

Functional hypoglycaemia often accompanies other complaints, especially those associated with prolonged periods of stress or anxiety, including chronic fatigue syndrome and post-viral fatigue syndrome sufferers. PMS has many symptoms which are similar to those of functional hypoglycaemia, and is often improved by a hypoglycaemic diet.

**Table 8.4 Questionnaire for suspected functional hypoglycaemia**  
**Score symptoms from 0–3 depending on severity or frequency**

1	<input type="checkbox"/>	Common desire for sweets and quick energy foods	<input type="checkbox"/>
2	<input type="checkbox"/>	Fatigue relieved by eating or drinking	<input type="checkbox"/>
3	<input type="checkbox"/>	Irritability before meals	<input type="checkbox"/>
4	<input type="checkbox"/>	Get shaky if hungry	<input type="checkbox"/>
5	<input type="checkbox"/>	Feel better after breakfast or early morning coffee, etc.	<input type="checkbox"/>
6	<input type="checkbox"/>	Need to eat often	<input type="checkbox"/>
7	<input type="checkbox"/>	Faintness when meals delayed	<input type="checkbox"/>
8	<input type="checkbox"/>	Headaches or heavy head relieved by eating or drinking	<input type="checkbox"/>
9	<input type="checkbox"/>	Sleepy during the day and after meals	<input type="checkbox"/>
10	<input type="checkbox"/>	Heart palpitations if meals missed or late	<input type="checkbox"/>
11	<input type="checkbox"/>	Number of cups of tea/coffee: Score 1 for 2–3 cups, 2 for 3–5 cups and 3 for more than 5 cups daily	<input type="checkbox"/>
12	<input type="checkbox"/>	Number of teaspoons of sugar in beverages: Score 1 for 1 teaspoon, 2 for 2 teaspoons and 3 for 3 or more teaspoons	<input type="checkbox"/>
13	<input type="checkbox"/>	Low energy	<input type="checkbox"/>
14	<input type="checkbox"/>	Reduced stamina, tire easily and quickly on exertion	<input type="checkbox"/>
15	<input type="checkbox"/>	Sluggish or lethargic in the morning	<input type="checkbox"/>
16	<input type="checkbox"/>	Tiredness in mid or late afternoon	<input type="checkbox"/>
17	<input type="checkbox"/>	Sleep disturbances or dream disturbed sleep	<input type="checkbox"/>
18	<input type="checkbox"/>	Hot flushes and/or night sweats	<input type="checkbox"/>
19	<input type="checkbox"/>	Difficulty concentrating	<input type="checkbox"/>
20	<input type="checkbox"/>	Cannot decide easily	<input type="checkbox"/>
21	<input type="checkbox"/>	Fluctuating emotions	<input type="checkbox"/>
22	<input type="checkbox"/>	Frequent anxiety	<input type="checkbox"/>
23	<input type="checkbox"/>	Become tearful easily for insufficient reason	<input type="checkbox"/>
24	<input type="checkbox"/>	Bouts of anger or unreasonable behaviour	<input type="checkbox"/>
25	<input type="checkbox"/>	Magnify insignificant events	<input type="checkbox"/>
26	<input type="checkbox"/>	Periods of depression or melancholy	<input type="checkbox"/>
27	<input type="checkbox"/>	Above symptoms worse premenstrually	<input type="checkbox"/>
28	<input type="checkbox"/>	Cigarette smoking Score 1 for 1–10/day, 2 for 10–20/day, 3 for more than 20 per day	<input type="checkbox"/>
29	<input type="checkbox"/>	Alcohol consumption Score 1 for average 1 glass daily, 2 for 2 glasses daily, and 3 for more than 3/day	<input type="checkbox"/>

A diverse group of symptoms can be associated with hypoglycaemia—having one or a few symptoms is not necessarily diagnostic of hypoglycaemia because these symptoms could accompany other complaints. True hypoglycaemia should respond to adequate dietary change within a week. If this does not occur, other reasons for the symptoms should be sought.

### **The main symptoms**

- Tiredness, vagueness or shakiness which is alleviated by eating.
- Tiredness or irritability if meals are late, or first thing in the morning.
- Sugar cravings.
- Hungry all the time or soon after eating.
- Headaches when meals are delayed.
- Inappropriate feelings of anxiety or inadequacy which disappear after eating.
- Waking in the middle of the night feeling abnormally hungry.

### **Causes**

- Prolonged stress  
Prolonged periods of stress trigger the 'fight or flight' mechanism which causes a series of changes in hormone levels and fluctuations in the blood sugar levels.
- Diet  
A number of dietary factors adversely affect glucose tolerance including an over-consumption of refined carbohydrates and sugars,<sup>119</sup> and an inappropriate alcohol intake (alcohol without eating, or alcohol with sugar-based mixers).<sup>120</sup>

Dieters often develop hypoglycaemia because of their low energy diets. This causes them to 'break out' and eat large amounts of starchy or sugary foods. The rapid drop in blood sugar initiates a very counterproductive cycle of sugar craving, hypoglycaemic symptoms<sup>121</sup> and, no doubt, weight gain. Following the diet for hypoglycaemia (below) is a successful way to lose weight slowly and progressively because it breaks the cycle of 'fast and feast'.

Chromium,<sup>122</sup> niacinamide<sup>123</sup> and magnesium supplements<sup>124</sup> improve glucose tolerance.

### **Diet**

The most effective treatment for functional hypoglycaemia is dietary change. Usually strict adherence to the diet is required for about three weeks and then a slightly more relaxed routine can be adopted. This will depend on each individual's response to the regime and the severity of both the complaint and the underlying causes.

## **Some general guidelines**

- Eat small amounts of protein regularly at meals and with snacks.
- Eat small, frequent meals.
- Avoid all sugar, honey and dried fruit.
- Consume only small quantities of unsweetened, diluted fruit juice.
- Avoid all stimulants such as tea, coffee, chocolate and cola drinks.
- Avoid alcohol and cigarettes.
- Eat only whole grain foods. Avoid white flour and refined cereals.
- *Always* eat breakfast.

## **Complementary proteins**

All animal protein is 'complete', and therefore meals containing milk products, eggs, meat or fish provide first-class protein. Incomplete (plant) protein foods, however, need to be combined to provide the same quality protein as animal protein.

Beans with grains: tofu and rice, lentils and rice, corn and beans, buckwheat and tempeh, muesli and soya milk, kidney beans and barley.

Beans and seeds: tahina and beans, tofu and sesame seeds.

Grains and nuts: nut butters on bread, rice and cashews, rice and peanut sauce.

## **Suggested menus**

### *Breakfast*

- Fruit with yoghurt, seeds and ground almonds.
- Whole grain bread toast with nut butters, hommus or egg.
- Homemade muesli: oats, rolled barley, triticale, rice flakes, rice bran, seeds, coconut, and crushed almonds or cashews. Add fresh fruit and soya milk, low-fat milk or yoghurt as desired.
- Cooked cereal: e.g. oats, rice or buckwheat, with a selection of seeds.

### *Morning, afternoon or supper snack*

- Mixed seeds and nuts.
- Avocado, tuna and balsamic vinegar dressing.
- Soya milk with seeds and nuts.
- Small container of low-fat yoghurt.
- Whole grain dry biscuits with nut butters or hommus.
- Energy drink: Blend together: ½ cup fresh fruit or juice, ½ cup low fat yoghurt, and seeds with almonds, and/or wheatgerm and lecithin.

### *Lunch*

- Mixed vegetable salad with protein—either fish, cheese, hommus, meat or other appropriately combined vegetable proteins.
- Salad sandwich with protein as above.

- Vegetable soup with yoghurt, cheese, or a combination of beans and grains.
- One of the dinner choices.

*Dinner*

- Bean and grain dish: e.g. stir-fry vegetables with rice and tofu, dhal with vegetables and rice, tortilla and beans, buckwheat noodles with vegetables and tempeh, vegetable soup with barley and red kidney beans.
- Grain and nut meal: e.g. steamed vegetables with rice and peanut sauce, stir-fry vegetables with cashew nuts, pasta and pesto sauce (wheat and pine nuts).
- Beans and seeds: many of the Middle Eastern vegetarian meals are based on this principle, e.g. falafel and hummus.
- Meat or fish with plenty of vegetables.

Meal sizes should be reduced so that the overall food intake does not increase above normal: six snack-size meals should be substituted for three normal-size meals.



# 9

## Menopause

### Key words

androgen	menorrhagia
androstenedione	oestradiol
climacteric	oestrone
endometrium	peri-menopause
follicle-stimulating hormone	phyto-oestrogen
GnRH agonist	post-menopause
gonadotrophin-releasing hormone	pre-menopause
HRT	SHBG
luteinising hormone	testosterone
menopause	female androgen deficiency syndrome

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Imprinted in the collective psyche of mid-life women is the picture of the ‘typical’ menopausal woman they might become. Anxious, nerves jangled through lack of sleep, she struggles through her day forgetting everything and being constantly overwhelmed by debilitating hot flushes. Well on her way to becoming incontinent, she neither looks for nor gains any sexual pleasure. Her life over, depressed and forgotten, she might just as well curl up in the corner with her aches and pains and dowager’s hump, and let the world pass her by.

This so-called ‘typical’ menopausal woman rarely comes through my clinic door. The menopausal woman we usually see may have some problems with menopausal complaints but, by and large, they don’t stop her from getting on with her life. Instead, she might be running her own business, or occupy a senior position in a company, school or the public service. She might be an active member of her church group; or looking after her grandchildren; she could be a painter, photographer or sculptor; she might be studying, taking a degree in something she’s always been interested in; she could have a new lover. Whatever she’s doing, she’s usually busy, organised, out there and achieving. Often, she has an exercise program: swimming laps, walking, dancing.

Far from becoming an old crone overnight, the menopausal woman is often more financially secure, and is energetic and ready for the challenges this new phase can bring.

Being fifty-something isn't old, but for all sorts of complex reasons, women have somehow confused ageing and menopause. Many lump together the years between menopause and 80 with the tag 'post-menopausal woman'; and it's not the energetic 50-year-old, it's the 80-year-old they visualise.

Menopause *is* a time of change. And making it a time of positive change is not just pot-luck! There is now plenty of evidence to suggest that preparing sensibly for mid-life with a good diet, lifestyle and an exercise program will greatly influence the way a woman experiences her menopause—and beyond.

## **Menopause defined**

Menopause literally means 'stopping menstruation'. The word is made up of Greek *meno* (monthly) and *pausis* (to stop). Women won't know menopause has occurred until a year has passed since the date of the last period—the actual date can only be decided retrospectively. Menopause, then, occurs on one distinct date and is not what most people mean when they describe themselves, or the women who consult them, as 'menopausal'.

The more correct term, the 'climacteric', is rarely used; peri-menopausal is now the favoured lay and medical term. The peri-menopause is analogous to puberty and the years when the menstrual cycle starts to become established; both are characterised by hormonal and sometimes emotional fluctuations, and menstrual irregularity.

## **Age and menopause**

Menopause which occurs between the ages of 45 and 55 is considered normal. For most women in Australia, menopause occurs between 48 and 53. Body weight tends to influence the age of menopause: thinner women are much more likely to have an earlier menopause than women who are heavier. Being very overweight may delay the onset of menopause until well into the fifties.

## **Premature menopause**

Premature menopause is when the last period occurs before the age of 40. The ovaries may stop working prematurely, menopause can be

deliberately induced for medical reasons, or prematurely brought on by surgery, drugs and certain illnesses.

### Premature ovarian failure

Premature ovarian failure is diagnosed when a woman of less than 40 years of age experiences amenorrhoea for more than four months, has low oestrogen levels and an FSH level above 40 IU/l. This condition is different to premature menopause in that ovarian function can occur sporadically. Premature ovarian failure is discussed in detail on pages 285–7.

### Medically induced menopause

Medically-induced menopause is more frequent now that drugs can be used to induce a temporary menopausal state to treat conditions such as endometriosis and uterine fibroids. These drugs are called gonadotrophin-releasing-hormone agonists (GnRH agonists), commonly Zoladex. The menopausal state is reversible.

Nevertheless, the changes are the same as would be experienced by any naturally menopausal woman for the time that the drug is taken: bone density loss, vaginal dryness, hot flushes and mood changes are common. Although each of the symptoms is reversible when drug use is discontinued, bone thinning may occur at an age when regaining the bone density is very difficult.

Menopause can also occur after radiation therapy for cancer, particularly of the pelvic region. Sometimes this is not deliberate, but the changes can be permanent. The ovarian tissue degenerates and fails to produce follicles in the usual way, and menopause is the result. The herb *Angelica sinensis* may help to protect the ovary from the effects of irradiation when destruction of ovarian tissue is not desirable.<sup>1</sup> Some drugs used in the treatment of cancer, such as cyclophosphamide, chlorambucil, mechlorethamine and vincristine, can cause menopausal symptoms. Some women develop premature ovarian failure or early menopause. For other women, menstrual cycle regularity can slowly return after a number of months.

Tamoxifen, used as an anti-oestrogen in the treatment of breast cancer, can also cause menopause-like symptoms. Hot flushes, vaginal dryness and itch, and vaginal bleeding have been reported.<sup>2</sup>

### Surgically induced menopause

Although much less frequent because of the efficiency of GnRH agonists and anti-oestrogen drugs like Tamoxifen, menopause may be deliberately induced by removing the ovaries. A complete hysterectomy and bi-lateral salpingo-oophorectomy where the ovaries and uterus are both removed, or removal of the ovaries only (but not the uterus) will immediately

lead to menopause. This type of surgery may be performed for endometriosis, oestrogen-responsive breast cancer, ovarian tumours or ovarian cancer.

A hysterectomy which leaves the ovaries intact should not be associated with an interruption in ovarian activity. Up to one-third of women having this type of hysterectomy, however, experience symptoms that indicate they have become menopausal.<sup>3</sup>

If menopause does not occur immediately after a hysterectomy, on average, it will occur five years earlier than in women who still have their uterus.<sup>4</sup> Some data supports the theory that in certain individuals, hysterectomy may result in disruption of ovarian blood or nerve supply, producing symptoms of diminished ovarian function.<sup>5</sup> A controversial theory holds that tubal ligation may also be associated with premature menopause for much the same reasons,<sup>6</sup> but this is a hotly debated issue which requires more research to be resolved.

### Normal transition or disease?

When the HRT debate was at its peak in the early 1990s, many doctors were describing the menopause as a deficiency disease, characterised by a lack of oestrogen, and comparable to other (medical) conditions caused by hormone deficiency such as diabetes, Cushing's disease and hypothyroidism. At the Sixth International Congress on Menopause held in Bangkok in 1990, doctors explained (to each other) how every woman was a hormonal tragedy waiting to occur.

Hormone deficiency diseases, they were claiming, are defined as states where the administration of the deficient hormone can reverse or prevent adverse effects in the body. Naturally, said the proponents of this theory, hormonal medication is needed to treat the deficiency and return the body to normal. They vigorously endorsed the use of replacement hormones and believed that all post-menopausal women, having outlived the functional lives of their ovaries, were diseased and in need of continued medical attention until they died. Even the acronym everyone has now adopted—HRT (hormone *replacement* therapy)—implies a deficiency state needing hormonal medication to correct it.

There are two issues for menopausal women. The first is the need for a safe and effective way to manage the symptoms of the transition phase of menopause; the second is the need to reduce risk of chronic degenerative diseases. Women now live much longer than their forebears and many will spend approximately the last third of their lives without oestrogen. This means that the protective effects of oestrogens on bone are lost and the risk of heart disease, also to some extent ameliorated by oestrogens, starts to increase. If menopause was a deficiency disease, then replacement hormones could be relied upon to correct both of these issues. But it wasn't to be.

It is now apparent that HRT is not the panacea for the menopause. In fact, for menopausal women who are well it seems to have more potential risks than benefits. The debate over menopause as a deficiency disease or a normal phase of a woman's life has become inconsequential as the medical profession tries to develop safe and appropriate medication regimes for women with menopausal conditions.

Natural therapists have always viewed menopause as a normal transition. Menarche, menstruation and menopause are seen as normal phases which affect women in their passage through life, and which may need supportive treatment. Rather than encouraging mid-life women to believe they have a disease, most natural therapists (and many like-minded doctors) encourage menopausal women to adopt positive lifestyle changes, good eating patterns and a positive attitude to this phase. For many women, these changes do not only improve symptoms during the transition phase when hormones first start to decline, but also reduce the risk of osteoporosis and heart disease.

### **A positive lifestyle**

Researchers in one study found that the well-being of mid-life women was related to being physically well, exercising moderately, having a positive attitude to menopause and feeling happy. Exercising, even once per week, was associated with fewer symptoms, as were positive relationships and friendships. Hormonal status was not the relevant feature of a positive menopausal experience.<sup>7</sup>

Diet has a direct influence on menopausal symptoms and is believed to contribute to the marked differences in symptoms experienced by women from other cultures, especially hot flushes.<sup>8</sup> Changing dietary intake of various foods containing natural oestrogens (phyto-oestrogens) reduces hot flushes and symptoms associated with vaginal dryness.<sup>9</sup> The positive effects of phyto-oestrogens are discussed in Chapter 18 'Oestrogen-like compounds in plants'.

## **The changes at menopause**

### **When to contact the doctor**

- Bleeding, no matter how light, which occurs one year after the last menstrual period.
- Bleeding after sex.
- Persistently heavy periods.
- Mid-cycle bleeding or bleeding between periods.
- Pain, if never experienced before.

## Hormone levels

Peri-menopausal hormonal changes start slowly, some two to three years before ovulation stops. The output of both oestrogen and progesterone declines gradually, sometimes in association with irregular menstrual patterns. When the changes in hormone production occur gradually, fewer menopausal symptoms may be the result. This may be one reason why ‘naturally’ menopausal women tend to suffer fewer symptoms than women with premature menopause or women whose menopause is induced surgically or with drugs.

During the menstrual cycle, oestrogen usually inhibits the levels of follicle-stimulating hormone (FSH), but as oestrogen declines, FSH increases because of the lack of feedback inhibition. FSH levels in blood are sometimes used as a biochemical indicator of menopause.

Luteinising hormone (LH) also increases, but more slowly than FSH. Both LH and FSH are released about every 60–90 minutes in small bursts, and the release of LH has been shown to coincide with hot flashes. LH also stimulates ovarian production of small amounts of an androgen (androstenedione) which is converted into a type of oestrogen known as oestrone.

Oestrone is the dominant oestrogen of post-menopausal women, but its production has little to do with the ovary. While both the ovary and the adrenal gland produce the starting hormone androstenedione, the adrenal gland is responsible for the far greater volume. The androstenedione is then released into the circulation and finally converted into oestrone in the fat, liver and kidneys with the fat tissue being the main site. This means that amount of body fat determines to some degree how well oestrogenised a woman will be after the menopause.<sup>10</sup>

This is referred to as ‘extraglandular’ or ‘peripheral’ oestrogen conversion. Its production levels are greater in women who are in the average to high ranges for body weight, and lower in thin women. The presence and amount of oestrone may partially account for the increased bone density and lack of peri-menopausal symptoms experienced by heavier women.

Oestrone is about twelve times weaker than the ovarian oestrogen, oestradiol. Overall, total post-menopausal oestrone production is about two-thirds of the usual pre-ovulatory levels in menstruating women and with only minute amounts of the most active oestrogen, oestradiol, oestrogen effect is greatly diminished.

While oestrogens drop suddenly around menopause, androgens behave differently, and testosterone is estimated to decrease by only about 15 per cent. Despite this slight drop in circulating levels, a decline in androgens is increasingly being seen as contributing to menopausal symptoms. This is now referred to as the ‘female androgen deficiency syndrome’ (see also pages 83–5).

Declining testosterone levels are most likely to contribute to

symptoms. Ten per cent of this androgen is derived directly from the adrenals, and 50 per cent from the ovaries. The 40 per cent remaining is derived from peripheral conversion, with androstenedione as the major precursor.<sup>11</sup> Removal of the ovaries results in a sudden decline in androgens because approximately one-half of a woman's testosterone and androstenedione production is lost. Testosterone secretion from the ovary after menopause is thought to vary from woman to woman—in some cases the ovaries become fibrotic and a poor source of androgens, and the adrenal glands then become the major source.<sup>12</sup>

Androgens tend to decline gradually with age so that the testosterone levels of an otherwise healthy woman in her forties are approximately half the testosterone levels of a woman in her twenties. Testosterone is derived in part from the peripheral conversion of DHEAS; however, levels of this hormone also fall with age and this contributes to the overall decline in testosterone levels.<sup>13</sup> Low levels of testosterone are believed to contribute to low libido, depressed mood and low stamina.

On the other hand, menopausal women can develop male-pattern hair loss of the scalp, or excess growth of coarse facial hair, particularly on the upper lip and chin. This seems to be related to an increased sensitivity of the hair follicle to androgens after the menopause and can occur even if a woman has had no prior problems with excessive hair growth. Rarely the cause might be an increase in testosterone production related to hypertrophy or hyperplasia of ovarian tissue, probably secondary to elevated LH levels.<sup>14</sup>

Under normal physiological conditions only 1–2 per cent of total circulating testosterone is free or biologically active.<sup>15</sup> About two-thirds is normally carried by a protein called sex hormone-binding globulin (SHBG), or is otherwise bound to albumin. The amount of SHBG determines whether testosterone will be freely available or bound and unable to interact with cells. In general increasing the amount of SHBG decreases the amount of freely available and active testosterone, which reduces its unwanted masculinising effects. Vegetarian diets<sup>16</sup> and diets with a high phyto-oestrogen content<sup>17</sup> increase SHBG, probably because of the high fibre content in these types of food. Recent research that showed that soybean isolates did not increase SHBG may be in fact confirming the role of fibre in increasing this carrier protein.<sup>18</sup>

Progesterone production is erratic around the menopause because ovulation occurs less frequently and follicle development is less predictable. Once a woman is menopausal, the production of progesterone ceases because follicular development and ovulation are necessary for progesterone to be produced by the corpus luteum. This can cause a number of the common problems of menopause including mood changes and heavy periods.

All of the hormonal variations, and not just declining oestrogen, orchestrate the physical and biochemical changes which accompany menopause. The most common symptoms caused by these fluctuations

are the change in the menstrual cycle, hot flushes and premenstrual mood changes.

## Menstrual cycle and other changes

The hormonal fluctuations are mirrored in menstrual changes and are usually the earliest sign of menopause. Some women stop menstruating suddenly, but there is a usual pattern of menstrual changes associated with the onset of the peri-menopausal phase. These usually begin some time in the fourth decade.

Gradually, changes become apparent in either the menstrual flow or the regularity of the cycle. The period may become more frequent but more often, less frequent ovulation causes the cycle length to increase. This stage may last for a few months or for many years. Women can still become pregnant during this time.

Other symptoms can include vaginal dryness, insomnia, hot flushes and night sweats. These are related to changes in the oestrogen levels. Some women also experience symptoms which are similar to premenstrual syndrome. If this occurs, they should be treated with the appropriate remedies for PMS.

The next phase is quite variable. Some women stop menstruating all of a sudden; others may have increasingly infrequent, but normal periods; still others, infrequent 'flooding'. This is sometimes referred to as the 'transitional phase' because it represents the stage immediately before menopause. Eventually the periods stop altogether and the woman becomes menopausal.

## Diagnosis

### Common tests

Blood tests for levels of FSH are not infallible, but despite expert opinion are often used to diagnose menopause. Elevated levels reflect the declining levels of oestrogen. (Table 9.1 shows the normal range for FSH.) FSH levels often fluctuate day to day during the peri-menopause and can give misleading results, but will remain consistently high once a woman has become menopausal. By then, however, she won't need a blood test to tell her. If a blood test for FSH is taken, it should be taken on day three of the menstrual cycle because the early follicular phase is the best time to accurately assess reduced ovarian reserve. A reading of more than 10 IU/L indicates a peri-menopausal state. FSH and oestradiol readings may be useful when there is doubt about the diagnosis—for example, after hysterectomy where there is no menstrual marker. FSH alone may be useful in determining between premature



menopause and secondary amenorrhoea in women less than 40 years of age.<sup>19</sup>

**Table 9.1 Normal ranges for FSH at various stages in the menstrual cycle**

	<i>FSH levels</i>
Follicular phase	3.5–16 IU/litre
Mid-cycle peak	8–30 IU/litre
Luteal phase	1.8–12 IU/litre
Post-menopausal	25 IU/litre

Sometimes the blood levels of oestrogen and progesterone are measured to see whether they are within the normal limits, but this is an even more unreliable test than the FSH level and in most cases this test will only be a waste of time and money. Blood for oestradiol measurements should also be taken on day three of the menstrual cycle to assess the reduced ovarian reserve. A reading of less than 150 pmol/l suggests peri-menopause. Levels are inaccurate when a woman is on oral oestrogen therapy.

The vaginal walls can show early changes which are caused by the declining oestrogen levels. They might look thinner and drier, and sometimes bleed. These signs are generally quite late, but women who have evidence of chronically low oestrogen (low body weight, undertake strenuous exercise, and women on a poor diet) might develop symptoms early in their menopausal transition.

It can be quite difficult to tell, even with tests, if a woman is menopausal. Symptoms are important and a menstrual diary will be a great help. (The menstrual diary on page 127 can be photocopied for regular use.) In many cases, and with all of the best intentions, a woman will still only know she is menopausal once she hasn't had a period for a whole year.

## Menopausal symptom index

The menopausal symptom index (see Table 9.2) is used to monitor the severity of menopausal symptoms and their response to treatment. The most common symptoms are graded according to their severity (very strong = 3, moderate = 2, slight = 1, not present = 0) and multiplied by a 'constant factor' (column two). Scores of >35 indicate severe symptoms; 20–35 moderate symptoms; and 15–20 slight symptoms. The chart can be filled out every month to assess the efficacy of treatment. Medication (but not dietary or lifestyle changes) is usually stopped once the score is below 15.

**Table 9.2 Menopausal symptom index (after Kupperman)**

		prior to treatment	after 1 month	2 months	3 months	4 months	5 months	6 months					
Symptoms	constant factor	variable factor of severity											
		▼		▼		▼		▼		▼			
Hot flushes	4												
Sweating	2												
Insomnia	2												
Nervousness irritability	2												
Depression	1												
Lack in concentration	1												
Joint pain	1												
Headache	1												
Palpitation	1												
	Total												

very strong = 3, moderate = 2, slight = 1, not present = 0

## Management of common peri-menopausal problems

### Menstrual cycle changes

The menstrual changes characteristic of the peri-menopausal years are associated with three major factors: the frequency of ovulation; the levels of oestrogens; and the production of progesterone.

When the frequency of ovulation is altered, the cycle length and regularity of the period also change. This is a normal characteristic of the peri-menopause and many women will experience erratic ovulation and menstruation as the only features of their approaching menopause. No treatment is necessary unless the erratic cycles are accompanied by menorrhagia (heavy periods) or spotting.

Anaemia might develop secondary to menorrhagia and iron supplements in combination with the herbs *Alchemilla vulgaris* and *Vitex agnus-castus* may be necessary to control the severity of menstrual blood loss. Doctors might suggest specific hormone replacement medication for peri-menopausal women to regulate hormone balance (see below) or a progestogen impregnated IUD. These and other recommendations for menorrhagia are discussed in more detail in Chapter 11.

Erratic ovulation also means that the cells of the endometrium tend to be exposed to lower levels of oestrogen for longer periods of time, but to little if any progesterone (which is only produced once ovulation occurs). This is sometimes referred to as the ‘unopposed effect’—oestrogen continues to stimulate the endometrium ‘unopposed’ by progesterone.

As a result, the endometrium looks and behaves differently from endometrium exposed to both oestrogen and progesterone. It tends to be fragile, to bleed more readily, and the periods can become excessively heavy. Spotting is common and, if there is prolonged exposure to unopposed oestrogen, the endometrial cells can undergo cancerous changes. Abnormal bleeding of this nature, and the various medical or natural treatments to control it, are discussed in the section on dysfunctional uterine bleeding in Chapter 12 ‘Erratic bleeding’.

### Peri-menopausal ‘PMS’

Women in their forties with PMS are often told they are, or describe themselves as being, ‘menopausal’. Symptoms related to hormone fluctuations are not necessarily indicative of the peri-menopause unless they are accompanied by menstrual irregularity, and even then there may be other causes. Some of the commonly associated menopausal symptoms, like hot flushes, migraines and palpitations, are experienced by women in their twenties and thirties who are not menopausal and certainly not in need of replacement hormones.

One study of recently menopausal women showed that although hot flushes increased with the cessation of periods, symptoms like breast discomfort, irritability, excitability, depression and poor concentration ‘improved after the cessation of menstruation, [which] suggests that these symptoms are more likely to be related to menstruation than to the menopause’.<sup>20</sup>

As a general rule, women who are forty-something, with fairly regular periods, and no hot flushes or vaginal dryness, should consider causes for their complaints other than menopause. And as far as treatment is concerned, many of them will respond better to remedies for PMS than to those for menopause.

For example, evening primrose oil capsules are commonly recommended or self-prescribed for so-called menopausal symptoms even though this supplement has been shown to be no better than placebo when given to women with menopausal symptoms.<sup>21</sup> Evening primrose *is*, however, useful for PMS, as are a number of other supplements and herbal and dietary recommendations. A detailed description of the treatment of all types of PMS, including the specific management of peri-menopausal PMS, is outlined in Chapter 8 ‘The menstruating years and PMS’.

Doctors prescribe different types of hormone replacement medication for women depending on whether they are in the peri-menopausal years—meaning that the last episode of menstrual bleeding was less than one year ago—or whether they are menopausal. All women are given continuous oestrogens of varying doses, but the progestogen dosage varies depending on the menstrual status of the women. Peri-menopausal women are given continuous oestrogen combined with *cyclical* progestogens, either as an oral preparation or in a patch, and will continue to have cyclic bleeds. HRT for post-menopausal women consists of continuous oestrogen with *continuous* progestogens at low doses, which will eventually lead to a thin and non-functioning endometrium (and no menstrual bleeding). Women who have had a hysterectomy, whether pre- or post-menopausal, are prescribed continuous oestrogens.

Table 9.3 outlines the different treatments that might be useful for peri-menopausal PMS versus those that might be recommended for menopausal symptoms.

## Migraines

The frequency and severity of premenstrual migraines can increase as a woman approaches menopause. Premenstrual migraines are often related to the rapid decline in oestrogens just before menstruation in conjunction with other migraine triggers such as rapid fluctuations in the blood sugar levels, food sensitivities, or structural problems of the neck and

**Table 9.3 Different recommendations for the treatment of peri-menopausal PMS and menopausal symptoms**

Treatment and treatment aims	Peri-menopausal PMS	Menopausal symptoms
<b>Aim</b>	Manage adverse response to cyclic hormone fluctuations	Support declining oestrogen levels
<b>Herbs</b> <i>Hormone modulation</i> <i>Nervines</i>  <i>Other</i>	<i>Vitex agnus castus</i> <i>Withania somnifera</i> <i>Hypericum perforatum</i>  <i>Schizandra chinensis</i> Bitters (chologogues)	<i>Cimicifuga racemosa</i> <i>Withania somnifera</i> <i>Hypericum perforatum</i> <i>Humulus lupulus</i>
<b>Diet and supplements</b>	Magnesium Vitamin B <sub>6</sub> Evening primrose oil Hypoglycaemic diet	Phyto-oestrogens Calcium Magnesium Vitamin E
<b>HRT</b> <i>With uterus</i>	Continuous oestrogen combined with cyclical progestogen: <i>Tablets:</i> Trisequens, Climen, Divina, Premia 5, Menoprem <i>Patches:</i> Estracombi, Estrapak	Continuous oestrogen combined with continuous progestogen: <i>Tablets:</i> Kliovance, Kliogest, Premia continuous, Menoprem
<i>Without uterus</i>	<i>Tablets:</i> Estrofem, Genoral, Premarin, Prodynova, Ovestin, Ogen, Zumenon <i>Patches and Implants:</i> Estraderm, Climara, Femtran, Dermestril, Menorest, Sandrena, Oestradiol implants, Primogyn Depot	

back. Any or all of these predisposing factors can trigger a vascular response, usually blood-vessel spasm, which causes pain.

The regime described for premenstrual migraines can be quite complex and is described on pages 138–9. Herbalists often prescribe *Vitex agnus-castus* in conjunction with the herb *Cimicifuga racemosa*, to regulate the oestrogen levels, with *Lavandula angustifolia* as a relaxing nervine and *Corydalis ambigua* as an anodyne.

Increasing the amount of phyto-oestrogens in the diet may also be useful. In a recent placebo-controlled study women with pre-menstrual migraine were given either 60 mg of soy isoflavones, 100 mg *Angelica sinensis* and 50 mg *Cimicifuga racemosa*, or placebo for 24 weeks. Migraine incidence decreased by more than half in the treated women compared to those on placebo.<sup>22</sup>

Medically, peri-menopausal hormone replacement might be recommended, but some women will experience more headaches or migraines as a result of hormone medication and may need to take conventional migraine medication instead.

## Hot flushes

The symptom that consistently correlates with being menopausal is hot flushes. About three-quarters of all menopausal women experience some form of hot flushes;<sup>23</sup> and about one-third of these women will find them debilitating enough to seek treatment. Two studies indicate that almost 40 per cent of menopausal women experienced ‘troubling’ hot flushes,<sup>24</sup> but not all women took medication or sought help for their symptoms.

Flushes are likely to be as different as the women who have them. Some have transient episodes of feeling a bit hot or sweaty; others might be drenched with perspiration, feel uncomfortably hot, go red in the face and be troubled by palpitations. Sometimes headaches, a sense of increased pressure in the head, vagueness, transient chills, fatigue, dizziness and nausea follow or accompany a hot flush. The body usually adjusts to the changing hormones after about one year and the hot flushes disappear completely. Rarely, they will last for five to ten years after the period has stopped.

Many women feel embarrassed and uncomfortable when they have a flush. They lose concentration, or they feel as though they won’t be taken seriously. Some women do obviously perspire and flush in the face, but most of the time, other people don’t notice hot flushes.

Flushing is related to oestrogen decline—women who have never menstruated do not flush unless they have been given oestrogen that is then withdrawn. Hot flushes are more severe when a woman is very thin, probably because body fat is an alternative source of oestrogen (oestrone). Women who become menopausal suddenly, or at a younger age than usual, often experience hot flushes that are more severe, perhaps because the body is not prepared for the abrupt change in oestrogen status.

Even so, it is not the oestrogen itself that fluctuates when a woman has a hot flush. Instead, luteinising hormone increases because of a flurry of activity in the hypothalamus and the release of gonadotrophin-releasing hormone. This leads to the usual symptoms associated with flushing. Afterwards, there is often a slight drop in temperature caused by loss of body heat from sweating. Temperature fluctuations can cause the on-again, off-again problem with clothing and lead to a serious disturbance in sleep patterns.

Some women seem to flush more, or only flush, when they are tired or over-worked. Natural therapists believe that exhaustion is related to unhealthy function of adrenal glands. Certainly, post-menopausal women rely on the production of androgens from the adrenal glands, which are converted into oestrone, once the ovaries stop producing oestrogen. These types of symptoms have historically been treated with a group of remedies called the adrenal adaptogens.

Some menopausal women can find that even apparently mild emotional

response will trigger disproportionately severe flushes. Being ‘flushed with excitement’ takes on a whole new meaning for a menopausal woman. As does being ‘hot and flustered’, ‘hot-headed’ or any number of other idioms that indicate the relationship between the nervous system, body heat and the emotions. A number of common medicinal herbs are used for menopausal symptoms aggravated by stress or anxiety.

Lately, there has been speculation that hot flushes are not just a nuisance and that they may serve a positive role. One theory is that the increase in body temperature sets the stage for a healthier old age by burning up toxins and stimulating the immune response (similar to the increase in immune activity when we have a temperature caused by a cold or the flu). Another is that they represent surges of creative and positive energy.



### ■ ■ The medical approach

Almost without exception, the medical treatment of any menopausal symptom is hormone replacement therapy (HRT)—and hot flushes respond well to this medication. Somewhere between 60 and 90 per cent of women with hot flushes who are treated with HRT improve dramatically. It is a useful medication, but in view of the concerns raised about its use, natural remedies may be more appropriate unless there are compelling reasons why HRT should be considered.

A detailed discussion on the risks and benefits of HRT appears on page 000.

Other drugs can be prescribed to manage hot flushes for those women for whom HRT is either contraindicated or not tolerated. The progestogens are sometimes suggested; however, there is some debate about the safety of progestational agents in women with a history of breast cancer.<sup>25</sup> Clonidine, an anti-hypertensive agent, may be used for hot flushes and is particularly used for Tamoxifen-induced hot flushes in women with breast cancer.<sup>26</sup> The selective serotonin re-uptake inhibitors (SSRIs), a class of antidepressants, are increasingly considered for managing hot flushes, with venlafaxine (Efexor), a selective serotonin and norepinephrine reuptake inhibitor, being the best studied to date. The most common side effects of venlafaxine include mouth dryness, anorexia and nausea.<sup>27</sup> Both Clonidine and the SSRIs are known to affect sexual function with Clonidine being linked with lack of orgasm in women.<sup>28</sup> Venlafaxine, on the other hand has demonstrated an improvement in libido scores from baseline in postmenopausal women.<sup>29</sup>



### The natural therapist's approach

Herbal treatment of any menopausal symptom is quite different to the medical approach where HRT is used to replace the lost hormones of

menopause. Herbs do not work in this way and are not the same as replacement hormones—if they were, herbalists would be experiencing the same difficulties that are now confronting doctors using HRT. Instead, a number of herbs are selected and then combined in an individual formulation to take into account each woman's unique constellation of menopausal symptoms.

Hot flushes are one of the many symptoms that occur during the menopausal transition and are part of what a herbalist might refer to as the 'menopausal syndrome'. Combinations of herbs might need to take into account symptoms as diverse as hot flushes, depression, high blood pressure, joint pain or stiffness and crawling skin. The symptoms that make up the menopausal syndrome will be unique to that particular woman, and therefore so will the herbal formula prescribed. This can be quite a complex process and requires knowledge of the individual herbs as well as the correct therapeutic dose to treat the presenting symptoms. It is important to see a herbalist with experience in this area. Over-the-counter preparations are unlikely to give lasting results, because they cannot be expected to account for all of the many presentations of the menopausal syndrome and because they often contain herbs that are not in the therapeutic dose range.

The treatment of hot flushes often involves dietary and lifestyle suggestions in conjunction with herbal remedies. Where possible, these should be adopted prior to the onset of symptoms; ideally, they should be slowly incorporated into the daily routine of women in their forties to reduce the severity of symptoms once hormone levels start to decline. Dietary phyto-oestrogens are the mainstay of any treatment of menopausal women, and when women are reluctant to take these as part of their diet, they can be prescribed soy supplements. There are many commercially available soy products; however, a lot of these are made from isolated soy compounds such as isoflavone or soy protein. The positive effects seen with dietary intake of soy are conferred by a synergistic blend of nutrients from the whole food and, as such, benefits are more apparent from whole soy supplements containing both the protein and soy germ (hypocotyl). (See 'Oestrogen-like compounds in plants', page 399.) An exercise regime adopted early in the transition phase has also been shown to reduce symptom severity. (See 'A positive lifestyle', page 157.)

## Herbal treatment of hot flushes

A herbalist will take several factors into account when prescribing for hot flushes. The primary group of herbs is chosen from those that have a specific hormone modulating effect to moderate the symptoms of declining oestrogens (often referred to as 'oestrogenic herbs'). A second group of herbs will be selected to specifically address the type of hot flush that the woman experiences. Herbs might need to be added that



also take into account other symptoms of the menopausal syndrome, as already described. Finally, individual herbs can be selected to manage the factors that contribute to the menopausal symptoms—exhaustion, stress or anxiety, for example. Although this makes the treatment more complex, an individuated herbal formula is much more likely to improve symptoms as well as addressing underlying contributing factors.

## Herbs with oestrogen-like effects

Herbs with an oestrogen-like effect have been used for centuries for the management of hot flushes and other oestrogen-related symptoms. All oestrogen-like components in plants are rather weak and have been estimated to be many times less potent than synthetic or endogenous oestrogens.<sup>30</sup> However, when a woman becomes menopausal and produces virtually no oestrogen of her own, herbal medicines can assist with the process of hormone modulation until the symptoms of the transition phase have ceased.

Of particular interest to herbalists is *Cimicifuga racemosa*, long recognised and used by Europeans, Native Americans and Chinese for menopausal symptoms. It has been the subject of a number of open and double-blind trials, particularly in Germany where many doctors prescribe it routinely for menopausal symptoms, and where it is often combined with *Hypericum perforatum*. The results are extremely favourable, especially for hot flushes, vaginal dryness and mood changes. *Cimicifuga* is discussed in more detail in Chapter 19.

Other herbs that are often referred to as being ‘oestrogenic’ are those that contain steroidal saponins, such as *Dioscorea villosa*, *Aletris farinosa*, *Tribulus terrestris* and *Asparagus racemosa*, or the herbs from the Chinese pharmacopoeia such as *Angelica sinensis*, *Paeonia lactiflora* and *Rehmannia glutinosa*. One or a number of these are often combined with *Cimicifuga racemosa* to form the basis of the herbal formula.

## Herbs for specific types of hot flush

### Flushing accompanied by severe sweating

Herbs to consider here include *Salvia officinalis* and *Astragalus membranaceus*. They are usually combined with the other remedies for flushing. One common Chinese formula for sweating associated with weakness contains *Astragalus membranaceus*, *Codonopsis pilulosa*, *Angelica sinensis*, *Cimicifuga racemosa*, *Atractylodes macrocephala* and *Bupleurum falcatum*.

*Salvia officinalis* is oestrogenic, and improves circulation to the head. A simple home remedy for the treatment of hot flushes and sweating is

as follows: Chop about 6 fresh sage leaves and soak overnight in lemon juice. In the morning, strain and drink the juice. Seven to ten days of this mixture will usually control flushing and sweating, and also improve digestion and concentration. It should not be continued for longer than two weeks without a break.

### Night sweats

*Zizyphus spinosa* is specific for night sweats and may be combined with *Withania somnifera* if sleep latency is poor. Neither of these herbs assists with hormone modulation, and one or more of the oestrogenic herbs would need to be added to a herbal formula to achieve the desired reduction in night sweats. When exhaustion contributes to night sweats, adaptogens may need to be considered as well.

Night sweats can cause debility and depression because they disrupt sleep. *Humulus lupulus* regulates LH surges and is specifically indicated for insomnia caused by flushing. In some cases, simply improving the quality of sleep with herbal hypnotics will improve hot flushes. *Valeriana officinalis*, *Scutellaria laterifolia*, *Passiflora incarnata*, *Avena sativa* and *Matricaria recutita* are commonly prescribed as teas or extracts, or in tablets.

## Herbs for complaints which accompany hot flushes

### Anxiety

Anxiety or worry can bring on a hot flush and a number of herbs are specifically indicated. They include *Hypericum perforatum* and *Lavandula officinalis*, for flushes associated with anxiety-depression states; *Humulus lupulus* and *Zizyphus spinosa*, for flushing, night sweats and insomnia; *Tilia cordata* and *Leonurus cardiaca* for menopausal symptoms which are accompanied by anxiety, insomnia and palpitations; and *Verbena officinalis* for anxiety associated with thyroid dysfunction.

### Depression

Depression commonly accompanies menopausal flushing, particularly when sleep is disturbed. The most reliable herbs are *Hypericum perforatum* and *Lavandula officinalis*, combined with *Withania somnifera* and the ginsengs.

### Insomnia

Insomnia can be associated with hot flushes, and herbs to reduce flushing can be expected to reduce insomnia. For some women, the insomnia accompanies or causes mood changes. Two herbal categories are prescribed for the treatment of insomnia. The first is for difficulty

getting to sleep; these herbs are from the class known as nerve sedatives, such as *Valeriana officinalis*, *Passiflora incarnata*, *Eschscholtzia californica* and *Zizyphus spinosa*. The second category is herbs for those waking through the night, the nerve tonics. *Withania somnifera* is probably the most effective for this type of insomnia, although positive effects may not be noticed for several weeks. *Hypericum perforatum* may also be useful when waking is associated with anxiety or depression.

### (Adrenal) exhaustion

In cases of fatigue and overwork, the adaptogens are indicated. The most commonly used are *Panax ginseng*, *Eleutherococcus senticosus*, *Codonopsis pilulosa*, *Rehmannia glutinosa*, *Glycyrrhiza glabra* and *Withania somnifera*. These herbs are usually prescribed as a compound herbal formulation in the form of a fluid extract.

### Palpitations

A rapid decline in oestrogens can give rise to a state of transient hyperthyroidism because thyroxine becomes more biologically available. *Leonurus cardiaca* is prescribed for menopausal symptoms which are accompanied by anxiety, insomnia and palpitations; and *Verbena officinalis* for anxiety associated with thyroid dysfunction.

### Diet

The dietary intake of phyto-oestrogens improves many of the menopausal symptoms. Adding just 100 g tofu and 1 tablespoon of ground linseed to the diet every day can reduce hot flushes and improve vaginal dryness.<sup>31</sup> Researchers have also observed a link between eating foods with high levels of phyto-oestrogens and lower rates of oestrogen-responsive cancers. These foods are so important that a whole chapter is devoted to their positive and therapeutic effects (see Chapter 18).

Some foods seem to aggravate hot flushes and should be avoided. They include coffee, excessively spicy foods and alcohol. Drinking or eating foods that are extremely hot can also trigger a flush and simply eating foods at a lower temperature can help.

### Supplements

#### Vitamin E

A number of studies in the 1950s validated the effectiveness of vitamin E for menopausal symptoms. In clinical trials, doses ranged from

10–100 mg daily<sup>32</sup> (100 IU is equivalent to 67 mg). Vitamin E is rarely used to reduce the severity of hot flushes and other symptoms associated with menopause, but between 100 and 500 IU is the usual dose prescribed.

Women with blood pressure or heart problems should seek professional advice before using vitamin E.

### Vitamin C and the bioflavonoids

In the early 1960s the bioflavonoid hesperidin, derived from citrus fruits, was shown to reduce the severity of hot flushes.<sup>33</sup> Sometimes moderate to high doses of vitamin C seem to help too—perhaps by increasing the bio-availability of oestrogens in the body. Further research is needed.

### Evening primrose oil

Some women report that evening primrose oil is useful for a variety of menopausal symptoms, including flushing, mood changes and fluid retention. Even so, studies have shown that it is little better than a placebo<sup>34</sup> and many of the symptoms which are reportedly improved by evening primrose oil seem to be related to PMS rather than menopause. Peri-menopausal PMS is discussed later in this chapter.

Evening primrose oil is needed in large doses over long periods and the other herbs and supplements are often a more efficient way to treat menopausal symptoms. The dose range is between 1–3 g daily.



### Self care

Women suffering from hot flushes can dress to reduce the severity of the symptoms. Light and loose-fitting clothing made from natural fibre such as cotton is much less likely to aggravate sweating. A lighter layer underneath a jacket or cardigan that is easily shrugged off helps with rapid temperature fluctuations. Cotton nightwear is also helpful, and some women sleep on a towel or folded sheet so they can throw it out of the bed if it becomes wet rather than having to change the sheets.

## Mood changes

Women suffer from depression twice as often as men,<sup>35</sup> and menopause or other hormonally related conditions have been suggested as causes.<sup>36</sup> Declining hormone levels may cause changes in neurotransmitters or the limbic system and increase feelings of depression and anxiety.<sup>37</sup> One theory suggests that oestrogen acts on neurotransmitters to prevent depression in a similar fashion to the antidepressant drugs the SSRIs, and that the fall in oestrogen levels is the reason for mood change.<sup>38</sup>

However, depression has been shown to *decline* with age, and by 60 the incidence of depression or other mood change is almost half that experienced by younger women.<sup>39</sup> The cause of depression around menopause seems to be related to *changes* in oestrogen rather than the *amount* of oestrogen.

Oestrogen replacement, while ineffective in the treatment of significant mood disorder, was found to improve mood in those women not suffering from clinical depression.<sup>40</sup> One reason for this may be that hormone replacement improves symptoms of sleep deprivation caused by night flushing, or vaginal dryness and related discomfort in the urogenital system, and that the absence of these symptoms improves mood. Other hormones known to decline around the menopause may also be responsible for mood change. Declining androgen levels have been linked to mood changes,<sup>41</sup> particularly testosterone.<sup>42</sup> Research is in the early stages and as yet there are insufficient numbers of clinical trials examining the long-term safety of androgen therapy as a treatment for depression.

Symptoms of anxiety have also been linked to declining hormone levels because some of the symptoms that accompany hot flushes mimic those of anxiety. Many menopausal women experience palpitations, insomnia, crawling skin and facial flushing—all symptoms that anyone might experience during an episode of anxiety. Likewise, many of the symptoms that accompany sleep deprivation, especially the morning fatigue and lack of interest in daily life, mimic depression, but may have their genesis in changes in sleep patterns rather than in hormone changes *per se*.

The physical changes that occur in the vagina and vulva can have an impact on sexual arousal and/or desire. Low libido, painful intercourse or lack of lubrication has been shown to affect both partners and can be a significant source of negative mood.<sup>43</sup> For example, males experienced more erectile dysfunction and expressed a fear of hurting their partners when their partners reached menopause.<sup>44</sup> This can be expected to have a negative impact on sexual function and, when taken together with other menopausal difficulties, can also influence mood.

Other physical changes around menopause also have an adverse impact on mood. Researchers found, not surprisingly, that when women suffered from other illnesses they were more likely to be depressed.<sup>45</sup> The level of physical fitness and amount of weekly exercise also influences mood. Women who exercise regularly have a better mood profile than non-exercisers.<sup>46</sup> Smoking also adversely affects mood, and menopausal smokers were found to be more depressed than non-smokers.<sup>47</sup>

A number of social constraints and perceptions are thought to influence a woman's mood around the menopause. The 'empty nest syndrome', which suggests women suffer from mood changes because they no longer feel they are making a worthwhile contribution to the family once children have left home, or because they miss their children,

has long been used to explain depressive feelings around menopause. However, this view has recently been disputed, with researchers finding that women experienced *positive* mood changes and better relationships with their partners when their last offspring left home.<sup>48</sup> At this time of their lives, many women are also grappling with the responsibilities of their job as well as caring for ageing or dying parents, both of which can impact negatively on mood.

Finally, psychological factors are likely to influence menopausal symptoms. Women who suffered from depression prior to menopause are much more likely to experience menopausal mood change.<sup>49</sup> A woman's attitude to menopause and ageing will also affect her menopausal experience. Women with a negative attitude to either or both were found to be much more likely to experience problems than women who saw menopause and ageing as positive experiences.<sup>50</sup> Body image issues are often critical to mood at this time and women who view their physical changes in a negative light are more likely to become depressed or anxious.<sup>51</sup> Mood is also affected when stresses or anxieties develop for other reasons, such as an unsatisfactory relationship with a partner,<sup>52</sup> but these factors are coincident to, rather than caused by, menopause.



#### ■ ■ The medical approach

The common medical treatment for menopausal mood changes was HRT, but the current recommendation is that hormone replacement should not be used for menopausal symptoms unless all other treatment has failed. This is likely to mean that increasing numbers of women are prescribed SSRIs or other anti-depressant drugs; however, counselling, exercise and appropriate dietary changes are just as likely to be effective and should be suggested as the first line of treatment. When HRT is used, flushing and vaginal symptoms improve and alterations in mood may occur as a result of this.<sup>53</sup>



#### The natural therapist's approach

*Hypericum perforatum* is the herb of choice for menopausal complaints which are associated with anxiety or depression. Herbalists refer to this plant as a nervine tonic, and it is usually combined with hormone modulating herbs for menopausal complaints. Other nervine tonics are *Scutellaria laterifolia*, *Withania somnifera* and *Turnera aphrodisiaca*. *Rosemarinus officinalis* combined with *Lavendula officinalis* and *Hypericum perforatum* is used when depression is accompanied by vagueness, poor memory and cognition. Nervine sedatives may be needed for anxiety, and the ginsengs are useful herbs for mood change

that is accompanied by physical exhaustion and lack of interest in daily activities.

Many women take B vitamins, particularly vitamin B<sub>6</sub>, evening primrose oil, and *Vitex agnus-castus*, but these remedies are more useful for mood changes in the peri-menopause (see pages 163–4).



### Self care

Starting or continuing an exercise regime improves mood around the menopause, and other simple lifestyle changes such as stress management techniques, yoga and meditation are helpful. Stopping smoking is vital for all sorts of reasons, not the least of which is that smoking has a negative effect on mood. Sometimes depression, anxiety, self-esteem or relationship problems will require the skills of a counsellor and help should be sought before symptoms become too entrenched.

## Tissue changes

Declining oestrogen levels are associated with changes in the mucous membranes and skin, and can affect the tissues of the vagina, vulva and urethra, or the eyes and mouth. Skin ages more rapidly when oestrogen levels are low,<sup>54</sup> while oestrogen replacement reduces skin wrinkles and dryness, the risks associated with hormone replacement use mean that doctors are now reluctant to use oestrogen for cosmetic reasons. Eye changes are also common around menopause, although whether this is related to androgens<sup>55</sup> or oestrogen<sup>56</sup> is not clear. Again, hormone replacement is unlikely to be recommended for these symptoms.

Vaginal dryness, thinning of the vaginal walls and/or urinary symptoms usually occur after menopause, but can affect some perimenopausal women. A range of symptoms might be experienced, from none at all to varying degrees of burning, dryness and irritation, and can have a serious impact on the quality of life.

Sex might be associated with extreme discomfort or even pain brought about by vaginal dryness and failure to lubricate adequately. Declining oestrogen levels can also lead to increased alkalinity of the vagina which can cause irritation, itch or infections. Surveys of women show that about 40 per cent of women past 55 have some dryness and about half of these report moderate to severe symptoms. The presence of symptoms and their severity seems to be connected to dietary factors, body weight and stress.

When urethral tissue is affected by declining oestrogens, frequency, burning, cystitis and incontinence can be recurring problems. These complaints require active treatment, and all women who develop urinary tract symptoms around the menopause, or later, should consider mucous

membrane change as a potential cause: only treating the urinary tract infection will almost certainly lead to a recurrence of the cystitis. Urinary frequency and urge or stress incontinence can worsen around menopause because of pelvic tissue weakness and mucous membrane changes associated with ageing.<sup>57</sup>



### ■ ■ The medical approach

Vaginal dryness, soreness and painful sex are usually treated with oestrogen-containing creams, tablets or pessaries. They should be used at night and their benefits and cautions are described in Chapter 20 'Drugs and surgery'.

Oral oestrogens may also be prescribed for some women; however, HRT for urogenital symptoms would normally be short-term only because the risks of more serious problems outweigh the benefits.



### The natural therapist's treatment

Natural therapists often recommend creams for vaginal dryness. An aqueous cream or vitamin E cream can be used as a base to which herbs and oils are added. This can be made at home: 10 ml infused oil of *Calendula officinalis* (marigold); 30 ml olive oil; 20 ml oil of evening primrose in 75 g of aqueous cream. Apply two or three times daily, or as required.

Using a water-based lubricant, such as Wet Stuff, during sex will also help.

The effect of dietary phyto-oestrogens on vaginal tissues has been known for some time<sup>58</sup> and women can take advantage of these positive effects by regularly consuming dietary soya products. Vaginal dryness was also shown to improve when women took a soy protein dietary supplement containing 118 mg of isoflavones (daidzein, genistein, glycitein and their respective isoflavones) for three months.<sup>59</sup>

A new product, a vaginal gel, made from 10 per cent concentrated soy isoflavones, has shown promise in the treatment of vaginal dryness. An *in vitro* study showed that the gel increased protein synthesis and regenerated vaginal epithelium, while twenty women with vaginal dryness using the gel over three weeks reported improvement in hydration and lubrication. Gynaecological vaginal examinations confirmed these impressions.<sup>60</sup> Topical isoflavones hold promise as treatment for tissue changes at menopause, but research is still in the early stages and more independent trials are needed.

Oral prescriptions of *Cimicifuga racemosa* have been shown to reduce dryness and changes of vaginal tissue. In a German study, 80 women were given either *Cimicifuga racemosa*, oestrogen or placebo and were evaluated every four weeks for menopausal symptoms and



mood changes. At the end of twelve weeks, a vaginal smear was taken to assess the state of the vaginal mucosa. All three parameters improved in the group of women given *Cimicifuga racemosa*.<sup>61</sup>

## Libido

Women can experience changes in libido or difficulties with painful intercourse around the menopause, which are believed to be influenced by a number of physical and hormonal changes, and/or psychosocial aspects of this phase of their lives. In general, sexual activity declines around the menopause, but not necessarily sexual satisfaction. When women experience difficulties with relationships or have pre-existing sexual problems, sexual activity might be adversely influenced during the menopausal transition. Other health problems or other menopausal symptoms such as hot flushes and sleep deprivation can also reduce libido.

Hormone changes might influence sexual function in two ways. First, the levels of oestrogens<sup>62</sup> and androgens seem to be directly related to libido. Low levels of testosterone may adversely influence arousal and desire and have been associated with reduced sexual activity,<sup>63</sup> however, other studies have found no correlation between testosterone and libido.<sup>64</sup> Vaginal dryness, soreness and lack of lubrication are associated with declining oestradiol and also have a significant negative effect on sexual response and libido. Oestrogens have vasodilatory effects that result in increased vaginal, clitoral and urethral arterial flow.

Anti-depressants (tricyclic anti-depressants, mono-amine oxidase inhibitors and SSRIs), benzodiazepines and Clonidine, all capable of reducing libido, are commonly used during the menopausal transition. Women may need to use alternative drug treatment when sexual functioning is adversely affected.



### ■ ■ The medical approach

Vaginal pessaries containing oestrogen are routinely prescribed for dyspareunia (painful intercourse) and are very useful for vaginal dryness. Oral HRT is being prescribed less often; instead, tibolone (Livial), a tissue-specific synthetic steroid hormone with oestrogenic, progestogenic and androgenic properties, is often suggested for low libido (see pages 519–20). Some doctors prescribe anti-depressants when depression accompanies changes in libido; however, some SSRIs are known to exacerbate sexual dysfunction and may be a poor choice of medication for these women.



## The natural therapist's approach

Herbs that can improve libido in women can be divided into two broad categories—those that mimic the action of testosterone (testosteromimetics), and those that have general tonic and rejuvenating effects and may act as mild aphrodisiacs.<sup>65</sup> The testosterone-like herbs are *Serenoa repens*, *Turnera diffusa* and *Smilax* spp. Of these, *Turnera* has been traditionally used for low libido in women,<sup>66</sup> and *Smilax* has general tonic effects.<sup>67</sup> *Serenoa* shows some promise in the treatment of androgen excess in women because it inhibits 5- $\alpha$  reductase,<sup>68</sup> but aphrodisiac properties have not been demonstrated.

Herbs that improve general well-being such as *Withania somnifera* and the ginsengs can be expected to improve libido via indirect mechanisms, and may only be useful when fatigue contributes to low desire. *Tribulus terrestris* and *Asparagus racemosus*, however, have been traditionally used for low libido and additionally contain steroidal saponins which may impart some hormone-like activity. Other herbs to correct tissue changes that result in poor libido are discussed on pages 176–7.

*Ginkgo biloba* has been successfully used to improve libido when women are taking SSRIs, improving sexual function in 84 per cent of participants at average daily doses of 209 mg.<sup>69</sup> DHEA supplements did not improve any of the menopausal symptoms (mood, dysphoria, libido, cognition, memory or well-being) above placebo.<sup>70</sup>



## Self care

General measures to improve general health are very likely to improve libido—managing stress, eating regularly and sensibly, exercising and dealing with relationship problems. Unless these contributing factors are dealt with, other treatment for low libido can be expected to have negligible effects.

## Fatigue

Women with insufficient stamina to meet their daily needs often think that their symptoms must be due to menopause. In reality, they may be due to any of the usual causes of fatigue including poor diet, hypoglycaemia, iron deficiency, adrenal exhaustion or depression. Assessment of the menopausal woman must first exclude these non-hormonal causes.

Women who are well, but fatigued, respond to combinations of the appropriate herbs for the nervous system, adaptogens and vitamin B complex, along with appropriate dietary changes and increase in exercise. *Eleutherococcus senticosus* 500 mg–1 g twice daily, combined with

vitamin B complex 1 twice daily, is often effective. Other adaptogens are discussed in the herbal section.

## Getting off HRT

The recent Women's Health Initiative trial (WHI) has prompted many women to stop using HRT, often without the knowledge of the prescribing doctor. It is important that a woman wanting to go off HRT consider the reasons she was prescribed this drug regime in the first instance, to better assess the potential risks and benefits of going off HRT.

The duration of the transition phase and the associated symptoms seem to be predetermined and unique to each woman. If HRT was suggested for menopausal transition phase symptoms, but the woman has not yet passed through this phase, symptoms will return. There is no method to determine the length of the transition phase in an individual, and therefore predicting the severity, or indeed the return, of symptoms is not possible. If HRT is withdrawn suddenly rather than tapered off, some symptoms can be expected even in those women who are well past the transition phase. The oestrogen withdrawal symptoms might be different to those for which the HRT was initially prescribed. For example, a woman who was prescribed HRT for hot flushes might experience aches and pains, insomnia or increased vagueness rather than hot flushes.

Women need to be reassured that all these symptoms—whether related to the sudden withdrawal of prescribed hormones or to the physiological changes of menopause—are part of the transition phase, and will pass once the body adjusts to the lower levels of oestrogen. Where osteoporosis has been diagnosed, women need to be assessed individually and the risks and benefits of continuing HRT need to be discussed with their prescribing doctor.



### ■ ■ The medical approach

The mode of withdrawal may differ between doctors and may also depend on the type of HRT—whether transdermal or oral, for example. It is preferable to taper off treatment under the guidance of the prescribing doctor rather than stop suddenly.



### The natural therapist's approach

Herbal treatment is ideally commenced about six to eight weeks prior to reducing HRT dose. *Cimicifuga racemosa* is the primary herb of choice and is usually commenced at a low dose while the woman is

taking HRT and increased if needed when symptoms occur. Other herbs are combined with *Cimicifuga* as necessary, and might include the adaptogens, nervines or other herbs for flushing.



### Self care

Dietary phyto-oestrogens should be increased or included prior to ceasing HRT. Details on the dietary phyto-oestrogens are on pages 394–419. It might also be useful to also reduce the usual dietary triggers for hot flushes such as caffeinated drinks, alcohol and highly spiced foods.

## Female androgen deficiency syndrome

Female androgen deficiency syndrome is a relatively new diagnosis to explain a number of common symptoms believed to be associated with reduced androgen levels. These include low libido, persistent fatigue and a decreased sense of well-being. This syndrome is covered in detail on pages 83–5.

### CHECK LIST FOR THE MID-LIFE WOMAN

The assessment of the peri-menopausal woman is primarily the assessment of the well woman who may have symptoms associated with the menopausal transition, or coincidental risks or medical disorders which may impact on well-being.

- Breast self-examination monthly.
- A mammogram or breast ultrasound every two years over the age of 50, and probably between 40–50, particularly if post-menopausal or at significant risk of breast cancer.
- Pap smear at least every second year, at the same time as the internal examination, or as recommended by medical practitioner. A vault smear two-yearly following hysterectomy if the woman has ever had abnormal Pap smear.
- Weight-bearing exercise for 30 minutes at least every second day.
- Calcium intake: 1500 mg daily.
- Magnesium intake: 800 mg daily.
- Body weight maintained at middle to upper level of ideal weight.
- Blood pressure check annually, more frequently if elevated.
- Bone density check if there is a strong family history or risk factors for osteoporosis. Re-check in 2–5 years, depending on result.

- Cholesterol check for high-density lipoprotein (HDL) and low-density lipoprotein (LDL) ratio in mid-fifties. Repeat if there is a family history of heart disease or if advised by doctor.

The following investigations are not mandatory but may be applicable for some women depending on history:

- Fasting glucose.
- Coagulation studies where there is a family history of thromboembolism, particularly if spontaneous and/or the woman is less than 40 years old.<sup>71</sup>

## **OSTEOPOROSIS**

Bone is a dynamic growing tissue—if it weren't, no fracture would ever heal. Bone remodelling occurs when calcium is resorbed from bone to interact in a wide range of necessary biochemical events. The activities of the osteoblasts and osteoclasts involved in bone remodelling are affected by fluctuations in hormone levels, mineral intake and exercise patterns. Dietary, lifestyle or hormonal interventions can be employed to manipulate bone cell activity to achieve optimum bone mass.

Bone density is a particular concern for women because a drop in oestrogen levels, irrespective of the cause, will affect bone density. Women of all ages need to be aware of all of the possible events that can have an adverse effect on their endogenous oestrogen. As exercise patterns and diet influence bone health, they should be part of a comprehensive regime to maintain or improve bone density. Increases in bone density are possible at all stages of life, even after menopause.

Bone resorption accelerates in the first five to ten years immediately following the cessation of menstruation unless hormone therapy is undertaken as part of the treatment regime. Loss of bone density will occur irrespective of the woman's age or the cause of the cessation of menstruation. All women should seek advice or begin an exercise regime to offset the risk of osteoporosis if menstruation stops, especially young women, because of the association between years without endogenous oestrogen and low bone density.

### **Peak bone mass**

Peak bone mass for women is achieved in their twenties; beyond this there will be a slow but steady decline until menopause. Bone loss at the spine begins about one and a half years before the last menstrual period,<sup>71</sup> and there is a rapid acceleration in the first five years following

menopause. The rate of loss in the trabecular bone of the spine has been estimated to be approximately 5 per cent annually in one study,<sup>72</sup> or an approximate 10.5 per cent total loss at the spine over eight years in another study.<sup>73</sup> Bone loss at the hip declines with age at approximately half a per cent per year before menopause, with loss during the menopause transition (two to three years before and three to four years after the menopause) of approximately 5–7 per cent.<sup>74</sup> After this time women lose bone at the same rate as men (about 1 per cent per year). Men maintain their bone density due to a higher peak bone mass and no equivalent menopausal transition phase.

### Important points for bone mass

- Achieving the highest possible peak bone mass may reduce the risk of fracture at advanced age.<sup>75</sup>
- Increasing dietary calcium intake will increase bone density up to the age of peak bone mass, and perhaps until menopause.<sup>76</sup>
- Exercise increases peak bone mass.
- Amenorrhoea will reduce peak bone mass and increase risk of osteoporosis.<sup>77</sup>
- Not surprisingly, the effects of calcium, oestrogen and exercise tend to be cumulative.

### Strong predictors of osteoporosis

The risk of developing osteoporosis is strongly associated with the availability of oestrogen and the women's family and inherited predisposition.

#### Inherited disposition

- Family history  
The risk of osteoporosis increases when a female relative has the condition.<sup>78</sup> Female children of women who have osteoporotic fractures have less bone mass than would be expected for their age. Genetics may be the greatest influence on maximal bone mass, accounting for up to 80 per cent of observed variability.<sup>79</sup>
- Female sex  
Women have a higher incidence of osteoporosis than men. Men have a higher initial peak bone mass and don't have the rapid loss seen in women in the early postmenopausal years.<sup>80</sup>
- Skin colour  
Fair skin increases risk.<sup>81</sup> Women with darker skin have fewer hip fractures<sup>82</sup> and a higher bone mass.<sup>83</sup> One study of Australian

Aboriginal and Torres Strait Islander women found that they developed hip fractures later in life than non-indigenous populations, suggesting genetic differences in bone mineral density or a healthier lifestyle in earlier days.<sup>84</sup>

## Low endogenous oestrogen levels

- **Menopause**  
Immediately before and following the cessation of menstruation at menopause, women have an approximately five-year rapid bone density loss that eventually plateaus to the annual 1 per cent bone density loss seen in both men and women.
- **Hypothalamic amenorrhoea**  
Rigorous exercise, excess dieting, anorexia nervosa or hormone imbalances are associated with hypothalamic amenorrhoea, low levels of oestrogen and a loss of bone mass.<sup>85</sup> Hypothalamic amenorrhoea can also occur after cessation of the Pill (but this is rare) and for other unknown reasons.
- **Premature menopause**  
Women who experience menopause before the age of 40 are at greater risk of developing osteoporosis because they spend more years without the protective effect of endogenous oestrogen.<sup>86</sup> Low oestrogen levels at an earlier age reduce the retention of calcium in bone. The number of years since menopause is a better indicator of bone density than age.<sup>87</sup> There is no evidence, however, to substantiate the proposition that these women are at greater risk of osteoporotic fracture.<sup>88</sup>
- **Premature ovarian failure**  
Premature ovarian failure is also associated with low circulating oestrogens, and although menstruation can occur intermittently, osteoporosis risk is high.
- **Other conditions**  
Hypothyroidism can cause amenorrhoea and low bone density if untreated. Severe dietary limitations and low body weight leading to reduced endogenous oestrogen levels are the triad of causes of low bone density in women with anorexia nervosa.<sup>89</sup>

## Other risk factors for osteoporosis

### Diet

- **Low calcium intake**  
We have monitored many women in our clinic in the 40–50 age group and found that calcium intakes tend to be around 500 mg,

on average, but between 250–300 mg daily amongst women who avoid dairy products or who are on weight loss diets. It is rare to find women consuming the recommended 1200 mg per day in this age group, and other age groups have been found to be similarly consuming much less than their recommended daily allowance. Magnesium intakes are often correspondingly low. The benefits of calcium and magnesium are discussed in the section on major bone nutrients (pages 192–4).

- Caffeine and alcohol  
Alcohol and caffeine increase the excretion rate of minerals in urine.<sup>90</sup>
- High protein diets  
Excess protein intake increases calcium excretion in the urine.<sup>91</sup> The calcium loss may persist for several months after dietary re-adjustment.<sup>92</sup>
- Sugar and salt  
Consuming both sugar<sup>93</sup> and salt<sup>94</sup> to excess increases loss of bone minerals via the urine.
- Fibre intake  
Women with excessively high fibre intakes have lower oestrogen levels and bone density than other women.<sup>95</sup> Phytates in grains can form an insoluble bond with the essential minerals and reduce absorption.<sup>96</sup> The effect of normal fibre in reducing calcium absorption is quite small and can be best overcome by an adequate calcium intake.<sup>97</sup> Most women in Australia consume far less than the recommended dietary intake for fibre, however, and this problem only affects small numbers.

## Lifestyle

- Sedentary lifestyle  
Not exercising increases mineral loss from bone.<sup>98</sup> Calcium is lost from bone during a normal night's sleep.
- Prolonged bed rest  
Prolonged bed rest (following fractures, surgery, spinal cord injuries, illness, stroke or complications of pregnancy), or immobilisation of some part of the body, increase mineral excretion in the urine because bones are not subject to the usual weight-bearing stress. Rather than the body mass pressing on the bones in a top-to-bottom direction, the body mass loads the bones in a lateral direction, over a larger area. The bones experience considerably lower stress, resulting in a change of bone metabolism. Exposure to reduced gravity during space travel has also been found to have a direct negative effect on bone.



## FACTORS INFLUENCING RETENTION OF CALCIUM IN THE BONE

### Negative factors

- Certain drugs
- Smoking
- Excess bed rest
- Frequent dieting
- Excess alcohol or coffee
- Excess sugar consumption
- Certain diseases such as hyperthyroidism and diabetes
- Aluminium
- Stress
- Overconsumption of phosphorus (in carbonated drinks)
- Overconsumption of animal protein

### Positive factors

- Oestrogen
- Exercise
- Phyto-oestrogens
- Vegetarian or low animal protein intake, especially after menopause
- Increased magnesium intake
- Increased boron intake

Healthy people who undergo periods of bed rest or immobilisation can regain bone density through the resumption of weight-bearing activities.

- **Smoking**  
Smoking decreases oestrogen production and increases oestrogen metabolism, lowering endogenous 17  $\beta$ -oestradiol levels.<sup>99</sup> Smokers often have lower body weight and bone density,<sup>100</sup> and women who smoke reach menopause 1.5–2 years earlier than non-smokers.<sup>101</sup> Post-menopausal smokers fracture bones more often than non-smokers,<sup>102</sup> and women who are on HRT and smoke may have up to 50 per cent less oestrogen than non-smokers.<sup>103</sup> Smoking may also interfere with calcium absorption and thus, adversely affect bone mass.<sup>104</sup> Women who stop smoking before menopause on average reduce the risk of hip fracture by about one-quarter, and up to one-half if they were heavy smokers.<sup>105</sup>

### Other complaints

- **Malabsorption syndromes, chronic diarrhoea**  
Complaints that reduce mineral uptake from the gut can adversely affect bone density. These include coeliac disease, Crohn's disease,

ulcerative colitis and fat malabsorption because of reduced vitamin D levels.

- Other illnesses  
Diabetes, hyperparathyroidism, rheumatoid arthritis, alcoholism, epilepsy (drug-induced), scurvy, Cushing's syndrome, thyrotoxicosis, the surgical removal of the stomach or portions of the stomach, and inherited disorders of the connective tissue are associated with an increased risk of osteoporosis.

## Pregnancy

Pregnancy and breastfeeding can be considered to confer either neutral to slightly positive effects on bone density. Calcium requirements are higher at these times, but the active transport of calcium from the intestines becomes more effective.<sup>106</sup> Recent studies have shown that pregnancy and breastfeeding do not negatively affect bone mass, and some researchers believe that pregnancy is a positive factor in improving bone density.

## Drugs

Oral glucocorticoid use causes the most common form of drug-related osteoporosis, and as yet the effects of inhaled glucocorticosteroid use are unknown.<sup>107</sup> Post-menopausal women taking glucocorticoids are at greatest risk of fracture of the spine; and prophylactic use of a bisphosphonate (page 196) is suggested to minimise bone loss.<sup>108</sup> Less common drugs that reduce bone density include the immunosuppressant cyclosporin and cytotoxic agents.<sup>109</sup>

Women who have taken GnRH agonists or analogues, which are often used as part of assisted fertility drug treatment or for the treatment of endometriosis, may also be at risk of developing osteoporosis.<sup>110</sup>

A recent three-year study of women aged 18–39 using Depo-Provera showed a greater loss of bone density at the hip compared with non-users. A similar effect was observed in the spine. After cessation of Depo-Provera, bone density did increase, although more slowly at the hip than at the spine. Two and a half years after stopping Depo-Provera, the average bone density was similar to those of non-users, except in the women aged 18–21 whose bone density values continued to be lower than in non-users.<sup>111</sup> Contraceptive choices are particularly important for young women since this is the stage at which peak bone mass is attained.

Aluminium-containing antacids may pose a risk to bone density when consumed in large doses over long periods.<sup>112</sup> Other common drugs that decrease calcium absorption, retention of calcium in bone, or have other negative effects on bone density are included in Table 9.4.

**Table 9.4 Common drugs and bone density<sup>113</sup>**

<b>Drug</b>	<b>Use</b>	<b>Effect</b>
<i>Cortisone:</i> Celestone, Prednisolone	Anti-allergy, anti-inflammatory and connective tissue disorders	<ol style="list-style-type: none"> <li>1. Reduces intestinal absorption of calcium</li> <li>2. Reduces level of vitamin D</li> <li>3. Increases PTH activity</li> <li>4. Reduces osteoblast activity and increases osteoclast activity</li> <li>5. Increases calcium excretion via the kidney</li> </ol>
<i>Laxatives:</i> Cascara, Epsom salts, castor oil, senna	Constipation	<ol style="list-style-type: none"> <li>1. Laxative abuse associated with increased intestinal calcium loss</li> <li>2. Decreases transit time and nutrient uptake</li> </ol>
<i>Sedatives:</i> (barbiturates)	Sedative, anti-convulsant	<ol style="list-style-type: none"> <li>1. Increase need for vitamin D and calcium</li> </ol>
<i>Antibiotics:</i> Tetracyclines: Achromycin, Aureomycin	Infectious diseases	<ol style="list-style-type: none"> <li>1. Chelate bi-valent ions which decrease intake</li> <li>2. Decreases absorption of calcium, magnesium, iron, fats and some amino acids</li> </ol>
<i>Anti-ulcer drugs:</i> Zantac, Losec	Gastric ulcers	<ol style="list-style-type: none"> <li>1. Reduces gastric acid secretion</li> <li>2. May decrease uptake of all bi-valent ions, including calcium and magnesium</li> </ol>
<i>Antacids:</i> Aluminium hydroxide	Gastric ulcers	<ol style="list-style-type: none"> <li>1. Decrease absorption of vitamin D</li> <li>2. Decrease absorption of phosphate</li> <li>3. Neutralise gastric acidity and may decrease uptake of bi-valent ions</li> </ol>
<i>Anti-convulsants:</i> Dilantin, Mysoline, Primidone	Epilepsy	<ol style="list-style-type: none"> <li>1. Increase vitamin D metabolism</li> <li>2. Decrease intestinal uptake of calcium and magnesium</li> </ol>
<i>Diuretics:</i> Loop diuretics (Lasix)	Fluid retention, heart disease, high blood pressure	<ol style="list-style-type: none"> <li>1. Decrease reabsorption of calcium in the kidney</li> <li>2. Increase excretion of calcium, magnesium, zinc and potassium</li> </ol>
<i>Potassium-sparing diuretics:</i> Spironolactone, Amiloride	As above	<ol style="list-style-type: none"> <li>1. Increased calcium excretion.</li> </ol>
<i>Anti-oestrogens:</i> GnRH agonists, e.g. Zoladex	Hormone-dependent disease, including endometriosis and fibroids	<ol style="list-style-type: none"> <li>1. Reduce calcium retention in bone.</li> </ol>

## Fluoride may affect bone density

Fluoride decreases the rate of vertebral fracture,<sup>114</sup> but may increase the incidence of hip fracture.<sup>115</sup> Long-term, low-dose exposure to fluoride in drinking water has been associated with lower bone density.<sup>116</sup>

## SPECIFIC INVESTIGATIONS

Bone density measurement, usually using dual energy X-ray absorptiometry (DEXA), is recommended for any woman with significant risk of osteoporosis. The risk factor questionnaire can be used to identify those with significant risk (see Table 9.8 on page 201). The strongest predictors of low bone mineral density are evidence of low oestrogen such as amenorrhoea, and a family history of osteoporosis.

### Dual energy X-ray absorptiometry (DEXA)

This method, introduced around the late 1980s, is the current 'gold standard' for the diagnosis of osteoporosis. It can measure small changes in the bone density of the hip and spine, and is reliable to a reported precision of about 2 per cent.<sup>117</sup> A very low level of radiation exposure is used.

DEXA measures bone mineral density (BMD), and fracture risk by expressing BMD in terms of a T-score. This represents the number of standard deviations (SD) from the mean BMD of the normal young adult population. In 2000, the World Health Organization (WHO) revised the definition of osteoporosis to be a BMD T-score below  $-2.5$  SD (see Table 9.5) of either the femoral neck or the spine.<sup>118</sup> The proximal femur is the best site for measuring BMD and considered to be the best predictor of fracture risk, especially in women older than 60, because it is not affected by osteoarthritis, which can make the measurements of the spine unreliable.<sup>119</sup>

The risk of fracture can be estimated by interpreting T-scores. Each standard deviation reduction in the BMD of the femoral neck increases the age-adjusted risk of hip fracture by a factor of approximately 2, and the risk of a traumatic fracture by about the same amount. When reading the BMD of the spine, each reduction in the standard deviation increases the risk of spinal fracture by a factor of approximately 2.3.<sup>120</sup> Interpretations of the T-score need to take into consideration other data, particularly the patient's age and previous fracture history.<sup>121</sup>

DEXA measurements are not carried out routinely as a general screening tool in the healthy population and should only be performed if the decision to treat (or not to treat) will be influenced by the results.<sup>122</sup>

In post-menopausal woman the rate of bone loss is generally 1–2 per cent per year, and there is no need to have a repeat a BMD test in under two years. Untreated women can be reassessed in five years unless there are circumstances that accelerate the rate of bone loss (for example, the use of corticosteroids).<sup>123</sup> Most women lose about half a standard deviation from the mean T-score every five years.<sup>124</sup>

**Table 9.5 Bone density interpretations**

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Normal bone density: T-score greater than 1.
Osteopenia (low bone mass): T-score between -1 and -2.5.
Osteoporosis: T-score less than -2.5.

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### Single photon absorptiometry (SPA)

This method is less expensive than DEXA, but has the disadvantage of only measuring the bone density of the forearm, which may not accurately reflect the bone density of the hip or spine. The radiation exposure is double that of DEXA, but is still small, at about 10 times less than an average X-ray.

### Plain X-Rays

An X-ray will detect osteoporosis once the amount of bone mineral loss is 30 per cent or more of the total bone mass. This makes plain X-rays unsuitable for evaluation of bone density because loss can only be detected once osteoporosis is well advanced.

### Computerised tomography (CT or CAT scan)

A CT scan is used to detect bone mineral loss in the spinal region. It is expensive and involves a higher radiation exposure than the other methods. CT scans are used when there is a suspicion of other problems in the spine, or to evaluate fractures. It is not used to detect bone density loss or monitor changes in bone density.

## **A HOLISTIC APPROACH TO REDUCE RISK OF OSTEOPOROSIS**

The three requirements to improve bone health are:

- Satisfactory *retention* of minerals in bone
- Adequate *intake* of the correct nutrients
- Proper *absorption* of these nutrients from the gut

Improvement in all three areas tends to lead to cumulative results. It is useful, for example, to improve nutrient intake, digestion and absorption of nutrients, and to increase exercise.

## Retention of nutrients in bone

### Exercise

The effects of calcium, oestrogen and exercise tend to be cumulative. Exercise has most beneficial effects on bone during the years when oestrogen is available, and the dietary intake of essential nutrients is good. Even though there is more benefit gained from exercise up until menopause, an exercise-related increase in bone density is seen at all ages, including after the menopause.<sup>125</sup> Evidence from randomised clinical trials has shown that moderate to high intensity weight-bearing aerobic exercise, high intensity progressive resistance training, and high-impact loading, such as jumping, can increase bone density by 1–4 per cent in pre- and post-menopausal women.<sup>126</sup> The rate of bone loss in older women has also been shown to be slowed by about 1.5 per cent per year from exercise, compared with sedentary women.<sup>127</sup>

Any exercise, but particularly types which stress the large muscles, has the potential to improve bone mass. The effect of exercise on bone density is not localised only to that part of the body that is exercised.<sup>128</sup> Weight-lifting and balance training will provide the best range of benefits in prevention of fracture, as well as reducing muscle weakness, the risk of falling, and increasing muscle mass and mobility.<sup>129</sup>

Weight-bearing activity can be thought of as any activity that is done while upright, requiring the bones to fully support the body's weight against gravity.<sup>130</sup> Impact-loading, weight-bearing activity, therefore, involves some impact or force being transmitted to the skeleton during weight bearing. Examples of weight-bearing exercise include walking, jogging, stair climbing, dancing, weight training, playing sport and cross-country skiing. Activities that involve less impact and less weight-bearing force include swimming and bicycling. *Strong Women Stay Young*<sup>131</sup> is a practical guide for women to implement an at-home exercise regime. Exercise should be daily or every second day for 60 minutes for maximum benefits.<sup>132</sup>

### Body weight

Body weight has two main effects on bone mass—the weight-bearing stimulus to bone formation is greater in heavier women, and throughout life women make a percentage of their oestrogens from fatty tissue. This may be one of the reasons why plumper women tend to have fewer symptoms of oestrogen decline at menopause, such as hot flushes and vaginal dryness.

## Hormone levels

The protective effects of oestrogen have already been discussed. Despite the early proposal by Dr John Lee that (natural) progesterone increased bone density, there has been no research since to confirm this. Androgens may have a role in the development and maintenance of bone mass in women, which may be related to aromatisation of androgens to oestrone,<sup>133</sup> or via a direct action on androgen receptors in bone.<sup>134</sup> Circulating DHEA and DHEA-sulphate have been positively associated with bone density in ageing women. Declining DHEA with increasing age is believed to contribute to osteoporosis.<sup>135</sup> These adrenal pre-androgens may directly influence bone metabolism; however, their metabolites—oestrogen and testosterone—are more likely to elicit the effects.

## Nutrients

Boron is a trace mineral that seems to affect the synthesis of the active form of oestrogen and vitamin D in the body.<sup>136</sup> It seems to have an oestrogen-like effect<sup>137</sup> and there is some suggestion that boron deficiency reduces the positive effects of HRT on bone density and other symptoms of oestrogen deficiency during the menopause.<sup>138</sup>

Animal proteins are a poor source of boron. Fruits, vegetables and nuts are the main sources. The best sources include prunes, which provide 2–3 mg of boron per 100 g.<sup>139</sup> Almonds and raisins contain approximately 2.5 mg per 100 g, and wine contains 0.8 mg per 100 ml. Other rich sources include parsley, dates, hazelnuts, peanuts, apples and peaches.<sup>140</sup>

Chromium may also improve bone density by improving insulin sensitivity. Chromium picolinate has been found to reduce urinary excretion of hydroxyproline and calcium in post-menopausal women, presumably indicative of a reduced rate of bone resorption. This nutrient also raised serum levels of DHEA-sulphate, which may play a physiological role in the preservation of post-menopausal bone density. Further studies are needed to confirm these positive effects.<sup>141</sup>

## Dietary phyto-oestrogens

Dietary phyto-oestrogens, particularly from soy, seem to have protective effects on bone density, but there is some uncertainty regarding how much must be consumed for bone protection. Some studies indicated that a high daily intake is needed to prevent bone density loss.<sup>142</sup> This was confirmed by a study looking at the amounts of soy needed to positively influence bone mineral density, which found that Japanese

women, who consumed about twice as much soy as the Chinese women in the study, had higher bone mineral density when pre-menopausal than other women, but not when peri-menopausal when the bone density tends to drop rapidly.<sup>143</sup> Another study, also looking at post-menopausal Japanese women, found that bone mineral density increased on high intakes but not on low intakes of soy (mean intake of 54.3 mg/d of isoflavones).<sup>144</sup> A population study of American women found that relatively modest intakes of isoflavones consumed as part of the diet was associated with a higher bone density than in those consuming low or no isoflavones.<sup>145</sup>

Tea drinking, possibly because of the weak oestrogenic isoflavonoids contained in tea, was positively associated with improved bone mineral density amongst older women, such that those women drinking most tea had a greater bone mineral density.<sup>146</sup>

### **Intake of essential nutrients**

A balanced diet (see pages 390–2) is essential for bone health, and should include a high proportion of vegetables, grains and beans, some dairy products and fruit in moderation. A vegetarian diet after the age of 50 improves bone density<sup>147</sup> because protein intake is lower and calcium loss is reduced.

## **The major bone minerals**

### **Calcium**

A consistently high calcium intake can improve bone density at all ages, prevent osteoporosis and fractures,<sup>148</sup> and treat osteoporosis.<sup>149</sup> The only exception is the years immediately after menopause, when the rapidly declining oestrogens exert a stronger effect.<sup>150</sup> Several years after menopause, calcium is again useful in reducing bone loss.<sup>151</sup> One study found that calcium-fortified milk prevented early post-menopausal bone loss, an effect that may be related to the calcium or other components of milk.<sup>152</sup>

Calcium supplements should contain magnesium because both minerals are required to improve bone density—calcium improves bone density while magnesium improves the rate of retention of calcium in the bone. Dairy foods are not suitable as the sole source of calcium because of their low magnesium content. Peri-menopausal women should consume two to three serves of low-fat dairy products per day combined with other foods that contain both calcium and magnesium, such as canned fish with edible bones and fortified soy products. A list of calcium-containing foods and the recommended daily allowance (RDA) figures appears on pages 199–200.



## Types of calcium supplements

Calcium carbonate, the most commonly prescribed calcium supplement, is poorly absorbed. As little as 4 per cent uptake has been demonstrated in those with low gastric acid secretion.<sup>153</sup> Stomach acidity usually declines with age and calcium carbonate may be of little value in improving bone density in the post-menopausal woman.<sup>154</sup> Calcium citrate is useful for women with low gastric acid levels, or for those with a risk of developing kidney stones. Calcium lactate and gluconate also have good absorption rates.<sup>155</sup> In general, calcium absorption seems to be better in the presence of food, and supplements should be taken at meal times<sup>156</sup> and in a divided dose.

## Guidelines for supplementing with calcium

Women of all ages should be encouraged to assess the amount of calcium in their diet. If their intake is below the recommended level, they should take a supplement to replace the missing portion. Calcium supplements are best taken in 500 mg doses once or twice daily depending on dietary intake. See the information page on calcium, pages 199–200, for a method of estimating average daily calcium intake. A simple way for a practitioner to determine the approximate daily calcium intake during a consultation is to work out the amount obtained from high calcium foods such as dairy, soy and sardines, and then add on 250 mg for other foods such as vegetables and nuts or seeds in muesli.

## 'Elemental' calcium (and magnesium)

All mineral supplements have an 'elemental' figure on the container. For example, 1050 milligrams of calcium citrate contains 250 mg of elemental calcium. The elemental figure is the amount of the actual mineral in the preparation. The remaining 800 mg is the weight of the other compound (in this case citrate). Table 9.6 shows the elemental amounts for some common calcium and magnesium supplements.

**Table 9.6 Elemental mineral content in supplements (mg)**

Calcium citrate	1050
elemental calcium	250
Calcium hydroxyapatite	1000
elemental calcium	240
Calcium orotate	1000
elemental calcium	100
Magnesium aspartate	1000
elemental magnesium	80
Magnesium orotate	800
elemental magnesium	52

## Magnesium

Magnesium is as important as calcium in maintaining healthy bones: osteoporosis is associated with lower than normal bone magnesium levels.<sup>157</sup> Magnesium increases calcium absorption from food, enhances calcium retention in the body, and increases bone density.<sup>158</sup> Despite this, medically prescribed supplements rarely contain magnesium. The RDA for magnesium is 400–800 mg/day and should equal about half the calcium intake. For example, a post-menopausal woman with a calcium intake of 1500 mg should have an intake of 800 mg of magnesium. More details on magnesium appear on pages 361–2.

## Phosphorus

Phosphorus is needed by every cell in the body for energy production, and is essential for the health of bones and teeth. High intakes are common due to excessive meat and soft drink consumption. The recommended daily intake of 800 mg per day (US RDA 1980) is easily achieved or exceeded. Too much phosphorus and not enough calcium can increase calcium loss from bone.<sup>159</sup>

## Other minerals involved in bone metabolism

Zinc, manganese, copper, silicon and strontium are the other minerals important to bone health. They are involved in collagen synthesis and in the processes of bone mineralisation. Many of these minerals are found to be below normal when women have osteoporosis.

Zinc is essential for collagen health, normal bone development, and the normal functioning of vitamin D. A recent Australian survey revealed that 85 per cent of women were receiving less than the RDA for zinc.<sup>160</sup> Zinc levels are lower in elderly people with osteoporosis.<sup>161</sup> Manganese is required for bone mineralisation and the synthesis of collagen in bone,<sup>162</sup> and has been found to be deficient in osteoporotic women.<sup>163</sup> When zinc, manganese and copper were added to a calcium supplement, post-menopausal bone loss slowed more than with calcium alone.<sup>164</sup>

Silicon is one of the important nutrients for the health of collagen tissue, but its levels in the body are difficult to determine and it has received little serious attention.

## Vitamins

Apart from vitamin D, the main role for vitamins in bone health is in the protection and maintenance of collagen. Vitamins B<sub>6</sub>, B<sub>12</sub>, A, C, E,

K and folic acid are all essential. Vitamin D, from sunlight and the diet, contributes to improved bone density. Researchers have found that high percentages of women with osteoporosis are vitamin D deficient.<sup>165</sup> The flavonoids are also important for collagen.

## Assimilation and absorption

Eating sensible amounts regularly, eating slowly and chewing food well all aid assimilation of minerals. Diarrhoea has already been mentioned as a risk factor for osteoporosis. The causes of diarrhoea should be identified and treated promptly. One teaspoon of slippery elm powder two or three times each day can be useful.

Women with symptoms of bloating, dyspepsia and indigestion may have poor gastric acid secretion which impairs absorption of calcium salts.<sup>166</sup> When gastric acid levels are low, calcium supplements must always be taken with food as this tends to normalise absorption.<sup>167</sup> Stimulating gastric secretions by eating bitter and sour foods can also improve uptake of minerals. Taking 'bitters', herbal remedies to improve digestion and assimilation, continues today in some cultures in the form of bitter aperitifs, and is an important aspect of herbal medicine. See Table 15.1 'Bitter foods and herbs'.

## TREATING OSTEOPAENIA AND OSTEOPOROSIS

Bone never stops changing and participating in the major bodily biochemical events. Osteopaenic and osteoporotic bone is no different. Women at any stage of reduced bone density can adopt all of the strategies outlined for maintaining healthy bone, but with a little more vigour, to treat low bone density. Attention to the factors which improve collagen health are even more necessary if osteoporosis is diagnosed.

### Osteopaenia

Women with osteopaenia (T-score between -1 and -2.5) are usually not treated with drugs. About 50 per cent of all women over 50 in Australia have osteopaenia but the majority of fractures occur in women over 60. There is little scientific research to show significant benefit from drugs such as the bisphosphonates (see page 196) in reducing the risk of fracture in this group.<sup>168</sup> The outcome of the Women's Health Initiative (WHI) study indicated that HRT is not recommended long term for reducing risk of osteoporosis unless the benefits outweigh the risks. Drug therapy is only recommended for women with a T-score of hip or spine

worse than  $-2.5$ , or between  $-2.0$  to  $-2.5$  when there is at least one additional risk factor for fracture.<sup>169</sup>

Instead of drug therapy, women with osteopenia should be advised to improve diet and exercise and reduce the risk factors for bone density loss. Calcium intake should be increased through diet, and supplements will be required by most women to achieve recommended daily allowance for calcium. Other dietary components need to be included to ensure all relevant nutrients for bone health are available. It is important to ensure that absorption and gastrointestinal function are adequate. Weight-bearing and resistance exercise are especially important to increase bone mass.

## Osteoporosis

Osteoporosis is defined as a T-score of less than  $-2.5$ , and is a significant cause of morbidity amongst older women.



### ■ ■ The medical approach

The gold standard for drug therapy in osteoporosis treatment is a demonstrable reduction in fracture risk in a randomised, placebo-controlled, double-blind trial with a large sample of people.<sup>170</sup> Interestingly, there is not sufficient evidence from randomised controlled trials to demonstrate that HRT can significantly reduce fracture rates.<sup>171</sup> It has, however, been shown to improve bone density. In the United States and Canada, oestrogen is recommended only for osteoporosis prevention, not treatment.<sup>172</sup> The use of HRT for osteoporosis is discussed in Chapter 20 'Drugs and surgery'.

Other drugs used to treat osteoporosis are the bisphosphonates. These drugs can improve bone density and reduce fracture rate. The bisphosphonates cause severe upper gastrointestinal tract irritation, and must be taken while standing up to minimise this risk. The drug should also be taken away from food to improve absorption. Evista, a selective oestrogen-receptor modulator, is also used to improve bone density, but its use is associated with an increase in hot flushes. Tibolone, a newer type of HRT, is also showing some promise, but at this stage, the evidence for safety and effectiveness has not been assessed in trials. These hormonal drugs are discussed on pages 519 and 525. Calcitonin is a hormonal inhibitor of bone resorption and is used to treat osteoporosis.



### The natural therapist's approach

There are limited options for natural therapists to increase bone density. Despite being advised of this, some women refuse conventional medical

treatment in preference for natural remedies. A holistic approach, combining exercise, diet, supplements and supplemental isoflavones, can be expected to have a modest effect for most women, and may maintain bone density at a steady state. Exercise regimes for women with established osteoporosis should be supervised, at least initially, so that good techniques are used to improve bone density and muscle strength, and so that injury does not occur.

A balanced diet should contain adequate vegetables, fruits, low-fat dairy products and foods containing phyto-oestrogens. Supplemental calcium, magnesium, boron<sup>173</sup> and chromium<sup>174</sup> are advisable. Dietary phyto-oestrogens may have positive effects on bone density. As yet, the research is in its early stages, but there is evidence to support the contention that a high daily intake may prevent bone density loss.<sup>175</sup>

The most benefits seem to be gained by supplementing with high intakes of isoflavones. Two studies of soy protein containing isoflavones at 80mg/day<sup>176</sup> and 90mg/day<sup>177</sup> evaluated the effect on bone in post-menopausal women and peri-menopausal women respectively. In both studies, bone mineral density improved in the spine after 24 weeks. The preparation Promensil containing high isoflavone levels extracted from red clover, may also be beneficial.<sup>178</sup> Ipriflavone also shows some promise;<sup>179</sup> however, a recent study in which 30 per cent of the trial participants developed leukopaenia should inspire caution.<sup>180</sup> Although these studies are beneficial, there are no studies examining bone density improvement at the hip, or safety of long-term use.

Research on all of these isolated compounds provides interesting insights into possible alternatives for women with osteoporosis, but further studies are necessary to evaluate risk/benefit ratios.



## Self care

### Exercise

Exercise has many benefits when a woman has osteoporosis. They include reducing further bone mineral density loss,<sup>181</sup> maintaining muscle mass and strength, and improving coordination and flexibility.<sup>182</sup> At least initially, an exercise regime should be supervised to prevent risk of injury and to maximise bone mass. The popular book *Strong Women Stay Young*<sup>183</sup> can be used as a practical home exercise regime.

### Fall-prevention strategies

Factors which will prevent falls, will of course minimise the risk of fracture, as 90 per cent of hip fractures occur after falls.<sup>184</sup> Factors that

increase the risk of a fall include impairment of vision or sensation, decreased strength and balance, and a person's thinness and fragility.<sup>185</sup> In an ongoing Australian Epidemiology Study, quadriceps strength and postural sway were of similar importance to bone density in predicting fracture in both men and women.<sup>186</sup> A number of medications can affect alertness or balance, or coordination, including sedatives, narcotics, analgesics, anticholinergics and antihypertensives.<sup>187</sup> Any concerns should be discussed with a pharmacist or doctor.<sup>188</sup> An increased risk of falls is also associated with alcohol consumption of greater than seven drinks per week (one drink equivalent to one beer, 125 ml wine, or 30 ml of spirits).<sup>189</sup>

Simple around-the-home strategies are often essential to reduce the risk of falls, such as using non-slip floor rugs and installing better lighting. Wearing sturdy, rubber-soled shoes is sensible advice. Even aids around the bathroom to make getting in and out of the shower or bath easier, such as grab bars and rubber mats in the bathtub, may be necessary for some. A visit to the optometrist is a good idea as well if eyesight has deteriorated. Balance-training exercises such as home-based physiotherapy and Tai Chi can also reduce the risk of falls.<sup>190</sup>

## CALCIUM—ESSENTIAL FOR BONES

It is essential to maintain bone density to prevent osteoporosis by continuing a high calcium intake before, during and after menopause. The following table gives quantities of foods to be eaten to obtain 300 mg of calcium. Post-menopausal women should consume 4–5 serves of these foods each day in order to obtain enough dietary calcium, preferably from different sources.

<b>High calcium, low kilojoule foods</b>	<b>Calcium (mg)</b>	<b>kJ</b>
1 ¼ cups cooked spinach or other greens	300	252
2 cups cooked broccoli	300	336
¾ cup plain low-fat yoghurt	300	420
1 cup buttermilk	300	420
¼ cup grated Parmesan cheese	300	483
50 g Swiss or Cheddar cheese	300	630
1 ½ cups full cream milk	300	630
1 ¼ cups plain yoghurt	300	700
200 g tofu	300	840
1 small standard can sardines	300	970
300 g can salmon	300	1050
2 cups low-fat cottage cheese	300	1772

### Recommended daily allowance (RDA)

<b>The RDA for calcium varies with age</b>	<b>mg</b>
Infants:	350–550
Children aged 1–10 yrs:	800
Teenagers:	1200
Young women 20–35 years:	800–1000
Pregnant/breastfeeding women:	1500
Pre-menopausal women 35 years and over:	1000
Post-menopausal women:	1500

### Daily calcium intake

A diet diary over a week can be used to evaluate the average daily calcium intake. Using the calcium levels in Table 9.7, an approximate calcium intake for each day can be calculated and then divided by seven to arrive at the average daily intake. Additional dietary or supplemental calcium can then be taken to reach the recommended daily allowance.

**Table 9.7 Sources of calcium (mg of calcium per 100 g of food)**

<b>Dairy products</b>		<b>Seeds</b>	
Skim milk powder (dry)	1190	Unhulled sesame seeds	1160
Whole milk powder (dry)	900	Linseeds	271
Whey powder	645	Hulled sesame seeds	110
Physical Milk™ 100 mL	205	Sunflower seeds	98
Yoghurt-cow's	180	Pumpkin seeds	52
REV Milk™ 100 mL	150	<b>Grains and cereals</b>	
Goat's milk	130	White SR flour	350
Skimmed cow's milk	123	Muesli (depends on brand)	200
Buttermilk	115	Wheat flour (white or brown)	150
Cow's milk, whole	115	Wheat bran	110
Human milk	30	Bread (brown or white)	100
<b>Cheese</b>		All Bran™	75
Parmesan	1091	Rice bran	69
Gruyère	1000	Wheatgerm	69
Mozzarella	817	Wheat crispbread	60
Cheddar	810	Oatmeal	55
Gouda	810	Rye crispbread	50
Edam (30% fat)	800	Brown rice	33
Edam (45% fat)	678	Weetbix™	33
Gorgonzola	612	<b>Meats</b>	
Camembert (30% fat)	600	All meat has <20mg/100 g	<20
Danish Blue	580	<b>Legumes (cooked)</b>	
Blue (50% fat)	540	Navy beans	95
Camembert (60% fat)	400	Chickpeas	70
Fetta	353	Kidney beans	70
Ricotta	223	Lentils	50
Cottage (low fat)	77	Black-eyed beans	40
Cottage	67	Split peas	22
<b>Eggs</b>		<b>Sprouts</b>	
Duck (whole)	63	Alfalfa	28
Chicken (whole)	56	Mung bean	20
<b>Fish</b>		Lentil	12
Whitebait	860	<b>Vegetables</b>	
Sardines (canned)	550	Parsley	260
Scallops	120	Watercress	190
Salmon (canned)	100	Dandelion greens	185
Lobster	60	Spring onions	140
<b>Soya products</b>		Onions	135
Soya milk (dry)	330	Spinach	135
Soya grits	255	Broccoli	125
Dried soya beans	225	Silverbeet	115
Soya flour, full fat	210	<b>Fruits</b>	
Tofu	170	Dried figs	260
So Good™	116	Lemons	110
Vita Soy™	32	Lemon juice (100 mL)	8
<b>Nuts</b>		Rhubarb (stewed)	93
Almonds	250	Orange juice (100 mL)	60
Brazil	180	Blackberries	60
Pistachio	136	Other fruit except dried fruit	<50
Pecan	75	<b>Other</b>	
Peanuts (fresh)	60	Kelp	1095
Walnuts	60	Crude molasses	654
Macadamia	50	Torula yeast	425
Hazelnuts	45	Carob powder	355
Peanut butter	35	Brewer's yeast	210
Cashews	30		



**Table 9.8 Osteoporosis questionnaire\***

Tick whichever of the following apply to you.  
All of the questions are related to bone loss.

	YES	NO		YES	NO
1. Do you take, or have you taken any of the following?			12. Do you suffer from any of the following conditions:		
a. Laxatives	<input type="checkbox"/>	<input type="checkbox"/>	a. Diabetes?	<input type="checkbox"/>	<input type="checkbox"/>
b. Cortisone	<input type="checkbox"/>	<input type="checkbox"/>	b. Hyperthyroidism?	<input type="checkbox"/>	<input type="checkbox"/>
c. Antihypertensives	<input type="checkbox"/>	<input type="checkbox"/>	c. Kidney disease?	<input type="checkbox"/>	<input type="checkbox"/>
d. Analgesics	<input type="checkbox"/>	<input type="checkbox"/>	If yes, have you had dialysis?	<input type="checkbox"/>	<input type="checkbox"/>
e. Anticonvulsants	<input type="checkbox"/>	<input type="checkbox"/>	d. Arthritis?	<input type="checkbox"/>	<input type="checkbox"/>
f. Anti-ulcer medication	<input type="checkbox"/>	<input type="checkbox"/>	13. Specifically for women:		
g. Antibiotics	<input type="checkbox"/>	<input type="checkbox"/>	a. Are you post-menopausal?	<input type="checkbox"/>	<input type="checkbox"/>
h. Anti-depressants	<input type="checkbox"/>	<input type="checkbox"/>	b. Have you had any full-term pregnancies?	<input type="checkbox"/>	<input type="checkbox"/>
i. Antacids	<input type="checkbox"/>	<input type="checkbox"/>	How many? _____		
j. HRT	<input type="checkbox"/>	<input type="checkbox"/>	Were any of the pregnancies less than 12 months apart?	<input type="checkbox"/>	<input type="checkbox"/>
2. a. Are you taking supplements? If yes, which type? _____	<input type="checkbox"/>	<input type="checkbox"/>	c. Do you exercise vigorously?	<input type="checkbox"/>	<input type="checkbox"/>
b. Are you taking any calcium?	<input type="checkbox"/>	<input type="checkbox"/>	d. Have you ever had amenorrhoea for 6 months or more?	<input type="checkbox"/>	<input type="checkbox"/>
3. Do you have a family history of fractures or loss of height?	<input type="checkbox"/>	<input type="checkbox"/>	14. Do you go outdoors regularly?	<input type="checkbox"/>	<input type="checkbox"/>
4. Do you consume meat or fish at most meals?	<input type="checkbox"/>	<input type="checkbox"/>	15. Are you engaged in heavy manual work or regular aerobic exercise?	<input type="checkbox"/>	<input type="checkbox"/>
5. Do you eat dairy products daily?	<input type="checkbox"/>	<input type="checkbox"/>	16. a. Is your water fluoridated?	<input type="checkbox"/>	<input type="checkbox"/>
6. Do you smoke	<input type="checkbox"/>	<input type="checkbox"/>	b. Do you have 'soft' teeth or numerous cavities?	<input type="checkbox"/>	<input type="checkbox"/>
7. Do you consume more than two alcoholic drinks daily?	<input type="checkbox"/>	<input type="checkbox"/>	17. a. Do you eat protein-rich foods at every meal?	<input type="checkbox"/>	<input type="checkbox"/>
8. Do you drink more than two cups of caffeinated beverages daily?	<input type="checkbox"/>	<input type="checkbox"/>	b. Do you supplement your diet with bran fibre, or eat non-yeast-leavened grains?	<input type="checkbox"/>	<input type="checkbox"/>
9. Do you salt your food, or enjoy salty foods?	<input type="checkbox"/>	<input type="checkbox"/>	c. Do you regularly eat citrus fruits and/or fresh green vegies?	<input type="checkbox"/>	<input type="checkbox"/>
10. Are you frequently on diets?	<input type="checkbox"/>	<input type="checkbox"/>	d. Are you vegetarian?	<input type="checkbox"/>	<input type="checkbox"/>
11. Do you eat 'junk' food?	<input type="checkbox"/>	<input type="checkbox"/>	e. Do you develop intestinal discomfort after eating?	<input type="checkbox"/>	<input type="checkbox"/>

\*This questionnaire can be used to gain insight into osteoporosis risk related to family history, diet, lifestyle, drug use and related health profile. A positive answer might confer negative or positive benefits; for example, calcium supplements and exercise reduce risk, while smoking increases risk.

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# Section E

When things go wrong

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## **WHEN THINGS GO WRONG**

Problems with periods are all too common. More than half of all women have period pain, about three-quarters have PMS, and it's usual for any woman to experience episodes of heavy periods or to miss a period from time to time. Some of these problems are just minor irritations and represent a temporary deviation from the normal functioning of an organ or a hormonal imbalance; at other times, symptoms are severe enough to disrupt the woman's life. They may even represent conditions that require immediate attention or prolonged treatment.

The difficulty with menstrual problems is because they occur so frequently, it is sometimes difficult to know which symptoms might represent the need for investigation and treatment. This is particularly so for abnormal bleeding patterns. While almost everyone will consult their health-care provider if they experience pain, abnormal bleeding, especially 'nuisance' or slight bleeding, is often ignored in the hope that it will 'just go away'.

### **Abnormal bleeding**

Bleeding is abnormal if the period is too heavy, prolonged, too light or does not occur often enough.

The other type of abnormal bleeding is bleeding between periods. This is always a cause for concern and should be investigated, especially when it occurs after sexual activity. Bleeding at ovulation is normal for some women and is usually related to minor hormonal variations, but it should always be reported straight away to exclude other possible causes.

### Too heavy, too often

There are two ways of defining ‘too heavy’ and ‘too often’: by the quantity of menstrual blood loss, *or* as a deviation from the woman’s usual menstrual pattern.

Medical textbooks (and some doctors) tend to use the first definition and describe excessive bleeding in terms of the quantity of blood lost and the frequency of menstruation or bleeding episodes. Using this definition, the bleeding will:

- continue for more than seven days
- occur more often than every 21 days, and/or
- exceed 80 ml in volume (about  $\frac{1}{2}$  cup)

Trying to determine what a greater than 80 ml menstrual loss will look like, or how many pads or tampons will be used when bleeding is this heavy, is almost impossible. It is much more useful to define excessive menstruation as a change in the usual pattern. Using this definition, the period:

- lasts for three days longer than expected
- requires two or more pads or tampons per day than is usual, and/or
- arrives five days or more earlier than usual

The second definition is a much simpler and more practical way to define abnormal bleeding. It identifies deviations from the usual and expected pattern for a particular woman and, because of the huge range of normal (as discussed in Chapter 3), is much more likely to alert an individual to changes.

One heavy period is not an indication for investigation (or treatment) unless the bleeding is severe. It is usual for women to have an uncharacteristic period every now and then, especially after stress or overseas travel.

### Too little or too infrequent

A period is considered to be abnormal when it:

- continues for less than three days
- occurs less often than every 35 days

- is very slight or almost absent, and/or
- requires two or less pads or tampons per day

Missing a period occasionally is not a major concern (unless unexpected pregnancy is the cause). Many women will miss a period after travel or major upheavals; sometimes a period can be missed for no apparent reason at all. It is a good idea to seek medical advice if there is persistent change in the menstrual cycle, and if menstruation has ceased for three months or more.

### Spotting or bleeding between periods

For some women, spotting just before or after their period is a usual part of their cycle, but if the symptom is new, it should be investigated. Bleeding between periods is usually slight, often painless and frequently inconvenient. From a practitioner's point of view, it is also the most troubling. The cause is usually hormonal, but spotting after sexual activity can be highly suggestive of problems with the uterus or cervix, such as polyps or cancer. This sort of bleeding should always be investigated, especially when:

- it is not part of a woman's usual cycle (some women always 'spot' a few days before their period, or mid-cycle)
- the woman is 40 or older, and/or
- it occurs after sexual activity of any kind

Any bleeding experienced by a post-menopausal woman must be investigated immediately by a medical practitioner, no matter how scant or transient. It is vital to exclude uterine cancer as the cause of bleeding after the menopause. Other causes of post-menopausal bleeding might be polyps or lesions on the cervix.

### Abnormal bleeding patterns

Abnormal bleeding patterns are not in themselves a disease or condition. For example, heavy bleeding or menorrhagia is a *symptom* of a condition such as fibroids or endometriosis; amenorrhoea (no periods) can be caused by polycystic ovarian syndrome.

#### Menorrhagia

An abnormally heavy period with a normal cycle length is called menorrhagia. Menorrhagia may be related to either the hypothalamic-pituitary unit; the ovary; excessive stimulation of the endometrium by oestrogen; failure to produce progesterone; or an imbalance in prostaglandins levels. Systemic factors such as hypothyroidism, low iron stores

and clotting abnormalities can also be causes. Problems with the uterus such as lack of uterine tone, intra-uterine devices, uterine infections and fibroids may also be implicated.

### **Metrorrhagia**

Bleeding which occurs at times other than at the period is called metrorrhagia. Sometimes it is also referred to as inter-menstrual bleeding or threshold bleeding. The bleeding commonly occurs at ovulation, although it may happen at any time during the cycle. Many conditions can cause metrorrhagia: hormonal factors are common, as are cervical lesions. Cancer of the uterus is another possible reason for this type of bleeding.

### **Polymenorrhoea**

The bleeding pattern associated with periods which occur too frequently (less than every 21 days) but are otherwise normal is called polymenorrhoea. Causes may originate in the hypothalamic-pituitary unit or the ovary. Frequently the origin of the problem is ovulation: either it does not occur, or it occurs too early.

### **Polymenorrhagia**

Periods can be too early (polymenorrhoea) and too heavy (menorrhagia). In combination, this is called polymenorrhagia. Any of the factors which cause polymenorrhoea or menorrhagia may be responsible.

### **Amenorrhoea**

Amenorrhoea is the absence of the period. There are two types—primary, where the menarche does not start at the usual time; and secondary, where the period starts but stops again at some time during the woman's usual menstruating years. The causes are discussed in Chapter 13, 'Amenorrhoea'.

### **Oligomenorrhoea**

Menstruation that is markedly diminished in amount is called oligomenorrhoea. *Oligo* is Greek, meaning 'too little', 'few' or 'scanty'. Heavy but infrequent periods are termed oligohypermenorrhoea (*hyper*—too much). Light and infrequent periods are referred to as oligohypomenorrhoea (*hypo*—not enough).



# 10

## The usual suspects

### Key words

adaptogen  
aldosterone  
amenorrhoea  
anorexia nervosa  
beta-carotene  
bioflavonoid  
body mass index

bone density  
bulimia nervosa  
dysmenorrhoea  
epinephrine  
hyperprolactinaemia  
menorrhagia  
scoliosis

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Menstrual changes can be brought about by a number of factors that are common to many women's lives. Stress, for example, can cause temporary disruption of the hypothalamic-pituitary-ovarian axis and lead to menstrual cycle irregularities or an increase in the severity of PMS. Other factors such as body weight or the amount of exercise can potentially alter many aspects of the menstrual cycle. These events often cause a disturbance in normal function before causing actual tissue change. However, prolonged functional disturbance can eventually give rise to verifiable physical alterations such as the reduction in bone density observed in women with amenorrhoea.

The usual suspects—stress, weight gain or loss, over-exercising, restricted diets and certain drugs—represent the most likely cause of menstrual cycle disturbance principally because they *are* so common. Before undergoing elaborate tests for complex conditions, it might be wise to look to these factors as a likely cause of the disturbance.

### STRESS

'Stress' can be defined as any event or series of events, physical or emotional in a person's life that leads to physiological and biochemical

changes. These events, either pleasant or unpleasant, include exams; travelling overseas; moving away from home; relationship break-ups; serious illnesses or extreme physical exertion. Stress can interfere with the menstrual cycle and cause a temporary cessation of menstruation, heavier than usual periods, erratic cycles, PMS or increased menstrual pain.

## **The physiological response to stress**

The body's first reaction to stress is an 'alarm' response (see Figure 10.1). Stressors initiate a number of effects in the limbic system in the brain, located between the brain stem and the cerebral cortex. This part of the brain influences various aspects of emotional expression as well as behaviours that are necessary for survival, such as eating, sexual activity and the instinctive defences of the 'fight, flight or freeze response'. Messages from the limbic system stimulate the autonomic nervous system, and these two systems have an intimate relationship in their control of the stress response.

The limbic system evaluates a particular event and determines whether there is need for rest or defensive action. This information is relayed to the autonomic nervous system, which has a role in the regulation of bodily activities that are 'automatic'—that is, those activities that are not under conscious control. These are the regulation of smooth muscles as well as organs such as the heart, intestine, kidneys, lungs, bladder and circulatory system. There are two branches of the autonomic nervous system, the sympathetic and the parasympathetic, which usually operate in concert with one another such that when one is activated, the other is at rest.

In a non-threatening environment when there is an opportunity for rest and relaxation the parasympathetic nervous system is activated. When action is required, a complex series of events is triggered, involving the release of various hormones and activation of the sympathetic nervous system and the adrenal glands in readiness for a protective response. Figure 10.1 demonstrates a simplified version of the hypothalamic-pituitary-adrenal response to stress.

A specialised part of the limbic system, the amygdala, signals the hypothalamus, which activates the sympathetic nervous system as well as secreting corticotropin-releasing hormone (CRH). CRH triggers the pituitary release of adrenocorticotrophic hormone (ACTH) which activates adrenal secretion of the corticosterones and cortisol. Simultaneously, the sympathetic nervous system stimulates adrenal gland release of adrenaline and noradrenaline from the adrenal medulla. The combined effect of these responses includes a faster heart rate; increased production of sweat; contraction of the spleen to return blood to the



circulation; dilation of the pupils and of the bronchioles; and release of stored sugars. Some functions slow down, including digestion and the production of urine. Once the stressful situation has been dealt with or danger has abated, cortisol will turn off the release of the medullary stress hormones and homeostasis is restored.

This is known as the 'fight, flight or freeze response' and was much more in demand when a quick getaway was needed or when it was necessary to fight bears (or something else furry and dangerous). A rapid heart rate and contraction of the spleen mean that more blood is available for muscles, sugar is at hand for instant energy, the person can see better, breathe faster and is more alert.

These responses occur irrespective of the type of stress. In an office and in many other modern-day situations they are quite inappropriate. There is no need to run, fight or physically protect oneself. The excess adrenaline, with no appropriate avenue of discharge, circulates around the system, leaving the person with a sense of being 'on edge' and unable to relax. On top of that, digestion is slowed for the duration of the stressful event.

In times of prolonged stress such as occurs in chronic illness, pain, emotional trauma or just being 'stressed' all the time, the 'alarm' response changes into the 'resistance' response. During this phase, there is a need for an inexhaustible supply of glycogen as an energy source. To achieve this, the liver increases the conversion rate of fats; corticosteroids accelerate the conversion of both proteins and fats; and the thyroid increases the conversion of carbohydrates.

The kidneys conserve more water and sodium because of the action of aldosterone. Aldosterone conserves sodium, but increases the excretion of potassium, one of the minerals essential to the normal function of muscles, including heart muscle, and the normal activity of the nervous system.

During this phase, the body is under enormous physical strain and the nutritional requirements are very high. However, the effects of stress on the sympathetic nervous system and the digestive organs impair the digestive functions. Just when a constant supply of good quality nutrients is required, the person is likely to suffer from loss of appetite, indigestion and poor assimilation. A rapid loss of protective bowel flora can also occur, leading to the symptoms of bloating, flatulence and irregular bowels common amongst stressed individuals. Symptom improvement can be achieved by administering daily doses of supplemental probiotics.<sup>1</sup> Irritable bowel syndrome may also develop. Dietary suggestions for this complaint are outlined on pages 296–7.

The combination of excessive output of adrenaline, thyroxine and the fluctuating blood sugar creates a sense of irritability and even anxiety attacks. Disturbed sleep is common. Patterns might include waking too early, dream-disturbed sleep and waking frequently through-

out the night. Sometimes this is accompanied by palpitations and some severely stressed individuals report 'night terrors' or anxiety attacks.

Night sweats are common when an individual is under prolonged stress and women often confuse this symptom with becoming menopausal (even when they are young and their cycle is regular!). Physiologically, the night sweats of stress probably have complex and interrelated triggers such as continued sympathetic nervous system stimulation and the effects of the various 'stress' hormones on metabolic rate and temperature control.

Most people live through repeated episodes of the 'alarm' and 'resistance' phases of the stress response; in the healthy individual, stress induces rapid and pronounced hormonal responses. Adequate nutrient intake, healthy exercise patterns and stress management techniques will ensure that enough reserves are available to allow the body to compensate for these physiological changes. But when stresses are just too extreme or too prolonged, not even the very best diet and lifestyle regime can provide enough protection. Chronic persistent stress results in desensitisation and a dampening of the stress response, and ACTH secretion becomes compromised by the down regulation of CRH receptors.<sup>2</sup>

This leads to the 'exhaustion' phase of the stress response. Unable to keep going at the same rate, many of the organs go into decline. Research in the 1950s showed that protein is utilised from body tissues during the exhaustion phase and that in the absence of adequate protein intake, organs are used as protein substitutes.<sup>3</sup> This state of catabolism is said to be responsible for the many symptoms encountered by those with chronic fatigue syndrome. Adrenal hormone production is disrupted, potassium and sodium are excreted in the urine, the immune response weakens, sleep is unrefreshing and often disturbed and the person is exhausted all the time. Even the simplest task seems like an enormous chore. Depression, poor memory, anxiety and irrational mood swings are also common after prolonged and unresolved stress.

It is important to recognise that *trauma* is qualitatively different from stress. Post-traumatic stress disorder (PTSD) is a very specific condition that occurs in response to extreme trauma. In contrast to stress, trauma overtaxes the body, resulting in lasting biological changes to the nervous system. The nervous system becomes hypersensitive and is too easily turned on and difficult to moderate or turn off.<sup>4</sup> The sum of physiological responses is said to be a *normal* reaction to an *abnormal* amount of stress.<sup>5</sup>

The symptoms described above are collectively known as the syndrome of adrenal exhaustion by Western herbalists, or colloquially as 'burn out'. Herbal treatment for adrenal exhaustion is with nervine tonics and sedatives as well as adrenal adaptogens to restore homeostasis and reduce risk of hormonal and menstrual cycle changes.

## Menstrual cycle responses to stress

During the alarm, resistance or exhaustion response to stress, the impact on the hypothalamic-pituitary-ovarian feedback loop can be sufficient to disrupt menstruation or cause interference in the hormonal balance. In fact, stress is one of the most common causes of menstrual cycle disruption.

The hypothalamus stops secreting GnRH in the usual pulsatile manner and the stimulus for ovulation (via LH and FSH) can be turned off or downgraded. This can cause irregular menstruation and conditions such as dysfunctional uterine bleeding, where bleeding is often heavy as well as erratic. Stress can also affect fertility by causing a temporary cessation of ovulation or by disrupting the luteal phase of the cycle.

Observation of stressed monkeys showed lowered LH and progesterone in the luteal phase, followed by a prolonged follicular phase in conjunction with an increase in cortisol levels.<sup>6</sup> Some women experience episodes of amenorrhoea and may believe themselves to have become 'menopausal'. We have observed that even where amenorrhoea has been evident for many months, women will recommence menstruation once the stress has been resolved or they have been given appropriate treatment (see pages 282–5, hypothalamic amenorrhoea). (An excellent review of the effects of stress on the hypothalamic-pituitary-ovarian axis and the hypothalamic-pituitary-adrenal axis can be found in the *Annals of Internal Medicine*.<sup>7</sup>)

PMS can become worse when a woman is stressed—some researchers even think that most women have some premenstrual symptoms, but that stressed and anxious women cope less well and develop PMS because they are unusually sensitive to the premenstrual hormonal fluctuations. Stressed women also report more cyclic breast pain than other women,<sup>8</sup> suggesting a stress-induced change in hormones, possibly associated with luteal phase progesterone changes. Menstrual migraines can become more pronounced or frequent, or both, and women who have adrenal exhaustion may need to be advised to adopt the strategies for PMS with depletion, as described on pages 134–6.

Period pain becomes more common during stressful times. Stress increases the perception and lessens the ability to cope with pain, but may also cause changes in the hypothalamic-pituitary hormones which regulate the menstrual cycle. Some women report that their period pain fluctuates according to the amount of tension they feel. Researchers found that the stress associated with family tension, guilt feelings about early sexual contact, or being encouraged to think of menstruation as unclean and disagreeable, accompanied period pain in some adolescents.<sup>9</sup>



## ■ ■ The medical approach

It is important to differentiate stress from depression-anxiety-related disorders. The prescription of SSRIs in conditions associated with stress is not particularly useful unless a reactive depression has resulted from a long period of unresolved stress. Medicine has only recently embraced non-drug related methods for stress management, and this has by no means been adopted by all medical practitioners. Sedation or drugs to reduce anxiety are not indicated for stress-related menstrual changes and should rarely need to be prescribed. Stress management techniques are the treatments of choice. Other conditions can mimic the symptoms of stress, including hypothyroidism and anaemia. Laboratory testing may be necessary to differentiate between these conditions.



## The natural therapist's approach

Treatment of the effects of stress require a complex and holistic approach. In conjunction with stress management techniques, the herbal and dietary management of stress involves improving the body's capacity to adapt to stress with herbal adaptogens, as well as reducing the adverse effects of stress with nervine tonics.

During the alarm and resistance phases of the stress response, nervine tonics and nervine sedative herbs may be indicated to help reduce the adverse affects of stress on the nervous system. These herbs would constitute the first priority in treatment, with adrenal tonics or adaptogens as an adjunct to modify the adrenal response. B vitamins and magnesium improve energy levels, ease muscle tension and improve sleep patterns. Vitamin C requirements increase during stress and thus supplements may be required, especially when the diet is inadequate. Beneficial herbal adaptogens include *Glycyrrhiza glabra*, *Schizandra chinensis*, *Eleutherococcus senticosus* and *Panax ginseng*. These herbs are discussed on pages 476–83. Nervine tonics include *Withania somnifera*, *Hypericum perforatum* and *Scutellaria laterifolia*.

If treatment during the alarm and resistance phases is effective, patients may avoid progression to the exhaustion phase. This third phase of the stress response is more difficult to treat, since prolonged exposure to stress causes complete exhaustion, hyper-stimulation of the nervous system and nutrient depletion. Treatment focuses on the herbal adaptogens, which are usually prescribed for a three to six week period, depending on the severity of the case, and then stopped for one to two weeks before treatment is resumed. Nervine tonics may need to be given in larger doses over a longer period to achieve beneficial outcomes.

Nervine sedative and tonic herbs are also indicated when sleep is disrupted, especially *Withania somnifera*, along with B vitamins and magnesium. Dietary changes such as a higher protein intake in the

evening, in conjunction with avoidance of stimulants, alcohol and refined sugars, are beneficial.

Specific herbs are also usually needed to regulate the period. Those herbs which regulate menstruation via the hypothalamic-pituitary-ovarian axis following stressful episodes are *Vitex agnus-castus* for erratic menstruation and PMS; *Cimicifuga racemosa* (especially for perimenopausal women); *Leonurus cardiaca* and *Verbena officinalis* for menstrual irregularities associated with anxiety and palpitations; and steroidal saponin-containing herbs if ovulation has ceased.

Herbs with a specific effect on the uterus are *Trillium erectum* and *Alchemilla vulgaris* for menstruation which is heavy and erratic, as is seen in dysfunctional uterine bleeding; and *Angelica sinensis* for exhaustion and debility, especially after blood loss or heavy menstruation.



### Self care

The diet included on pages 150–2 is intended to improve an individual's capacity to cope with long-term stress. Types of stress management could include yoga; long, slow, distance exercise; using tapes to relax; or learning meditation techniques. Having fun, dancing and relaxing with friends may be just as useful if the idea of meditating is unappealing.

#### *Reducing tension*

Herbal teas such as chamomile and lime flowers (*Tilia europa*) reduce tension and can be mixed together. Lemon balm is useful for stomach upsets caused by anxiety, especially when combined with chamomile. Oats or porridge are good for the nervous system, and an extract of the green oat seed (to be taken as a herbal mixture) is used by herbalists for depression and exhaustion. Rubbing a drop of oil of ylang ylang or lavender on the temples reduces anxiety and some people find these oils useful for headaches associated with tension. (Do not take essential oils internally.)

Rescue Remedy, a Bach flower essence available from health food shops and most natural therapists, is useful to relieve anxiety associated with worrying events, exams or public speaking, for example. It is usually used short term for isolated events that cause anxiety, but can also be used for sleeplessness associated with worry.

#### *Improving sleep*

There are three aspects of sleep that require attention: the ease with which a person gets to sleep, the quality of the sleep and the time that they wake up. Sleep quality generally improves when a person is less tense, and they usually get to sleep much more easily as well. Waking up too early, such as at five o'clock every morning, can be a sign of



depression, and if this is persistent may indicate a need for professional help.

General rules for better sleep include not undertaking stimulating activities such as strenuous exercise, or watching exciting movies just before bed; reducing or eliminating stimulants such as caffeine and sugar; setting up a relaxing routine around bedtime such as having a bath and a warm drink (soy or cow's milk and honey is a good idea); and trying to establish a regular routine by going to bed at the same time. Many of the Eastern traditions suggest that the two hours before midnight are the two most valuable hours sleep to have. Those who suffer from hyoglycaemia may also wake during the night due to a drop in blood sugar levels. In this instance, a small snack before bed, like yoghurt, or a warm soy or milk drink will help alleviate this problem.

A hot bath with lavender oil is very relaxing and can be used for insomnia. Valerian-containing preparations with at least 1000 mg per tablet may be used to improve relaxation and shorten the length of time it takes to get to sleep. As already mentioned, *Withania somnifera* reduces sleep latency. Magnesium is also useful where stress is associated with sleep disturbances.

Dreaming excessively or suffering nightmares can be an effect of stress, and can seriously disrupt sleep patterns. Excessive doses of B vitamins, particularly vitamin B<sub>6</sub>, can increase dreams and should be taken in the morning. Dreaming more than usual can indicate that the person doesn't get into deep sleep and so the remedies for insomnia can be used to improve sleep quality. If over-the-counter remedies do not work, professional guidance is needed.

## **ABNORMALLY LOW BODY MASS INDEX (BMI)**

Being underweight is defined as having a body-fat composition of less than 22 per cent. Women need about 17 per cent of their total body weight to be made up of fat in order to menstruate at all, and 22 per cent body fat to have periods regularly. On average, women stop having periods once their body-fat composition is below 20 per cent of their total body weight; many underweight women, including sports-women, gymnasts, ballet dancers and dieters, stop having periods.

### **Causes**

Being underweight has a number of causes. The most troubling are the eating disorders anorexia nervosa, which effects small but increasing numbers of women mostly in their teens, and bulimia nervosa, which seems to affect women who are in their late teens and older. Extreme weight loss can also be associated with a number of serious illnesses

such as cancer, malabsorption syndromes and dysentery (particularly when travellers have difficulty getting medical attention quickly). Over-exercising without appropriate kilojoule intake can also lead to abnormal weight loss.

Women who become vegetarian or vegan can sometimes lose too much weight if they are unaware of how to manage these diets correctly.

## Diagnosis

One of the ways to tell if body weight is within the normal range is to calculate the body mass index (BMI). This is done by dividing the weight in kilograms by height in centimetres squared. The normal range for BMI is between 20 and 25. Anything below 20 is considered to be underweight; overweight is between 26 and 30; and obese is more than 30. See box below.

### **Body mass index (BMI)**

The calculation is only relevant after full height is attained—that is, after age eighteen or twenty.

The body mass index (BMI) is a method used to determine whether a person's weight is in the correct range for their height. The BMI is expressed in numbers.

- Less than 20 is considered to be underweight.
- 20–25 is considered to be normal.
- 26–30 is considered to be overweight.
- Over 30 is considered to be obese.

To determine BMI divide weight in kilograms by height in metres squared.

For example, when a woman weighs 52 kg and her height is 1.75 m, her BMI is calculated by dividing 52 by  $1.7 \times 1.7$  (2.89) which equals 17.99. Her BMI is 18 which is considered to be underweight.

## Recognising eating disorders

Eating disorders can vary quite dramatically in severity. It is fairly usual for many people to overeat as a result of stress, tension and extreme fatigue; or to use food to lessen feelings of disappointment, anger or poor self-esteem. At the other end of the spectrum are those who are constantly on one diet or another, who excessively restrict their intake

of certain food groups and who are obsessed with their body size. These sorts of behaviours may indicate that the person has a mild form of eating disorder, but usually they cause little real physical damage. This is quite different from the two most severe eating disorders, anorexia nervosa and bulimia nervosa.

For more information on treatment and support for people with an eating disorder and advice for friends and family, contact your local hospital or the anorexia and bulimia support group in your area.

### The common symptoms

These conditions can be very difficult to recognise because people with eating disorders often deny they have a problem and try to hide their behaviour from others. If family or friends have noticed that the person is behaving in a worrying manner, they may need to be quite persistent to get the individual to seek help. Here is a list of symptoms which might indicate either disorder.

- Extreme weight loss with denial that weight gain is necessary (anorexia nervosa).
- An unnatural fear of gaining weight.
- An obsession with food—thinking and talking about food too much, particularly in a negative manner.
- An unrealistic body image—feeling fat all the time and an inability to recognise when body weight is normal.
- Avoiding social situations which involve eating.
- Going to the bathroom after eating, or long stays in the bathroom. Running the tap or flushing the toilet to disguise vomiting.
- Exercising excessively to change body weight and shape.
- Weighing frequently.
- Inability to concentrate or think clearly; depression.

Obviously some of these symptoms might be related to something other than an eating disorder. Someone who always visits the bathroom after eating might have bowel problems such as diarrhoea; not wanting to eat out might be related to low self-esteem or shyness; and not being able to concentrate has multiple causes. However, a number of these behaviours occurring together may be an indication of an eating disorder.

## Menstrual cycle changes

Menstrual changes commonly occur because of low body weight. Oestrogen levels are low, because the stimulus from the hypothalamus and pituitary gland is ‘turned off’ and ovulation does not occur. For this reason, fertility rates for women with a low BMI are lower than for normal weight women. Bone density and collagen strength are

dependent on adequate oestrogen levels and it is common for women who have experienced an episode of weight-related amenorrhoea to have an abnormally low bone density. Some women develop menopausal symptoms like hot flushes and vaginal dryness because of the abnormally low oestrogen levels.



### ■ ■ The medical approach

Anorexia nervosa and bulimia nervosa require some form of counselling or psychotherapy to help change the person's perception of themselves and their relationship to food. This may take the form of family therapy, individual counselling or group counselling. Very occasionally drug therapy is used for severe and disabling depression. Hospitalisation is necessary if the body weight falls below 35 kilograms.

Doctors often refer sufferers to a dietitian to ensure that a balanced diet is eaten, and so that there is a better understanding of the necessity of some of the food groups. Sometimes a special diet will be needed to rectify specific nutrient deficiencies.



### The natural therapist's approach

Natural therapies such as herbs, homoeopathics or diets, *cannot* correct eating disorders. Sufferers of these conditions need extensive counselling to help them overcome the complaint, and while some natural remedies may help to rectify some of the physical problems, they are best advised as adjunctive treatments.

Despite the weight loss often seen in eating disorders, serum albumin (protein), cholesterol and betacarotene are usually normal. However, blood levels of trace metals such as zinc and copper are often depleted.<sup>10</sup> Zinc deficiency seems to play a major role in anorexia nervosa, and some preliminary work suggests that correcting zinc levels may improve adaptation to stress in eating disorders.<sup>11</sup>

Herbs such as the bitters and the nervines are useful to assist with digestion, assimilation and stress; and the hormone regulating herbs such as *Vitex agnus-castus* may be needed to regulate the period once the appropriate weight has been gained. General tonics and nutritive herbs are also useful, such as *Eleutherococcus senticosus* and *Medicago sativa*.

The phyto-oestrogens (discussed in Chapter 18) can assist temporarily with low oestrogen symptoms and may help bone density, but they can never replace the effects of endogenous oestrogens.

## LONG-TERM DIETARY RESTRICTIONS

Becoming healthy, some people believe, is a tortuous process, bound to involve at least some restriction in diet, if not a complete fast. Some natural therapists are very fond of these strategies to ‘improve’ health and a number of popular texts have been written stressing the virtues of a clean diet and correct way to eliminate toxins from the system. In the past, these theories of ‘purity’ and ‘internal cleanliness’ have been associated with the belief that menstruation is somehow impure or unclean. The arguments—usually implied—are that a woman who has difficulty with menstruation, or who menstruates heavily, or even a woman who menstruates at all, has become in some way ‘toxic’ and in need of a purifying regime.

This impression is strengthened by association with the common premenstrual symptoms of constipation, acne, fluid retention and bloating. These are seen as the ultimate proof of the toxicity—after all, they disappear once the ‘cleansing’ process of menstruation starts. These theories had their recorded genesis in the ancient Greek medical texts where it was quite strongly held that menstruation was a purifying process, necessary to prevent a great number of unpleasant ills (see Chapter 3). Gradually, over the years, this theory has been modified by some practitioners to read ‘no menstruation means purity’. The proponents of this theory quite happily tell their patients to fast or use extreme elimination diets to reduce or stop menstrual flow.

Many practitioners recommend short-term diets for detoxification as an adjunct to treatment for a variety of medical complaints, and in these cases such diets can be expected to have beneficial effects. As a general rule, however, women are more likely to be depleted than toxic because of the many stresses on the female body. Adolescents, pregnant or breastfeeding women, athletes or those on a strenuous exercise regime, women with menorrhagia or who are convalescing, need dietary modifications to take into account *increased* nutritional requirements.

Despite this, many women remain on restricted diets because of food intolerances or allergies, such as coeliac disease or wheat and dairy allergies—or for weight loss. A number of medical conditions also require long-term dietary intervention, including polycystic ovarian syndrome (PCOS), endometriosis, cardiovascular disease and diabetes. Diets for these conditions need to make allowances to include those nutrients specific to women’s dietary requirements. Specific attention should be given to iron for menstruating women, folate prior to and during pregnancy, zinc and iron for adolescents, calcium and magnesium for peri- and post-menopausal women, and chromium and magnesium for women with PCOS.

Dietary advice for these life changes or during times of special need can be found in the appropriate chapters.

## Adverse effects of dietary restrictions

Severely restricted diets can reduce or stop menstruation, but not because the body is detoxified. The resultant weight loss can mean that the BMI is below the level needed for ovulation and menstruation to occur. Excess fibre intake can diminish menstrual flow by reducing the availability of oestrogen—and in addition has deleterious effects on bone density.

A recent study showed that nutritional deficiencies were responsible for functional (hypothalamic) amenorrhoea amongst a group of women with normal exercise levels and body weight: women with functional amenorrhoea were inclined to have a lower percentage of body fat and a higher lean body mass than those with a normal menstrual cycle. Importantly, it was the type of energy consumed, rather than the actual kilojoule intake, that contributed to the absence of periods. The women with functional amenorrhoea consumed half the amount of fat, twice as much fibre and more carbohydrates than the menstruating women.<sup>12</sup>

Leptin, a hormone secreted by adipocytes, seems to be implicated in the regulation of the menstrual cycle during times of reduced kilojoule restriction.<sup>13</sup> Leptin levels seem to regulate the onset of the menarche, such that a critical amount of body fat and leptin secretion is needed to trigger GnRH release by the hypothalamus and the onset of menstruation. This mechanism has been shown to operate throughout a woman's life.<sup>14</sup> When energy intake is significantly reduced, leptin levels are also low and there is reduced signalling to the hypothalamus, ultimately leading to reduced pulsatile release of LH (and to a lesser extent FSH) and subsequently to hypothalamic amenorrhoea. Women with amenorrhoea, a low kilojoule intake and a low BMI were shown to have the lowest levels of leptin, followed by women with amenorrhoea and a low BMI. Menstruating women were shown to have leptin levels in the highest range, irrespective of body weight and BMI.<sup>15</sup>

Another problem is seen among women who are chronic dieters who have very low dietary calcium intakes and develop low bone density as a result. Long-term dietary regimes to maintain a suitable body weight to reduce the risk of heart disease, for example, are counterproductive if the same diets increase the woman's risk of osteoporosis. Some dietary restrictions increase menstrual flow. Prolonged dietary deficiency of iron and vitamin B<sub>12</sub> has been associated with anaemia and *excessive* menstruation.<sup>16</sup>

A high dietary fibre intake adversely affects bone density and can cause oligomenorrhoea or amenorrhoea because of increased oestrogen clearance via the bowel. The current recommendation of a high protein, low or no carbohydrate diet for weight loss can also cause problems. These diets are higher in saturated fats and protein and lower in fibre than mixed carbohydrate and protein diets. When used over a protracted period of time, a rise in LDL cholesterol can occur. Menorrhagia and

dysmenorrhoea are also common because of the imbalance in saturated fats and essential fatty acids.

All practitioners concerned with women's health should be aware of these important considerations and advise their patients accordingly.

## **OBESITY**

Obesity is a medical term and is defined as having a BMI exceeding 30 (see Table 10.1). BMI readings are not accurate until the individual has gained full height, usually after twenty years of age.

### **Effects on menstruation**

Obesity is associated with a reduction in SHBG resulting in an increased bioavailability of oestrogens, which can increase the risk of menorrhagia, endometrial hyperplasia, fibroids and breast cancer. Women with PCOS and obesity experience more menstrual irregularities, as well as more severe problems with hirsutism as a result of insulin-induced abnormalities in ovarian function (see pages 336–9). Symptoms associated with androgen excess are more pronounced in obese women without PCOS as well, possibly due to a greater bioavailability of androgens which occurs because of low SHBG.



#### **■ ■ The medical approach**

Doctors may recommend long-term dietary and lifestyle changes for obese patients, in conjunction with an appropriate exercise program, and will usually refer to a dietician. The prescription of appetite-suppressant drugs should be discouraged since side-effects outweigh any long-term benefits.



#### **The natural therapist's approach**

Natural therapists will usually make suggestions about long-term diet changes and exercise. The emphasis is on smaller serving sizes and a reduction in the intake of refined carbohydrate foods. Foods with a low glycaemic index (GI factor) such as grains and legumes that have an intact fibrous outer coat are ideal. These foods are less affected by cooking and are digested more slowly because of a higher ratio of amylose. Slower digestion means that blood sugar rises gradually after a meal, allowing for better glycaemic control. Satiety is also improved with low GI foods and energy levels are better sustained through the day. A dessertspoon of vinegar or lemon juice eaten with or just prior

to eating increases the length of time foods remain in the stomach and gives the sensation of being fuller for longer, as well as improving blood sugar control.

One of the most important features of the low G1 diet is the regulation of insulin release in combination with a reduced risk of insulin resistance. Insulin resistance increases the deposition of abdominal body fat, which is a known risk factor for heart disease and type 2 diabetes. A tendency to gain weight in the abdominal region, known as android weight distribution, rather than around the hips (the gynecoid weight distribution) indicates a possible diagnosis of syndrome X, the metabolic disorder that is associated with obesity, heart disease and diabetes. Women with PCOS have closely related problems with android weight gain, insulin resistance and glucose tolerance (see pages 333–60).

Reducing kilojoule intake by reducing the amount of fats is also essential, but diets should be designed to maintain the intake of monounsaturated fats such as olive oil, and increase the levels of omega-3 fatty acids from oily fish and certain nuts (see pages 371–2). Protein intake needs to be limited in volume, but eaten at three meals in the day to maintain energy and improve appetite control. The amount of the total protein intake at each meal should be about the size of the individual's palm and must be selected from low-fat types of foods. To avoid patient confusion, legumes and soy products are counted as proteins in a grain plus legume meal.

Supplements are sometimes necessary, but cannot replace the effects of sensible and sustained dietary changes. Many patients, consciously or subconsciously, view supplements as providing a means to weight loss that will require less vigilant eating patterns. It is the responsibility of all practitioners to disabuse them of these beliefs. Specific recommendations might include chromium, zinc, N-acetyl cysteine and magnesium for glycaemic control and L-carnitine for weight loss. Some herbs are helpful and can be prescribed to improve glucose tolerance—*Galega officinalis*, *Trigonella foenum-graecum*, *Gymnema sylvestra* or *Garcinia* spp. (Malabar tamarind or brindleberry).



### Self care

Short-term, quick-fix diets are ineffective in the control of obesity. Meals should be regular with attention to serving sizes. Better glycaemic control is obtained when meals are taken with less than a five-hour interval during the day. Water intake is essential, and should replace sugary drinks and most tea and coffee. Most dieters lose weight relatively rapidly in the first few months, but after this it is best to aim for a loss of between one and two kilograms each month.



Exercise is covered in the following section on the benefits of exercise. Many women with weight problems describe an underlying psychological problem and counselling may be beneficial.

## **THE BENEFITS OF EXERCISE**

Exercising regularly and moderately has many health benefits for women. These include improved cardiovascular health, better bone density, maintenance of a healthy body weight, prevention of obesity, and a general reduction in stress. Menstruation is positively affected by moderate exercise as well. The severity of period pain is reduced and in some cases entirely relieved by exercise; PMS improves when women exercise; and exercise can even reduce the volume and duration of menstrual flow.<sup>17</sup>

Regular exercise reduces the incidence of a number of common gynaecological complaints as well. Women who do regular exercise may have a reduced risk of endometriosis because the rate of oestrogen production is lower. The incidence of endometriosis increases amongst women who lead sedentary lives and amongst younger women who stop exercising earlier than their peers.<sup>18</sup> Cyclic breast pain and cystic disease of the breast are also less common amongst women who exercise moderately and regularly.<sup>19</sup>

So what is moderate exercise and how often does it need to be done to achieve these benefits on the menstrual cycle? The answer depends on what needs to be achieved. It might be as little as half an hour a few times a week for some women; dysmenorrhoea and PMS can even improve when women exercise only during the week leading up to the period.

The type of exercise doesn't seem to be important either, except that exercise that increases the heart rate (aerobic exercise) like walking, swimming, cycling, jogging, team sports or aerobics are associated with the most all-round benefits. Although not usually thought of as an aerobic type of exercise, specific yoga exercises which improve pelvic blood flow can give considerable relief from pelvic pain and discomfort. Yoga often incorporates a relaxation component which is also useful to help cope with pain and can reduce the severity of PMS. These exercises can be taught by a yoga teacher or learned from a text with specific exercises for the pelvic region.

One of the best types of exercise, especially when stress aggravates period pain or PMS, is long, slow, distance exercise. This is when rhythmic and repetitive exercise, usually walking, bike-riding or swimming, is sustained at a moderate pace for about three-quarters to one hour. This has the effect of calming the nerves, shutting off the inappropriate adrenal response and improving stamina.

Weight-bearing exercise—literally, bearing your own weight—

improves muscle strength and stamina, accelerates weight loss and, most important of all, increases bone density. Not exercising increases the amount of calcium and other minerals lost from bone. Calcium is even lost from bone during a normal night's sleep. The positive effects of calcium, oestrogen and exercise on bone tend to be cumulative and exercise is most beneficial during the years when oestrogen is available, and when the dietary intake of essential nutrients is good. There is more benefit gained from exercise up until menopause, but an exercise-related increase in bone density is seen at all ages, including after the menopause.<sup>20</sup>

Any weight-bearing exercise, but particularly types which stress the large muscles, has the potential to improve bone mass. The best types are walking, running or playing sport. Swimming and cycling are still important even though they are not classically included in the weight-bearing group. For maximum benefit, exercise should be daily or every second day for about 60 minutes.<sup>21</sup> A less-studied but equally important area of concern for post-menopausal women is the loss of muscle bulk and tone. It has been estimated that a woman can lose as much as 30 per cent of total muscle mass between the ages of 50 and 80. Resistance exercise is the best way to maintain muscle bulk, and for those women who are unused to this type of exercise, supervised training is advised, at least initially. An excellent book on this topic, which outlines a simple and effective exercise regime, is *Strong Women Stay Young* by Miriam E. Nelson, published by Aurum Press.

Staying fit and active is important for older women too. Muscle strength and physical fitness are associated with not only increased bone mineral density, improved agility and better cardiovascular health, but a reduced incidence of falls and fractures. Even when falls do occur, they are likely to be less awkward or cause serious injury.

## Over-exercising

The effects of rigorous exercise are not all positive. Women who engage in strenuous physical activity *during* menstruation have an increased risk of endometriosis, perhaps related to the increased retrograde flow via the Fallopian tubes.<sup>22</sup> When exercise is prolonged, such as during endurance training, exercise-induced menstrual infrequency or amenorrhoea may result. This usually occurs in conjunction with a number of predisposing factors which work together to create the abnormal hormonal environment. These include:<sup>23</sup>

- The age of the woman when she started to train  
Young women who start to exercise excessively before menstruation has commenced, and before hypothalamic-pituitary-ovarian communication is established, are inclined to have a much later onset

of menstruation. When training starts around the menarche, there is a higher incidence of amenorrhoea.

- Previous menstrual history  
Women who have a prior history of irregular menstrual cycles, light periods or amenorrhoea are more prone to these problems when they undertake strenuous exercise.
- Body weight  
Women with a low body mass index or who lose large amounts of weight during training are more prone to menstrual irregularities.
- Nutritional intake and kilojoule balance  
Energy expenditure during exercise should be replaced by foods containing adequate kilojoules to prevent excessive weight loss. Menstrual cycle regularity might also be connected to the type of energy foods eaten. One study showed that women who ate less fat in combination with a high fibre and high carbohydrate diet were more inclined to become amenorrhoeic.<sup>24</sup> The requirements for most minerals, especially calcium, iron, zinc, magnesium and potassium, increase during exercise and may contribute to delayed physical development and menstrual irregularities.
- Distance run during training  
Menstrual disorders increase proportionally with the distance run. Women who run more than 80 km per week have a higher incidence of amenorrhoea.
- Stress experienced during training  
Women who experience more stress during training may be at greater risk of developing menstrual irregularities.
- Type of training  
Amenorrhoea is much less frequent amongst swimmers than in runners, gymnasts and ballet dancers.

Excessive exercise can cause specific menstrual cycle problems throughout a female athlete's life. During adolescence, not only is the onset of menstruation delayed, but so also are other aspects of physical maturity, such as attaining normal height. Infertility is also common because ovulation is either erratic or ceases in tandem with menstrual irregularities. The major concern associated with these menstrual changes, though, is the possibility of irretrievable changes to bone density. This can lead to a failure to reach peak bone mass, reduced bone density, scoliosis (spinal column curvature) and stress fractures.<sup>25</sup>

### Causes of the menstrual changes

When women undertake endurance exercise, an oestrogen deficiency can develop. This is probably caused by a (reversible) suppression of the frequency and amplitude of the pulsatile secretion of GnRH from

the hypothalamus and then to a decrease in the pulsatile secretion of LH and, to a lesser extent, FSH by the pituitary gland. The decline in LH may be a survival mechanism which was once geared to reducing fertility in times of stress and physical endurance when pregnancy would be undesirable.<sup>26</sup> (See also Hypothalamic amenorrhoea, pages 282–5.)

## Maintaining a regular period and healthy bones

The reduced oestrogen levels are responsible for the irregular cycles, amenorrhoea and low bone density, but at least some of the time, eating disorders also contribute to the picture.<sup>27</sup> It is important for athletes to remember that if the diet is good, body mass index is maintained within a healthy range, menstruation continues, and bone density is maintained.<sup>28</sup>

Additional complex carbohydrates will be needed to meet the kilojoule requirements of endurance training and an adequate fat intake is important. Calcium in the range of 1000–1500 mg per day is also necessary—the higher range is necessary when menstruation is erratic or absent. Women with prolonged menstrual irregularities or amenorrhoea may need to consider the Pill if their bone density is low. Further advice is included in the section on osteoporosis (see pages 181–98).

## Drugs

### Prescribed drugs

A number of drugs affect menstruation. Some increase flow while others reduce it; some influence the regularity of the cycle; and some can even cause menstruation to cease temporarily. Not all drug influences are negative—some drugs are deliberately prescribed to re-establish menstrual flow and regularity; to reduce pain or to minimise heavy flow. Some of the common drug effects on the menstrual cycle include:

- Oral contraceptives (the Pill)  
The Pill is used as a therapeutic agent for a number of gynaecological conditions. It has many benefits, including a reduction in menstrual flow and period pain, as well as more regular cycles. It can also cause unwanted side effects. The cautions, side effects and drug interactions, as well as the benefits and complaints which respond well to the Pill, are discussed in Chapter 20 'Drugs and surgery'.
- Progestogens  
These drugs are commonly prescribed for endometriosis and abnormal bleeding. They can often cause bloating, fluid retention, weight gain and mood changes.

- GnRH agonists  
These drugs cause a temporary menopausal state which includes cessation of the period, menopausal symptoms and a loss of bone density. They are used for fibroids and endometriosis, and their use for PMS and benign breast disease is under review.
- Corticosteroids  
The corticosteroids can cause a drug-induced Cushing's Syndrome which is associated with menstrual irregularities or amenorrhoea, and androgenising (male hormone-like) effects. Loss of bone density is a common and serious side-effect from long-term corticosteroid therapy. The common types of corticosteroids are prednisolone (Solone), hydrocortisone (Hysone), betamethasone (Celestone) and dexamethasone (Decadron).
- Prostaglandins-inhibiting drugs  
The prostaglandin (synthetase) inhibitors, for example, Ponstan and Naprogesic, are used for period pain and occasionally for menorrhagia as well. Sometimes they can delay the onset of the period and their use is associated with an increased risk of gastrointestinal ulcers.
- Anti-coagulant drugs  
Drugs which affect clotting time can occasionally increase menstrual flow. These include Calciparine, Dindevan, heparin and warfarin.
- Cytotoxic drugs  
The cytotoxic drugs which are used in the treatment of cancer, such as cyclophosphamide, chlorambucil, mechlorethamine and vincristine, can lead to infertility, irregular menstruation, amenorrhoea and premature menopause.
- Tamoxifen  
Tamoxifen is an anti-oestrogen used in the treatment of breast cancer, and rarely for benign breast disease. It can cause menopause-like symptoms and, less frequently, abnormal vaginal bleeding and irregular menstruation.
- Drugs which affect prolactin levels  
The drugs which effect prolactin levels can interrupt cyclic regularity. They are discussed in the section on hyperprolactinaemia on page 276.

## Recreational drugs

Alcohol, cigarettes, opiates and cocaine can all affect the menstrual cycle. Coffee (more than two cups per day), which is linked to infertility,<sup>29</sup> does not necessarily cause menstrual irregularities but can increase menstrual pain, especially if consumed during the period.

Excessive use of alcohol has been associated with infertility due to ovulatory failure amongst women with endometriosis, and increases the

risk of developing endometriosis by about 50 per cent.<sup>30</sup> Alcoholism increases the chance of early menopause,<sup>31</sup> and can also increase prolactin production.<sup>32</sup> These complaints can be associated with erratic cycles, menorrhagia or amenorrhoea.

Cocaine use is associated with higher levels of prolactin and abnormal menstrual cycles.<sup>33</sup> Methadone and possibly other opiates increase prolactin levels, but do not appear to have long-term effects on ovulation.<sup>34</sup> Cigarette smoking lowers oestrogen levels, and is associated with an increased incidence of menstrual irregularity, infertility and earlier menopause.<sup>35</sup>

Recreational drugs which interfere with menstruation usually have an impact on the levels of one or more of the hormones. These effects can translate into more serious problems such as osteoporosis and infertility. It is wise to curtail any activities which negatively affect menstruation.

# 11

## Menorrhagia

### Key words

adenomyosis	laparoscopy
androgen	myometrium
astringent	pathology
beta-hydrogenase	pedunculated
D&C	phyto-oestrogen
emmenagogue	prostacyclin
endometrial hyperplasia	prostaglandin
endometrium	saponin
flavonoid	sarcoma
GnRH agonist	serum ferritin
hyperplasia	spiral arterioles
hysteroscopy	uterine tonic
isoflavonoid	

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There are a number of reasons why a period might be heavier than normal and each of these should be investigated. The most common causes are 'functional', where nothing is essentially wrong but there is an abnormality of function. Fibroids are the other main cause of excessive menstruation. These causes of menorrhagia will be covered in this section.

It cannot be said too many times that treating abnormal menstrual bleeding without knowing its cause carries a potential risk for the woman. The need for an accurate diagnosis is vital. Sometimes a diagnosis can be made using only the history and routine examinations; sometimes procedures, such as dilatation and curettage (D&C), laparoscopy or hysteroscopy are necessary. Some of these procedures require a general anaesthetic.

The diagnostic techniques used by natural therapists such as iris, tongue or pulse diagnosis, are much less invasive (and are therefore seen by many women to be a much more desirable option), but do not give

the type of information needed to pinpoint the origin of the abnormal bleeding. They should never be used as an alternative to the appropriate medical examinations.

## **THE COMMON CAUSES OF MENORRHAGIA**

### **1. Functional menorrhagia**

The term menorrhagia is used to describe a bleeding *pattern*.

*Functional* menorrhagia is a condition which presents as abnormally heavy menstruation, and a normal menstrual cycle. There is no demonstrable pathology found either within the uterus or from blood tests; however, feedback control of the hypothalamic-pituitary-ovarian unit is likely to be disrupted by the effects of stress, certain drugs, body weight and exercise patterns, which may result in menorrhagia.

### **2. Uterine fibroids**

These are non-cancerous (fibrous) tumours of the uterus, usually in the myometrium (muscle wall). Fibroids are common in women over 30 and affect about one in every five women. They may vary in size and number and can be diagnosed with an ultrasound. Fibroids may be symptom free, or exert pressure effects like urinary frequency if the tumours are larger. Heavy bleeding at menstruation is a common symptom that accompanies many, but not all fibroids. Rarely, fibroids can undergo malignant change and develop into a uterine sarcoma.

### **3. Uterine polyps**

Uterine polyps arise because of hyperplasic changes to the endometrial tissue. The process is similar to the development of endometrial hyperplasia, and so there is a possibility that uterine polyps can become cancerous. They can cause either menorrhagia or metrorrhagia.

### **4. Endometriosis**

This is caused by the endometrium (normal cells which line the uterine cavity) growing in incorrect places. These cells still have hormonal sensitivity and therefore bleed during menstruation and might grow on the ovaries, tubes, pelvic ligaments, bowel or bladder. Endometriosis is most common amongst 20 to 30 year olds, but women of any age who are ovulating and/or menstruating can develop the complaint. Endometriosis can cause pain, heavy periods, abnormal bleeding patterns and/or infertility.



## **5. Adenomyosis**

Adenomyosis is similar to endometriosis in that normal endometrial cells become displaced and grow in the wrong place, in this case within the uterine wall. The tissue is responsive to hormonal stimulation and the bleeding into the muscle layer causes pain and often heavy menstruation. It is a common cause of menstrual pain and menorrhagia in women over 40.

## **6. Pelvic inflammatory disease (PID)**

PID is caused by infection, which may or may not be sexually transmitted. The symptoms include abnormal bleeding and heavy periods in about 30 per cent of sufferers, but typically fever, malaise and pelvic pain are the presenting complaints. A bloody or purulent discharge is common if the PID is caused by gonorrhoea.

## **7. Contraceptive causes**

These are rare for women who use either natural family planning (based on the detection of ovulation); or barrier methods (condoms, diaphragm or cervical cap).

### *i) IUD*

The IUD or 'loop' can cause heavier and more painful periods. Some women experience bleeding between periods, especially in the first three months after insertion. Severe pain and/or bleeding may indicate that the IUD has dislodged or an infection has developed, and requires immediate assessment.

### *ii) Tubal ligation*

Tubal ligation has been shown to be associated with altered menstrual patterns including menorrhagia. This may be a result of the procedure or be secondary to having stopped the Pill.

## **8. Non-gynaecological causes**

Disturbance in hormone levels, blood clotting or deficiencies of certain nutrients may result in heavier periods. The more common causes are related to the following systems.

### *i) The blood*

Disorders of blood production or blood clotting can be related to bleeding abnormalities. Causes range from nutritional deficiency to leukaemia. Anaemia and low serum ferritin can cause heavy bleeding;

von Willebrand's disease, a congenital clotting abnormality, may become obvious for the first time as menorrhagia in adolescence.

ii) *The endocrine system*

Imbalances of the adrenal hormones, associated either with drug use or adrenal disorders may result in abnormal uterine bleeding.

The *thyroid gland* controls the general rate of the body's functions, including menstruation; and abnormalities in thyroid function can lead to menorrhagia.

iii) *The liver*

The liver metabolises the reproductive hormones and synthesises clotting factors. Poor liver function can lead to menorrhagia.

## **9. Pregnancy and bleeding**

Pregnancy-related conditions are the most common causes of abnormal bleeding amongst women from the age of 20 to 40. Pain may accompany the abnormal bleeding.

*Miscarriage*

A late and/or painful, heavy period may be an early miscarriage or a 'blighted ovum' where the foetus fails to develop normally. Bleeding later in an established pregnancy, and before the fourteenth week, might also be a miscarriage.

## **FUNCTIONAL MENORRHAGIA (HEAVY MENSTRUATION)**

The medical term for a heavy period not related to any other condition (organic pathology) is functional menorrhagia. 'Functional' means that the menorrhagia occurs because of disordered function of an otherwise healthy-looking uterus. Women with functional menorrhagia have heavy *periods*, but their menstrual *cycle* is normal. The diagnosis implies an absence of identifiable pathology in the reproductive tract such as uterine fibroids or polyps. In addition, cyclic regularity suggests that failure to ovulate is not a cause of the abnormal bleeding.

### **Cause**

Why some women have heavier periods than others is not entirely understood. There are a number of common associations with functional menorrhagia, however, that might point to relative oestrogen excess.

These include being overweight, a high fat intake, not exercising and stress-induced luteal phase defects. Irregularities in prostaglandins are observed in the endometrium when women have menorrhagia. An imbalance in the prostaglandins levels can occur because of a relative oestrogen excess and/or an excessive saturated fat intake.

One of the prostaglandins, prostacyclin 2, is a potent dilator of blood vessels and also inhibits blood clotting, leading to increased menstrual bleeding.<sup>1</sup>



## ■ ■ The medical approach

A diagnosis of functional menorrhagia is a ‘diagnosis of exclusion’ and is made by eliminating all diseases and intrauterine conditions as the reason for the heavy period. Past and present history, Pap smear results, the findings from an internal examination and blood tests may all be necessary in some cases to differentiate between the various causes of the excessive bleeding.

Depending on the age of the woman, a vaginal ultrasound, hysteroscopy or diagnostic D&C is sometimes also suggested if the history of the complaint, the pattern of the bleeding or the age of the woman are suggestive of a pre-cancerous or cancerous condition, or if there is a suspicion of an intra-uterine lesion such as a polyp or fibroid. A D&C is diagnostic rather than therapeutic, although bleeding patterns sometimes return to normal after the procedure. The reasons for this are not always clear. Small sub-mucous fibroids and polyps can be removed during a hysteroscopy.

If there are no obvious causes of the heavy period, a diagnosis of functional menorrhagia is made. The medical practitioner might suggest the following treatments, usually starting at the top of the list and progressing through until a satisfactory outcome is achieved. More details on each of the drugs and surgical procedures is included in Chapter 20 ‘Drugs and surgery’.

### The Pill

The Pill is a common treatment for menorrhagia and is often the most efficient way to establish a regular cycle and a lighter period.

### Prostaglandins inhibitors (Naprogesic, Ponstan)

Prostaglandins inhibitors such as Naprogesic and Ponstan are sometimes used to treat menorrhagia. They block the conversion of prostaglandins into prostacyclin 2 and reduce bleeding,<sup>2</sup> and work best when women are ovulating, or in combination with the Pill or progesterone tablets. Some doctors combine these treatments.<sup>3</sup>

Progestogens in the second half of the month or continually (often Provera or Primolut)

Progestogens are used for menorrhagia even though many women who have this problem do not have irregularities in either progesterone production or hormone balance. When the hormone medication is withdrawn after 10 to 20 days, the endometrium is shed completely and the period often goes back to normal. Progestogens can also be given continuously, which causes the endometrium to shrink.

### A Hysteroscopic D&C

This diagnostic procedure allows the gynaecologist to view the uterine cavity, detect any problems and then perform a curette to remove and biopsy abnormally developed endometrium.

### Progestogen-releasing IUD

A levonorgestrel-releasing IUD has been used recently in the treatment of abnormal bleeding caused by functional menorrhagia and dysfunctional uterine bleeding. Unlike other IUDs which can increase bleeding, this IUD was found to shrink the endometrium after about three months' use and many women reported very light periods or amenorrhoea.<sup>4</sup> An additional advantage for sexually active women is that the IUD is a contraceptive device. Women with uterine fibroids and polyps responded less favourably to this type of treatment.<sup>5</sup>

### Temporary medically induced menopause

The GnRH agonists (Zoladex, Synarel), which create a 'medical menopause', can be suggested for abnormal bleeding which has failed to respond adequately to other methods.

### Uterine endometrial ablation

The lining of the uterus (endometrium) is destroyed using laser or cauterisation via a hysteroscope which leads to cessation of, or reduction in, menstruation. A newer method of ablation is the thermal balloon method where the endometrium is destroyed by heat. A balloon is passed through the cervix into the uterus and filled with a glucose solution which is then heated and left *in situ* for several minutes (see also page 529).

### Hysterectomy

The removal of the uterus, which may also involve the removal of the ovaries (hysterectomy and bilateral salpingo-oophorectomy), is reserved as the last treatment option for excessive menstrual loss.



## The natural therapist's approach

Many women visit natural therapists for abnormal bleeding because 'nothing else has worked'. Often they have been examined by a doctor and told that they just have heavy periods, and that nothing is wrong. When a physical examination has not been performed, the woman should be referred to a doctor for the appropriate examinations. A complete gynaecological check-up is recommended for all women with menorrhagia who are 40 or older, and for any woman who has symptoms which may indicate other conditions.

Once the possibility of other conditions has been eliminated, the first step in a natural therapist's diagnosis is to determine which categories of herbs will be most likely to reduce menstrual loss for the particular woman to be treated. Anti-haemorrhagic herbs will be a necessity, of course, but often hormone-regulating herbs will be indicated as well. Symptoms such as premenstrual syndrome, an irregular cycle, and spotting or intramenstrual bleeding are suggestive. Taking a basal body temperature reading can also assess whether ovulation is occurring. If there is no evidence of a hormonal irregularity, remedies to regulate hormone levels may not be necessary, even though it is common for medical treatment to include hormones.

Natural therapists can use a variety of clinical assessments to evaluate the causes and the type of treatment they will use for functional menorrhagia. Problems might be confined to the uterus, or be part of a more systemic complaint related to the 'constitutional state' of the woman.

Uterine problems might be associated with:

- abnormal uterine tone
- prostaglandins imbalance
- an excess of Heat, Cold or Moistness in the uterus

Or, the bleeding may occur because of an imbalance in the entire system and be caused by:

- nutritional deficiencies
- weakness and lack of vitality leading to a systemic imbalance and (usually) a tendency to become Cold
- liver congestion leading (often) to irritability and headaches, and a tendency to become Hot

In reality, there is considerable overlap in these types of complaints, both in their presentation and treatment. For example, abnormal uterine tissue tone will often occur when there are nutritional deficiencies, particularly iron, and when there is a more generalised lack of vitality. Herbs to nourish Blood and improve vitality often also affect uterine

tone (for example, *Angelica sinensis*); and iron is believed to improve both anaemia and uterine tone.

## Nutritional and dietary aspects of functional menorrhagia

### Iron

It has been understood for some time that anaemia can be a cause as well as an effect of menorrhagia.<sup>6</sup> Researchers have shown that women who had heavy periods also had depleted iron stores (serum ferritin), but not necessarily anaemia.<sup>7</sup> They speculated that the menorrhagia was caused by a relative weakness of both the uterine muscles and the spiral arterioles of the endometrium which were unable to stop bleeding by contracting. This condition is very similar to the lack of uterine tone described by natural therapists.

### Vitamin A

Vitamin A is an important nutrient in the growth and development of adolescents<sup>8</sup> and ensures healthy endometrial growth.<sup>9</sup> Women with normal menstrual loss appear to have significantly better levels of vitamin A than women with menorrhagia. When the women with heavy menstrual loss were given vitamin A, improvement resulted in more than 92 per cent of cases.<sup>10</sup> Normal oestrogen levels are dependent on vitamin A, and a deficiency leads to impaired activity of the enzyme 3 beta-dehydrogenase which is vital to the production of oestrogen (oestradiol).

Vitamin A is only useful for menorrhagia associated with a restricted or inadequate intake. Levels of 10 000 IU for three months are safe (but not for women trying to become pregnant); however, doses of up to 25 000 to 30 000 IU daily have been used and were associated with negligible toxicity.<sup>11</sup> These doses should be supervised. Vitamin A is restricted to 5000 IU tablets for over-the-counter sales and is toxic if taken for prolonged periods.

### Vitamin K

Crude chlorophyll has been used historically for excess menstruation,<sup>12</sup> although exactly why it should help has been unclear. One theory is that chlorophyll contains high levels of vitamin K which is necessary for the normal clotting of blood. Vitamin K was shown to reduce the number of menstruating days when menstrual irregularities were associated with longer than normal periods.<sup>13</sup>

Deficiencies of vitamin K are said to be uncommon because dietary intake is usually assumed to be adequate and, anyway, bacterial colonies can manufacture vitamin K in the absence of a good intake. However,

the major food source of vitamin K, green leafy vegetables, is often lacking in the average diet and altered bowel flora, especially with the administration of antibiotics,<sup>14</sup> can interfere with normal manufacture of vitamin K. Supplements should not be necessary. A balanced diet containing dark green leafy vegetables and yoghurt should improve any deficiency quickly.

### The flavonoids

The flavonoids are a diverse group of compounds which naturally occur in food and medicinal plants, and are some of the major physiologically active constituents of herbal medicines.<sup>15</sup> Flavonoids have diverse effects in the body, several of which may affect menorrhagia. They improve capillary fragility; interact with oestrogen receptor sites, reducing the proliferative effect of oestrogens (phyto-oestrogens are flavonoids);<sup>16</sup> and inhibit production of oestrogen due to inhibition of the enzyme responsible for its synthesis.<sup>17</sup> But with over 500 different flavonoids identified, it is likely that many of the effects of flavonoids in gynaecological conditions are yet to be discovered.

Flavonoids are commonly found in astringents, plants traditionally used for menorrhagia. This may be related to their affect on capillary fragility. Citrus bioflavonoids reduced the menorrhagia of almost all of the women in one study who were treated with 600 mg of water-soluble bioflavonoid compound. The results were thought to be due to improved capillary strength which reduced permeability and bleeding.<sup>18</sup>

### Dietary phyto-oestrogens

Phyto-oestrogens are thought to inhibit the effect of oestrogen on the endometrium by binding to the same receptor sites as endogenous oestrogen. Competitive inhibition by the phyto-oestrogen is responsible for preventing oestrogen from having a stimulatory effect. When menstruating women have a high intake of soya products, studies have shown that they ovulate later, and the period tends to become lighter and shorter.<sup>19</sup>

### Prostaglandins and fat intake

Prostaglandins play a major role in the initiation of menstruation and are also involved in menorrhagia and dysmenorrhoea. Prostaglandin inhibitors are used in medicine for the control of bleeding, and it seems likely that some herbs will have similar prostaglandin-inhibiting actions.

Manipulating the diet by reducing saturated fats improves menorrhagia. Benefits may arise from the dual effects of a reduction in relative oestrogen excess and improved prostaglandin ratios.

## Herbs for functional menorrhagia

Herbs for functional menorrhagia are chosen from the following categories.

- Herbs which affect uterine tone and regulate uterine bleeding: the uterine anti-haemorrhagics, uterine tonics and emmenagogues.
- Herbs which have diverse ‘systemic’ effects, and which improve the overall vitality or constitutional state of the woman: the female tonic herbs and the Liver herbs which reduce bleeding by clearing Heat and (often) aiding oestrogen clearance.

### Uterine anti-haemorrhagics

Herbalists refer to anti-haemorrhagics as being Drying—in fact one of the ways to tell if a herb has an astringent effect is to see whether it has the typical drying and puckering sensation in the mouth. This ‘astringent’ effect is caused by tannins, but tannins are not responsible for the effects on the uterus because they are not absorbed from the gut.

The uterine anti-haemorrhagics usually contain the tannins characteristic of most herbal astringents, in addition to other (non-tannin) constituents, primarily flavonoids and saponins which regulate bleeding. Some of these effects are quite complex, and not all of them are understood. They are discussed in greater detail in the section on uterine anti-haemorrhagics herbs in Chapter 19.

Uterine anti-haemorrhagics used to treat menorrhagia include *Trilium erectum*, *Equisetum arvense*, *Achillea millefolium*, *Tienchi ginseng*, *Capsella bursa-pastoris* and *Hydrastis canadensis*. The important astringents for menorrhagia in adolescence are *Achillea millefolium*, *Alchemilla vulgaris*, *Capsella bursa-pastoris* and *Geranium maculatum*.

### Uterine tonics

Herbs which affect the muscle tone of the uterus, the uterine tonics, are believed to affect bleeding by normalising the uterine tone. The uterine tonics are accepted as being capable of improving weak muscle activity and relaxing excess spasm and are often combined with the uterine anti-haemorrhagics in the treatment of menorrhagia. In addition, the uterine tonics seem to have diverse and as yet unidentified actions on the endometrium. These are evident at ultrasound when endometrial changes are seen amongst women given uterine tonics for infertility. They include *Angelica sinensis*, *Chamaelirium luteum*, *Rubus idaeus*, *Caulophyllum thalictroides*, *Mitchella repens*, and *Aletris farinosa*, and are discussed in the section on uterine tonics in Chapter 19 ‘Herbs’.



## Emmenagogues

Emmenagogues are used to treat menorrhagia associated with a lack of uterine tone. This group of herbs increases muscular activity and the resting tone of the uterus and are indicated for heavy bleeding immediately after delivery, when fibroids interfere with the normal muscular activity of the uterus, after a miscarriage or termination, or following frequent full-term pregnancies. They should only be prescribed by a trained herbalist.

## Liver herbs

Liver herbs are often used for conditions associated with excess Heat such as irritability, headaches, acne and constipation. When this is confined to the premenstrual phase of the cycle, it is often thought of as an imbalance in the hormone levels caused by a relative oestrogen excess.

Liver herbs are bitter and Cooling. Dietary changes are usually recommended at the same time.

## Tonic herbs

Herbalists recognise a type of uterine bleeding that is associated with a lack of vitality or general body weakness. The usual characteristics are that the woman is unusually tired, weak and pale. This type of bleeding has been recognised for a long time: it is recorded as a cause of bleeding in the *Medieval Woman's Guide to Health* as 'weakness of the woman who cannot keep the blood inside her'.<sup>20</sup>

The cure was reported to be a good diet of 'plump hens' and 'comforting food'—still good advice. In addition, the uterine and female tonic herbs, of which there are few better than *Aletris farinosa* and *Angelica sinensis*, would also be suggested. These are both Warming herbs. Blood, nervine and adrenal tonics might also be indicated when Blood deficiency, nervous or adrenal exhaustion accompany heavy menstrual bleeding. Appropriate herbs might include *Angelica sinensis* with *Paeonia lactiflora*, *Rehmannia glutinosa* and *Angelica sinensis* for Blood deficiency; *Withania somnifera*, *Hypericum perforatum* and *Scutellaria laterifolia* for nervous exhaustion; and *Eleutherococcus senticosus*, *Panax ginseng* or *Glycyrrhiza glabra* for adrenal exhaustion.



## Self care

Exercising and reducing stress levels have many effects on menstrual patterns. These are described in Chapter 10 'The usual suspects'.

A diet to complement the treatment of functional menorrhagia should reflect the assumed causes. If these are related to iron deficiency, additional iron-containing foods that are also low in fat can be included. A low fat, high fibre diet will reduce menstrual flow by increasing

oestrogen clearance and regulating prostaglandin balance. Saturated fats should be avoided or at least reduced. These include those fats found in full-cream dairy products, meat, eggs and some vegetable products, including peanuts and coconut. Fibre also improves oestrogen clearance. Additional information on the effects of fibre and fat on oestrogen levels is included in Chapter 5.

If bioflavonoid deficiency is the assumed cause of the bleeding, citrus fruits, fruits and vegetables generally, or even buckwheat leaf tea can be taken to correct the problem. But because flavonoids are ubiquitous in the plant world, simply increasing the intake of fruit and vegetables will increase flavonoid intake.

## **UTERINE FIBROIDS**

Uterine fibroids, also known as uterine leiomyomas or uterine myomata, are fibrous (and non-cancerous) tumours of the uterus which affect 20–25 per cent of women past the age of 35.<sup>21</sup> They vary greatly in size, number and position, some growing to vast sizes and causing pressure symptoms, others remaining small and discrete. A fibroid is comprised of dense muscular fibres arranged in circular layers and encapsulated in a layer of compressed smooth muscle cells. The blood supply reaches the fibroid via vessels which traverse the outer capsule, the tumour itself having relatively few blood vessels within its structure.

Fibroids may cause few symptoms; occasionally quite large ones are discovered because of a routine examination or ultrasound scan for another reason. In fact, fibroids which are not interfering with fertility or causing unwanted symptoms require no surgery or drugs, medical, natural or otherwise, to shrink or remove them. Regular monitoring is advisable, and some general measures to moderate the effects of oestrogen are useful to contain growth and reduce the risk of additional fibroids.

Large fibroids, those that are pedunculated (growing on a stem), and those that grow rapidly should be monitored closely. A rapidly growing fibroid can be associated with an increased risk of a uterine sarcoma, which is an aggressive type of tumour. Often doctors suggest that a fibroid that is growing quickly be removed before any abnormalities develop.

## **Symptoms**

The most common symptom associated with fibroids is heavy bleeding. Larger fibroids are also associated with urinary frequency, pressure symptoms, heaviness and congestion in the lower abdomen. Some women have a heavy feeling, sometimes described as a sensation ‘as

though everything might fall out' before or during the period. Very large fibroids may cause abdominal enlargement and the woman may look as if she is in the early stages of pregnancy. Sometimes fibroids will cause a miscarriage or infertility and, rarely, pregnant women may go into labour too early because of fibroids. Fibroids are also associated with an increased risk of post-partum haemorrhage.

Many women have no symptoms at all and only become aware of the presence of fibroids when they are detected during a pelvic ultrasound. Very occasionally, fibroids can be associated with pain because of obstruction to the blood supply, torsion of a pedunculated fibroid or infection. Another uncommon, although potentially serious, complication associated with fibroids is obstruction producing urinary retention, or dilatation of the ureters or renal pelvis. Constipation can also result from the obstructive effects of fibroids.

## **Types of fibroids and their locations**

Fibroids can be described according to their location in relation to the uterus; or according to their type.

### **Location**

#### **Intra-uterine or sub-mucosal fibroids**

These fibroids are found within the uterine cavity and are sometimes called 'sub-mucosal' because they are situated below or within the endometrial lining. These fibroids can be removed via a hysteroscope if they are less than 5–6 cm in diameter. They are frequently associated with heavy menstruation, even if rather small, and can extend through the cervix if they are pedunculated. Problems with fertility may occur because the endometrium around the fibroid does not undergo normal hormonal change. Implantation can be affected and the miscarriage rate is often higher.

#### **Myometrial or intramural fibroids**

These are fibroids found within the muscle wall of the uterus (the myometrium). They can occur at any location within the uterine muscle and vary considerably in size. Symptoms are usually excessive bleeding at menstruation and, if large enough, pressure may be exerted on adjacent organs. Rarely, pressure on a ureter (the tube between the kidney and bladder) may cause a back-flow of urine, causing structural abnormalities of the kidney and ureter and abnormal renal function. These fibroids can adversely affect fertility if they grow into and distort the uterine cavity.

## Extra-uterine or sub-serous fibroids

As their name suggests, these fibroids are attached to the outside of the uterus. They are sometimes called 'sub-serous' because of their positioning under the serous outer lining of the uterus. They can also cause pressure symptoms or be associated with excessive bleeding. Some are found around or on the Fallopian tubes and may interfere with fertility. Sub-serous fibroids are often pedunculated (see following).

## Type

Fibroids are of two main types. They can be discrete, fibrous and encapsulated tumours, which are usually roughly spherical in shape; or pedunculated tumours attached to the uterine cavity or the outside of the uterus by a stem or pedicle.

The latter variety can cause problems because of the (fairly rare) tendency to twist on the pedicle (called torsion). If this occurs the blood supply to the fibroid can be cut off, and death of the fibroid tissue will occur. This is associated with extreme pain and increased pressure symptoms as the fibroid swells in its capsule and presses on adjacent organs. Immediate surgery may be needed.

## What makes a fibroid grow?

It is not known why muscular fibres start to arrange themselves in the spherical form that is typical of fibroids. What is known, however, is that their growth is dependent upon the presence of oestrogen: they rarely develop before menarche and will almost always shrink after menopause. Women with other conditions which are associated with oestrogen over-activity, such as endometrial hyperplasia and endometriosis, have a greater risk of fibroids, adding weight to the theory that they are somehow reliant on, or caused by, oestrogen levels.<sup>22</sup>

Downgrading the effect of oestrogen is one of the requirements of a successful treatment. Natural therapists treat fibroids as conditions associated with 'relative oestrogen excess'; and doctors use drugs which will temporarily cause a menopausal state, or suggest surgical removal.

Fibroids have also been found to contain larger amounts of DDT than other uterine tissue.<sup>23</sup> The significance of this is not clear, but DDT has oestrogen-like effects and may be responsible for the tissue changes seen in these women.

## Factors which affect the incidence of fibroids

### Pregnancy

Pregnancy seems to reduce the risk of fibroids developing. With each successive pregnancy, the rate at which fibroids develop reduces; women who have had five full-term pregnancies have only one-quarter the risk of women who have had none.<sup>24</sup>

### Coffee

Coffee may increase the likelihood of developing uterine fibroids. Researchers from the company Nestlé gave mice the equivalent of two to three cups of instant coffee per day.<sup>25</sup> They had a slightly higher incidence of fibroids than control mice, but the significance of this for women is not clear.

### Hypertension

Some studies have revealed an association between fibroids and high blood pressure,<sup>26</sup> suggesting that fibroids and hypertension share the same pathogenic features.<sup>27</sup>

### Perineal talcum powder

The use of talcum powder may increase fibroid incidence for unknown reasons.<sup>28</sup>

### Obesity

Obesity is associated with an increased risk of fibroids, possibly because of the relative over-abundance of oestrogen seen in overweight women compared to normal weight or thin women. Peripheral conversion of androgens to oestrone is responsible for the elevated oestrogen levels.

### Use of oral contraceptives

Studies which have investigated the Pill and fibroid incidence have been inconclusive, with some studies showing a reduced incidence;<sup>29</sup> one study showing a slightly increased rate (not statistically significant);<sup>30</sup> and two others finding no change.<sup>31</sup>

### Smoking

Smokers tend to develop fibroids *less* often.<sup>32</sup> In one study, current smokers were shown to have a 40 per cent lower incidence of fibroids than non-smokers.<sup>33</sup>

## Diagnosis

A fibroid could be suspected if the following signs and symptoms are present:

- Heavy bleeding at the time of menstruation.
- Dragging, congestive pain in the lower abdomen at the time of menstruation and premenstrually.
- An enlarged and bulky uterus discovered during a pelvic examination by the doctor.
- A lower abdominal mass discovered by the woman or her doctor.

An ultrasound scan is used to diagnose uterine fibroids. They will show up as masses in or attached to the uterus: their number, size and position can often be precisely determined. An ultrasound is also frequently used to monitor the size and growth rate of fibroids. Some doctors will also want to perform a laparoscopy to absolutely establish that the pelvic mass visible with the ultrasound is a fibroid. This is particularly the case if the ovaries cannot be clearly seen, as ovarian cysts or cancer can sometimes be mistaken for uterine fibroids.



### ■ ■ The medical approach

There are three main options for the management of fibroids.

- Observe, but do not treat.
- Surgical intervention—either removal involving a hysterectomy or a myomectomy (see Chapter 20 ‘Drugs and surgery’), or with a newer surgical procedure called uterine artery embolisation. This procedure is performed laparoscopically and involves the occlusion of the blood supply to the fibroid. The aim is to completely deprive the fibroid of arterial blood so that it atrophies. Successful outcomes have been achieved in as many as 80–90 per cent of women treated.<sup>34</sup>
- Drugs to reduce the size of fibroids prior to surgery. These drugs have two different effects, but the overall aim is to reduce the level of oestrogen. The drugs used are Danazol, to produce a predominance of androgens and suppression of oestrogens; and GnRH agonists, which induce a medical menopause.



### The natural therapist's approach

The treatment of fibroids aims to:

- regulate excess bleeding
- reduce ‘relative oestrogen excess’
- contain or reduce the size of the fibroid.

## Abnormal bleeding

It is often surprisingly easy to reduce the excessive bleeding associated with fibroids and this may be all that is required. Women who have passed their child-bearing years, those with small fibroids, or those women for whom surgery is not an option may find that this simple approach to managing the fibroids is satisfactory.

All of the herbs mentioned in the treatment of functional menorrhagia, especially *Alchemilla vulgaris*, but also *Trillium erectum*, *Equisetum arvense*, *Achillea millefolium*, *Panax notoginseng*, *Capsella bursa-pastoris* and *Hydrastis canadensis*, are appropriate. Anti-haemorrhagics are usually combined with one or more of the uterine tonic herbs to improve the uterine tone and try to normalise uterine function.

Of the nutrients, the bioflavonoids are the most useful for bleeding associated with fibroids. Iron is recommended for anaemia or low serum ferritin, and may also improve bleeding.

## Relative oestrogen excess

It is possible to contain or reduce the growth-promoting effects of oestrogen. The main way this is achieved herbally is via competitive inhibition. Other methods, many without scientific trials to verify their efficacy, are also used. Considering the number of women who develop fibroids, the research on treatment and prevention is disappointingly sparse.

In one of the few trials using medicinal herbs to treat fibroids, the herbs *Paeonia lactiflora* and *P. suffruticosa*, *Poria cocos*, *Cinnamomum cassia* and *Prunus persica* were given to 110 pre-menopausal women with uterine fibroids. Ninety per cent experienced an improvement of their symptoms, and in 60 per cent of cases the fibroids were reduced in size.<sup>35</sup> The same formula, known as Cinnamon and Hoelen Combination, also reduced adenomyosis,<sup>36</sup> another oestrogen-dependent condition, in mice.

It is important to regulate relative oestrogen excess because women who have the tendency to grow fibroids can do so again after the fibroid has been removed or adequately treated, or may continue to produce multiple fibroids if the hormonal imbalance is not corrected.

All conditions related to relative oestrogen excess seem to respond to the same sorts of treatment and the principles for improving oestrogen clearance are discussed in Chapter 5 'Maintaining hormonal balance'.

## Other fibroid treatments

Herbs used to treat fibroids and reduce their size are *Calendula officinalis*, *Thuja occidentalis*, *Ruta graveolens* and *Turnera diffusa*. Vitamin E is believed to reduce fibroid size, but the reasons for this are unclear.



### Self care

Uterine fibroids are related to relative oestrogen excess. The self-care strategies to reduce this imbalance are discussed in Chapter 15 'Endometriosis and adenomyosis'.

Preventing anaemia is also important and information on iron can be found below.

## THE IMPORTANCE OF IRON

### Iron and iron-deficiency anaemia

Iron requirements for women are around 80 per cent higher than for men because of menstruation and child-bearing. It is estimated that iron deficiency is the commonest nutritional disease worldwide and that more than half of all women consume less than the recommended amount of 10–15 mg daily.

Those at most risk for developing iron deficiency are:

- pregnant women
- women with heavy menstrual loss
- children
- vegetarians
- frequent dieters
- those who are on strict exclusion diets
- those with low gastric acid levels such as occurs after stomach surgery and with ageing
- those who do not have access to good quality food e.g. due to poverty and famine

### Iron deficiency vs anaemia

Iron is stored in the body in places other than in the red blood cells. These include the liver, bone marrow, spleen, muscles and in the serum. A test for anaemia will determine whether there is a depletion of iron stored in the red blood cells (the haemoglobin level), but not whether iron stores elsewhere in the body are at sufficient levels.

It is now known that the symptoms of iron deficiency can exist before the red blood cells become depleted of iron and that a



considerable number of people are iron deficient even though their haemoglobin is normal. For this reason, many doctors now order a blood test to check both iron stores (in the serum) and haemoglobin levels.

### **Symptoms of anaemia and iron deficiency**

Many of the symptoms of *anaemia* are related to the inability of the red blood cells to carry oxygen around the body because they lack iron. These include:

- poor stamina
- shortness of breath on exertion
- unreasonable limb fatigue
- dizziness

Other symptoms seem to be related *iron deficiency*. These might include:

- a red sore tongue and cracks in the corners of the mouth
- concave fingernails
- reduced resistance to infection, particularly in children
- also in children, a failure to thrive, slow learning and poor appetite
- poor digestion caused by low gastric acid levels. Iron deficiency can be both a cause of decreased production of gastric acid and can be itself caused by low gastric acid.

### **Improving iron absorption**

Apart from increasing the amount of available iron in the diet, there are a number of other ways to increase iron levels.

- Eat vitamin C-rich foods, particularly when consuming foods high in iron.
- Add acidic dressings, such as lemon juice and vinegar, to iron-rich foods. This is a common Southern Mediterranean practice, where there is a high incidence of inherited anaemia and the traditional diet contains little red meat.
- Eat bitter vegetables or fruit before or during the meal to increase the flow of gastric acid which will in turn improve the absorption of minerals. Alcoholic aperitifs, grapefruit, Swedish bitters and bitter green vegetables can all be used. Bitter vegetables are best because they usually contain iron as well as stimulate its absorption.
- When low gastric acid levels are accompanied by iron deficiency, taking iron may improve both.
- Avoid tea (especially black tea) or coffee until the iron deficiency improves. The tannin in tea binds with iron, making it difficult to absorb. Coffee also reduces absorption, especially if taken with

or after a meal, but not when taken more than one hour before eating. Don't take iron tablets with a cup of tea or coffee.

### Detecting low iron stores

Iron deficiency should be suspected if the symptoms described above are apparent, and should respond to a low-dose iron supplement. Iron should not be taken unnecessarily as it will accumulate in the body and may become toxic. If symptoms do not respond, iron studies which evaluate serum iron levels and a full blood examination that evaluates haemoglobin and red blood cell status can help to differentiate between iron deficiency anaemia, anaemia associated with blood loss, or anaemia from other causes, such as vitamin B<sub>12</sub> or folate deficiency.

**Table 11.1 Sources of iron (mg per 100 g)**

#### RDA 10–15 mg/day

##### Meat, fish and eggs

eggs	2.0	light chicken meat	0.6
beef, lean	3.4	cod	0.4
lamb, lean	2.7	sardines	2.4
pork, lean	1.3	mussels	7.7
dark chicken meat	1.9	oysters	6.0

##### Grains

wheatgerm	10.0	whole wheat bread	2.5
wheat bran	12.9	All Bran™	12.0
whole wheat flour	4.0	Special K™	20.0
raw oatmeal	4.1	Weetbix™	7.6
soya flour	9.1	rye biscuits	3.7
white bread	1.7		

##### Legumes and vegetables

haricot beans	2.5	spring onions	1.2
broccoli tops	1.0	parsley, raw	8.0
leeks	2.0	peas	1.2
lentils	2.4	potatoes, jacket	0.6
lettuce	0.9	spinach	3.4
mushrooms, raw	1.0	silver beet	3.0

##### Fruits

apricots, fresh	0.4	peaches, dried	6.8
apricots, dried	4.1	prunes	2.9
avocado	1.5	prunes, stewed	1.4
currants	1.8	raisins	1.6
figs, dried	4.2	raspberries	1.2
dates	1.6	sultanas	1.8

##### Other

almonds	4.2	walnuts	2.4
brazil nuts	2.8	curry powder	75.0
hazel nuts	1.1	yeast	20.0
peanuts	2.0		

# 12

## Metrorrhagia

### Key words

adaptogen	hysteroscopy
adenomyosis	luteal phase
anovulatory	luteinising hormone
biopsy	(LH)
diagnostic D&C	menorrhagia
follicle-stimulating	mittelschmerz
hormone (FSH)	nervine
haemostasis	peri-menopause
hyperplasia	prostaglandin
hypothalamic-pituitary-	spiral arterioles
ovarian axis	steroidal saponin

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Bleeding between periods is often not a problem when it is caused by hormonal changes at ovulation or by benign lesions on the cervix—but it *could* be caused by cancer, and until that possibility has been investigated and eliminated as the cause, no treatment should be undertaken.

Women sometimes dismiss slight bleeding as trivial; as a mild inconvenience which will ‘probably just go away’. But paradoxically, it is the slight bleeding that can be most suggestive of cancer or other serious pathologies: any bleeding between periods, therefore, should be given the same diagnostic priority as a breast lump.

## **COMMON CAUSES OF BLEEDING BETWEEN PERIODS**

### **1. Dysfunctional uterine bleeding (DUB)**

Dysfunctional uterine bleeding is associated with disturbance in the body's hormonal control and feed-back centre in the hypothalamic-pituitary unit. Bleeding is erratic and unpredictable and often associated with failure to ovulate. The dysfunction may be chronic and persistent, or a transient event which lasts for one cycle.

### **2. Endometrial hyperplasia**

This is a condition where the endometrial cells are excessively stimulated by prolonged exposure to oestrogen without sufficient counter-balancing from progesterone. An ultrasound of the uterus will give an accurate evaluation of the thickness of the endometrium and a presumptive diagnosis, however, endometrial hyperplasia can only be diagnosed if a sample of tissue is taken and examined under a microscope. This is usually performed during a hysteroscopy or a D&C, both of which usually require a general anaesthetic. The condition can be pre-cancerous in older women. Common symptoms are irregular bleeding, spotting and/or heavy, persistent flow.

### **3. Uterine cancer**

Cancer of the endometrium is most frequent in women over 40, and there is an increased incidence among women with PCOS. It is characterised by abnormal or recurrent bleeding between periods, after sex or after the menopause. In this age group these symptoms should always be investigated, irrespective of how scant and transient.

### **4. Polyps**

A polyp is an overgrowth of tissue, which is attached by a stem or pedicle. Gynaecological polyps might originate from the cervix or endometrium. The cells of the polyp are often normal, but can bleed easily or cause pain due to their position. Contact bleeding—that is, bleeding after sexual activity or examination by a doctor—is a common symptom. Women over 40 with cervical polyps may also have endometrial polyps.

### **5. Abnormalities of the cervix**

Abnormalities of the cervix can cause bleeding and/or pain.

i) *Cervical eversion/ectropion*

If the cells which normally line the cervical canal grow down and onto

infection. Discharge is a common symptom which may be accompanied by pain or contain brownish blood and have an offensive odour.

## **6. Conditions affecting the ovaries**

Conditions affecting the ovaries present less frequently as abnormal bleeding. Usually pain is the initial symptom.

### *i) Ovarian cysts*

Ovarian cysts may be 'physiological' (a consequence of the normal ovarian cycle), they may be benign, or occasionally cancerous. Some cysts can be associated with abnormal bleeding patterns.

### *ii) Ovulation*

Some women experience spotting with or without pain (mittelschmerz) with normal ovulation. The bleeding is presumed to be caused by the oestrogen changes at mid-cycle. If this is a new symptom it should be investigated.

## **7. Contraceptive causes**

### *Hormonal contraceptives*

The combined (oestrogen and progesterone) Pill; the sequential Pill (pills containing oestrogen and progesterone which are varied throughout the cycle); the Mini Pill (progesterone only) and Depo-Provera (an injection of slowly absorbed progestogen) can all be associated with abnormal bleeding patterns.

## **8. Metabolic causes**

### *Malnutrition or excess weight loss*

This may be due to chronic illness, unavailable food, inadequate food, dietary extremes (anorexia or bulimia nervosa) or excessive exercise. Usually menstruation stops, although infrequent and heavier periods may be the consequence.

## **9. Pregnancy and bleeding**

### *i) Placental malfunction*

Bleeding can occur as a result of placental malfunction, and is of three main types.

- Bleeding associated with abnormal development of the placenta and often the foetus.
- Bleeding associated with a normally developing placenta, which is situated in the wrong place. This is referred to as a 'placenta praevia'.
- Bleeding associated with a normal placenta which dislodges from

the uterine wall prematurely. This is called an 'accidental haemorrhage' and is associated with considerable pain.

*ii) Hydatidiform mole*

This results from products of conception which lack an intact foetus. The tissue secretes large amounts of human chorionic gonadotrophin (HCG) hormone which usually causes severe 'morning sickness'. Often heavy bleeding starts about 10–12 weeks into the pregnancy, but will generally continue until all the hydatidiform mole is expelled. As this tissue can become cancerous, most women have a D&C to ensure that all the tissue is removed, and have hormonal (HCG) monitoring for another year.

*iii) Ectopic pregnancy*

An ectopic pregnancy refers to a pregnancy which has started to develop outside the uterus. If the pregnancy develops in the tube, the increasing size may cause tubal rupture. This can be very serious and requires immediate surgery.

*iv) Implantation bleeds*

Some women experience bleeding at the time the fertilised ovum implants into the endometrium. As this often occurs at or around the time of the expected period, it can be confused with a light period.

## **DYSFUNCTIONAL UTERINE BLEEDING (DUB)**

DUB, like functional menorrhagia, is a disorder of function, but in this case the problem is caused by abnormal hormone balance. The reproductive tract remains essentially normal, although the endometrium may not show secretory (progesterone-related) changes. The disorder usually originates from a disorder of the hypothalamic-pituitary-ovarian axis.

### **Causes**

In many cases of DUB, ovulation does not occur normally, or fails entirely. This leads to an imbalance in the hormones—oestrogen is still produced, but progesterone production is either far too low or entirely absent. This results in unopposed oestrogenic stimulation of the endometrium ('unopposed' suggests a lack of the normal amounts of progesterone) and leads to the characteristic bleeding patterns—an erratic cycle, no obvious signs of ovulation, and irregular or prolonged episodes of bleeding.

In the normal course of events, oestrogen is accompanied (opposed)

by progesterone, and it is primarily the progesterone production and withdrawal that maintains the regularity of the endometrial shedding (and therefore the period). When ovulation does not occur, oestrogen continues to stimulate the endometrial cells, which grow and thicken. However, the absence of progesterone means that the endometrium does not develop the usual structural features of the secretory phase, including the spiral arterioles. Their function is to nourish the endometrium and to control blood loss once menstruation commences.

Without the development of these blood vessels, circulation throughout the thickened endometrium is incomplete and eventually fails; and the tissue becomes fragile and starts to break down. This does not occur uniformly throughout the endometrium—some sections are shed while others remain intact, resulting in the spotting and erratic blood loss characteristic of the condition.

In a normal cycle, the usual mechanisms for slowing the blood loss are shared by prostaglandins and spasm of the spiral arterioles. With these structures being absent, haemostasis is impaired and excessive flooding can occur. This type of DUB is most common when regular ovulation is at its most fragile: amongst teenage women who have just started to menstruate, and around the menopause. It can also be a feature of any condition where ovulation does not occur, such as after stress, but can occur in relation to other less common conditions such as thyroid disease and androgen excess.

## Diagnosis

As with functional menorrhagia, the diagnosis of DUB is a diagnosis of exclusion and examinations are performed to eliminate other conditions as the cause of bleeding.

Signs and symptoms highly suggestive of DUB are:

- The age of the woman  
Women who are establishing their normal cyclical pattern at the menarche, and women whose cycles are slowing down around menopause, are more likely to develop anovulatory DUB.
- Normal uterine size and normal cervix  
Because spotting is a feature of cervical conditions, a healthy cervix is unlikely to be causing inter-menstrual or premenstrual bleeding. Uterine size and shape will change if the woman has fibroids or adenomyosis, which are common causes of heavy menstruation.
- A recent history of persistent or severe stress  
Ovulatory failure or disrupted progesterone production can occur after stress because of the effect on the hypothalamic-pituitary function.

- A negative pregnancy test  
Pregnancy-related bleeding is the most common cause of abnormal menstrual patterns amongst women who are sexually active.
- No pain during either a vaginal examination or abdominal palpation  
Pelvic inflammatory disease and endometriosis are two conditions which can cause symptoms similar to DUB; however, both are usually accompanied by pain during an examination.



### ■ ■ The medical approach

The treatment for DUB is similar to that described for functional menorrhagia. A synthetic progesterone (for example, Provera or Primolut) is used to try to interrupt the abnormal hormonal pattern and regulate the cycle. A progestogen (levonorgestrel)-releasing IUD can also be inserted to reduce bleeding. Usually a D&C or hysteroscopy is performed for older women to determine whether the bleeding is caused by endometrial hyperplasia or cancer.



### The natural therapist's approach

The treatment of DUB is based on a multi-faceted approach which aims to:

- re-establish ovulation
- support the luteal phase of the cycle
- treat stress where appropriate
- utilise all or any of the treatments for functional menorrhagia as necessary

At the menarche, the occurrence of erratic cycles is so common that it is usually thought of as being physiological—in other words, a normal feature of the physiology of this age group. For this reason, young women with dysfunctional bleeding patterns *do not* normally require any treatment unless the bleeding is particularly severe and causing other problems. Herbal remedies which are appropriate for bleeding experienced around the menarche are *Achillea millefolium*, *Equisetum arvense*, *Rubus idaeus* and *Alchemilla vulgaris*.

## Ovulation

In order to re-establish ovulation, it is first necessary to identify the reason it stopped. This may be related to the stage of the menstrual cycle—that is, around menopause or the menarche—or ovulation may temporarily stop because of stress, over-exercising, low body weight or a poor quality diet. Sometimes the exact cause is unknown (idiopathic).



(Ovulatory failure can be related to other more complex hormonal irregularities which involve other endocrine glands such as the thyroid or the adrenal gland; or to a major disruption in ovarian function, as is seen in polycystic ovaries; or to abnormal activity of the hypothalamic-pituitary unit, such as hyperprolactinaemia. These conditions are treated by rectifying the abnormal function of the endocrine gland/s involved.)

There is a long herbal history of the use of 'female tonics' to re-establish normal bleeding patterns. These are assumed to have regulatory effects on the hormonal axis and ovulation, but as yet the mechanisms by which this occurs are largely unknown. Many of these herbs contain steroidal saponins which may interact with the hypothalamus or the pituitary to re-establish ovulation. The important tonic herbs are *Tribulus terrestris*, *Asparagus racemosus*, *Angelica sinensis*, *Cimicifuga racemosa* and *Aletris farinosa*.

A combination of herbs containing steroidal saponins and *Vitex agnus-castus* is commonly used to treat DUB. *Vitex agnus-castus* has been shown to stimulate ovulation,<sup>1</sup> and is specific to problems of the luteal phase of the cycle and hypothalamic-pituitary function. Since DUB is primarily a relative progesterone deficiency due to an irregularity of ovulation, this is usually an effective combination.

*Vitex agnus-castus* can be used for menstrual irregularity associated with menopause, but in this case it is more favourably combined with *Cimicifuga racemosa*. It is unwise for women to self-medicate with *Vitex agnus-castus* because it can cause menstrual irregularity if incorrectly administered.

*Aletris farinosa* and *Angelica sinensis* are both Warming adaptogens for the reproductive organs and have similar effects on ovarian function to *Tribulus terrestris* or *Asparagus racemosus*. *Cimicifuga racemosa*, slightly Cooler than the other two, is sedative, oestrogenic, adaptogenic and is the herb of choice for peri-menopausal complaints.

## The luteal phase

*Vitex agnus-castus* is the primary herb for problems associated with the luteal phase. Trials have verified its use in DUB, endometrial hyperplasia, anovulatory cycles and polymenorrhoea.<sup>2</sup> It should be started as close as possible to day one of the cycle and continued throughout the whole menstrual cycle including the period. A three-month course is usually necessary and some women may need longer courses to regulate ovulatory patterns. *Vitex* is usually given as a single morning dose of 2 ml of fluid extract.

Although vitamin B<sub>6</sub> is useful to control symptoms associated with premenstrual hormone irregularities, there is no evidence that it will rectify the causes of DUB. Even so, vitamin B<sub>6</sub> is a useful medication when troubling PMS-type symptoms are associated with the abnormal

bleeding pattern, and can be used either alone or in combination with B complex.

The usual dose of B<sub>6</sub> is 50–100 mg twice daily for 7–10 days before the period, although some authors suggest that doses between 150–200 mg daily are more beneficial.<sup>3</sup> Vitamin B<sub>6</sub> is relatively safe, but there may be side-effects at higher doses and the lowest dose that gives the best therapeutic response is recommended.

## The nervous system

Nervines are important in the treatment of DUB because of the effect of stress on the hormonal axis. Any of the herbs in these categories will have a beneficial effect; the nervines which are clinically superior include *Hypericum perforatum*, *Leonurus cardiaca* and *Verbena officinalis*.

Nervine herbs can be either Cooling, Warming or neutral. In general, Warming nervines are useful for lack of vitality and debility (*Matricaria chamomilla*, *Verbena officinalis*, *Leonurus cardiaca*) and Cooling nervines have a more sedating effect (*Hypericum perforatum*, *Humulus lupulus*, *Bupleurum falcatum*).

## Uterine tone

*Alchemilla vulgaris* is very effective for DUB because it has anti-haemorrhagic effects and is believed to improve progesterone production. *Trillium erectum* contains saponins (plant hormone-like substance) which seem to be capable of regulating both the blood flow and the hormone balance. These herbs are considered to be ‘specific’ to the treatment of DUB which is caused by failure to ovulate, and can regulate both cycle length and menstrual loss within 1–3 cycles. They are often prescribed with *Vitex agnus-castus*.



### Self care

The dietary advice outlined for functional menorrhagia is important. It is also necessary to minimise stress because, apart from anything else, erratic and heavy bleeding is stressful in itself and the worry associated with the implications of the symptoms may feed into the stress cycle and worsen the symptoms. Stress management, including long, slow, distance exercise is discussed in Chapter 10 ‘The usual suspects’.

## ENDOMETRIAL HYPERPLASIA

'Endometrial hyperplasia' refers to overgrown tissue in the uterus and the term is made up of the Greek *endon* meaning within; *metra*—uterus; *hyper*—more than normal; and the Latin *plasia* meaning a tendency to build up tissue.

Endometrial hyperplasia occurs for much the same reasons as dysfunctional uterine bleeding—there is prolonged or excessive stimulation of the endometrial cells by oestrogen—but in this case, the hormonal imbalance causes the cells to change and become overgrown (hyperplastic). It can cause erratic bleeding in pre- or post-menopausal women. Other causes may include oestrogen therapy prescribed without progestogens, abnormal oestrogen metabolism or obesity.

The hyperplastic cells can progress through a range of changes from mildly overgrown and easily treated through to endometrial cancer. A provisional diagnosis is made with ultrasound, but a definitive diagnosis requires a biopsy during a hysteroscopy under general or local anaesthetic. The endometrial cells are examined and graded according to the degree of change from normal to abnormal, usually with a three-stage grading of mild, moderate and serious (often called simple, complex and atypical). Cystic hyperplasia is another term used for the least advanced (simple) form of endometrial hyperplasia.

Once the change in the endometrium has been graded, a treatment is decided upon which will take into account the severity of the endometrial change, the age of the woman and whether she expects to become pregnant or not.

It is important to identify the underlying causes of endometrial hyperplasia. These include ovulatory failure secondary to conditions like polycystic ovarian syndrome, thyroid disease, and ovarian and adrenal tumours. Relative oestrogen excess can occur as a result of obesity and diabetes. Other risk factors for developing endometrial hyperplasia include an early menarche, late menopause and never being pregnant.



### ■ ■ The medical approach

The aim of treatment is to remove the abnormal tissue and then establish cyclic shedding of the endometrium—initially with drugs. The affected endometrium is removed with a D&C when the hysteroscopy is performed. This will not 'cure' the condition unless the hormonal causes of the endometrial hyperplasia are also dealt with.

To rectify the abnormal hormonal pattern, gynaecologists usually recommend synthetic hormones to simulate a hormonal pattern similar to the normal menstrual cycle. Usually, a progestogen is given by tablet

for between ten and twenty days so that the endometrium develops the cells and structures similar to those of the luteal phase, then the drug is stopped to allow 'menstruation' to occur. Ovulation often starts spontaneously after a few cycles on progestogens. The reasons for this are not known.

Progestogens are not suitable for women who are actively trying to become pregnant at the time of treatment. When pregnancy is desired, ovulation is often stimulated by short courses of drugs like Clomid. Women taking this drug must be monitored closely because of the risk of hyperstimulation of the ovary and ovarian cysts.

Endometrial hyperplasia does not always become endometrial cancer, but the risk increases if the degree of cellular change is advanced. Between 1–4 per cent of women with the mildest form—simple or cystic hyperplasia—can develop endometrial cancer; but more than 20 per cent of women progress to cancer if they have the most advanced form.<sup>4</sup>

About 10 per cent of all cases of post-menopausal bleeding are caused by endometrial hyperplasia (up to 20 per cent are caused by cancer). This figure increases when women are obese or are given oestrogen without progesterone. When oestrogen is given alone, cell changes occur because the endometrium is continually stimulated by oestrogen without the counterbalancing effect of progesterone.



### The natural therapist's approach

Endometrial hyperplasia is always diagnosed by a medical practitioner. Usually, the same doctor will administer medical treatment, but occasionally a woman will seek the advice of a natural therapist either because she is inclined towards natural treatments whenever possible, or because she fears the side-effects of the drugs her doctor has suggested. Endometrial hyperplasia presents specific difficulties in treatment because a pre-cancerous condition has already developed along with the failure to ovulate and shed the endometrium regularly. This condition should always be managed by herbalists and natural therapists with experience in the treatment of the complaint.

A natural therapist's treatment will be similar to that for DUB, but with one major difference: regular cyclic menstruation must be re-established, and with some speed. Even in the mildest forms (cystic hyperplasia), ovulation should be established within the first two cycles; sooner is always better than later.

This can be difficult. Most natural remedies are not capable of stimulating ovulation irrespective of the underlying cause. Some medicinal herbs can regulate the cycle by re-establishing ovulation, but will often fail unless the original cause for ovulatory failure has also been treated. For example, if a woman has developed endometrial hyperplasia because of an underactive thyroid, the treatment will need to be directed

towards thyroid gland regulation. Often, ovulation will be delayed for too long (and hence menstruation), and the woman will be at risk in the interim.

A decision to treat with natural remedies should only be made after careful evaluation of all of the risks and benefits for that particular woman. Being over 40, being obese, or having the more severe type of endometrial hyperplasia should all be considered reasons for *not* using natural therapies. In many cases, the most practical suggestion is for the woman to follow her doctor's advice.

When a decision has been made to treat endometrial hyperplasia, the regime is similar to that outlined for DUB with additional emphasis on:

- re-establishing ovulation and therefore menstruation
- protecting the endometrium with phyto-oestrogens which counter the effects of unopposed oestrogens, and anti-oxidants which minimise the risk of the hyperplastic changes becoming cancerous.

## Menstruation

Sometimes, when regulating ovulatory patterns is not possible, or not possible quickly, herbs can be used which will cause menstruation to occur. These are chosen from the group of herbs called the emmenagogues.

All emmenagogues are abortifacients, and so due care is needed with their use. They are quite powerful and can cause some unpleasant effects in the wrong hands. They must be prescribed within a definite dose range, and it is necessary to make sure that pregnancy has not occurred prior to their administration. This group of herbs should only be prescribed by an experienced practitioner.

As is the experience of many traditional herbalists, Dr Weiss, a German herbalist and doctor, remarks on the use of the emmenagogues for restoring menstruation:

. . . medicinal plants get very good results in secondary amenorrhoea and in oligomenorrhoea (no periods or infrequent periods). Hormone therapy is much to the fore in this field, but there are considerable problems; hormone therapy calls for sophisticated techniques and in many cases fails to get results. Medicinal herbs therefore continue to have their place . . . Emmenagogues were very popular before hormone therapy. There remains the fact, based on experience, that emmenagogues will often restore normal menstrual flow and give very considerable subjective relief.<sup>5</sup>

The popular and reliable emmenagogues are *Ruta graveolens*, *Mentha pulegium* and *Artemisia vulgaris*. They will usually need to be prescribed for several months until regular menstruation is established. Hormone-regulating herbs can be used at the same time.

## Protecting the endometrium

The plant oestrogens occur naturally in foods and herbs, and when consumed as part of a normal diet have the potential to protect the tissues from over-stimulation by oestrogens. Medicinal herbs containing steroidal saponins can also be used. Trained herbalists follow traditional guidelines to treat this type of abnormal bleeding. They use specific herbs for the optimum period of time, and prescribe only those medicinal plants which have historically been used for menstrual disorders of this type. The most important of these is *Alchemilla vulgaris*.

Other herbs used include the anti-menorrhagic herbs *Achillea millefolium* and *Capsella bursa-pastoris* (which contains the same cancer-preventative agents as the cabbage family vegetables).

Numerous studies have been undertaken worldwide to evaluate the effectiveness of the anti-oxidants as protective agents against cancer, or as therapeutic substances in the treatment of cancer. Although there is no definitive evidence, a number of these studies have demonstrated a protective role for some of the anti-oxidants. Their effects on the endometrium may prevent endometrial hyperplasia from becoming a cancerous condition. Those shown to have a protective effect are the vitamins A, E, K and C, beta-carotene and the mineral selenium.

Selenium and vitamin E seem to work best when adequate levels of both are present in the body. When comparing the blood levels of these two nutrients, one study showed that women with endometrial tumours had 40 per cent less selenium and 23 per cent less vitamin E than their female relatives who lived in the same household.<sup>6</sup> Selenium-containing foods are garlic, whole grains, meat, eggs, brewer's yeast and fish.



### Self care

Improving the regularity of ovulation may be necessary and the type of intervention will depend on the reason why ovulation has stopped. Stress and diet are often important factors. Excessive exercise; BMI below the recommended levels; many drugs (both prescribed or social); alcohol consumption, cocaine and other recreational drugs; and excessive amounts of coffee can all affect ovulation. These factors are discussed in Chapter 10 'The usual suspects'.

Protective foods can be included in the diet as a means of reducing the risk of developing cancer. Healthy colonies of gut bacteria are needed to convert dietary phyto-oestrogens into the active forms needed for the competitive inhibition of oestrogen-binding sites. Yoghurt encourages healthy levels of gut bacteria and may improve conversion of inert lignans into the active forms.

## UTERINE POLYPS

Uterine polyps develop as small pedunculated structures, usually within the uterine cavity. They form because of hyperplastic changes in the endometrium, and seem to occur because the endometrium is not uniformly responsive to hormonal stimulation. As a result, it is usually possible to identify (on histological examination) some portions of the endometrium that show little response to normal progesterone levels during the menstrual cycle. These portions do not slough away during menstruation and continue to grow in subsequent cycles because of the proliferative effects of oestrogen. This results in hyperplasia and the development of thick-walled vascular stalks which eventually become polypoid.

Hyperplasia of endometrial tissue, whether it occurs in adolescents with anovulatory cycles, in areas of endometrium unresponsive to progesterone, or in anovulatory or post-menopausal women, has the same histological characteristics. For this reason, polyps have a tendency to become malignant, and recommendations for their management are similar to that of endometrial hyperplasia.

### Symptoms

Uterine polyps might bleed because of engorgement of the tip, necrosis or malignant changes and can cause spot bleeding. Spotting associated with uterine polyps should be regarded with suspicion and it is wise to advise their removal. Polyps often also cause menorrhagia, and sometimes their presence is associated with cramping uterine pain. In many cases, however, uterine polyps are asymptomatic and are found during an ultrasound for other reasons.

### Diagnosis

Very occasionally, a polyp will be extruded through the cervix and can be seen during speculum examination, but are usually diagnosed by vaginal ultrasound.



#### ■ ■ The medical approach

Uterine polyps can resolve spontaneously, but when they are seen in association with bleeding between periods they should be removed hysteroscopically, usually under a general anaesthetic. Those that protrude through the cervix can often be removed in the doctor's rooms. Polyps are always examined histologically to determine whether they

are malignant. When a polyp does not cause menorrhagia or metrorrhagia it is observed over several menstrual cycles to determine whether it will resolve spontaneously or require treatment.

If a cervical polyp is discovered during a speculum examination of the cervix of a woman 40 years or older, there is a high statistical possibility of intra-uterine polyps as well. These women are usually advised to have a pelvic ultrasound to establish the presence, size and position of other polyps.



#### The natural therapist's approach

Many women seek a natural therapist's treatment for uterine polyps as a means of avoiding surgery. Treatment is the same as that outlined in the section on endometrial hyperplasia—that is, to try to normalise hormonal stimulation of the endometrium with herbs such as *Vitex agnus-castus* and to use the uterine tonics, anti-haemorrhagics and/or emmenagogues to transform the endometrium and expel the polyp. In some cases it is safe to advise treatment for three months and then re-evaluate the polyp with a uterine ultrasound. However, post-menopausal women, and those with menorrhagia or spot bleeding, would be advised to seek medical advice for surgical removal.

## **ABNORMALITIES OF THE CERVIX AND SPOTTING**

Bleeding from the cervix is often slight, erratic and painless. Sometimes the discharge doesn't resemble blood at all, but is brownish or like stained fluid. It can occur at any time during the cycle, and is more common after sexual activity or examination by a doctor. Many of the common causes of cervical bleeding are not related to cancer and are easily treated. Bleeding caused by cancer of the cervix is less common when women have regular Pap smears.

### **Cervical eversion**

The tissue which lines the inner cervical canal (columnar epithelium) is very delicate in comparison to the tissue lining the vagina and the outer surface of the cervix (squamous epithelium). The junction of the columnar and squamous epithelium is called the transitory zone and is usually situated just at, or just inside, the cervical canal.

Cervical eversion occurs when the transitory zone is located on the outer surface of the cervix, leaving much more of the friable columnar epithelium on view and prone to bleed on contact.



Columnar epithelium is normally visible at the cervical opening during adolescence and pregnancy. Women who take the Pill also commonly develop cervical eversion. DES daughters (DES = diethylstilboestrol, a synthetic oestrogen) are sometimes born with a 'congenital' eversion, and can develop a cervical eversion that extends into the vagina. Some doctors also blame irritation from the string attached to an IUD, but this is disputed.

Cervical eversion usually causes few problems and is often discovered at a routine Pap smear. Sometimes the eversion causes an increase in vaginal secretions and the area becomes infected, but sometimes the eversion is *caused* by an infection. When there is an infection in the cervical canal, the swollen membranes are inclined to protrude from the cervical opening. In severe cases and when infection is present, the tissue becomes angry, red and looks unhealthy. Contact bleeding (especially bleeding after sex) is common and an offensive and/or blood-stained discharge may be present.

The bleeding associated with cervical eversion will alter depending on the associated complaints and the amount of blood lost. Slight bleeding may be brownish and thin or sticky. After sexual contact, the bleeding may be heavier and brighter. Cervicitis will often cause the bleeding to be yellowish or brown and offensive.



#### ■ ■ The medical approach

Regular monitoring of the cervical eversion is desirable, and some women may have to stop the Pill. Occasionally the area is treated with diathermy or laser treatment, especially if inflammation or infection are a problem.



#### The natural therapist's approach

Local astringent remedies which improve the tone and strength of the mucous membranes, treat secondary infection and stop bleeding are used for cervical eversion. Cervical eversion is considered to be associated with Heat and Moistness, and the remedies chosen are Cooling and Drying.

- *Hydrastis canadensis* is the herb of choice, either in the form of a cream, pessary or wash. Treatment needs to be continued until all inflammation has reduced. (A repeat speculum examination is warranted.)
- *Calendula officinalis*, also in the form of a wash, cream or pessary is also useful. *Phytolacca decandra*, as a combination pessary with *Calendula officinalis*, is popular in Europe.
- Agents such as tea-tree oil are far too harsh, and should never be

used for this condition in dilutions stronger than 1:20 (5 per cent), irrespective of the severity of the secondary infection. A cream containing 5 per cent tea-tree oil, 10 per cent hydrastis and 10 per cent calendula in an aqueous or vitamin E base is useful when applied to the cervix.

Women who are taking the Pill, and who would like to continue to do so, may find that their symptoms are helped with folic acid and B complex vitamins. The reasons for this are not clear, but may be related to improvement of the underlying hormonal triggers.

## Cervicitis

Cervicitis is an inflammation or infection that affects the cervix. It is usually caused by bacteria, although the type is not always identified. Often the woman is run-down or her vaginal environment is altered sufficiently for opportunistic infections to develop. The diagnosis is usually on the basis of an offensive or blood-stained vaginal discharge and pain on moving the cervix, either during sex or when the cervix is examined.



### ■ ■ The medical approach

Cervicitis is often treated with antibiotic creams, and in some cases, oral antibiotics as well. Creams and pessaries are inserted at night to keep the medication near the cervix.



### The natural therapist's approach

Astringent and antiseptic creams, pessaries or douches are used for cervicitis. Creams and pessaries which are inserted at night are favoured because they stay in contact with the cervix for longer. The herbs *Hydrastis canadensis*, *Calendula officinalis* and tea-tree oil are effective in the treatment of cervicitis.

*Echinacea angustifolia* or *E. purpurea* can be taken for long-term and recurrent infections, and to support a weakened immune system when the woman is run-down and unable to fight off trivial infections.

## ABNORMAL TISSUE TONE

Healthy tissue in the human body forms a barrier between the inner structures of the body and the outside world. When the tissue becomes unhealthy, either through abrasions, poor diet or age, it forms a less efficient barrier, allowing noxious (often infectious) material to pass into the body and the normal body fluids to pass out.

This is an important concept in natural medicine since the integrity, strength and tone of all tissues throughout the body are believed to have marked effects on an individual's ability to maintain health. As examples, a breach in tissue tone of the mucous membranes of the respiratory tract may contribute to hayfever; and poor tissue tone of the cervix can cause infections and discharges such as cervicitis.

Poor tissue tone is treated with herbal astringents—agents which are applied directly to the tissues to 'tighten' and improve the integrity of the barrier between the tissues and the outside world. Creams, pessaries or washes of herbs such as *Calendula officinalis* and *Hydrastis canadensis* are astringent, anti-microbial, anti-inflammatory and healing to the mucous membranes.

Abnormal tissue tone may also be a feature (but not the cause) of a wide variety of serious cervical pathologies including cervical cancers and *identification of the condition must first be obtained before any treatment is instituted.*

# 13

## Amenorrhoea and oligomenorrhoea

### Key words

androgen	pilo-sebaceous unit
androgenic alopecia	pituitary
dihydrotestosterone	microadenoma
dopamine	polycystic ovarian
galactorrhoea	syndrome
hyperthecosis	primary amenorrhoea
hirsutism	prolactin
hyperprolactinaemia	secondary amenorrhoea
imperforate hymen	vaginal septum
latent	virilisation
hyperprolactinaemia	

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The absence of menstruation in a woman during the usual menstruating years for more than six months is called amenorrhoea. This is not a diagnosis, but a symptom of another condition. It can be caused by a wide range of hormonal, physical and metabolic conditions and the most complex aspect of treating amenorrhoea is to establish the exact cause for the absent period. Oligomenorrhoea is the term used to describe menstruation that is markedly diminished in amount and/or frequency.

Needless to say, treatment should only proceed after investigations to identify the serious or treatable problem. A serious condition might otherwise remain undetected. Conditions like polycystic ovarian syndrome (PCOS) or elevated prolactin levels, which commonly cause oligomenorrhoea and amenorrhoea, may not be accompanied by any other obvious signs. Alternatively, a pregnancy might be deliberately or accidentally missed and herbs used to ‘bring on the period’ could result in a dangerous situation for the woman and a difficult problem for the practitioner.

A common misunderstanding is that women are somehow fortunate if they don’t menstruate regularly, or at all, because they avoid the

nuisance effects of a period. Amenorrhoea and oligomenorrhoea are often associated with low oestrogen levels and carry an increased risk of osteoporosis. Prolonged periods without menstruation, when oestrogen levels are adequate, increase the risk of endometrial hyperplasia and uterine cancer. For these reasons, menstrual regularity should be reinstated as quickly as possible before irreparable damage has occurred.

Amenorrhoea is categorised as either primary or secondary amenorrhoea for the purposes of diagnosis and treatment.

### Primary amenorrhoea

- Where menstruation has not commenced by age seventeen.
- When physical maturation, such as breast development, has not commenced by fourteen.

OR

- When the period has not started within two years of physical maturation commencing.

#### **Table 13.1 Medical evaluation of primary amenorrhoea when breast development is normal**

Take pelvic ultrasound:

- Uterus absent—chromosomal abnormalities
- Uterus present—examine for obstruction of vagina or imperforate hymen
- Uterus, vagina and hymen normal—take blood tests to evaluate FSH, LH, prolactin:  
Normal tests = delayed puberty or hypothalamic causes such as low body weight, over-exercising, stress

High LH = PCOS

High prolactin = prolactinoma, drug induced, other causes

High FSH and LH = ovarian failure

### Secondary amenorrhoea

- Cessation of the period for six months or more during any of the years between the onset of menstruation (menarche) and menopause.

OR

- Cessation of the period for more than three menstrual cycles when the cycle is longer than usual, for example, when a woman has a period only every two months.

#### **THE COMMON CAUSES OF SECONDARY AMENORRHOEA**

##### **I. Uterine causes**

Conditions which affect the uterus or cervix either prevent menstrual blood loss due to obstruction, or are associated with destruction of the endometrial tissue.

i) *Asherman's syndrome*

Persistent amenorrhoea and infertility which results from intra-uterine adhesions, usually following a curette or from an uterine infection.

ii) *Cervical stenosis*

Obstruction of the menstrual flow can be caused by extreme narrowing or closure of the cervical canal. Chronic infection, cone biopsy, cauterisation (the destruction of tissue with an instrument, or the burning of tissue with a caustic substance), cryosurgery (the destruction of tissue with extreme cold), laser surgery, or irradiation of the cervix can rarely cause this type of obstruction.

## **2. Hypothalamic amenorrhea**

The hypothalamus usually secretes GnRH in pulses, but a number of conditions can interfere with this secretion. Of these, stress, weight loss and rigorous and prolonged exercise are the commonest causes.

i) *Stress*

Stress can sometimes lead to amenorrhoea (travelling, leaving home, relationship difficulties, for example). The oestrogen levels are in the lower range and often ovulation does not occur.

ii) *Weight loss*

Amenorrhoea occurs if the body fat content drops below 25 per cent. Common causes are anorexia nervosa and serious illness.

iii) *Rigorous exercise*

GnRH pulsatile release is negatively affected by prolonged and rigorous exercise causing amenorrhoea.

iv) *Severe chronic illness*

Chronic renal or liver failure, and other severe or prolonged illnesses can interfere with menstruation because of their effect on the hypothalamus.

v) *Post-Pill amenorrhoea*

About 80 per cent of women start to menstruate within three months of stopping the Pill, but about 1 per cent will experience long-term post-Pill amenorrhoea. Some of these women have pre-existing conditions such as polycystic ovarian syndrome which have not been apparent while the Pill caused regular 'menstruation'.

vi) *Pseudocyesis ('phantom pregnancy')*

A phantom pregnancy is usually accompanied by higher than normal levels of prolactin and luteinising hormone which cause amenorrhoea.

vii) *Hypothalamic lesions*

Lesions of the hypothalamus causing amenorrhoea are associated with levels of FSH and LH which are too low to stimulate follicle development and oestrogen production.

### **3. Pituitary causes**

The destruction of pituitary gland tissue can give rise to amenorrhoea.

#### *i) Pituitary lesions*

Malignant or non-malignant tumours of the pituitary gland can cause amenorrhoea. The most common of these are associated with increased secretion of prolactin (prolactinomas) which leads to hyperprolactinaemia.

#### *ii) Pituitary insufficiency*

Rarely the pituitary tissue can be damaged by lack of oxygen, blood clots or severe haemorrhage (haemorrhage after childbirth causing destruction of the pituitary gland is called Sheehan's syndrome). The FSH, LH and oestrogen levels are all low.

#### *iii) Empty sella syndrome*

In this rare syndrome the membrane that separates the pituitary and hypothalamus is either absent or incomplete. This might be congenital, caused by surgery, irradiation, or be associated with a tumour. The pressure of the cerebrospinal fluid flattens the pituitary gland, which appears on X-ray to be absent. Amenorrhoea can be the result.

### **4. Failure to ovulate**

A number of conditions can lead to prolonged ovarian dysfunction and amenorrhoea.

#### *i) Polycystic ovarian syndrome*

This is the most common condition associated with failure to ovulate and is characterised by multiple immature ovarian follicles, an abnormal hormone profile and amenorrhoea.

#### *ii) Breastfeeding*

Breastfeeding is initially associated with high prolactin levels which cause ovulation and menstruation to cease.

#### *iii) Thyroid conditions*

An underactive thyroid causes lower levels of SHBG which leads to an eventual increase in the availability of oestrogen. An overactive thyroid leads to a greater conversion of androgens to oestrogens. Both situations can lead to amenorrhoea due to ovulatory failure, but once the thyroid condition has been treated, menstruation recommences.

#### *iv) Cushing's syndrome*

A syndrome associated with excess corticosteroids and a wide range of symptoms including obesity, thinning of the skin, abnormal fat distribution around the neck and upper back, high blood pressure, diabetes, hirsutism and amenorrhoea. It can be caused by adrenal or pituitary tumours, or high-dose cortisone medication.

v) *Congenital adrenal hyperplasia*

This is a rare congenital condition where the adrenal gland produces too much androgen. An adult-onset form is also seen and is associated with abnormal cortisol production and elevated androgen levels.

vi) *Androgen-secreting adrenal and ovarian tumours*

These very rare, often malignant tumours secrete androgens and can cause amenorrhoea. In the ovary, mucinous cystadenomas, cystadenocarcinomas and Brenner tumours, as well as a number of other malignant ovarian tumours, are associated with increased androgen production.

vii) *Premature ovarian failure*

Cessation of ovarian function before 40 is defined as premature ovarian failure. The causes are unknown, but for some women may arise from an auto-immune response or because of a failure of the ovarian tissue to respond to FSH and LH.

viii) *Destruction of ovarian tissue*

Ovarian tissue can be damaged by impaired blood supply and irradiation. This leads to a failure of ovulation and amenorrhoea.

ix) *Drugs*

The phenothiazides (for example, Largactil, Stemetil, Stelazine) can increase prolactin levels and lead to amenorrhoea or menstrual irregularities. Some anti-hypertensive (blood pressure-lowering) drugs can also cause amenorrhoea, especially Aldactone and Aldomet. Hormonal contraceptives can also cause amenorrhoea. Chemotherapy used in the treatment of cancers can lead to temporary or permanent interruption in ovulation and subsequent amenorrhoea.

## **PRIMARY AMENORRHOEA**

Primary amenorrhoea, or failing to commence menstruation, can be caused by a number of congenital and hormonal factors. In rare cases, patients are found not to have a uterus. Doctors describe four categories which are based on the presence or absence of a uterus and on whether breast development occurs.

### **No breast development, but a uterus can be seen**

In this group, four main conditions are identified:

- The hypothalamus does not secrete GnRH because of a functional disorder.
- The pituitary gland does not secrete FSH and LH.



- Congenital abnormalities of the ovaries lead to absent ovulation and menstruation. These include the rare condition known as resistant ovary syndrome in which the ovary cannot respond to FSH, and the chromosomal abnormalities like Turner's syndrome.
- Lesions or tumours affect the function of the hypothalamus or pituitary glands.

### **Breast development, but no uterus**

Two very rare conditions are associated with breast development and a congenitally absent uterus. In the first, the uterus is absent, but the ovaries function and ovulation occurs. The other is an extremely rare condition known as androgen-insensitivity syndrome where the foetus has an inherited 'lack of response' to the androgen dihydrotestosterone. This leads to the development of female genitalia, but no uterus. This is almost always undetected until a reason is sought for primary amenorrhoea.

### **No breast development, uterus absent**

These very rare congenital conditions are caused by genetic abnormalities.

### **Breast development, uterus present**

This category is associated with an abnormality of the hypothalamic-pituitary-ovarian axis; or the causes of secondary amenorrhoea listed in Table 13.1 may also be responsible. Rarely, blockages in the vagina, such as a transverse vaginal septum or an imperforate hymen may need correcting so that the outflow of menstrual blood can occur.

## **Diagnosis**

The medical diagnosis of the causes of primary amenorrhoea follows a fairly routine pattern. In many cases, there is no major physical problem, and the onset of puberty has simply been delayed. In these cases, menstruation will commence in due course. Delayed onset of puberty, however, is a diagnosis of exclusion, and most doctors will want to make absolutely sure that this diagnosis is correct.

Breast development indicates either that ovarian oestrogen is being produced or that oestrogens are being produced by conversion of androgens in the fat. Because full breast development will only occur

in the presence of ovarian oestrogens, examination of the breasts gives important information about the causes of the primary amenorrhoea.

Attaining a normal height for age is also important because some of the more common chromosomal abnormalities, such as Turner's syndrome, are associated with a short stature.

The next step is an abdominal ultrasound to determine whether a uterus is present. This allows any uterus, tubes, ovaries and vagina to be seen.

When breast development is normal and the uterus is present and looks normal, the next step is to take blood tests to try to determine if a hormonal abnormality is associated with the problem (see Table 13.2). Usually the levels of FSH, LH and prolactin are checked. Normal levels of all three are seen in delayed puberty; a high LH with a low FSH may be present in polycystic ovarian syndrome (the ultrasound findings will usually show the ovarian follicles typical of PCOS); a high prolactin level might have physiological causes or indicate a pituitary tumour called prolactinoma; and a high FSH and LH might suggest that the ovary is not responsive to FSH.

## **HYPERPROLACTINAEMIA**

Hyperprolactinaemia is characterised by higher than normal secretion of prolactin. Normal prolactin levels are between 60–480 mU/l but in hyperprolactinaemia levels can vary dramatically from anywhere above 500 mU/l to many thousand mU/l.

Elevated prolactin is responsible for between 10–20 per cent of cases of amenorrhoea and women with absent periods usually have their prolactin levels evaluated in the first round of tests. Hyperprolactinaemia is responsible for 75 per cent of cases of amenorrhoea accompanied by galactorrhea (excessive or spontaneous secretion of breast milk) and, of those diagnosed, 30 per cent will have a prolactin-secreting tumour (prolactinoma).

The lactotroph cells of the pituitary secrete prolactin and prolactin receptors have been identified in many tissues throughout the body. In women, receptors have been found in the breast, liver, renal tubules, adrenal cortex, lung, ovary, lymphocytes, myocardium and brain. This diverse distribution indicates that prolactin has effects other than the well-known galactogenic (milk-stimulating) action.

The main action of prolactin, however, is to stimulate breastmilk production. During pregnancy, the rising levels of oestrogen trigger an increase in the numbers of pituitary lactotroph cells; however, lactation does not occur because of the high levels of oestrogen and progesterone during pregnancy. Three to four days after childbirth, when oestrogen and progesterone levels fall, breastmilk production commences. Ovulation usually does not occur in the first few months post-partum when

women breastfeed because FSH and LH are suppressed by the elevated prolactin.

Dopamine (also known as prolactin-inhibiting factor) inhibits prolactin secretion via an effect on the D-2 receptors located on lactotrophs. Prolactin *release* can be stimulated by thyrotropin-releasing hormone (TRH) and oestrogen. Hypothyroidism, where TRH is elevated, can result in hyperprolactinemia, which emphasises the importance of checking thyroid function in patients presenting with hyperprolactinemia.

Prolactin is secreted in a pulsatile fashion and increases during sleep and is highest between 3 and 5 am, with the lowest levels about three hours after waking. Cyclic changes in oestrogen levels also affect prolactin. When oestrogen is highest in the menstrual cycle during the luteal phase, prolactin levels increase. Eating, stress (even that associated with blood sampling) and sexual activity will also increase levels. For these reasons, prolactin levels should be taken from blood drawn between 8 am and 12 midday during the follicular phase of the cycle while the woman is fasting. Some endocrinologists take three blood tests, leaving the needle in place, at half-hour intervals to rule out false positive readings, especially stress-induced elevations related to blood sampling.

**Table 13.2 Normal ranges of serum prolactin (expressed as mU/l, Ug/l & ng/ml)**

Normal range	Pregnancy	Post-menopausal	Units used (& country)
60–480	206–4420	38–480	mU/l (milli-international units per litre: Australia)
< 25	100–300	N/A	Ug/l (micrograms per litre: Australia)
<26 ng/ml	26–200 ng/ml	N/A	ng/ml nanograms/ml (USA)

Note: American units (ng/ml) are equivalent to Australian readings expressed as Ug/l. To convert these readings to mU/l, multiply ng/ml or Ug/l by 21.

## Causes of hyperprolactinaemia

### Physiological

Physiological events may cause elevations in serum prolactin lasting minutes to days.

- Pregnancy and breastfeeding
- Excessive and prolonged stress

- Prolonged breast stimulation in non-lactating women may increase prolactin levels. This may be the mechanism whereby ‘Deer Massage’ (a meditative yoga pose which includes prolonged massage around the nipples) inhibits regular menstruation
- Exercise such as athletic training
- Food ingestion
- Dehydration
- Sexual activity and orgasm

## Pathological

### *Tumours*

- Pituitary tumours (prolactinomas) which arise from hypertrophy of the lactotroph cells of the pituitary gland
- Other prolactin-secreting tumours of the pituitary
- Tumours that inhibit dopamine production such as tumours of the hypothalamus or pituitary
- Hydatidiform mole

### *Neural stimulation to chest wall*

- Surgery such as mastectomy, thoracotomy
- Chest-wall trauma caused by burns, irritation or chronic breast abscess
- Chest-wall stimulation from breast implants or herpes zoster

### *Other neural stimulation*

- Spinal cord injury, tumour or surgery
- Post-epileptic seizure

### *Endocrine causes*

- Hypothyroidism
- Adrenal or ovarian tumour

### *Other*

- Factors that reduce dopamine production such as Parkinson’s disease, irradiation, stroke
- Cirrhosis of the liver
- Renal failure
- Multiple sclerosis

### *Drugs*

- Major tranquillisers and anti-psychotics such as the phenothiazines (Largactil, Stemetil, Stelazine and Melleril), haloperidol (Serenace), pimozide (Orap), and risperidone (Risperdal) are dopamine-receptor antagonists
- Metoclopramide (Maxalon), also a dopamine-receptor antagonist
- MAO inhibitors and tricyclic anti-depressants

- Verapamil, a calcium channel-blocker (other calcium channel-blockers do not raise prolactin)
- Anti-ulcer drugs such as Pepcidine, Tagamet, Tazac and Zantac
- The anti-hypertensive drugs Aldactone and Aldomet (deplete dopamine synthesis)
- High-dose oestrogen oral contraceptive pills increase prolactin secretion
- Opiates, cocaine and alcohol, especially beer

## **Physiological hyperprolactinaemia**

### **Pregnancy**

Prolactin normally increases during pregnancy, but the magnitude of the increase can be quite varied and range between 206–4420 mU/l (or 26–200ng/ml). The most likely reason for the rise in prolactin levels is the increasing concentration of serum oestradiol. Oestradiol returns to normal about six weeks after delivery, and by this time, serum prolactin levels are usually normal as well.

### **Nipple stimulation**

Suckling of the oestrogen-primed breast triggers a neural response to stimulate release of prolactin from the lactotroph cells of the pituitary. The amount of prolactin released appears to be directly related to the amount of oestrogen. High levels of oestrogen, like those seen in the third trimester of pregnancy, initiate hyperplasia of lactotrophs and therefore a significant increase in prolactin in the months after delivery. Several months after childbirth, breastfeeding only causes a slight elevation of prolactin above normal.

Nipple stimulation in non-lactating women can be expected to cause negligible changes in prolactin levels because of the absence of oestrogen priming of the pituitary lactotroph. An early study showed that breast examination also caused no change in prolactin levels. However, excessive or prolonged stimulation around the breast and chest wall seems to have an impact, as has been observed following surgery and perhaps with ‘Deer Massage’.

### **Stress**

Stress can also increase prolactin levels. The magnitude of increase in prolactin levels is relatively small, and certainly not in the range caused by a prolactinoma. Levels rarely exceed 800 mU/l. Stress-related increases in prolactin are rarely associated with galactorrhea and are usually transient.

## Pathological hyperprolactinaemia

The most common causes of hyperprolactinaemia in this category are the prolactin-secreting adenomas known as prolactinomas, hypothyroidism and drugs. Other conditions such as chest-wall trauma will elevate prolactin only while the problem continues. Some systemic illnesses such as renal failure and cirrhosis of the liver can cause elevated prolactin.

A thyroid function test will always be ordered in case the cause of the high prolactin is hypothyroidism. Diminished thyroid function means that there is a lack of negative feedback on the hypothalamic-pituitary axis, as well as a lack of positive feedback on dopamine. This causes an elevated TSH (and a small increase in TRH) and depressed secretion of dopamine, leading to elevated prolactin levels.

When galactorrhea accompanies an elevated prolactin level and amenorrhoea, the cause will be a prolactinoma about one-third of the time. Low circulating oestrogen levels may be determined by failure to bleed following progestogen administration and withdrawal. In general, pre-menopausal women tend to have microadenomas (tumours less than one centimetre in diameter), while macroadenomas (where the diameter of the tumour is greater than one centimetre) are more likely to be found in post-menopausal women.

The reason an elevated prolactin level causes menstrual cycle changes is not entirely understood. The major mechanism seems to be that an elevated prolactin level stimulates an increase in dopamine secretion by the hypothalamus, which in turn interferes with the pulsatile secretion of GnRH. This then leads to decreased levels of FSH and LH and inadequate stimulation of the ovarian follicle, which means that both menstruation and ovulation usually cease. Oestradiol is reduced, and the adrenal androgens are often elevated,<sup>1</sup> but usually do not cause hirsutism because of the reduced levels of 5-alpha-reductase which converts testosterone into the more potent androgen, dihydrotestosterone (DHT). Sex hormone-binding globulin (SHBG) levels are also reduced.<sup>2</sup>

Women who have prolactin levels below 480 mU/l, galactorrhea and normal menstrual cycles are unlikely to have a prolactinoma. Other women in the slightly elevated prolactin range might develop luteal phase defects with menstrual cycle irregularities, low progesterone levels and a shortened luteal phase. These women might present for treatment because of irregular bleeding patterns (DUB), with or without PMS. Prolactin levels between 850–2000 mU/l are less likely to be associated with a prolactinoma, but an MRI scan is often suggested to absolutely rule out this possibility. When prolactin exceeds 2000 mU/l, the possibility of a prolactinoma is high.

There seems to be some relationship between the size of the prolactinoma and the amount of prolactin secreted. Microadenomas are usually associated with prolactin levels less than 4000 mU/l, while

macroadenomas will usually cause prolactin levels to rise above that level, although occasionally a large prolactinoma will cause only a modest increase in prolactin levels.

## Signs and symptoms

When prolactin levels are elevated to pathological levels, galactorrhea and amenorrhoea or oligomenorrhoea are the most common symptoms. Oestradiol levels are low, and as a result many women complain of vaginal dryness and painful intercourse, or other symptoms such as loss of libido and mood changes. Of concern for women with hyperprolactinaemia is the low bone density which seems to occur irrespective of oestrogen levels.<sup>3</sup> When a prolactinoma is the cause of the elevated prolactin, headaches or visual field changes can occur because of pressure around the optic nerve, especially with a macroadenoma. Galactorrhea, normal prolactin and menstrual cycles are relatively common and require no treatment once pathology of the breast has been eliminated as a cause.



### ■ ■ The medical approach:

The treatment of hyperprolactinaemia is determined by the cause and initial steps are directed towards identifying the origin of the problem. Drug-related causes can be determined by the history and drugs are withdrawn when possible. A thyroid function test is always an early part of evaluation, and treatment of hypothyroidism with supplemental thyroxine should restore prolactin levels to normal.

When prolactin levels are elevated above 850 mU/l, an MRI scan of the pituitary gland is usually recommended, to determine whether the cause of the elevated prolactin is a pituitary tumour and to evaluate its size. Rarely, very large pituitary tumours might need removal because they can interfere with vision or cause blindness if they damage the optic nerve.

In most cases of prolactinoma the course of action is to reinstate a normal cycle by reducing prolactin with either cabergoline (Dostinex) or bromocriptine (Parlodel). Usually lactation stops and ovulation, cyclic regularity and fertility are reinstated relatively quickly, especially with cabergoline.<sup>4</sup> In addition, with both drugs, although more so with cabergoline, tumour shrinkage is noted.<sup>5</sup> Bromocriptine often causes nausea, vomiting and dizziness and this can be reduced to some extent by giving the drug at night. Cabergoline seems to be much better tolerated—12 per cent of women in one small study experienced side-effects compared with 53 per cent of the bromocriptine group.<sup>6</sup> Cabergoline dose can be reduced once prolactin levels are normal;

following cessation of cabergoline, prolactin levels were noted to increase after about 30 days, but remained normal as long as twelve months later in some women.<sup>7</sup> (See page 523 for more details on cabergoline and bromocriptine.)

When women are lactating but have normal menstrual cycles, treatment is rarely needed and a wait-and-see approach is usually adopted. If the cycle is erratic and long, progestogens are given at regular intervals and then withdrawn to initiate endometrial shedding. These women should be advised to refrain from expressing breast milk as this will aggravate the condition.

Yearly measurements of blood prolactin levels are often suggested to monitor prolactin-secreting tumours (prolactinomas). These tumours do not usually increase in size and so repeated X-ray imaging is generally unnecessary. With both cabergoline and bromocriptine treatment, tumours have been observed to shrink. Measurements of the visual field to determine whether the tumour is encroaching on the optic nerve may also be suggested.



#### The natural therapist's approach

Some women are inclined to try a more natural approach for their complaints before using medication; others experience side-effects from drugs such as dizziness, especially from bromocriptine, and seek herbal alternatives. However, herbal, vitamin and mineral treatments for hyperprolactinaemia may have a limited application when prolactin levels are extremely high and are certainly not as straightforward as taking a drug. There is also a tendency for herbal preparations to reduce prolactin levels for the first few months, and then only with some difficulty after that. For example, in a small sample of five women from our clinic with prolactin levels above 3000 mU/l who were given *Vitex agnus-castus*, two showed only slight reductions in prolactin; two halved prolactin levels within the first three months of treatment, but in one prolactin levels increased again to pre-treatment levels, and the other changed to drug treatment when further reductions in prolactin levels were not evident over the next two months. One of these women eventually reached normal prolactin after one year and became pregnant. A fifth woman, with amenorrhoea, galactorrhea and a prolactin level of 2000 mU/l, commenced menstruating after three months on 15 ml per week of *Vitex agnus-castus*, but her prolactin levels were not retested.

For these reasons it is necessary to decide in advance on the desired outcome of the treatment. Herbal remedies can be effective when prolactin levels are in the low to mid range (480–3000 mU/l) and when it is possible for the woman to wait for the apparently slower reduction in levels seen with herbal treatment. It is advisable for the woman to



have monthly prolactin levels monitored to evaluate the effectiveness of the herbs. Regular menstrual bleeding should be established to protect the endometrium, and oestrogen levels should return to the normal range to protect against bone density loss.

*Vitex agnus-castus* has proven efficacy in latent hyperprolactinaemia and luteal phase defects (see pages 450–4) and this is an entirely appropriate application for herbal medication. Nutrients can be expected to have minimal effects when prolactin levels are markedly elevated above normal.

## Herbs

*Vitex agnus-castus* has been investigated for its effect on prolactin. It has been shown to mimic the action of dopamine, the antagonist of prolactin secretion. Researchers have suggested that *Vitex agnus-castus* be used as a safe and efficient alternative to drugs for infertility associated with luteal phase defects and for premenstrual breast soreness associated with mildly elevated prolactin levels.<sup>8</sup> When *Vitex* is used for prolactin levels greater than 500 mU/l the dose should be about 30 ml per week, and when women have prolactin levels that exceed 3000 mU/l, a dose of 40 ml per week has been shown to be effective, at least in the short term. *Vitex* given in divided doses, three times daily, seems to be more effective than when given as a single daily dose.

A number of herbal formulas commonly used in traditional Chinese medicine have been investigated for their effectiveness in the treatment of hyperprolactinaemia. These include Rehmannia Eight Combination (Ba Wei Di Huang Tang) and Peony and Licorice Combination (Shao Yao Gan Cao Tang). Rehmannia Eight Combination given over three months resulted in pregnancies amongst eleven of the 27 infertile women treated.<sup>9</sup> Peony and Licorice Combination is thought to act directly on the pituitary gland to counteract hyperprolactinaemia. It stimulates the dopamine receptors, and also directly stimulates the ovarian production of oestrogen by stimulating aromatase (enzyme) activity.<sup>10</sup>

## Zinc and vitamin B<sub>6</sub>

Zinc is necessary for the normal synthesis of dopamine. It is not clear whether giving zinc will lower elevated prolactin levels, but zinc should be considered as a supplement for women who have an elevated prolactin with concurrent zinc deficiency signs. Vitamin B<sub>6</sub> acts as a co-factor with zinc in the synthesis of dopamine. It is questionable whether significantly elevated prolactin will respond to these nutrients.



## Self care

Stress affects prolactin levels. Relaxation techniques, stress management, meditation and increasing exercise of the long, slow variety are all useful. Beer increases prolactin levels, as do a number of recreational drugs, and should be avoided.

## HYPOTHALAMIC AMENORRHOEA

Hypothalamic amenorrhoea is the cessation of menstruation for six months or more, or for more than three menstrual cycles (when the cycle is longer than usual) in women who previously had regular periods. Common causes are anorexia, excessive exercise and stress. The hypothalamus stops producing GnRH, which leads to a reduction in the pulsatile release of FSH and LH by the pituitary, and ultimately to reduced levels of the ovarian hormones oestrogen and progesterone. Ovulation and menstruation stop, and infertility is the result. This condition is sometimes also called functional hypothalamic amenorrhea, and affects about 5 per cent of women in their reproductive years.

Hypothalamic amenorrhoea can have significant consequences. Low oestrogen is associated with osteoporosis when left untreated for long enough, and other symptoms of low oestrogen can become troublesome. Anorexia nervosa is a significant cause of morbidity, and mortality can be as high as 15 per cent. Women who over-exercise and have amenorrhoea often believe that their bone density is protected by the amount of exercise they do, but this is often not the case. The effects of over-exercising, eating disorders, poor eating habits and stress on the menstrual cycle have been discussed in detail in Chapter 10 'The usual suspects'. Hypothalamic amenorrhoea is the most serious gynaecological manifestation of these behaviours.

### Causes

The most important causes of hypothalamic amenorrhoea are stress, poor dietary habits and excessive exercise. Some of the research into hypothalamic amenorrhoea has tried to identify whether there are different types of hypothalamic dysfunction represented by different patterns of LH pulsatile release. However, when hormone levels from women with hypothalamic amenorrhoea were examined, it was found that LH secretion patterns varied between women and within the same woman, indicating that most women with this condition do not have a static defect in GnRH secretion, but rather have changing patterns of GnRH secretion that vary over time irrespective of the actual cause of the hypothalamic amenorrhoea.<sup>11</sup>

## Stress

Recent investigations have shown that cortisol levels are higher in stressed women with hypothalamic amenorrhoea than in non-stressed women with the same condition.<sup>12</sup> Stress has a number of diverse effects on the hypothalamic-pituitary-ovarian axis, as well as on the hypothalamic-pituitary-adrenal axis. These are discussed in Chapter 10 'The usual suspects'. Researchers found that women with hypothalamic amenorrhoea had similar psychological profiles, including a tendency towards perfectionism and poor nutritional or lifestyle choices. Many were likely to attempt an unrealistic number of tasks in one day.<sup>13</sup>

The endocrine system seems to function best when an individual adopts a lifestyle philosophy of moderation in all things. For women with stress-induced amenorrhoea, participation in psychotherapy sessions or cognitive behavioural therapy may be useful. Gentle exercise, yoga, meditation and relaxation techniques will need to be incorporated into the treatment regime for any satisfactory or long-lasting results. The association between inappropriate eating, stress and hypothalamic amenorrhoea suggests that dietary counselling may also be necessary.

## Excessive exercise

Although only about 5 per cent of women develop functional amenorrhoea, between 25–60 per cent of this group stops menstruating because of exercise-induced amenorrhoea. Generally, these women participate in endurance sports such as distance running, but other activities where it is customary to closely monitor body weight, such as gymnastics, also contribute significantly to this group. The major concern regarding exercise-induced amenorrhoea is the reduction of bone density that can lead to serious consequences related to oestrogen deficiency. Exercise is discussed in more detail in Chapter 10 'The usual suspects'.

Suppression of hypothalamic pulsatile release of GnRH is the cause of the amenorrhoea. Initially, it was believed that an abnormal BMI was the primary trigger for the inadequate GnRH release, but it is now believed that when dietary energy intake does not meet energy expenditure, and causes a drop in metabolic rate, adaptive changes occur in reproductive function which lead to a decrease in pulsatile release of GnRH. It may also be that leptin has a role in this condition. Leptin is a hormone secreted by fat cells and optimum levels are required for the initiation and maintenance of menstrual cycle regularity.<sup>14</sup> Hypothalamic amenorrhoea is more likely to occur when low leptin levels are associated with low kilojoule intake and a BMI below 20 than when BMI is low but kilojoule intake is adequate.<sup>15</sup>

## Poor eating habits

The effects of poor eating patterns on the menstrual cycle have already been discussed in Chapter 10 'The usual suspects'. Hypothalamic amenorrhoea seems to occur when nutritional deficiencies cause low body weight and inadequate body fat, leading to low oestrogen levels and increased risk of osteoporosis. This picture is exacerbated when kilojoule intake does not meet energy expenditure requirements. It has become apparent that the type of kilojoules is an important consideration in the prevention of hypothalamic amenorrhoea. When dietary energy is derived from carbohydrate foods instead of from adequate fat or protein intake, amenorrhoea is more likely to occur. For example, restricted eating patterns in normal weight, non-athletic women, such as very low fat intake, high fibre intake and a kilojoule intake that did not meet the energy expenditure of daily aerobic activity, were shown to increase the risk of amenorrhoea.<sup>16</sup> Targeting the cause of the low oestrogen, in this case the dietary problems, is a more appropriate way of dealing with this issue than using replacement hormones.

Leptin levels are also implicated.<sup>17</sup> When nutrition restrictions are severe, leptin levels fall irrespective of the BMI, body fat ratio or body weight. Menstruation does not occur when leptin levels are low, perhaps because the hypothalamic response to this apparent state of starvation is to reduce ovulation and menstruation to preserve the health of the woman and prevent pregnancy which would entail some risk to both mother and unborn child.

## Diagnosis

While low levels of gonadotropins and oestrogen are suggestive, hypothalamic amenorrhoea is a diagnosis of exclusion. Hyperprolactinaemia, PCOS, hypothyroidism and hypothalamic amenorrhoea are all likely diagnoses when a woman develops secondary amenorrhoea. Pregnancy should also be eliminated as the cause of absent menstruation. Clinical evidence of androgen excess, such as hirsutism and acne, or amenorrhoea secondary to weight gain, point to a possible diagnosis of PCOS. Blood levels of prolactin and TSH are usually evaluated in conjunction with oestrogen, LH and FSH to rule out hyperprolactinaemia and hypothyroidism. Sometimes a progestogen challenge might be suggested to determine whether uterine function is normal, but this is only useful when oestrogen levels are adequate. When oestrogen is low a withdrawal bleed does not occur because the endometrial proliferation is absent. Premature ovarian failure, a less common cause of amenorrhoea, presents with elevated FSH and LH, but low levels of oestrogen.

Hypothalamic amenorrhoea should also be suspected in athletes or other women undertaking endurance sports, when abnormal eating

patterns are revealed, or when a woman describes an episode of recent stress. Post-Pill amenorrhoea is a type of hypothalamic amenorrhoea, but is very rare. Sometimes hypothalamic amenorrhoea occurs for unknown reasons.



#### ■ ■ The medical approach

Women with hypothalamic amenorrhoea should be started on treatment as soon as possible. It is preferable that this involves some attention to the underlying cause/s not just replacement hormone therapy. Hormone replacement and oral contraceptives can be used to minimise the loss of bone density caused by a prolonged lack of oestrogen, until the causes are identified and appropriate treatment is used to rectify these. However, unless the causes for hormonal loss are addressed, oestrogen replacement has not been shown to be very effective.



#### The natural therapists's approach

The treatment of hypothalamic amenorrhoea will need to be partially directed towards the cause, such as consuming more kilojoules in the form of protein and fats, exercising less or addressing the adverse effects of stress (see 'The usual suspects', pages 209–30).

Other herbal treatment aims to reinstate normal hypothalamic-pituitary-ovarian feedback control with herbs such as *Vitex agnus-castus* and *Paeonia-lactiflora*. Pulsed treatment with steroidal saponin-containing herbs may also be useful. The method for prescribing these herbs is outlined in 'Improving ovulation and fertility' in the PCOS section, pages 355–6.

## PREMATURE OVARIAN FAILURE

Premature ovarian failure is not the same as premature menopause. While menopause is an irreversible condition, premature ovarian failure is characterised by intermittent and temporary ovarian failure with periodic episodes of normal follicular activity and ovarian function.<sup>18</sup> The estimated prevalence of premature ovarian failure is 1/1000 in women aged 15–29 years and 1/100 in women aged 30–39 years.<sup>19</sup>

This complaint is diagnosed if a woman of less than 40 years of age has the following signs and symptoms:<sup>20</sup>

- Amenorrhoea for four months or more
- Low oestrogen levels

- An elevated FSH (confirmed by two to three FSH levels of >40 IU/l at least one month apart)
- Infertility

There is a depletion of the primordial ovarian follicles and ovulation occurs sporadically. Physical changes that occur when a woman has premature ovarian failure include a thinning of the endometrium, which can be detected on ultrasound. Bone density is severely compromised if the oestrogen levels remain low over a long period.

Most of the time, premature ovarian failure appears to begin spontaneously and its origin is elusive or unknown. Some of the identified causes include auto-immune disease, particularly if related to hypothyroidism, or auto-immune oophoritis. Specific genetic defects have been identified as a cause, as have infections such as mumps, shigella, malaria and varicella; and enzyme deficiencies such as galactosaemia, although these are less common. Chemotherapy for breast cancer leads to premature ovarian failure in approximately one-third of all women treated—women approaching menopause are more likely to be affected, but younger, fertile women can develop persistent amenorrhoea and should be counselled accordingly.<sup>21</sup>

Despite the high levels of gonadotrophins, women with premature ovarian failure will produce oestrogen and ovulate intermittently,<sup>22</sup> and can achieve a spontaneous pregnancy. However, the probability of this occurring is very low, being estimated to be in the region of 5–10 per cent.<sup>23</sup>



#### ■ ■ The medical approach

If pregnancy is not a desire, women with premature ovarian failure are prescribed the Pill as a type of hormone replacement to protect their bones from the prolonged absence of oestrogens. As ovulation can occur spontaneously and with no warning, the Pill also provides contraceptive protection for those women who need it.

When the woman wants to become pregnant, the first step is oestrogen replacement for one month to check ovarian reserve. If this is satisfactory, FSH levels will drop and drugs are then prescribed to stimulate ovulation. In many cases, however ovulation induction rates do not change and continue to be much the same as the spontaneous ovulation rate seen in untreated women.<sup>24</sup> Medically, the proven method of achieving pregnancy in women with premature ovarian failure is fertilisation of a donor egg.<sup>25</sup>



#### The natural therapist's approach

Contraception and protection of bone density is difficult to achieve successfully for these women. Details on bone density protection and

treatment are outlined on pages 181–98 in the section ‘Osteoporosis’. Natural family-planning methods may be acceptable for some women, and will need to be taught by those trained in this area, but the sporadic nature of ovulation is likely to create some difficulty. Natural therapists should ensure that bone monitoring is undertaken regularly.

Some women respond to hormone modulating treatments such as *Vitex agnus-castus* or *Paeonia lactiflora* in conjunction with female tonic herbs and the steroidal saponin-containing herbs. Usual treatment would involve a single morning dose of *Vitex* combined with a pulsed prescribing regime of the tonic herbs, usually for two weeks of every month until a cycle is re-established and then for the first two weeks during and following menstruation after that. When menstruation can be re-established, the positive effects have been short lived for some women, and may be apparent for no more than 3–6 months. Other women have achieved successful pregnancies where medical treatment has failed, but numbers of women treated herbally have been limited and it is not possible to make firm predictions about outcomes.

### **BLOOD QUALITY**

Over the centuries, traditional medicine developed an understanding of the actions of blood by observing people during and after blood loss. Those who looked as though they had lost blood and were pale, weak, tired and vague were said to have ‘weak’ blood; those who were red-faced, overstimulated, irritable and energetic were said to have an excess of blood.

A large number of women’s complaints were attributed to blood because women not only lose blood every month and during child-birth, but also were believed to lose the essence of blood when they breastfed. (Many early cultures thought of breast milk as blood with the redness taken out.)

A relatively modern name for weak blood, dating from around Shakespeare’s time until the turn of this century, was ‘chlorosis’. Chlorosis means ‘greenish colour’ and was a common diagnosis of young menstruating women. The symptoms were fatigue; a yellowish face with dark rings around the eyes; and menstrual symptoms such as amenorrhoea or menorrhagia.<sup>26</sup>

The opposite condition, ‘plethora’, indicated an excess of blood. It was characterised by over-indulgence generally and of alcohol in particular, irritability, headaches and a red face. It was a condition common to the older generation, usually men, and was believed to be the precursor to strokes.

A diagnosis of either chlorosis or plethora was cast aside when it became possible to test for anaemia. Technically, anaemia means a

lack of iron in the red blood cells or insufficient numbers of red blood cells. The common causes are lack of dietary iron or excessive blood loss. The term is commonly used (incorrectly) to describe a number of symptoms including tiredness, inability to concentrate, paleness, dizziness or a lacklustre attitude to life.

A natural therapist's diagnosis of poor blood quality (also known as 'blood deficiency' in traditional Chinese medicine, and 'anaemic' or 'nutritionally depleted' by naturopaths) is *not* the same as anaemia. It is a rather more complex syndrome characterised by:

- frequent exhaustion and poor stamina
- unusual debility around the time of menstruation, and especially afterwards
- an increased tendency to infection around the period, especially thrush and recurrent viral infections such as herpes
- frequent headaches, often with or after the period
- dizziness
- pale face and tongue
- dry skin and unhealthy lank hair
- menstrual irregularities, especially amenorrhoea or infrequent periods, occasionally menorrhagia

The aim of the treatment is to improve the overall quality and activity of the blood. Iron, though important, is not the end of the story.

- The quality of blood is corrected with appropriate dietary changes, nutritive herbs and supplements as required.
- The general energy levels are improved with the female tonic herbs.
- Where infrequent periods or amenorrhoea occur, hormonal regulatory herbs are used.
- Assimilation of nutrients is assisted with the Warming digestive herbs and foods.
- Circulation is enhanced with circulatory stimulants and Warming herbs.

Many of the common herbs used to treat abnormal bleeding are also nutritive herbs and are high in the blood-building and anti-haemorrhagic nutrients iron, vitamins A, K and C, and folic acid. Some important examples are *Rubus idaeus* and *Petroselinum crispum*.

*Aletris farinosa* and *Angelica sinensis*, as well as *Rubus idaeus*, are general female tonics and assist with regulation of all aspects of the menstrual cycle.

Anaemia is related to blood quality and is a common complaint affecting menstruating women. The iron-containing foods, and information on iron and anaemia, can be found on pages 248–9.



# 14

## Dysmenorrhoea

### Key words

adenomyosis  
anodyne  
antispasmodic  
bioflavonoid  
congestive  
dysmenorrhoea  
emmenagogue  
endometriosis  
hysterectomy  
irritable bowel  
syndrome

laparoscopy  
nervine  
PID  
proanthocyanidins  
prostaglandins  
pycnogenol  
spasmodic  
dysmenorrhoea  
spasmolytic  
uterine tone

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Pain is the most common symptom to accompany disease, and it is the symptom that brings people to their health-care practitioners quicker than any other. Pain is not only uncomfortable and unpleasant—we all know that pain means that something is wrong, and that it needs remedying.

That is, unless the pain is period pain. Many women, and their doctors, think that a ‘bit of period pain is normal’. ‘Grin and bear it’, ‘you’ll just have to get on with it’, ‘it will be better once you have a baby’ are the sorts of comments they hear regularly. A bit of period pain is *usual*, but being common doesn’t make it normal.

The two questions to ask about period pain are: ‘Does it bother you enough to want/need to do something about it?’ and if so ‘Are you happy with the treatments you are using?’. After all, on average, a woman will have twelve or thirteen periods annually and if she has pain on two or three days of these, she will experience about a month of pain every year.

Dysmenorrhoea means painful periods; the term is made up of the Greek *dys* meaning difficulty with, and *menorrhoea* indicating that the difficulty is associated with menstruation. Dysmenorrhoea is a symptom, not a disease—and the first aspect of any successful treatment of dysmenorrhoea is to determine exactly what is causing the pain. Period pain can be associated with two major categories of complaint.

- Functional disorders where the uterine muscle is behaving abnormally, but is otherwise healthy. This is called *primary dysmenorrhoea* or sometimes also called functional dysmenorrhoea.
- Organ disease where the pain is caused largely by the underlying complaint. This is called *secondary dysmenorrhoea*. Common causes of secondary dysmenorrhoea are endometriosis and pelvic inflammatory disease (PID).

Severe pain cannot be assumed to have a secondary origin. Sometimes the most severe pain of all is caused by primary dysmenorrhoea, and sometimes conditions which seem as though they should cause pain, like endometriosis, are pain free.

## **PRIMARY DYSMENORRHOEA**

Primary dysmenorrhoea is caused by uterine contractions which are too strong and occur too frequently. Between the contractions, the uterine muscle does not relax properly, and there is an abnormally high ‘resting tone’. (For a description of uterine tone, see pages 303–4.) The overall effect is a reduction in the amount of blood flowing through the uterine muscle (ischaemia) which causes the pain known as primary dysmenorrhoea.

The most usual cause of primary dysmenorrhoea is an imbalance in the prostaglandins levels. Prostaglandins are complex hormone-like substances found in most body tissues. There are many different types of prostaglandins which control bodily functions by working together as an integrated team. When the different types of prostaglandins are present in normal ratios, menstruation proceeds normally. An imbalance in the ratios in favour of the type of prostaglandins which increase muscle spasm will cause period pain. Their role in menstruation is complex and is discussed in Chapter 6 ‘Prostaglandins’.

### **The symptoms**

The quality and severity of period pain can vary dramatically from woman to woman, and even from period to period. The most usual description of period pain is a continual, dull, ‘background’ ache or sense of heaviness (congestive dysmenorrhoea), over which is super-

imposed episodic, cramping pain (spasmodic dysmenorrhoea). The pain is usually central and located in the lower abdomen. Sometimes a heavy aching pain extends to the groin, the back and down the thighs.

The pain may start before the menstrual flow has become established. It may be of either type, but is more frequently congestive and aching. Sometimes this sort of dysmenorrhoea is accompanied by a heavy dull sense of dragging in the vagina or a sense of fullness in the bowel. It is often described as feeling as though 'everything will fall out'.

Most commonly, the pain starts with the beginning of the period and intensifies as the flow becomes heavier, or when clots are passed. Some women describe this pain as being 'like labour'. Usually the spasmodic, crampy-type pain is the shortest-lived, but it is generally the most debilitating. Sometimes cramps can be accompanied by vomiting or diarrhoea, possibly caused by a reflex irritation of the gastrointestinal tract.

Bowel complaints often aggravate dysmenorrhoea. The bowel tends to be affected by hormone changes as well as by the muscular activity of the uterus. Many women become constipated premenstrually and a full bowel can exacerbate the sense of fullness and heaviness felt with congestive dysmenorrhoea. Irritable bowel syndrome both aggravates period pain and is in turn aggravated by it. The bowel and uterus share a similar nerve supply and when either organ is in spasm, the other will spasm in sympathy. (This knowledge was used in the past to bring women into labour by giving them castor oil and enemas to irritate the bowel and start uterine contractions.)

## Diagnosis

Primary dysmenorrhoea is a diagnosis of exclusion—the exclusion of other complaints as the origin of the pain. An appraisal of the individual features of a woman's medical, menstrual and obstetric history; age; and sexual activity are the first steps in locating the cause. For example, a sexually active woman has a higher risk of PID, and an older woman is more likely to have adenomyosis than a younger woman.

The history of the pain gives other important clues. Where it is, how long it lasts, which other symptoms accompany the pain, whether it radiates and whether it occurs predominantly before, during or after bleeding, are all important in establishing the causes.

## Pelvic examinations

Once a woman is sexually active, a doctor may suggest an internal examination of the pelvic organs. This usually involves looking at the cervix with a speculum to see whether it looks normal and healthy, and

examining the pelvic organs by inserting a gloved hand into the vagina to feel the size, state and position of the organs. These examinations and the reasons they are performed are described in Chapter 3 in ‘The Well Woman’s Check List’.

## Laparoscopic investigations

Sometimes surgery is needed to make a diagnosis, usually in the form of a laparoscopy. This may be used if the history is suggestive of secondary causes of pain, or if the pain fails to respond to the medication used for primary dysmenorrhoea. The laparoscopic procedure is described in Chapter 20 ‘Drugs and surgery’.

## When to see the doctor

- Pain changes in character or is present for the first time.
- Pain is unilateral and/or radiating.
- Pain is associated with pregnancy or has occurred after a missed period where pregnancy is likely.
- Usual pain control measures are no longer useful (in other words, the pain has changed in character).
- New symptoms accompany the pain—for example, vomiting or diarrhoea, faintness.
- Pain worsens towards the end of the period.
- Pain is aggravated by pressure, bowel motions or sexual activity.
- A fever or discharge accompanies the pain.



### ■ ■ The medical approach

There is a hierarchy of treatments used by medical practitioners to treat dysmenorrhoea. Prostaglandins-inhibiting drugs are the most likely first suggestion, but the Pill and some other forms of pain killers are also commonly used. Sometimes, if the pain is severe and fails to respond to the usual treatments, drugs like Duphaston are used. A progestogen-releasing IUD has also been shown to reduce dysmenorrhoea.<sup>1</sup> These drugs are discussed in Chapter 20 ‘Drugs and surgery’.

A hysterectomy is sometimes suggested for women who are past their child-bearing years or who do not want to have children, when pain does not respond adequately to drugs. Another surgical procedure, rarely used, is to cut the uterosacral nerve to destroy the perception of pain in the uterus.



## The natural therapist's approach

Sometimes even severe dysmenorrhoea will improve with dietary changes and exercise, and this is always the best place to start. Limiting animal fats and increasing essential fatty acids in the diet can reduce period pain, perhaps because of the relationship between prostaglandins imbalance and fat intake, or oestrogen levels and fats. Whatever the reason, many women reduce their period pain simply by changing their diet and exercising.

When dysmenorrhoea does not improve with diet and exercise, herbs or supplements are the next option. Herbs are combined so that the formula treats both the symptoms and the cause of the dysmenorrhoea. Supplements may also be appropriate in some cases.

## Herbs

### The uterine tonics

The uterine tonics, *Aletris farinosa*, *Caulophyllum thalictroides*, *Angelica sinensis* and *Rubus idaeus*, are used to treat pain because they are believed to regulate the muscular activity of the uterus and help initiate contractions which are regular, rhythmic and more orderly. They are combined with other herbs which are indicated by the symptoms.

### The antispasmodics

Antispasmodic herbs are indicated for period pain which is crampy, colicky and comes in intermittent waves of pain. They are also useful for the vomiting and diarrhoea that sometimes accompanies dysmenorrhoea. Antispasmodics are more effective if given to stop the onset of spasm, rather than to treat pain that has already started. They should be started several days before the expected onset of the period. There is no reason to take antispasmodics throughout the whole cycle.

*Viburnum opulus* and *V. prunifolium*, *Caulophyllum thalictroides*, *Dioscorea villosa*, *Ligusticum wallichii* and *Paeonia lactiflora* are useful antispasmodics. *Paeonia lactiflora* is usually combined with *Glycyrriza glabra* to obtain the best effect. *Caulophyllum thalictroides* is used when the spasm seems to be localised in the cervix, resulting in acute crampy pain with very little flow. Women with this pain pattern usually experience relief once the flow becomes established.

### Emmenagogues

Emmenagogues are herbs which can increase the strength of uterine contractions. They are used to increase the expulsive activity of the uterus and start the menstrual flow. *Artemesia vulgaris*, in combination

with any of the uterine tonics, is particularly indicated for period pain which is dull and congestive and which occurs in conjunction with periods which are slow to start.

### Warming herbs

Herbs which are Warming improve the action of the antispasmodic herbs, especially when the period pain is aggravated by cold, relieved by heat, or the woman has a tendency to 'feel the cold' easily. Two herbs are specific for the pelvic region: *Zingiber officinale* and *Cinnamomum zeylanicum*. Both can be added to a herbal mix in the form of a tincture, or taken as a tea, either alone, with other therapeutic herbs or in an ordinary cup of tea.

Warming herbs are best if taken hot. To make ginger tea, grate 2–4 cm green root ginger, place in a stainless steel saucepan with 1–2 cups of water, cover and bring slowly to the boil. Keep covered and simmer for about ten minutes. Strain, add honey to taste and sip while still hot. If possible, also have a bath. Other herbs can be taken at the same time. Ginger also eases nausea and is useful for period pain accompanied by vomiting.

### Hormone-regulating herbs

Herbs which regulate the hormone levels can improve period pain. Regulating hormone levels is believed to have an indirect effect on the prostaglandins levels and is one of the reasons that the Pill is effective for pain. The most valuable of the herbal hormone regulators is *Vitex agnus-castus*, which is very useful for congestive dysmenorrhoea, particularly when the pain is accompanied by premenstrual tension. *Vitex agnus-castus* is a very difficult herb to prescribe successfully and should only be taken while under the supervision of an experienced herbalist.

A number of other herbs have subtle effects on hormonal balance and are also effective for the treatment of pain. The exact reasons for their actions is often unknown, but it is likely that they work at a variety of levels. Included in this group are *Paeonia lactiflora*, *P. suffruticosa* and *Cimicifuga racemosa*, which are antispasmodics and may also competitively inhibit the activity of oestrogen; and *Verbena officinalis*, which is sedative and has been traditionally used for menstrual disorders which have a hormonal origin.

### Relaxing herbs

Nervine (relaxing) herbs are useful, especially where anxiety or tension accompany the pain. Some nervine herbs are also antispasmodics, the best being *Valeriana officinalis*, *Paeonia lactiflora*, *Piscidia erythrina*, *Corydalis ambigua*, *Verbena officinalis* and *Matricaria recutita*. Even

when anxiety is not a problem, nervine herbs in the formula potentiate the actions of the antispasmodic and pain-killing herbs.

### Herbs to reduce pain: the anodynes

Anodyne is the term used in herbal medicine to describe herbs that have analgesic (pain-reducing) effects. *Corydalis ambigua* from the Chinese *Materia Medica* is the most potent of these, and can be used for pain anywhere in the body. It also reduces heavy menstrual flow. Other important anodynes for menstrual pain are *Piscidia erythrina*, *Lactuca virosa* and *Anemone pulsatilla*.

It may seem strange that the anodyne herbs are included so far down the list of herbs used to treat period pain. There are very good reasons for this. Anodynes are much weaker than conventional analgesics and must be prescribed with other herbs for the best effect. Also, a herbalist never tries to treat painful conditions by just stopping the pain. The aim is to rectify the underlying causes so that the problem is cured, rather than the symptom abolished.

### Prostaglandins-inhibiting herbs

There is no herbal tradition for the use of prostaglandins-inhibiting herbs in dysmenorrhoea. (Prostaglandins were only discovered in the 1930s, and by this time herbal medicine had been used for thousands of years.) However, a number of commonly used herbs for period pain have been discovered to have prostaglandins-inhibiting effects similar to those of drugs. *Zingiber officinale*, *Tanacetum parthenium* and *Curcuma longa* are commonly prescribed, and there are probably others, but there is little research in this area. In fact, *Tanacetum parthenium* was suspected of having prostaglandins-inhibiting effects when women taking it for migraines noticed an improvement in their period pain. *Curcuma longa* is used in Chinese and Indian herbal medicine and has a long tradition of use for period pain. It has proven prostaglandin-inhibiting effects.<sup>2</sup>

### Treating the liver

Congestive period pain, the heavy, dull, dragging type of pain experienced by many women before their period, is often improved when Liver herbs or bitters are given. Historically, the Choleric (liverish) woman was described as being inclined to be irritable, hot-headed, constipated, as suffering from headaches and 'congestive complaints' like congestive dysmenorrhoea, with heavy, fiery-red menstrual flow. She was given bitter and Cooling herbs to expel Heat and remove the Yellow Bile humour.

These herbs are still used today for the same kinds of symptoms, even though we don't know exactly why they work. They may have an

indirect effect on hormone balance and improve the excretion of oestrogens from the bowel and through the liver and bile. *Berberis vulgaris* seems to be particularly useful, but as it is also an emmenagogue, the positive results may come from multiple effects.

### Treating bowel-related symptoms: constipation and irritable bowel syndrome

Spasmodic or congestive dysmenorrhoea accompanied by constipation is difficult to treat successfully unless the constipation is improved as well. The aperient herbs such as *Cassia senna*, *Rhamnus purshiana* and *Aloe barbadensis* can be used but will often aggravate spasm if taken during the period. Bitters are safer and equally reliable, especially *Taraxacum officinalis*, *Silybum marianum* and *Berberis vulgaris*.

By far the best method to treat constipation is to increase the level of fibre and fluids in the diet. About two litres of water should be taken every day when fibre intake is increased.

Irritable bowel syndrome frequently becomes worse around the period and can aggravate period pain—sometimes it is even mistaken for period pain. A diet and regime for treating irritable bowel syndrome follows.

#### **IRRITABLE BOWEL SYNDROME**

These dietary recommendations help to reduce spasm, pain and bloating associated with irritable bowel syndrome, and to regulate bowel function.

##### **Seed breakfast**

The seed breakfast consists of a combination of seeds, pectin-containing fruit and yoghurt.

##### **Seeds and rice bran**

- Linseed meal
- Almond meal
- Ground pumpkin seeds
- Ground sesame seeds
- Sunflower seeds
- Rice bran

The seeds and bran are combined together in quantities equal by weight after being ground to the consistency of coarsely ground coffee. They should be used immediately or kept refrigerated.

##### **Fruit**

- Grated raw apple
- Stewed apple, pear or plums



### **Yoghurt**

- Plain (unsweetened) low-fat yoghurt with live cultures. (Jalna, Lesna, Hakea and Hellenic are all good brands.)

In winter, the seed mix can be added to cooked oatmeal (porridge) or rice and eaten with warmed stewed fruit and yoghurt.

### **Herb tea**

*Melissa officinalis*, *Matricaria recutita* and *Mentha piperita* in equal quantities are prepared as for ordinary tea (2 teaspoons per cup).

Dose: 1–2 cups between each meal.

### **Foods to avoid or reduce**

- Stimulants such as tea, coffee and cola drinks.
- Cereals made from 100 per cent wheat bran.
- Fried food, pastry, cream and ice-cream.
- Yeast breads.
- Refined sugar and foods containing refined sugars.
- Alcohol such as beer and wine.

## **Making a herbal formula for dysmenorrhoea**

Every woman experiences period pain differently and has combinations of symptoms that are peculiar to her. Herbal formulas which are individually prescribed should attempt to deal with as many of these symptoms as possible. This is one of the reasons that over-the-counter herbal remedies for period pain can be less than successful—they simply can't have the right combination of herbs for every single woman.

It can be quite complicated to design a remedy for period pain, but the formula is made up with the following rules in mind:

- One of the uterine tonics should always be included because these herbs are believed to have a regulatory and normalising effect on uterine muscle.
- Antispasmodics, relaxing, pain-relieving and prostaglandin-inhibiting herbs are included if the symptoms indicate their use.
- Emmenagogues may also be used if the pain is accompanied by late or slow-starting periods.
- Almost always, Warming herbs will also be needed.

These herbs are combined and given for a few days before, and in frequent doses during the period. It is also usual to prescribe the uterine tonics throughout the whole cycle because their action on uterine muscle is slow and progressive. They are frequently prescribed with hormone-regulating or Liver herbs.

This first group of herbs treat the uterus, but generally it is also

necessary to treat the whole person to ensure that the underlying causes of the pain are removed. Herbs for hormone regulation and the Liver, and remedies to improve constipation or irritable bowel syndrome, are usually needed throughout the month rather than just around and during the period. It may also be necessary to use herbs for congestion of the pelvic blood vessels. These are discussed later in this chapter in the section on 'Pelvic congestion syndrome'.

## Diet and supplements

Prostaglandins cause menstrual pain, but prostaglandin levels can be influenced by hormones and diet. When the diet contains too many saturated fats and not enough of the 'good fats', the levels of prostaglandins associated with muscle spasm are more likely to increase. Hormone imbalances are also likely to alter prostaglandins ratios, again usually in favour of the prostaglandins which increase muscle spasm and the volume of menstrual flow. (One of the reasons the Pill is effective in the treatment of dysmenorrhoea is because it alters hormone levels.)

Dietary changes which encourage high levels of the essential fatty acids can reduce the levels of the series 2 prostaglandins (see Chapter 6 'Prostaglandins') which are associated with an increase in muscle spasm. The dietary precursors to these series 2 prostaglandins are animal products, especially meat, organ meats, egg yolk and prawns. If a restriction in animal fats is combined with the dietary precursors to the series 1 prostaglandins, there is often a reduction in menstrual pain.

### Essential fatty acids

Evening primrose oil and fish oils can improve dysmenorrhoea. Usually a dose of 3 g of either in capsule form is necessary to achieve good results. For the first few months, taking the supplements daily is recommended. This dose can be reduced once pain control is achieved. The role of essential fatty acids for dysmenorrhoea is discussed in Chapter 6 'Prostaglandins'.

### Calcium and magnesium

Calcium and magnesium supplements will sometimes relieve menstrual cramps, but whether this is related to a dietary deficiency of these nutrients is not clear.

Calcium can be taken in the form of an orotate, citrate, chelate or phosphate. Follow the recommended dose on the label. Usually, a combination of calcium and magnesium is best.

## Acupuncture

Acupuncture can help with dysmenorrhoea. The treatments are usually given twice weekly and may involve moxibustion as well (the burning of herbs to warm certain acupuncture points). Some women respond well to acupuncture, others not.

## Chiropractic and osteopathy

Chiropractors and osteopaths believe that period pain can be aggravated by pressure on the spinal nerves that supply the uterus. They treat this problem by manipulating the lower back. A positive response is usually obvious within one or two treatments.



### Self care

## Relaxation

Being able to relax doesn't stop pain, but it does improve a person's ability to cope with pain. Some women use relaxation tapes (hypnotherapists and psychologists will sometimes make a personalised relaxation tape) either when they have pain or in the week prior to the period. Guided imagery and meditation can be useful as well.

## Massage

Massage just before or during the period can help, either from a qualified practitioner or from a friend. Some people use massage as a way of relaxing, but some specific massage techniques like shiatsu, acupressure and foot reflexology can be used to relieve pain and pelvic congestion, and to improve symptoms related to hormone imbalance.

## Aromatherapy

Clary sage, lavender and chamomile oil are all useful for period pain because of their antispasmodic and relaxing properties. They can be used regularly in the bath, as a component of massage oil or as a warm compress, but should not be taken internally. These oils are not used 'neat', and are always diluted with other oils or water.

To make a massage oil, add between 1–3 ml or 20–60 drops of each essential oil to 100 ml of massage oil (olive, almond or apricot kernel

oil are good choices). Massage into the lower abdomen and back when pain is a problem. Some women find it is useful to have a hot bath first, then use the massage oil.

A hot compress is made by adding about 5 drops of each essential oil to a bowl of very hot water, soaking a cloth and then applying it to the painful area after wringing out the excess water. The cloth can be repeatedly dipped in the water each time it cools. Alternatively, a hot-water bottle can be placed over the compress to keep it warm.

Another very useful way to use these oils is in the bath water. Usually only about 5–10 drops are needed in a full bathtub. Valerian oil can be very useful if the period pain prevents sleep, or when it is useful to ‘sleep the pain off’. It can make some people quite drowsy, so don’t expect to be the life of the party afterwards.

## Warmth

Heat of any sort will help to relieve muscle spasm. A hot-water bottle or a hot bath is cheap and easy to arrange. It is also possible to buy small hot packs that can be worn close to the skin—some manufacturers even sell them with specially made underwear which has a little pouch to hold the pack in place. (Warmease is the name of one product.)

A warm ginger pack on the lower abdomen, while messy, can be useful. Place grated root ginger on several layers of cloth and place a hot-water bottle over the top. A little oil on the skin first will prevent burns from the ginger juice. Remove the pack if the skin starts to burn or sting.

While warmth is helpful, getting cold can increase pain. Swimming in cold water can be a problem, but only because of the temperature of the water. The swimming itself can relieve pain.

## Food quality

Period pain which becomes worse with exposure to cold, or improves with warm applications, can be aggravated by iced drinks, ice-cream or cold food from the refrigerator. Raw foods, like salads, can also be a problem. Women with this type of period pain can try food which is at room temperature or hotter; and adding warming spices to food, like ginger, cardamom, coriander, turmeric and cinnamon.

## Sex

Having sex or an orgasm can sometimes help to reduce menstrual pain by reducing muscle spasm and pelvic congestion.

## Smoking

Smoking can either increase or decrease pain. Smokers tend to have period pain less often than non-smokers, possibly because of an inhibition of the prostaglandins responsible for triggering the pain.<sup>3</sup> But if a cigarette smoker does get dysmenorrhoea, her pain is likely to get worse if she smokes during her period.

## PELVIC CONGESTION SYNDROME

Pelvic congestion syndrome is poorly defined and poorly understood. The most frequent symptoms are a dragging or heavy lower abdominal pain, congestive period pain, low backache and pain during sex. Some women develop a vaginal discharge. The pain can become worse towards the end of the day when the blood pools in the veins, or might occur primarily around and during the period. Often anxiety, fatigue, headache and insomnia, in other words premenstrual syndrome, accompany the pelvic symptoms. Typically, the complaint is most common after the age of 35 and after a woman has had a number of pregnancies.

In many cases, when a pelvic examination or laparoscopy is performed, the pelvic blood vessels are engorged, and the uterus is enlarged and tender. Even so, no consistent relationship has been seen between pelvic blood vessel engorgement and pain—some women have swollen blood vessels without pain, while others have the same sorts of symptoms without any evidence of physical changes.

A number of causes of pelvic congestion syndrome have been suggested. It may be related to tension and stress,<sup>4</sup> and can also occur when women have chronic pelvic inflammatory disease.



### ■ ■ The medical approach

Some doctors treat pelvic congestion with progesterone (Provera or Primolut) because they believe that it has a hormonal origin; or sometimes a hysterectomy is suggested. Other doctors think it is a psychosomatic condition.



### The natural therapist's approach

In natural medicine, pelvic congestion is believed to be related to constitutional weakness, hormonal imbalance, lack of exercise, constipation, or stress and tension.

## Herbs for pelvic venous congestion

*Hamamelis virginiana*, *Aesculus hippocasticum* and *Ruscus aculeatus* are used to treat any condition associated with venous congestion or blood vessel inflammation. These herbs have additional anti-inflammatory, anti-haemorrhagic and astringent effects, and are useful when pelvic congestion is accompanied by heavy menstruation, or when other blood vessels are affected and the woman complains of aching haemorrhoids or varicose veins.

Older women or women who have had repeated pregnancies often develop symptoms similar to pelvic congestion syndrome which are caused by pelvic floor or uterine prolapses. The specific herb in this case is *Aletris farinosa*. This herb also contains bitters and is a general tonic. It is ideal for women who are tired and who have heavy, dragging pain, prolapses or low back pain. A combination of *Astragalus membranaceus*, *Bupleurum falcatum* and *Angelica sinensis* is frequently used in Chinese medicine.

## Diet and supplements

The bioflavonoids are a group of naturally occurring compounds, often found in vitamin C-rich foods, which improve the integrity of blood vessels. Rutin and hesperidin are often combined with vitamin C supplements and also occur in fruit, especially citrus fruits, capsicum and buckwheat leaf tea.

The proanthocyanidins are a class of bioflavonoids quite recently recognised as having an even more potent effect on blood vessel fragility and permeability. They are found in many berries, fruit, seeds and barks with a red or purplish colour. These compounds are anti-oxidants and have the ability to prevent collagen destruction, including the collagen of tendons, ligaments, cartilage and bone; the collagen in the skin; as well as that found in the blood vessels. Blueberries are a particularly rich source, and the herb *Vaccinium myrtillus*, which is a combination of the fruit and the leaves, can be used as a medicinal agent.

The pycnogenols, which are extracted from grape seed skin, the bark of Lindes' pine, the bracts of the lime tree and the leaves of the hazelnut tree, are available in supplement form and are believed to be the most effective of all of the classes of bioflavonoids. The supplemental dose is 150–300 mg per day.<sup>5</sup>

The bioflavonoids are unlikely to have a direct affect on the pain, but can be used to improve blood vessel integrity and reduce tissue oedema caused by lymphatic fluid leakage.

A high fibre intake will also help to prevent constipation which will aggravate the symptoms of pelvic congestion.



## Self care

Exercise assists with the return of blood to the heart and helps to prevent blood from pooling in the pelvic blood vessels. When symptoms are severe, it may be necessary for the exercise to be non-weight bearing, such as swimming. Alternatively, exercise such as walking should be taken in the morning before the veins become too engorged.

Sometimes sleeping with the foot of the bed elevated helps relieve the symptoms of pelvic congestion by assisting venous blood drainage overnight.

### UTERINE TONE

Uterine tone is the term used by natural therapists to refer to the muscular activity of the uterus. When uterine tone is normal, muscular contractions are orderly, regular, neither too strong nor too weak, and there is a resting phase between each contraction. This muscular activity continues all the time, even when the uterus is apparently at rest. During menstruation, or the birth of a child, the uterine activity is amplified many times, but when this muscular activity is normal, both the resting phase between the contractions, and their regularity, means that pain is kept within normal limits.

The 'resting phase' or 'resting tone' between contractions is important. Normally, the blood flowing through the uterine muscle carries oxygen and other nutrients. When the muscle fails to relax adequately, the diminished oxygen supply causes pain.

The quality of the pain can be crampy and spasmodic, and some women describe it as being 'labour-like'. Many women also develop diarrhoea, frequent desire to urinate, or vomiting due to the reflex spasm in adjacent organs.

Poor muscle tone, on the other hand, is frequently accompanied by heavy bleeding or 'flooding' at the time of menstruation. There may be a sense of heaviness or pelvic congestion, often described as dull dragging. Lack of tone can be caused by:

- frequent pregnancies
- the recent birth of a child
- conditions which prevent adequate contraction of the uterus such as fibroids, polyps and adenomyosis

#### Treatment

There are three classes of herbs which affect uterine muscle: the uterine tonics, the emmenagogues and the spasmolytics. Each class has a specific action on uterine tone and is discussed in more detail in Chapter 19 'Herbs'. In summary, spasmolytics reduce amplitude of

contraction, frequency of contraction and the resting tone. Emmenagogues have the opposite effect. They increase strength and frequency of contraction, and at high doses increase the resting tone. Uterine tonics normalise uterine activity. If tone is too high, they relax the muscle, if it is too weak, they improve it. Uterine tonics also ensure contractions are regular and rhythmic. They are the most important class of uterine herbs used in gynaecology and obstetrics.

**Table 14.1 Uterine tone**

	<b>Hypertonicity</b>	<b>Normal</b>	<b>Hypotonicity</b>
Tone	Excessive with contraction		Relaxed
Uterine size	Normal	Normal	Bulky
Pain	Spasmodic, cramp-like or colicky		Congestive and dull pain
Flow	Tardy with crampy pain		Excessive with dull pain
Herbal treatment	Spasmolytics, uterine tonics and prostaglandin-inhibiting herbs		Uterine stimulants or emmenagogues and uterine tonics



# 15

## Endometriosis and adenomyosis

### Key words

adhesions	laparoscopy
adenomyoma	laparotomy
auto-immune disease	leukotriene
dysmenorrhoea	IVF
endometrioma	peritoneal fluid
emmenagogue	peritoneum
endometrium	pouch of Douglas
functional	prostaglandins
hypoglycaemia	spasmolytic
hysterectomy	ultrasound

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Normally, the endometrium lines the inside of the uterus and is expelled during each menstrual period, but in endometriosis and adenomyosis, the endometrial tissue starts to grow elsewhere in the body, most commonly in the pelvic region.

*Endometriosis* occurs when endometrial growths develop on the ovaries, the tubes, the outer wall of the uterus, the uterine or ovarian ligaments, the bowel, the ureters or the bladder. The term is made up of the Greek *endon* meaning within, which refers to the endometrium; *metra* for uterus; and *osis* meaning a process, usually a disease process.

*Adenomyosis* is endometrium growing between the fibres of the muscular wall of the uterus.

Endometriosis is a perplexing complaint. No one knows for sure why it occurs, and so prevention is difficult. It causes a multitude of different symptoms, making it hard to diagnose. The course the illness follows is unknown, therefore decisions about treatment are complex and sometimes conflicting. Predictions about future fertility are almost impossible.

## Incidence

The number of women with endometriosis is unknown, but most estimates suggest a figure between 10–15 per cent of menstruating women and perhaps as many as 35 per cent of infertile women.<sup>1</sup> This may not be representative of the true incidence, however, because only women with infertility or pain generally undergo investigative surgery. For instance, between 16–22 per cent of women having a laparoscopy for tubal ligation were found to have mild endometriosis,<sup>2</sup> and when doctors deliberately look for endometriosis during a laparoscopy, the number of women diagnosed almost doubles.<sup>3</sup>

Interestingly, when pathologists are given a sample of tissue and not told of its origin, they are often unable to determine whether it is endometrium or endometriosis. This points to one of the medical dilemmas in treating this condition—to use medications that reduce endometriosis while at the same time causing no irrevocable damage to the endometrium, such that when the drugs are withdrawn, endometrial function returns to normal but the endometriosis does not return.<sup>4</sup>

Some researchers believe there may be different types—and that some of the time, endometriosis may not be severe enough to be classified as a disease. Many women seem to have endometrial implants when conditions are favourable (oestrogen and menstruation for long enough), but only some of these women have endometriosis which causes pain or infertility.<sup>5</sup> For largely unproven reasons, probably related to healthy immune and inflammatory responses, these other (well) women are capable of preventing the endometriosis from progressing further and becoming a serious problem to their health and well-being.

Symptoms are reliable indicators of endometriosis—it is the cause of up to 80 per cent of pelvic pain or infertility. Endometriosis also tends to recur, and about half of all women with endometriosis develop the condition again within five years of completing a successful treatment regime.<sup>6</sup>

## Possible causes

Almost all women who develop endometriosis do so during times in their lives when they are producing oestrogen and menstruating regularly. However, other factors are clearly involved in the development of endometriosis—otherwise every woman would have it.

Additionally, all menstruating women who have patent (non-blocked) Fallopian tubes have some menstrual fluid in the pelvic cavity, but in the majority of cases endometriosis does not develop. This has led to speculation that factors other than menstrual fluid in the pelvic cavity (also called refluxed endometrium or retrograde menstruation) are involved.

## Relative oestrogen excess

Women who develop endometriosis might do so because they have a relatively higher level of exposure to oestrogen than other women. Endometriosis is associated with menstruating more times per year, starting to menstruate at a younger age, and delaying pregnancy and breastfeeding. Relatively high levels of oestrogens might be capable of stimulating a thicker endometrium and more substantial pelvic contamination because of increased menstrual volume. Oestrogen also influences the activity of the natural killer cells (see 'The immune system', page 308).

Other factors such as aromatase activity in the endometrium of women with endometriosis favour increased local oestrogen production which then induces PGE 2 formation.<sup>7</sup> Aromatase is not present in normal endometrium, but is expressed aberrantly in endometriosis, and is also capable of initiating an increase in PGE 2 independent of the oestrogen-induced increase in this prostaglandin. Further studies have documented the absence of progesterone receptors in women with endometriosis.<sup>8</sup> Both of these factors contribute to relative oestrogen excess and increased prostaglandin E2 (see 'The immune system', page 308).

## Retrograde flow

Retrograde flow is probably normal. Almost all women who are examined laparoscopically while menstruating have refluxed endometrium in their pelvic cavity. The difference between women who do and do not develop endometriosis may be related to the volume of the menstrual fluid which is regurgitated up the Fallopian tubes.

The ability of the menstrual blood to pass easily through the cervix and into the vagina is an important factor in limiting the volume of retrograde flow.<sup>9</sup> Women who have an outflow blockage (either partial or complete) from congenital abnormalities, adhesions within the uterus or cervix, or an imperforate hymen, may have excessive volumes of refluxed endometrial cells, and seem to have a higher incidence of endometriosis. One woman with endometriosis recovered completely after surgery was performed to correct a congenital abnormality which had been restricting her menstrual flow.<sup>10</sup>

Prostaglandins imbalance may also allow excessively large amounts of endometrium to reflux up the tubes by increasing uterine spasm *and* increasing Fallopian tube diameter. Women with endometriosis have higher levels of prostaglandins in their peritoneal fluid, and have Fallopian tubes with a wider diameter than usual.<sup>11</sup> Increased prostaglandin levels probably occur because of the inflammatory changes caused by the endometriosis.

## The immune system

The immune system appears to be involved in the development of endometriosis. The number of white cells (leucocytes) found in the peritoneal fluid increases in the early stages of endometriosis. These white cells normally engulf and/or destroy cells which should not be found in the fluid in the pelvic cavity. Of these, the macrophages and the T-lymphocytes are the most important.

Macrophages congregate in tissues to clean away the debris caused by infection or inflammation by engulfing bacteria and cells like damaged red blood cells. In early-stage endometriosis (stages 1 and 2), these cells increase in number and activity to remove the endometrium shed into the pelvic cavity and to suppress the growth of the endometrial implants.<sup>12</sup> In the later stages, macrophage activity declines<sup>13</sup> and may be associated with a reduced ability to suppress the growth of the endometriosis.<sup>14</sup> Women with endometriosis, especially those who are infertile, have been shown to have higher levels of macrophage migration inhibitory factor than healthy women,<sup>15</sup> suggesting greater immune dysfunction in endometriosis sufferers.

Macrophages have many effects. In the early stages of endometriosis, macrophages can prevent fertilisation of ovum; reduce sperm motility; or engulf and destroy sperm, ovum and embryo. This may contribute to the infertility associated with early-stage endometriosis.<sup>16</sup> Macrophages are also believed to increase the rate of adhesion formation associated with endometriosis,<sup>17</sup> and after surgery.<sup>18</sup> Later in the course of the disease, their activity is reduced<sup>19</sup> which may allow the endometriosis to become more invasive.

Macrophages also produce a number of factors which regulate immune activity and inflammation. Important amongst these is prostaglandin E<sub>2</sub> (PGE<sub>2</sub>) which increases uterine muscle spasm and increases blood loss by dilating blood vessels. Another substance produced by macrophages is believed to act as growth factor for the implantation and maintenance of endometrium in the pelvic cavity.<sup>20</sup>

The other white cells of interest are the lymphocytes, especially the T-helper lymphocytes and the natural killer cells. The T-helper cells assist with immune system function and serve as regulators of virtually all immune responses. To do this they produce a number of proteins called lymphokines which, among other roles, stimulate the growth and proliferation of the natural killer cells, and improve the surveillance and engulfing activities of the macrophages. These important functions of the T-helper lymphocytes are depressed in endometriosis.<sup>21</sup>

The natural killer cells are also affected. Natural killer cells can attach themselves to foreign or malignant cells, bacteria or virally-infected cells and inject the cell with a substance to destroy it. When women have endometriosis, the activity of natural killer cells is reduced.<sup>22</sup> This has been linked to oestrogen levels,<sup>23</sup> and to substances

produced by the endometrial tissue itself.<sup>24</sup> High levels of oestrogen diminish natural killer activity, but this improves spontaneously as oestrogen levels fall. Treatments which reduce oestrogen levels are believed to improve the activity of the natural killer cells.

Another theory about endometriosis and the immune system is that endometriosis is an auto-immune condition. Auto-immune literally means that the body has antibodies to its own tissues, but as yet it is unclear whether the auto-immunity develops because of the endometriosis, or whether it precedes the endometriosis and causes it to occur.

## Prostaglandins

Prostaglandins may be involved in the pain, the increased menstrual loss and some of the altered immune responses seen when women have endometriosis. These substances are extremely important factors in the normal function of the reproductive tract and as causative agents in disease and are discussed in Chapter 6 'Prostaglandins'.

It has recently been suggested that young women with severe dysmenorrhoea may be more susceptible to endometriosis, as extreme uterine contractions associated with prostaglandins imbalance may increase retrograde flow.<sup>25</sup>

## Cellular change

Some researchers believe that the cells which line the pelvic cavity alter and become identical to endometrial cells,<sup>26</sup> then behave in the same way as the normally placed endometrium. No one can say exactly why these cells might start to change, but this theory does help to explain the rare cases of endometriosis found in the lungs and other distant sites.

## Risk factors for developing endometriosis

A number of dietary, inherited and lifestyle factors seem to contribute to the risk of developing endometriosis. Not all risk factors carry the same weight and some risks need to occur in combination with others for a cumulative effect to occur.

### Menstrual characteristics

Risk of endometriosis seems to be associated with the frequency, length and regularity of the period. Starting to menstruate at an early age, long (more than seven days) and heavy *periods* are associated with an

increased risk of endometriosis. Long and irregular *cycles* are associated with a lowered risk.<sup>27</sup>

## Family

An immediate family member, either the mother or sister, of a woman with endometriosis is seven times more likely than other women to also have the condition. Daughters of women with endometriosis are also believed to have an increased risk of developing endometriosis.<sup>28</sup>

## Exercise

The amount and timing of physical activity affects the chances of endometriosis developing. Women who engaged in strenuous physical activity during menstruation had an increased risk of endometriosis, thought to be related to an increased volume of retrograde flow.<sup>29</sup> Conversely, women who do regular exercise may have a reduced risk of endometriosis because exercise is believed to decrease the rate of oestrogen production.<sup>30</sup>

## Pregnancy

Full-term pregnancies are associated with a decreased risk of endometriosis, and the reduction of risk increases with each successive full-term pregnancy.<sup>31</sup> This does not mean that pregnancy will ‘cure’ endometriosis, and there are cases of endometriosis being found in the pelvic cavity when a Caesarean section is performed. Breastfeeding for as long as possible after delivery is useful to delay the onset of the period and perhaps the incidence of endometriosis.

## Type of contraception used

The use of the IUD has been associated with an increased incidence of endometriosis, possibly because the device increases the degree of retrograde flow<sup>32</sup> and may temporarily alter prostaglandins levels.<sup>33</sup>

It is not clear if there is a link between taking the Pill and endometriosis. Some studies have reported an increased risk, others a reduced risk, and still others no change.<sup>34</sup> In one study of more than 17 000 women, the incidence of endometriosis was lower in women currently taking oral contraceptives, but higher in former Pill users when they were compared with women who had never taken the Pill.<sup>35</sup>

The Pill might influence the risk of endometriosis in three ways: the

oestrogen component could potentially increase risk (although the amount of oestrogen has steadily reduced over the past 30 years); the progesterone component might decrease risk; and so might the reduced amount of menstrual bleeding observed when women take the Pill.

## **Caffeine**

When 1000 women with infertility were asked about their caffeine consumption, researchers reported a significant increase in the risk of infertility due to tubal disease or endometriosis in the group of women who consumed between five and seven grams of caffeine per month.<sup>36</sup> (A strong cup of tea contains 50 mg, and a cup of coffee contains, on average, 100 mg. Five to seven grams per month is roughly equivalent to two cups of coffee or four cups of tea a day.)

## **Alcohol**

Two recent studies examined the relationship between alcohol and endometriosis. One found alcohol consumption was higher in women with endometriosis and that they also tended to drink more when they were experiencing gynaecological problems.<sup>37</sup> The other reported a decreased fertility rate with moderate alcohol consumption which was associated with either ovulatory disorders or endometriosis.<sup>38</sup>

## **Abnormal bowel flora**

A recent study suggests that endometriosis is associated with changes in normal bowel flora (at least in monkeys). Notably, lower concentrations of lactobacilli and higher gram-negative bacteria concentrations were found. The authors suggested that the changes might be due to intestinal inflammation precipitated by the endometriosis. The ingestion of foods rich in live cultures of lacto bacillus bacteria may be useful for endometriosis sufferers, either as an adjunct to treatment or as part of a preventative protocol.<sup>39</sup>

## **Sex while menstruating**

One American study asked nearly 500 women about their sexual practices to determine whether there was a relationship between sexual activity and the incidence of endometriosis. They found an increased rate of endometriosis when women had intercourse during their period, and an increased rate of infertility related to abnormalities of the

Fallopian tubes.<sup>40</sup> Conversely, a more recent study found that intercourse, especially with orgasm, and tampon use during menstruation were likely to be associated with a decreased risk of endometriosis.<sup>41</sup>

## **Tampon use**

Tampons probably have no effect on the risk of developing endometriosis,<sup>42</sup> however, a link between long-term (more than fourteen years) tampon use and endometriosis has been found.<sup>43</sup>

## **Cigarette smoking**

Smoking reduces risk by altering the levels of oestrogen,<sup>44</sup> but needless to say is not a recommended practice.

## **Environmental factors**

Environmental toxins such as dioxin, DDT and other substances have been implicated in the development of many reproductive disorders, including endometriosis.<sup>45</sup>

## **What it looks like**

### **The ovary**

About 60 per cent of women with endometriosis develop ovarian cysts which vary in size from microscopic spots to cysts the size of tennis balls. When small, the endometrial growths look a bit like blood blisters and are reddish-blue or brown (if the blood is old). Both ovaries are usually affected.

The ovary usually tries to contain the growth of the endometrial tissue by creating a capsule around it, and a cyst is formed. These cysts, called either endometriomas, 'chocolate cysts' or endometrial cysts, are filled with the endometrial blood shed at each period. Even when small, these cysts have a tendency to rupture and spill their contents into the pelvic cavity.

If early rupture does not occur, the cyst/s grow within their thickened capsule. The encapsulated endometrial tissue still responds to hormonal change in the same way as normal endometrium and bleeds with each period, causing the cyst/s to increase in size every month. Over time the blood becomes thick, sticky and dark brown—hence the term 'chocolate cyst'.



Until the cyst ruptures, there will be little scar tissue formed. Instead, there may be increasing pain as the cyst becomes larger and presses on other organs, blood vessels and nerves. Alternatively, the cyst may grow painlessly, but either way, because the size of the cyst typically increases at each period, the risk of rupture multiplies as the months go by.

When large cysts rupture, they usually cause symptoms of acute abdominal pain and shock which usually has to be treated by immediate surgery. Occasionally, the cysts shrink spontaneously because the internal pressure becomes so great that the endometrial tissue is deprived of a blood supply and wastes away (atrophies). Atrophied cysts cause ovarian scarring which looks like multiple small whitened areas within the ovarian tissue.

Much more frequently, however, the cysts will rupture before they grow to any great size, shedding small amounts of menstrual blood. Even a very small amount of blood is extremely irritating to the lining of the pelvic cavity and causes inflammation and pain. Rupture often occurs during or just after the period, and may account for a large percentage of the pain felt with endometriosis.

## The Fallopian tubes, ligaments and the peritoneum

Endometriosis in other locations can occur in conjunction with endometriosis on the ovary or independently. Common sites are in the pouch of Douglas, on the uterine ligaments (the round, broad, and uterosacral) and the pelvic peritoneum. These 'raspberry-like' lesions of varying number and size can be reddish-blue or brownish-black. As the endometriosis worsens, the lesions tend to merge together and form larger islands of endometrial implants.

The endometrial tissue will usually 'menstruate' for some months, but as the disease advances, scar tissue develops and fibrous, solid lumps form over the tissues and organs that have become invaded by the endometrial implants. These are called adhesions.

When endometriosis is severe (stages 3 and 4), it is common to find multiple adhesions; endometrial implants at various stages of development and activity; and the drawing together of adjacent organs which have become increasingly immobilised by the bands and sheets of fibrous tissue.

## The uterus

Endometrial growth within the muscle fibres of the uterus is termed adenomyosis. When the uterus is palpated, it feels larger and may have an irregular shape. Pain is common because the irritant menstrual blood is shed into a confined space between muscle fibres. This causes a

combination of pressure-like symptoms (described as heavy or congestive pain) and cramping of the uterus due to muscle spasm. Occasionally, the endometrial implants form a well-defined benign tumour-like mass called an adenomyoma.

The uterus becomes retroverted (tilted backwards) and fixed (difficult to move) if endometrial growths are located on the ligaments which hold it in place.

## Other sites

Endometrial implants can develop in the lower bowel and cause progressive scarring. This can become severe enough to cause constriction in the colon and occasionally even an obstruction in the bowel. Irritation, severe intestinal cramps and bleeding can occur when moving the bowels, especially during the period.

Infrequently, endometrial implants are found in the bladder or the urethra, and can cause painful, frequent passing of urine. Blood may be detectable in the urine during menstruation. In the vagina or on the cervix, endometriosis looks like small raised patches of bluish tissue which is firm to touch, but which frequently breaks down and bleeds with the period. It may be associated with pain, particularly during intercourse. Occasionally, this type of lesion may develop on the vulva.

Endometrial implants found in scar tissue or around the navel are called endometriomas. These also look like bluish swellings under the surface of the skin or within the scar tissue, and may break through the surface and bleed during the period. These are sometimes a long way from the pelvic region—for example, in the arms and legs, or in the lungs. Endometriomas vary in size and can become quite tender to the touch when they swell as menstruation approaches.

## Adhesions

One of the ways the body protects healthy tissues from irritant body fluids or infective material is to ‘wall off’ the problem area with a protective barrier. Adhesions (scar tissue) are the result. Blood is the irritant when a woman has endometriosis and the normal response (triggered by the macrophages) is to attempt to confine it to as small an area as possible.

Adhesions typically solidify over time and become thickened and fibrous. If the endometriosis progresses unchecked, more and more adhesions are formed. Eventually, the tissue and organs near the endometriosis are totally covered and plastered down by scar tissue and the pelvic organs become one large immovable mass. Any movement of

these constricted organs—for example, during sexual activity or an examination by a doctor—can cause pain or discomfort.

## **Endometriosis and the menstrual cycle**

Endometrial tissue, irrespective of its location, is continually influenced by the cyclic variation of hormones. During the follicular phase, oestrogen has the major effect on endometrial tissue. This is particularly so for the most stimulatory form of oestrogen, oestradiol. Increasing levels of this hormone during the first weeks of the cycle are responsible for the normal thickening of the endometrium, as well as for the growth of endometriosis and adenomyosis.

Endometrial tissue starts to produce microscopic glandular structures under the influence of progesterone during the luteal phase. This causes an increase in the volume of endometrial tissue and the increase in tissue mass can cause bloating and pelvic discomfort or pain before the period.

When menstruation begins and the (normally placed) endometrium is shed vaginally, the misplaced endometrium also starts to break down and is shed into the pelvic cavity (endometriosis) or between the muscle fibres of the uterus (adenomyosis).

## **What it feels like—the symptoms**

Adenomyosis and (especially) endometriosis are both extremely variable diseases with diverse symptoms ranging from debilitating and recurrent pain, pelvic discomfort, painful sex, abnormal bleeding, premenstrual tension and infertility, to no symptoms at all.

### **Pain**

The quality, timing and severity of pelvic pain is extremely variable; and there is no relationship between severity of endometriosis and the severity of the pain. About one-third of women with endometriosis have no pain.

The quality of pain is often described as a congestive, heavy, or a dull, dragging sensation in the pelvis. During the period, the pain can become sharper, more crampy and labour-like—sometimes pain is severe enough to cause fainting, vomiting and diarrhoea. The timing of pain varies from woman to woman. It can occur randomly throughout the month; at ovulation; before, during or after the period; or all the time. Many women report pain during intercourse or during bowel movements. Diarrhoea is often experienced, especially in the earlier stages of

endometriosis.<sup>46</sup> Many women also experience cyclic leg pain, which is thought to be referred pain from the pelvic peritoneum.<sup>47</sup>

## Hormonal imbalance

Most women with endometriosis have symptoms of PMS including anxiety, mood swings, bloating, breast soreness, constipation, food cravings and headaches. These symptoms are believed to be related to an imbalance between oestrogen and progesterone. Symptoms may occur from a few days premenstrually or start just after or at ovulation and last for up to two weeks.

## Cycle length and menstrual flow

Some women with endometriosis have long cycles, but a short cycle with a heavier period is common. The flow is characteristically slow to start and may be thick, black and tarry at first. Irregular cycles, spotting and/or mid-cycle bleeding can be common.

## Making a diagnosis

### The 'suggestive' signs and symptoms

Some symptoms occur so commonly that they indicate the need for a pelvic examination and possibly further (surgical) investigations. The *suggestive* symptoms, in decreasing order of significance, are:

- severe dysmenorrhoea
- infertility
- pain associated with sexual activity
- pain increasing in severity towards the end of the period
- pain before period and at ovulation
- one-sided pelvic pain
- a mother or sister with endometriosis

### Pelvic examination

A fixed and retroverted uterus, as well as nodules or swellings along the uterine ligaments, increases the likelihood of endometriosis. A large, bulky or irregularly shaped uterus can indicate adenomyosis. Referral to a specialist gynaecologist is likely when the combined symptoms and physical findings strongly indicate endometriosis or adenomyosis.

## Ultrasound

An ultrasound can be used to aid diagnosis. This is a type of imaging using high frequency soundwaves to show the contents of the pelvic cavity. (An ultrasound for endometriosis or adenomyosis is performed with the same instrument that is used during pregnancy.) The ultrasound image might be taken abdominally or vaginally. Ultrasound imaging will not reveal endometriosis in the pelvic cavity, but it can be used to diagnose adenomyosis or ovarian cysts. Endometriomas (the particular type of ovarian cyst associated with endometriosis) are blood filled and appear as denser lesions than other fluid-filled cysts.

## The definitive diagnosis

### Laparoscopy

A laparoscopy is the only way that a diagnosis of endometriosis can be absolutely confirmed. The procedure is described in Chapter 20 ‘Drugs and surgery’.

## Treatment



- ■ The medical approach

### Surgery

Laparoscopic removal of endometrial lesions or small cysts is the commonest way to manage endometriosis surgically. Occasionally, some women will need microsurgery to remove adhesions from the pelvic cavity or the tubes; and serious endometriosis or intractable pain may require a hysterectomy.

Laser laparoscopic surgery for the treatment of pain associated with endometriosis is very successful. In one study of pain relief following laparoscopic laser, 62.5 per cent of women said that their pain was reduced or resolved. There were no complications related to either the operation or the laser.<sup>48</sup>

However, surgical treatment of endometriosis will not necessarily increase fertility. Similar pregnancy rates were shown with laparoscopy for observation, and laparoscopy for diathermy or laser. In fact, a number of studies suggest that neither the medical nor surgical treatment of mild endometriosis improves the fertility rate more than no treatment at all. In severe endometriosis, laser treatment seems to be superior to laparotomy or diathermy in improving fertility rates.<sup>49</sup> The common

surgical procedures used to treat endometriosis are described in Chapter 20, 'Drugs and surgery'.

## Drugs

The aim of drug treatments for endometriosis is to either reduce the volume of menstrual flow (the Pill), to create a pseudo-pregnancy state (the progestogens Provera and danazol, or the Pill when given continuously) or to cause a temporary menopausal state (the GnRH agonists). Recently the controversial abortion drug mifepristone (RU486) has been clinically trialled for use in endometriosis.<sup>50</sup>

The decision to use one type of medication over another depends on the woman's history, the severity of the condition and her desire to become pregnant. These drugs, and the prostaglandins inhibitors used for the treatment of menstrual pain, are discussed in Chapter 20 'Drugs and surgery'.



### The natural therapist's approach

The aims of treatment are to improve relative oestrogen excess and immune system irregularities; to regulate prostaglandin synthesis; to ensure normal uterine function and menstrual flow; and when appropriate, to improve fertility. Dietary and lifestyle changes usually need to be ongoing to minimise chances of a recurrence.

The amount of pain and the desire for pregnancy are the characteristics of a woman's history that determine the type of treatment she is to be given. For instance, some categories of herbs, such as the emmenagogues, cannot be given when pregnancy is desired; when pain is severe, it will be given priority of treatment.

Many of the complaints associated with endometriosis are covered in detail elsewhere in this book. For instance a whole section is devoted to the management of period pain, another to the treatment of excessive bleeding, and another to PMS. In this chapter, only the essentials will be given if the treatment is covered in another section, and the reader will be directed to that section for further information.

## Reducing the growth-promoting effects of oestrogen

Endometriosis is believed to be related to a relative oestrogen to progesterone ratio imbalance which causes the PMS-type symptoms as well as the abnormal production of endometrium. Oestrogen levels are influenced by 'competitive inhibition' with plant oestrogens; and by dietary changes and exercise to improve oestrogen clearance. This is

discussed in the section on relative oestrogen excess in Chapter 5 'Maintaining hormonal balance'. The aim is to keep oestrogen within normal limits, rather than reduce the levels below normal as with medical intervention that increases bone density loss as well as requiring additional treatment to offset such side-effects.<sup>51</sup>

In essence the regime involves increasing dietary fibre intake; eating bitter foods such as chicory and radicchio; cabbages; yoghurt; reducing fat intake; and exercising regularly.

Some women will not respond adequately to dietary or herbal manipulation of oestrogen. For them an oestrogen-deprived or oestrogen-free environment produced with drugs is the best place to start. In the meantime, all of the other aspects of treatment can be started (apart from hormone regulation, which cannot be undertaken while women are on drugs) in preparation for the time when they are taken off medication.

## Uterine tone

Uterine tone is primarily effected by the prostaglandins balance and is responsible for the ease of menstruation and the amount and type of menstrual pain. Herbal and other remedies are selected from those which:

- initiate orderly uterine contractions: the uterine tonics
- encourage an expulsive uterine action: the emmenagogues
- reduce excessive and abnormal uterine spasm: the spasmolytics
- rectify prostaglandins imbalance.

## Uterine tonics

Uterine tonics initiate regular and orderly uterine contractions and regulate uterine tone. *Angelica sinensis* is the principal herb used for endometriosis; *Caulophyllum thalictroides*, *Chamaelirium luteum* and *Rubus idaeus* are also indicated.

## Emmenagogues

Sluggish menstrual flow, which is thick, tarry and dark, is a common symptom of endometriosis and indicates a need for emmenagogues (uterine stimulants). Emmenagogues have an expulsive effect on the uterus, and can hasten the menstrual flow. They are indicated for congestive symptoms including heavy dragging pain, especially when menstruation is late. They are always prescribed with the uterine tonics. *Artemesia vulgaris* and *Ruta graveolens* are amongst the most useful.

## Spasmolytics

Spasmolytics reduce uterine muscle spasm, relieve pain and ensure orderly uterine evacuation. The most important for endometriosis include the *Viburnums*, *Paeonia lactiflora* and *Corydalis ambigua*.

## Prostaglandins regulation

The omega-3 essential fatty acids found in oily fish have the greatest impact on menstrual pain and retrograde flow caused by prostaglandins or leukotriene imbalance. Between three and five 200 g serves of fish per week, or 2–3 capsules of fish oils daily containing around 200 mg of EPA and 100 mg of DHA, are beneficial.

The herbs *Tanacetum parthenium* and *Zingiber officinale* also have prostaglandins-inhibiting effects and can improve menstrual pain. *Tanacetum parthenium* is a Cold herb, *Zingiber officinale* is Hot, and as most menstrual pain is worsened by cold, *Tanacetum* is often combined with *Zingiber*.

These protocols are especially important in the management of dysmenorrhoea in younger women, as it may have some preventative effects on the development of endometriosis.<sup>52</sup>

## PMS

PMS is common when women have endometriosis or adenomyosis. Natural therapists use these symptoms to determine the degree of hormonal imbalance and as an indication of the success of treatments. PMS can be associated with a range of hormonal changes and the treatment of these types of hormonal imbalance are outlined in the section ‘The premenstrual syndromes (PMS)’ in Chapter 8.

## Mood swings

Episodes of depression and irritability often accompany endometriosis. Common symptoms are feeling overwhelmed, tearful and irritable; feeling inadequate and as though everything is too much; inappropriate tiredness; irritability and ‘on a short fuse’ all the time. These may become worse premenstrually when other physical symptoms are at their peak, and are often confused with PMS, but unlike PMS, these symptoms last all month.

There are a number of reasons why women have these sorts of feelings, not the least of which is continual pain or the anticipation of the arrival of the period. Infertility, the constant recurrence of the condition and the inevitability of PMS are also common triggers. Many



women feel worn down by their repeated experiences with surgery and the frustration of a condition which seems so totally out of their control.

These types of feelings are called 'reactive' to indicate that they have occurred as a reaction to an event, in this case to the problems associated with endometriosis.

Although counselling is one way of dealing with reactive depression—probably the best way for most people—it is not always acceptable. *Hypericum perforatum*, the B complex vitamins, and the common nervines such as *Withania somnifera*, *Scutellaria lateriflora* and *Passiflora incarnata* are useful. Exercising often helps, especially exercise first thing in the morning and of the long, slow, distance variety. Functional hypoglycaemia often aggravates mood swings or depression. A hypoglycaemic diet is included on pages 150–2.

## Infertility

Many women consult natural therapists for infertility associated with endometriosis. Often they have been treated by gynaecologists and have tried in-vitro fertilisation (IVF) without success, and try natural medicine as the last resort. All of the problems associated with endometriosis-related infertility—prostaglandins imbalance, luteinised unruptured follicle syndrome, failed ovarian follicle development, infrequent ovulation, immune dysfunction and adhesions—need to be treated to provide the most stable environment for conception to take place.<sup>53</sup>

### Immune system irregularities

The traditional treatments for conditions such as endometriosis were based on symptoms rather than any knowledge of the underlying causes. The common and recurring symptoms of lower pelvic discomfort, heaviness and dragging pain were referred to as pelvic congestion and said to be, in part, related to lymphatic congestion. It has since been discovered that the herbs used for lymphatic congestion, the 'lymphatic drainage herbs', all have an effect on the immune response.

*Calendula officinalis* is the favoured lymphatic drainage herb in endometriosis. It reduces muscle spasm, lessens menstrual bleeding and reduces inflammation. It also has well-known effects as a wound healer and antiseptic when applied to the skin, and has an immune-stimulating effect when taken internally. It is useful when there is dull, congestive pain with heavy bleeding; and in any case of menstrual disorder with altered immune function. All of these factors are common to endometriosis.

Fish oils, star flower oil and evening primrose oil alter prostaglandins and leukotriene levels and may be capable of improving fertility. Evening primrose, from between 2000–3000 mg daily, and/or fish oils also

between 2000–3000 mg daily, can be taken as supplements. A high essential fatty acid diet is also recommended.

A number of practitioners have reported improvement in the severity of endometriosis with the use of grape seed extract. The exact mode of action is unknown, but may be related to an inhibition of the release of prostaglandins, leukotrienes and other compounds that promote inflammation. Current research suggests that exposure to environmental toxins, and free radical damage, may contribute to the development of endometriosis, and the antioxidant effect of grape seed may be of benefit.<sup>54</sup> The standard dose of grape seed extract is between 150–300 mg per day of the oligomeric procyanidins (pycnogenol).

### Problems with ovulation

A number of problems are associated with ovulation when women have endometriosis. In the follicular phase, ovulation can either be delayed or the follicle might not develop normally. Luteinised unruptured follicle syndrome—where the follicle develops but the egg is not expelled—is thought to be one of the causes of infertility which effects the luteal phase.<sup>55</sup> The other, lower than normal progesterone levels, is often referred to as a luteal phase defect and is commonly seen in association with luteinised unruptured follicle syndrome. These conditions are associated with ovulatory infertility or early miscarriage.

Inflammation is thought to contribute to reduced fertility and biochemical changes associated with endometriosis impede implantation.<sup>56</sup>

Herbs to modulate hormonal balance, such as *Vitex agnus-castus* and *Paeonia lactiflora*, combined with the steroidal saponin-containing herbs are clinically effective. Using *Tribulus terrestris*<sup>57</sup> or other female tonic herbs at the upper end of the dose range during the follicular phase of the cycle can improve ovulation rates. *Vitex* is a difficult herb to use and should be prescribed by a trained herbalist. Ovulatory hyperstimulation has been observed in isolated cases.<sup>58</sup>

Other herbs known to non-specifically enhance fertility include *Aletris farinosa* and *Angelica sinensis*. Vitamin E also seems to improve fertility, possibly by reducing adhesion formation.

### Adhesions

Adhesions increase when women have endometriosis. Vitamin E has been shown to reduce adhesion formation through unknown mechanisms.<sup>59</sup> It is likely that the reduction in adhesion formation is related to the inhibition of the series 2 prostaglandins production (which increase inflammation),<sup>60</sup> and to better removal of debris in the pelvic fluid by white cells.<sup>61</sup>

Doses of 500–1000 IU of vitamin E can be used to prevent adhesion formation, although doses at this level should be supervised. Large doses of vitamin E (exceeding 500 IU) should not be given in the immediate

pre- or post-operative period as there is a slight chance that bleeding may occur due to reduced platelet adhesiveness.

## Irritable bowel syndrome and constipation

Irritable bowel syndrome commonly accompanies endometriosis, and can aggravate the severity of period pain. Because some of the symptoms of endometriosis are so similar to irritable bowel syndrome, many women do not realise that they have bowel spasm, and treat their pain and bloating inappropriately.

When irritable bowel syndrome is suspected, the diet outlined on pages 296–7, and especially the seed breakfast, is useful. The seed breakfast also has the advantages of being rich in trace minerals, calcium and essential fatty acids.

Constipation is also a common problem for many women when they are expecting a period. Apart from a sense of pelvic discomfort, constipation usually aggravates dysmenorrhoea and reduces the capacity for oestrogen clearance via the bowel. Bitter green vegetables and dietary fibre, such as that obtained from the seed breakfast, are the best remedies for constipation.

Analgesics containing codeine are very useful for pain control, but are inclined to aggravate constipation. A chemist or doctor can give advice on the most suitable codeine-free preparation.

### **CASE STUDY: TREATMENT AND DIET FOR ENDOMETRIOSIS**

Deborah is 28 and has had endometriosis since her early twenties. She has had one endometrioma removed and has had a variety of drugs including Provera and the Pill. She has recently decided to come off all medication, but has had bad period pain. Recently she fainted while doing aerobics during her period because of the severity of the pain. Her other symptoms are premenstrual acne, PMS and a tendency to constipation.

For the last four years she has been studying, but now has her first job which she finds very stressful. She and her partner would like to start a family in about two years (this is the reason for coming off medication), and are using condoms for contraception. She had one termination nine years ago.

#### **Her treatment**

*Diet:* Low-fat, high-fibre diet with no coffee, chocolate or alcohol. Bitter greens every day as a salad or cooked vegetables. Chinese or

other cabbage at least three times a week. Review of diet after three months.

*Exercise:* 30 minutes of rapid walking every second day, no exercise during the period, and one class of aerobics weekly.

*Herbs:* *Vitex agnus-castus*, *Chamaelirium luteum*, *Angelica sinensis*, *Berberis vulgaris* and *Cinnamomum zeylanicum*, one dose morning and night. Period pain mix consisting of *Viburnum opulus*, *Corydalis ambigua*, *Zingiber officinale*, *Anemone pulsatilla*, *Paeonia lactiflora* and *Glycyrrhiza glabra*, taken 2–3 hourly for period pain as needed.

*Supplements:* Vitamin B complex, one tablet daily and increased to two daily (divided dose) for ten days prior to the period. Vitamin E 500 IU for adhesions.



### Self care

The possibilities for relief of some of the symptoms associated with endometriosis by adopting simple dietary and lifestyle changes are very good. Many women also seem to be able to reduce their recurrence rate by continuing to adhere to these changes:

- Reducing risk factors, where possible, taking regular exercise, reducing caffeine and alcohol intake.
- Adhering to a low fat, high fibre and high essential fatty acid diet.
- Having a regular intake of the cabbage family vegetables, phyto-oestrogens and lignans for competitive inhibition of endogenous oestrogen.
- Adopting a lifestyle which balances work and relaxation, and allows for some time to have fun, relax and a good laugh.
- Finally, make sure of good reliable professional back-up. Endometriosis is too complicated to be taken on alone.

## THE LIVER

In antiquity, the liver was considered to be the 'seat of the mind' and a liver imbalance could give rise to grave emotional states. The humoral theory described two personality types (temperaments) related to bile (and directly or indirectly to the liver)—the Choleric and the Melancholic.

The Choleric person was hot-tempered and irascible. So common has this concept remained that we still describe people who are bad tempered as being 'liverish'. Melancholic was the temperament associated with the Black Bile. An excess of Black Bile might cause introversion, depression or even insanity.

The humoral theory also described a wide range of physical complaints, including problems associated with menstruation. A Hot womb, caused by an excess of Yellow Bile, caused fiery and red menstrual loss; a Cold womb led to too little menstrual loss and a feeling of coldness and heaviness in the pelvic area.<sup>62</sup>

The symptoms associated with the Liver are not peculiar to Western thought and the humoral theory. The symptoms of Liver disharmony described by traditional Chinese medicine include irritability, depression, frustration, anger and digestive upsets; and common gynaecological complaints such as PMS, irregular menstruation, light periods or amenorrhoea, infertility and dysmenorrhoea.<sup>63</sup>

Many of the broader concepts of the humoral theory and Liver dysfunction are incorporated into the herbalist's diagnosis and treatment today. Herbs and foods which improve liver function are used to treat conditions accompanied by emotional symptoms, such as PMS; as well as conditions caused by hormonal imbalance such as fibrocystic breast disease, endometriosis, fibroids and some types of excessive bleeding. Liver function is adversely affected by poor diet, over-eating, excessive intake of fats, sugars, alcohol and coffee; in addition to the burden of environmental poisons.

As the major organ of detoxification in the body, the liver must be ready to process the (approximately) 3000 chemicals which can be added to foods during processing, and around another 12 000 chemicals which can be used in food packing materials; the pesticides, fungicides and antibiotics which commonly contaminate food and the environment; and the prescribed, recreational and social drugs. Since early last century, an estimated 4 million new chemicals have been introduced into the environment. For about 80 per cent of these, the long-term effects on the body are unknown.<sup>64</sup>

### **Functions of the liver**

- Detoxification of drugs, chemicals and poisons.
- Bile production.
- Storage of vitamins (especially the fat-soluble vitamins A, E, D and K) and minerals.
- Storage of sugar in the form of glycogen.
- Storage of blood which can be quickly released if needed.
- Heat and energy production from the breakdown of fats, proteins and carbohydrates.
- Production of the plasma proteins.
- Break down, excrete and/or recycle hormones.

## Optimising liver function

### Protection of liver cells

- *Silybum marianum* seeds contain the most potent liver cell protective compounds known to exist.
- Anti-oxidants, such as vitamins A, E and C, beta-carotene and selenium.
- Phosphatidyl choline, or lecithin, is a major component of healthy cell membranes. It protects liver cell membranes from damage from the continual attack of toxins and free radicals.

### Improved bile flow

- Bitter foods and herbs (see Table 15.1) increase the flow of bile which is the vehicle for removing the substances broken down by liver cells.

### Improved detoxification

- Specific herbs can improve liver enzyme activity such as *Silybum marianum* and *Schizandra chinensis*.
- Sulphur compounds found in cabbage family vegetables, garlic and dandelion can induce enzyme reactions in the liver which assist with detoxification. Brussels sprouts and cabbage, for example, can improve the breakdown and removal of some drugs.
- An adequate protein intake is necessary to bind (conjugate) some toxic materials.
- Carbohydrates assist with detoxification pathways. Low kilojoule diets may not provide enough carbohydrate for the liver to function as an organ of detoxification.
- Minerals such as magnesium, calcium, zinc, copper and iron are essential components of many of the enzymes needed in detoxification pathways and are also involved in biochemical reactions which help to prevent free radical damage in liver cells.
- Ingestion of the foods which inactivate oestrogens through methylation—a chemical reaction which occurs in the liver—especially through the methionine found in beans, eggs, onions and garlic.

**Table 15.1 Bitter foods and herbs**

#### Foods

Endive  
Chicory  
Silverbeet  
Radicchio  
Cos (outer leaves)  
Mustard greens  
Dandelion leaf  
Dandelion root (coffee)  
Grapefruit

#### Herbs

St Mary's thistle (*Silybum marianum*)  
Gentian (*Gentiana lutea*)  
Barberry (*Berberis vulgaris*)  
Centauray (*Centaurium erythraea*)  
Hops (*Humulus lupulus*)  
Artichoke leaves (outer) (*Cynara scolymus*)

# 16

## Ovarian cysts

### Key words

aromatisation

cystadenoma

fibroma

follicular cyst

FSH

hyperprolactinaemia

insulin resistance

LH

luteal cyst

oestradiol

oestrone

pedicle

pedunculated cyst

peripheral conversion

polycystic ovarian

syndrome (PCOS)

SHBG

teratoma

torsion

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The ovary consists of many complex tissues which perform a variety of cyclic functions such as ovum production and hormone secretion. Sometimes ovarian tissue begins to develop abnormally and cysts or tumours form. Ovarian cysts range from cancerous to completely harmless, requiring no treatment.

Ovarian cysts can be structurally different from each other and often have unique behaviour patterns. For example, if the cells that produce ovum develop abnormally, they may become a dermoid cyst which contains teeth and hair, a rather bizarre but common form of ovarian cyst. If the cells which produce hormones for the natural cycle develop abnormally, the resulting cyst may produce large amounts of unnecessary hormones. Some cysts are associated with painful conditions like endometriosis; others may develop and resolve spontaneously without the woman ever knowing.

Many ovarian cysts are symptom free. Often women only discover they have an ovarian cyst because of a routine examination, or when an examination is being performed for another reason. Sometimes pain

during intercourse can be a warning sign, and very large cysts can cause pressure symptoms, abdominal enlargement and discomfort.

An ultrasound will detect most ovarian cysts and a doctor can sometimes make an 'educated guess' about the type because some types are characteristically solid, semi-solid or fluid-filled. However, many of the different types of cysts have forms which can be benign, malignant or 'borderline', and it is usually not possible to differentiate between these different forms without surgery.

The most reliable method of telling whether a cyst is malignant, benign or somewhere in between, is to examine it under a microscope. This will require a general anaesthetic and either a laparoscopy or laparotomy so that the cyst can be removed. Because of the many different cyst types, and the possibility that some may be cancerous, it is essential that women with ovarian cysts know which type of cyst they and their practitioners are dealing with.

## **BENIGN OVARIAN CYSTS**

There are many different types of benign ovarian cyst. The most common ones are the physiological cysts and those associated with polycystic ovarian syndrome (PCOS), both of which develop as a result of a disturbance in the normal processes associated with ovulation. They are discussed later in this chapter. Other less common varieties include the cystadenomas, fibromas, dermoid cysts and Brenner cysts. Many are symptom free unless they rupture or twist on their stem or pedicle.

### **Serous and mucinous cystadenomas**

These types of ovarian cyst frequently grow to very large sizes and are sometimes attached to the ovary by a stem or pedicle which carries the blood supply to the cyst. Pain or rupture of the cyst is usual if torsion occurs.

Torsion can be complete or occur intermittently as the cyst twists and then untwists again. Complete torsion is usually accompanied by extreme pain and often vomiting. There is a high risk of rupture because the cyst tends to swell. Incomplete or intermittent torsion usually causes episodic pain.

Ovarian torsion often occurs when cysts are large, and carries a high risk of ovarian damage due to ischaemia. When not resolved quickly, ovarian blood supply can be completely occluded, resulting in swelling, pain and ovarian tissue death.

The serous cysts are filled with a thinnish liquid, while the mucinous ones contain a much stickier mucus-like substance. Rupture of both types is associated with pain, but the mucinous cyst causes more irritation of the pelvic lining and adhesions are more common. They do



not affect ovulation, but rarely reabsorb by themselves, and surgery is advisable.

These ovarian cysts have a malignant form called serous or mucinous cystadenocarcinoma. These should be removed as soon as possible.

## **Fibromas**

Fibromas are fibrous, often solid and sometimes produce oestrogen. Absolute confirmation of their type can only be made after they are examined under a microscope, and as they rarely go away of their own accord, doctors usually recommend that they be removed.

## **Dermoid cysts (teratomas)**

Dermoid cysts form as a result of abnormal multiplication of the cells which produce the ovum. These ovum-producing cells have the capacity to give rise to any of the many different types of tissue normally found in the body. Erratic growth of these cells, as occurs in dermoid cysts, can produce structures including hair, teeth, bones and skin fragments. Dermoid cysts can be pedunculated, sometimes become malignant and will not resolve spontaneously. They rarely rupture, but when they do their contents are extremely irritating and they cause severe pain. They are best removed surgically.

## **Brenner tumours**

These are usually small and benign, but can sometimes become malignant. They can occur at any age, but are more common when women are post-menopausal. They are sometimes associated with abnormal periods and surgical removal is usually recommended.

## **MALIGNANT OVARIAN CYSTS (OVARIAN CANCER)**

Ovarian cancer is quite rare, but carries serious implications because it is usually symptom free until it is relatively advanced. The earlier ovarian cancer is diagnosed, the greater the chances of survival—the early removal and treatment of a cancerous cyst can result in a complete cure in some cases. Ovarian cysts can be ‘borderline’—neither benign nor malignant, but somewhere between the two, and some benign

ovarian cysts may become malignant. Some tumours might metastasise to the ovary, but have their origin elsewhere.

To reduce the risk of undiagnosed ovarian cancer, women over 40 should have an annual internal examination and all women should have an internal examination when they have a Pap smear. Routine pelvic ultrasound screening was also suggested as a way of reducing the risk of ovarian cancer, but was found not to be cost-effective.

## **HORMONE-PRODUCING OVARIAN CYSTS**

Hormone-producing cysts, also known as functioning cysts, have the ability to produce oestrogens or androgens and therefore interfere with the cycle or fertility. They are usually diagnosed because of their effects on the period or, in the case of those cysts which produce androgens (male hormones), because they have masculinising effects including male-pattern hair growth, deepening of the voice, decreased breast size and the development of a male-type body shape. These androgen-producing cysts are rare. Removal of the cyst should rectify the problems, although the voice changes may persist.

The ovarian cysts which produce oestrogen are the more common of the two. They can cause irregular and heavy bleeding and abnormal cell changes in the endometrium which can progress to endometrial cancer. All of these symptoms are related to the prolonged and elevated exposure to oestrogen. These cysts vary in size, but are often quite small. Ovulation can still occur despite the excess oestrogen levels, albeit erratically.

## **Treatment**

The treatment of ovarian cysts needs to be adapted to prevent the complications associated with each type. Complications can include the spread of cancer; rupture; twisting of the cyst on its pedicle, commonly known as torsion; interference with the regularity of the cycle; destruction of ovarian tissue; and infertility. The three strategies often adopted are surgical removal, hormonal treatments, or 'wait and see'.

Many cysts require no treatment. If the cyst is small, and there is a very good chance that it is benign and will reabsorb of its own accord, it is safe to observe and not treat. This is especially so for young women who develop benign physiological cysts, which usually reabsorb within two cycles. However, when any cyst is present for more than two cycles, surgery is often recommended because benign and trouble-free cysts are less likely to persist for this long. The Pill may be recommended when

recurrent cysts are a problem or for some cases of PCOS because it prevents ovulation which is the source of these cysts. Long-term use of the Pill is also associated with a lower risk of developing ovarian cancer.

Surgical removal of a cyst is advised if it has characteristics which indicate possible complications or serious illness. Cysts which continue to grow, fail to reabsorb or which might be malignant fall into this category. Some women seek natural treatments to ‘dissolve’ or ‘shrink’ the cyst as an alternative to surgery. This is not a good policy—treating ovarian cysts without specific knowledge of their type is asking for trouble.

Torsion of ovarian cysts is associated with severe pain and will require surgery. Torsion is when the ovary containing the cyst twists and cuts off its own blood supply, causing death of the ovarian tissue.

Large cysts, especially those larger than 5 cm, can rupture at any time causing pain and adhesions. Blood-filled cysts associated with endometriosis (endometriomas) tend to grow with each period and are prone to rupture, even when quite small. Growing or large ovarian cysts are removed because they can destroy normal ovarian tissue, sometimes so severely that the entire ovary atrophies and becomes incapable of ovulation or hormone production. If malignancy is suspected, surgical removal is also recommended.

Ovarian cancer is a concern for all women. Although the incidence is very much less for younger women, one in every three ovarian cysts which occur from 45 onwards is cancerous. In this age group, when a small benign-looking cyst is discovered the doctor may wait for one cycle, but if it persists or if there is any doubt about the type of cyst, the doctor will suggest immediate removal.

Ovarian cysts in post-menopausal women are suspicious (because ovulation has stopped, ovarian cysts should not form) and there is a high likelihood of malignancy. They should be removed as soon as possible. Hormone ‘markers’ are often produced by ovarian cancers and these can be used as diagnostic aids and, after surgical removal, as a way of telling whether the malignancy has been completely eradicated.

## **PHYSIOLOGICAL CYSTS**

Physiological cysts are also known as simple cysts or functional cysts (and should not be confused with ‘functioning cysts’, which produce hormones). Functional cysts represent a deviation in the normal functioning of the ovary rather than an expression of abnormal cell growth. There are two sorts of physiological cysts, follicular and luteal, which are named after the time they appear in the menstrual cycle.

## **Follicular cysts**

Follicular cysts are formed due to a deviation of the normal ovulation and occur quite frequently. They develop as a consequence of a developing follicle (egg sac) and may occur either because the most mature follicle fails to release its ovum and continues to grow, forming a cyst; or one/some of the other developing follicles fail to disintegrate and form a cyst instead.

In most cases they are small, cause few symptoms and may only be discovered because of a routine examination. They generally require no treatment and are usually re-absorbed without causing any problems. Occasionally, these cysts may rupture, but since they are small and don't often contain blood, they usually require no further treatment.

## **Luteal cysts**

Luteal cysts develop in the second phase of the cycle after the corpus luteum has formed. If large enough they can cause dull pain on one side, but most of the time they are only discovered because of a routine examination. They require no treatment and will usually be re-absorbed uneventfully.

Very occasionally luteal cysts rupture. When the cyst is small, the pain is generally mild, requires no treatment and ceases once the period starts (due to the degeneration of the corpus luteum which is the source of the minor blood loss). However, large blood-filled cysts can be associated with quite a degree of pain and may be confused with ruptured ectopic pregnancy or other causes of abdominal pain.

Luteal cysts may interfere with progesterone production and can cause irregularities in the cycle. The progesterone stimulates the uterine lining and can delay the onset of menstruation, or can cause an alteration in blood loss during the period. Luteal cysts usually disappear after one cycle, and the menstrual cycle will return to normal without any treatment.



### **■ ■ The medical approach**

Physiological cysts are diagnosed with ultrasound imaging. They rarely require treatment; however, some women develop these cysts very regularly and sometimes suppression of ovulation with the Pill is suggested as a treatment.



### **The natural therapist's approach**

Physiological cysts require no treatment unless they occur frequently and interfere with the cycle or cause pain. The herbs used most often

are *Chamaelirium luteum* and *Paeonia lactiflora*. *Chamaelirium luteum* is believed to normalise ovarian function, including the processes of ovulation (it is also used for infertility associated with erratic ovulation), and is specific for the treatment of ovarian cysts. The way that it works is not fully understood because, unlike the Pill, it does not stop ovulation, but it will usually prevent the formation of recurrent cysts. *Chamaelirium luteum* is now endangered and should not be used until a commercially grown source is available. Other herbs containing steroidal saponins may be suitable substitutes, but little information on their use is available.

*Paeonia lactiflora* has been shown to normalise follicular development because of its effect on the aromatase enzyme and may prevent cyst formation. These herbs are discussed in Chapter 19 'Herbs'.

## **POLYCYSTIC OVARIAN SYNDROME (PCOS)**

The term 'polycystic ovary' (PCO) is actually a misnomer and refers to the ultrasound appearance of an ovary which appears to have many small cysts. In reality, these 'cysts' are follicles. Polycystic ovaries will be seen on the ovarian ultrasound of about 20 per cent of all women, many of whom will have regular cycles and ovulatory patterns, and normal hormone profiles. The ovarian ultrasound appearance of PCO is common to almost all women who have anovulatory cycles, irrespective of the underlying cause of the ovulatory failure. When PCO is seen on an ultrasound it is an indication that some type of endocrine abnormality *might* exist but, equally, it could be a normal feature of that woman's ovaries.

Polycystic ovarian *syndrome* (PCOS), however, is a complex complaint that usually presents with multiple ovarian follicles as well as hormonal abnormalities and irregularities in ovulation and menstruation. Although about 20 per cent of women have ovarian follicles on ultrasound screening, only about 7–8 per cent of these women have PCOS. However, 70–80 per cent of women who do not ovulate regularly have PCOS, and PCOS will be the diagnosis more than 80 per cent of the time when women have excessive hair growth and regular menstruation.

PCOS is primarily a metabolic condition commonly associated with insulin resistance. It is associated with a *tendency* to over-activity or over-production of androgens, and with erratic ovulation. Insulin resistance and glucose intolerance also commonly occur. Symptoms of PCOS can be failure to menstruate, failure to ovulate, hirsutism, acne and obesity; women with PCOS might have one, any or all of these complaints. Women with the syndrome have at least seven times the risk of heart attacks and heart disease of other women and by the age of 40, up to 40 per cent will have developed type 2 diabetes or impaired glucose tolerance.<sup>1</sup>

Making a diagnosis of PCOS is complicated because the combination of symptoms commonly encountered—ovulatory failure, hirsutism, obesity, etc.—is not unique to PCOS. Women who have other endocrine disorders may develop similar symptoms. These conditions include Cushing’s disease; inherited adrenal disorders such as congenital adrenal hyperplasia; hormone-producing cysts or tumours of the ovary and adrenal gland; hyperprolactinaemia (excess prolactin production); and disturbed function of the thyroid gland.

## Diagnosis

Investigations for PCOS are frequently instigated because a woman has menstrual cycle irregularity, amenorrhoea, and symptoms of androgen excess such as male-pattern hair growth. If PCOS is suspected the first step is a series of blood tests to evaluate serum androgen levels including DHEAS and free androgen index (FAI), as well as SHBG and FSH and LH levels. When symptoms of androgen excess are severe, serum levels of 17-OH progesterone are usually tested to rule out the possibility of congenital adrenal hyperplasia. This condition is rare in Australia, but is treated in much the same way as PCOS—see treatment for androgen excess, pages 82–3.

The next step is to establish whether the woman has insulin resistance. The euglycaemic clamp test is the best diagnostic method to confirm insulin resistance but because it is difficult to perform and also very invasive, it is generally only used in specialised experimental situations. The most usual method is to draw blood to test the fasting insulin levels and, if indicated, to perform an oral glucose tolerance test (GTT). A number of different diagnostic parameters are recognised as being indicative of insulin resistance. A fasting insulin level between 10–14 IU/L suggests mild insulin resistance; while levels above 20 IU/L are diagnostic. A GTT is usually needed to confirm the diagnosis when the fasting insulin levels are in the mid range. An insulin level exceeding 80 IU/L during the oral GTT is strongly suggestive of insulin resistance. A GTT is generally not considered necessary when fasting insulin levels are below 10 IU/L.

An alternative method of diagnosing insulin resistance is the so-called HOMA (Homeostasis Model Assessment) index which is calculated using the following formula:

$$\frac{(\text{Mean of 3 fasting insulin levels IU/L}) \times (\text{Mean of fasting glucose mmol/L})}{22.5}$$

where:

≤ 2.0 = normal

2.0–≤ 3.0 = mild insulin resistance

> 3.0 = moderate or severe insulin resistance

Additional tests ordered will depend on the combination of symptoms the woman has, but often thyroid function and prolactin levels are checked, especially if oligomenorrhoea or amenorrhoea are problems. Blood lipid evaluation is suggested when women are obese because 30 per cent of obese women with PCOS have an abnormally low HDL-cholesterol and elevated triglyceride levels.

An ultrasound of the ovaries is the last step in diagnosis. Between 65–85 per cent of women with PCOS have multiple ovarian follicles. An ultrasound is also important to rule out endometrial hyperplasia when a woman has erratic and/or long cycles.

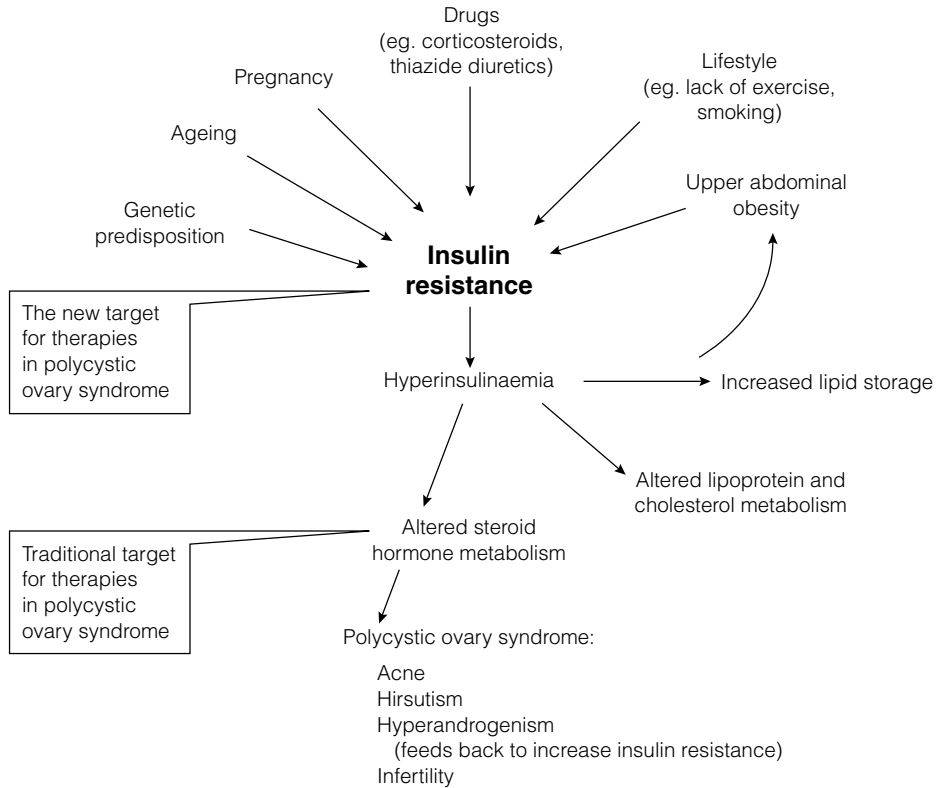
Once other types of endocrine abnormality have been excluded a diagnosis of PCOS is made when a woman has several of the following biochemical or clinical signs:

- Polycystic ovaries
- Elevated free androgen index
- Irregular ovulation
- Hirsutism
- Elevated fasting insulin

## **Causes**

It had been generally believed for some time that PCOS was caused by excess androgen production in the ovary, but exactly why this was occurring had remained a mystery. Lately, interest has focused on the role of insulin resistance and glucose intolerance as a major cause (see Figure 16.1). A woman's weight might be an important contributing factor because excess weight seems to be able to initiate hormonal changes that can transform a symptom-free condition into a full-blown case of PCOS. This may be because obesity worsens insulin resistance and blood glucose metabolism, giving rise to elevated androgen levels. The insulin resistance seen with PCOS can arise independently of body weight, however, because some women have insulin resistance despite being a normal weight.

The hypothalamic-pituitary unit and the adrenal gland are also involved in PCOS, but their relative importance may vary in each case. It has been suggested that other endocrine glands like the thyroid might be associated with PCOS some of the time, or that a number of different triggers may interact in susceptible women.<sup>2</sup> PCOS may also be inherited. Around 40 per cent of the women in families with PCOS will have the condition, but not all of them develop symptoms.



## Insulin resistance

Insulin resistance describes a condition that is characterised by a decreased sensitivity of cellular insulin receptors to insulin. This prevents tissues—usually muscles—from taking adequate levels of glucose into the cell for energy production. Obese women with PCOS also have lower insulin resistance. Elevated serum insulin levels have been shown to be a reliable diagnostic marker for peripheral insulin resistance. The condition can progress through a number of intermediary stages into glucose intolerance and type 2 diabetes if the right predisposing factors are present or if steps are not taken to diminish the risk. Estimates vary, but somewhere between 50–70 per cent of women with PCOS have some degree of insulin resistance—obesity both worsens the picture and aggravates this underlying predisposition.

In insulin resistance, a compensatory rise in pancreatic insulin



secretion occurs in an attempt to maintain normal blood glucose levels as well as adequate cellular glucose levels. The elevated blood insulin increases fat storage while inhibiting the release of fat for energy production. Triglyceride levels usually increase and there is a drop in HDL cholesterol. Elevated insulin levels also increase ovarian androgen production, either by direct stimulation of ovarian tissue or by stimulating LH secretion.<sup>3</sup> In addition, insulin may enhance the activity of the enzyme 11 $\beta$ -hydroxysteroid dehydrogenase.<sup>4</sup> This enzyme increases cortisol clearance and is thought to contribute to elevated *adrenal* androgen production (as explained on page 339). It is now believed that insulin-induced androgen production by the ovary is the primary trigger for the development of PCOS.

Insulin resistance can be acquired or amplified because of obesity, particularly when fat distribution is around the abdomen. A sedentary lifestyle and smoking also aggravate this condition, as can certain diuretics, corticosteroids and perhaps, some types of the Pill.<sup>5</sup> Appropriate dietary changes, exercise and diabetic medication such as metformin (Glucophage, Diabex) improve insulin sensitivity, reduce androgen levels and improve ovulation rates when women have PCOS. These strategies also reduce the risk that insulin resistance will eventually cause cardiovascular disease and glucose intolerance as well as the problems commonly seen with type 2 diabetes.

## Body weight and shape

It was once believed that insulin resistance only occurred in association with obesity, but it has now been shown that both obese and non-obese women with PCOS can develop insulin resistance.<sup>6</sup> At least two recent studies have shown that the degree of insulin resistance is comparable in overweight and normal weight women with PCOS.<sup>7</sup> However, obese women with PCOS have more pronounced menstrual cycle abnormalities and problems with fertility, as well as more severe symptoms of excess androgens such as hirsutism, than normal-weight PCOS women. The body mass index (BMI) is the most reliable way to determine an ideal weight for height ratio in an individual (see page 218). Obesity is defined as a BMI above 30.

In addition, excess weight gain alters the process of aromatisation—the conversion of androgens into oestrone in the fatty tissue, muscle and the brain. Importantly, when women are overweight, the conversion of androgen to oestrone is enhanced and much more oestrone is produced. This increased conversion of androgens in fatty tissue may also affect PCOS.<sup>8</sup>

In fact, excess weight gain is responsible for the development of the full-blown syndrome amongst some susceptible individuals with PCOS. This does not mean that thin women will not develop PCOS, but that

some women will only do so when their body weight is above a certain range. Other factors such as increased activity of the hypothalamic-pituitary-adrenal axis, decreased SHBG synthesis and, possibly, high dietary lipid intake may be additional mechanisms by which obesity favours the development of elevated androgens in PCOS.<sup>9</sup>

Normal weight women with PCOS have been shown to have increased fat distribution around the waist compared to women without PCOS, which is related to insulin resistance.<sup>10</sup> When an increased waist to hip ratio—the so-called ‘apple shape’ or android body weight distribution—accompanies obesity, the symptoms of PCOS become more pronounced. Abdominal obesity increases androgen levels and amplifies the related clinical signs; the severity of these symptoms can be controlled by weight loss, especially if the waist to hip ratio is reduced.<sup>11</sup> Thin women with PCOS may not have the increase in abdominal adiposity.

Many women with PCOS tolerate being thin better than other women. They maintain their bone density even when their BMI is low, and continue to ovulate (or start to) when they are thin. For these reasons, some researchers speculate that such women with PCOS will reproduce better when there is a shortage of food or they eat sparingly, and pass on this tendency to their daughters who will also have the reproductive edge when food is limited.<sup>12</sup> They may have inherited what is known as the ‘thrifty gene’, a genetic make-up that meant their forebears could tolerate the vicissitudes of the hunter-gatherer way of life, with its variability in food supply, by laying down fat in times of plenty and utilising fat stores when food was scarce.

Women without PCOS and with ‘normal ovaries’ function best when there is an abundance of food. They do not have the hormonal profile to tolerate thinness easily; they stop menstruating or ovulating if they lose weight or are too thin; and are most fertile and have better bone density when they eat regularly and their body weight is within the normal range. At the other end of the weight spectrum are the thin women with PCOS who may have low oestrogen levels and a high risk of osteoporosis and who need to maintain their body weight to improve their fertility. This points to a need for all women to remain as close to their normal BMI range as possible to maintain ovulatory function and fertility, irrespective of the presence or absence of an endocrine abnormality.

## Abnormal ovarian function

Women with PCOS produce low levels of ovarian oestrogen (oestradiol) and excessive levels of ovarian androgens. A number of theories, possibly interrelated, have been proposed to explain how this might occur. Insulin resistance with the consequent elevation in insulin levels is the first step in the abnormal ovarian androgen production. The problem

might occur because of enzymatic activity and might arise in either the theca or granulosa cells of the ovary, or both simultaneously.  $17\beta$ -hydroxysteroid dehydrogenase is active in the theca cells of the ovary and in the hair follicle, and converts androstenedione to testosterone. Overactivity of this enzyme leads to an increase in testosterone, one of the more potent androgens in women. The activity of the aromatase enzyme in granulosa cells of the ovary is reduced in PCOS. This leads to poor conversion of androgens into oestradiol and provides a second possible explanation for elevated ovarian androgen levels.

As a result of these proposed abnormalities, the ovary secretes high levels of androgens and very little oestradiol.<sup>13</sup> The androgens are thought to impede normal follicle development, leading to the formation of small cystic follicles that produce ova; however, both ovum and follicular development are inhibited and neither follows the orderly pattern of development and maturity. As ovulation has failed, no corpus luteum develops and no progesterone is produced to influence the hypothalamic-pituitary unit via feedback inhibition. The sum total of elevated androgens, persistent acyclic oestrogens (oestrone) and no progesterone causes the chronically elevated LH which perpetuates the cycle by increasing the stimulation of ovarian theca cells and the production of more ovarian androgens (see Figure 16.2).<sup>14</sup>

## The adrenal gland

One theory is that an insulin-induced over-activity of  $11\beta$ -hydroxysteroid dehydrogenase might be a source of excess *adrenal* androgen production.<sup>15</sup> When  $11\beta$ -hydroxysteroid dehydrogenase is overactive, cortisol clearance is increased, leading to a compensatory rise in adrenocorticotrophic hormone (ACTH). This in turn leads to an increased production of adrenal androgens because of the increased ACTH-mediated stimulation of the adrenal cortex (see Figure 16.2).

Androgens are converted to oestrone in the fatty tissue, causing the blood levels of oestrone to rise. The elevated and non-varying oestrone stimulates the production of excessive amounts of LH while FSH levels remain low. The LH triggers *ovarian* androgen production, and so the cycle is perpetuated as seen in Figure 16.2.

## Leptin

Leptin is a newly discovered hormone secreted by adipocytes that regulates body weight via an effect on metabolism, satiety and energy metabolism. Leptin is also known to play a role in fertility and pregnancy, and may be a possible trigger of puberty by triggering LH release

once body fat levels are adequate to cope with the physiological demands of adolescence.

Leptin seems to participate in regulation of follicular development indirectly via control of LH and FSH secretion,<sup>16</sup> and may also have a direct regulatory action on the developing follicle. The ovarian follicle has leptin receptors, and may be able to synthesise leptin,<sup>17</sup> suggesting that this hormone may play a physiological role in follicular maturation and ovum development.<sup>18</sup> The association between increased body weight and infertility may be related to these actions of leptin. Leptin levels are related to BMI and are higher amongst women with obesity with or without PCOS.<sup>19</sup>

Other research suggests that leptin may not act directly on the ovarian follicle, but has a central effect. Obese women with PCOS or hirsutism were shown to have elevated leptin levels and a probable leptin resistance which seemed to have an adverse effect on gonadotrophin release, causing the persistently elevated LH seen in women with PCOS.<sup>20</sup> Finally, it has been shown that thin women with PCOS have lower levels of leptin than thin non-PCOS women.<sup>21</sup> Much of the research is speculative at this stage, and exactly what role leptin plays in infertility and obesity in PCOS is still to be elucidated.

## The hypothalamic and pituitary hormones

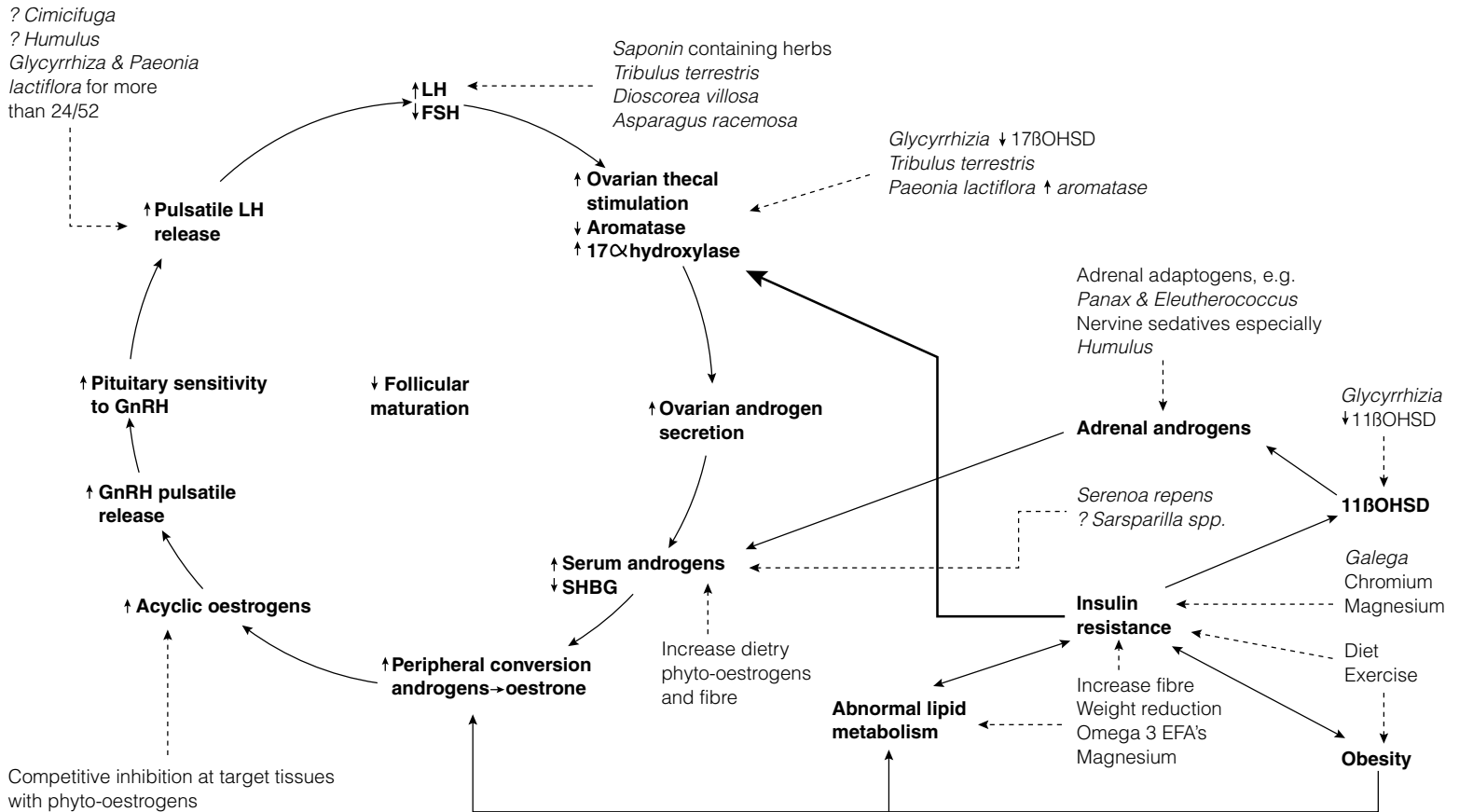
Elevated levels of LH are generally accepted as being caused by androgen excess. Some researchers, however, have suggested that the initial trigger for PCOS may occur in the hypothalamus or the pituitary gland.<sup>22</sup> Inappropriate hypothalamic secretion of gonadotrophin-releasing hormone (GnRH) can cause an increase in the pituitary production of LH which then causes an increase in the production of androgens. As already described, excess androgens increase the secretion of LH, and so the cycle becomes self-perpetuating.

The other pituitary hormone, FSH, can be low when women have PCOS. Low FSH is usually thought to be a casualty of the unvarying levels of oestrogens. Low FSH reduces the capacity of the cells in the follicle to convert androgen to oestradiol, and is another reason for the imbalance in the hormone levels.

## Associated hormone changes

### Acyclic oestrogens

The two types of oestrogen that are important when a woman has PCOS are oestradiol and oestrone. In a normal cycle the levels of oestradiol vary from relatively low in the follicular phase and becoming higher in



**Figure 16.2 Pathogenesis and treatment of PCOS**

the luteal phase in response to ovulation. Many women with PCOS, however, do not ovulate or ovulate only sporadically and usually have low and non-variable levels of oestradiol. The situation with oestrone can be quite different. Oestrone is primarily derived from the peripheral conversion of androgens via aromatisation, which largely occurs in fat and muscle tissue.

Oestrone levels are linked to body weight—obese women usually have higher levels of oestrone because they have an ample supply of fatty tissue as well as insulin-induced hyperandrogenaemia. When cycles are irregular with correspondingly erratic endometrial shedding, high levels of oestrone can theoretically predispose a woman to endometrial hyperplasia or cancer. In fact, there is an association between excess body weight and an increasing incidence of endometrial cancer for all women. The best way to prevent this risk is to ensure regular shedding of the endometrium; most doctors suggest that five or six bleeds per year are sufficient to confer protection for women with PCOS.

## Androgen excess

Androgens can exert masculinising effects, but usually circulate in small amounts in the blood of all women without causing any problems. If a woman has PCOS, however, the levels of androgens are elevated, and though still well below the normal male levels, contribute significantly to the hormonal imbalance and the symptoms of PCOS. The largest portion of androgens is derived from the ovary, with the adrenal gland making a smaller contribution.

Androgen excess is related to both elevated insulin levels, and body weight and shape. The degree of abdominal obesity amplifies the degree of hyperandrogenism and related clinical symptoms and signs. Both loss of body weight and/or the reduction of insulin levels, induced by diet or insulin-sensitising drugs, have important effects, since they normalise blood androgen levels and reduce their adverse consequences, as well as leading to improved ovulation rates.<sup>23</sup>

## Sex hormone-binding globulin

Sex hormone-binding globulin (SHBG) is the carrier protein for both oestrogen and testosterone; normally, most of the circulating testosterone would be bound to SHBG, making it less capable of exerting masculinising effects on skin and hair. The level of SHBG is reduced by elevated androgens and obesity, so that large volumes of unbound and biologically active testosterone circulate in the serum causing acne and male-pattern hair growth.

## Signs and symptoms

- About 90 per cent of women with PCOS have irregular menstrual cycles.
- PCOS is the most common cause of ovulatory failure, and about 75 per cent of women with PCOS develop infertility.
- Between 50–70 per cent of women with PCOS are estimated to have insulin resistance irrespective of body weight.
- Sixty per cent have excess body hair.
- About half will not menstruate.
- Around 40 per cent are overweight.
- Nearly one-third have abnormal bleeding patterns.
- Only about 15 per cent report the temperature changes which indicate ovulation if they take and chart their temperature every morning (basal body temperature). Menstrual bleeding does not necessarily indicate ovulation. Women with PCOS (and other women) frequently have non-ovulatory menstrual cycles.
- A very rare symptom is the development of a deeper voice and changes in body shape.
- Another very uncommon finding is acanthosis nigrans—darkened skin patches in the axillae, back of the neck and/or breast folds, which is diagnostic of insulin resistance.

## Lifetime consequences of PCOS

The insulin resistance of PCOS is influenced by body shape and weight as already described, leading to elevated insulin (and androgen) levels. The degree of hyperinsulinaemia determines whether glucose intolerance develops, although not exercising, smoking and diet will also have an effect. Women with PCOS have a much greater incidence of both type 2 diabetes and cardiovascular disease, and investigations have shown that the risk of both, while worsened by obesity, can occur independently of being overweight.<sup>24</sup>

On the basis of the current information, even those women who exhibit relatively few symptoms of PCOS, or do not have excess abdominal weight gain, should be given dietary and lifestyle advice to reduce the risk of developing heart disease and type 2 diabetes in later life. For those women who do have symptoms, and especially when there is a family history of either cardiovascular disease, hypertension or type 2 diabetes, it now seems prudent to combine these lifestyle changes with regular monitoring of insulin status and/or glucose intolerance, as well as measures to improve insulin sensitivity and glucose tolerance.

## Type 2 diabetes mellitus

Analysis of a group of middle-aged women in whom a diagnosis of PCOS had been made during their reproductive years revealed a 13 per cent prevalence of type 2 diabetes compared with only 2 per cent in a carefully matched reference group.<sup>25</sup> Women develop glucose intolerance at a younger age when they have PCOS. It is estimated that between 10–20 per cent of obese young women with PCOS have either impaired glucose tolerance or type 2 diabetes.<sup>26</sup>

### Nutritional factors

Although PCOS and the tendency towards insulin resistance are inherited, nutritional factors may also play a part. Magnesium deficiency in the general population results in increased insulin resistance, as well as increased smooth muscle and platelet reactivity, and is seen in association with both cardiovascular disease and diabetes mellitus.<sup>27</sup> Women with PCOS have been found to have significantly lower serum and total magnesium compared with the controls,<sup>28</sup> and this may contribute to the progression from insulin resistance to type 2 diabetes and heart disease. The plasma magnesium level has been shown to be inversely related to insulin sensitivity.<sup>29</sup> Population studies have confirmed that a high daily magnesium intake is associated with a lower incidence of type 2 diabetes,<sup>30</sup> while individuals with low serum magnesium have a higher incidence.<sup>31</sup> Moreover, magnesium deficiency can occur amongst diabetics despite adequate dietary intake,<sup>32</sup> because urinary excretion is increased in the presence of elevated insulin and glycosuria.<sup>33</sup>

Daily magnesium supplements improve insulin-mediated glucose uptake<sup>34</sup> and insulin secretion in patients who have established type 2 diabetes<sup>35</sup>—both important for women with PCOS. Amongst patients with poorly controlled type 2 diabetes, magnesium supplementation reduces the risk of developing further problems such as retinopathy and hypertension.<sup>36</sup>

Chromium has been known to be an essential supplement for improving glucose tolerance for many years. In animals, chromium deficiency can cause a diabetic-like state, impaired growth, elevated blood lipids, increased aortic plaque formation, and decreased fertility and longevity.<sup>37</sup> In an early review of the effectiveness of chromium in experimental studies, potentiation of the action of insulin *in vitro* and *in vivo* was demonstrated in almost every trial. Maximal *in vitro* activity was seen in these studies with a special form of chromium, known as glucose tolerance factor or GTF, a chromium-nicotinic acid complex.<sup>38</sup>

Type 2 diabetic patients have been shown to have lower plasma chromium and a urinary excretion of chromium twice that of healthy controls, suggesting that large losses of chromium over many years may



exacerbate an already compromised chromium status.<sup>39</sup> In addition, a poor chromium intake worsens the prognosis once diabetes has developed, by increasing other risk factors associated with diabetes such as cardiovascular diseases. Serum glucose can be improved by chromium supplements in types 1 and 2 diabetes as well as in gestational and steroid-induced diabetes, and the effect appears dose dependent.<sup>40</sup>

The beneficial effects of chromium on serum glucose, lipids and insulin resistance occur even in the healthy. Chromium increases insulin-binding to cells, insulin receptor numbers, and activates insulin receptor kinase leading to increased insulin sensitivity.<sup>41</sup> Chromium is an ideal adjunct to dietary strategies to reduce risk of progression from insulin resistance to glucose intolerance and type 2 diabetes. Adequate intake can be obtained from foods (see page 359) or as a supplement of (preferably) chromium picolinate, or alternatively as chromium amino acid chelate or chloride. Chromium has also been shown to improve bone density by reversing the negative effect of insulin on bone resorption.<sup>42</sup> Biotin, at doses of 3 mg three times daily in combination with a chromium supplement, has been shown to improve and enhance insulin sensitivity and beta-cell function, enhance postprandial glucose uptake by liver and skeletal muscle, and inhibit excessive hepatic glucose production.<sup>43</sup>

The trace mineral vanadium has also been used in the treatment of type 2 diabetes. This is not a new treatment. Vanadium as sodium metavanadate was the principal ingredient in the *panacée universelle* sold for the treatment of diabetes in the 1890s.<sup>44</sup> Vanadium is found in high levels in dill seeds, which were also traditionally employed to control symptoms of diabetes. Vanadium is believed to act by enhancing insulin sensitivity,<sup>45</sup> particularly in the liver.<sup>46</sup> There are some concerns about potential toxicity in the liver and kidney when inorganic compounds are used<sup>47</sup>—gastrointestinal discomfort has been severe enough to cause weight loss in some patients. These effects were not seen with the use of organic compounds. In addition there are no guidelines available for safety during conception or pregnancy.

Organic vanadium salts have been developed,<sup>48</sup> but their availability is limited. Skim milk, lobster, vegetable oils, many vegetables, grains and cereals contain relatively high levels of vanadium. Fruits, meats, fish, butter, cheese and beverages are relatively poor sources. The daily dietary intake in humans has been estimated to vary from 10 mcg to 2 mg of elemental vanadium.

Investigators found that inadequate consumption of dietary zinc leading to low serum zinc levels were associated with an increased prevalence of type 2 diabetes and coronary artery disease. Associated risk factors suggestive of mild insulin resistance, including hypertension and elevated triglycerides, were also apparent.<sup>49</sup> Fish oils may also be protective of progression from insulin resistance to glucose intolerance. Omega-3 fatty acids are incorporated into the plasma membrane and reduce the concentration of arachidonic acid. This decreases the

production of PGE<sub>2</sub>, which in turn suppresses the production of cyclic AMP, a well-known enhancer of glucose-induced insulin secretion. Consequently, fish oils increase insulin secretion from beta-cells in the pancreas and assist with the regulation of blood sugar.<sup>50</sup> Rats fed a diet providing 5–10 per cent of dietary energy from fish oil had accelerated glucose uptake and maintained normal glucose metabolism, even at high levels of fat intake.<sup>51</sup>

## Heart disease

Women with PCOS have a high incidence of heart disease, including an increased risk of heart attack, high blood pressure<sup>52</sup> and elevated blood fats. Studies have shown that these women have heart attacks 7.4 times more often,<sup>53</sup> and have worse ischaemic heart disease as seen on coronary angiogram, than other women of the same age.<sup>54</sup> Blood lipid assays tend to show a high triglyceride level and low HDL cholesterol.<sup>55</sup>

Elevated plasma homocysteine levels, a marker for early atherosclerotic change, have been identified amongst PCOS women.<sup>56</sup> In addition, decreased HDL cholesterol, another biomarker for premature vascular disease, has been shown to be prevalent in all women with PCOS, and is significantly worsened by obesity.<sup>57</sup> A paper evaluating the risk of cardiovascular disease and diet found that diets high in carbohydrates with a high glycaemic index (GI) increased risk of heart disease, while low-GI diets improved HDL-cholesterol concentrations, especially in women.<sup>58</sup>

## Nutritional factors

Studies have shown that a high daily magnesium intake is predictive of a lower incidence of type 2 diabetes and hypertension, and that intracellular magnesium may play a key role in modulating insulin-mediated glucose uptake as well as vascular tone. It has been suggested that a reduced intracellular magnesium concentration might be the missing link that explains the epidemiological association between type 2 diabetes and hypertension.<sup>59</sup> As mentioned above, deficiencies of omega-3 essential fatty acids, chromium and zinc also contribute to the risk of developing cardiovascular disease. A diet concentrating on low saturated fat intake with low glycaemic carbohydrates is a valuable addition to any treatment regime (see pages 358–60).



### ■ ■ The medical approach

There are four main aspects to medical (as well as herbal and dietary) treatments for PCOS:

- Treat insulin resistance.
- Ensure regular menstrual bleeding.
- Reduce and treat the consequences of excess androgen levels.
- Improve ovulation and fertility for those women wanting to become pregnant.

These treatments will need to be adapted to meet the concerns and manage the symptoms of the individual woman. Overweight women with PCOS should be given appropriate dietary and exercise advice designed to achieve weight loss and reduce risk of heart disease and type 2 diabetes. Weight loss should be the first step of any treatment for overweight PCOS women with hirsutism or infertility because it has been shown that the loss of even a few kilograms can reduce androgen levels and reinstate ovulation. Those women who have relatively regular cycles and no symptoms of androgen excess may require no treatment other than the suggestions on healthy diet and lifestyle modifications in the self care section below.

### **Treat insulin resistance**

Adequate management of insulin resistance requires changes to diet and lifestyle.<sup>60</sup> In addition, various insulin-sensitising drugs are now being used to treat insulin resistance and other symptoms of PCOS. The most commonly used and studied is metformin (Diabex, Glucophage). Numerous trials have shown that this drug improves insulin resistance, as well as reducing body weight and androgen levels.<sup>61</sup> Menstrual cycle regularity, hirsutism and ovulation are also improved.<sup>62</sup> There is also an indication that women with PCOS who take metformin have a reduced rate of early miscarriage.<sup>63</sup> The positive effects are amplified if the woman eats an appropriate low-kilojoule diet.<sup>64</sup>

Metformin can cause a number of gastrointestinal symptoms such as nausea, diarrhoea, vomiting, abdominal bloating and lack of appetite. These side-effects are usually dose-dependent and diminish over time. They can be minimised by starting the drug at a low dose and gradually increasing over time; however, because women with PCOS are usually prescribed lower doses of metformin than are needed for diabetes, such side-effects may not eventuate. A very rare risk is the development of lactic acidosis. Metformin can also cause a vitamin B<sub>12</sub> deficiency, which can be ameliorated to some extent by giving supplemental calcium.<sup>65</sup> Doses of metformin for PCOS are usually either 500 mg three times daily or 850 mg twice daily.

### **Ensure regular menstrual bleeding**

Regular menstrual bleeding is necessary to reduce the likelihood of cancerous change occurring in the endometrium, especially for

overweight women with few periods. This risk is minimised by the administration of cyclic hormones such as the Pill; or by small doses of progesterone for seven to ten days of each month. The progestogen, either taken alone or in the Pill, initiates changes in the endometrium that are similar to those in the normal cycle. When the progestogen is withdrawn, menstruation occurs.

## Reduce and treat the consequences of excess androgen levels

Hirsutism and acne commonly occur secondary to elevated androgens. The most common medications for either condition are Androcur (cyproterone acetate) or the Pill, especially those brands containing cyproterone acetate such as Diane. Androcur and Diane block the effects of androgens by competitive inhibition at the receptor sites on cells, thus preventing the androgens from being able to interact with tissues that are normally responsive to them such as the hair follicle and the sebaceous glands in the skin. Androcur can cause depression in some women, as well as weight gain at higher doses. Often, when these drugs are stopped, however, signs of androgen excess recur and they may need to be continued for long periods to control the problem.

Spironolactone (Aldactone), another drug used to treat hirsutism and acne in women, can cause elevated potassium levels, lower blood pressure and can increase the frequency of menstrual bleeding. Ovulation is often restored, and sexually active women are usually offered the Pill with cyproterone acetate for this reason. For well-established hirsutism, no improvement in excess hair growth will be evident for up to six months.

Recently, a small trial examined the effects of metformin on hirsutism in women with PCOS. The women had more regular cycles, and weight loss, as well as a significant reduction in hair growth. This may indicate another role for this drug in PCOS.<sup>66</sup>

The oral contraceptive pill lowers androgen levels, but there are some disadvantages with this treatment. A trial comparing two types of the Pill in adolescent girls with PCOS showed that while hirsutism and androgen levels decreased, total cholesterol and LDL cholesterol increased, and there was a tendency towards increasing the levels of triglycerides with the Pill containing cyproterone acetate.<sup>67</sup> Other trials showed differing results depending on the type of Pill used. One study (on a norgestimate-containing Pill) showed improvement in both androgen levels and insulin sensitivity;<sup>68</sup> another, on ethynyl oestradiol with cyproterone acetate showed no benefit on insulin resistance.<sup>69</sup> These findings may mirror some of the recent concerns of increased risk of heart disease with HRT, and suggest that only certain types of the Pill will be suitable for women with PCOS because of their inherently high risk of hypertension and abnormal blood lipid levels. A doctor who

specialises in hormone treatment should prescribe the Pill for women with PCOS to ensure that the most suitable type is taken.

Oral micronised progesterone is often suggested for women with PCOS, however, a trial on the effect of this drug (also known as natural progesterone) did not significantly alter circulating androgen or progesterone levels, although it did induce withdrawal bleeding.<sup>70</sup>

### **Improve ovulation and fertility for those women wanting to become pregnant**

The most common prescription in this situation is clomiphene (Clomid or Serophene). Clomiphene competitively antagonises oestrogen receptors in the hypothalamus. This interferes with normal negative feedback mechanisms and increases the release of pituitary gonadotrophins, especially LH, leading to ovulation. A common side-effect of this drug is thinning of the endometrium, which reduces implantation and therefore pregnancy success. More recently, metformin has been proven to be successful in improving fertility and is now recommended to women wanting to get pregnant.<sup>71</sup> If clomiphene and metformin fail, many women with PCOS will be offered IVF treatment.

Two surgical procedures are sometimes used to improve ovulation rates in women with PCOS—‘golf balling’, or a wedge resection of the ovaries. Golf balling is a laparoscopic procedure that involves the drilling of small holes into the surface of the ovary (so that it resembles a golf ball) to reduce the amount of androgen-producing tissue. Wedge resection aims to achieve the same result. The risks with these procedures arise from the surgery itself and also from the increased incidence of obstructive infertility due to adhesions.



#### **The natural therapist’s approach**

The natural therapist’s treatment of PCOS is directed at the same four therapeutic goals of improving insulin resistance, ensuring regular menstrual bleeding, reducing and treating the consequences of excess androgen levels, and improving ovulation and fertility for those women wanting to become pregnant. An additional consideration is the reduction of cardiovascular disease risk with diet, lifestyle and appropriate supplements.

Although this is a complex complaint with a number of serious consequences, it is not necessary to prescribe vast amounts of complicated and expensive treatments to achieve good results. Sometimes the best outcomes are seen with the simplest of interventions such as dietary and lifestyle changes, and these should be, if not the first, then certainly the mainstay of a treatment plan. In addition, many women have normal

cycles and few symptoms, and require no treatment apart from dietary advice and education about the lifetime consequences of PCOS (see pages 343–6 and the self care section below).

The tendency to develop PCOS cannot be ‘cured’ or eliminated—the aim is to improve insulin sensitivity as a first step towards regulating ovulation, cycle length and reducing androgen levels. When the condition is severe, natural remedies may not be sufficient to improve the adverse consequences of PCOS. A more suitable treatment may be to combine natural remedies and drugs, especially when there is serious risk of endometrial change or severe masculinising effects from androgens.

### Treat insulin resistance

Dietary changes in combination with regular exercise may be all that is required for some women. Weight loss, restricted fat intake and aerobic exercise can work in a complementary way to promote increased numbers of insulin receptors that are more functionally competent. Weight loss might be a necessary first step in management of insulin resistance for some women. Restricted carbohydrate diets have been shown to be beneficial in weight reduction and few adverse effects have been recorded with long-term follow-up.<sup>72</sup> Carbohydrate foods should be selected from those with a low glycaemic index. Those who need to lose weight will need to restrict volume as well as type of carbohydrates. Women with PCOS, with or without glucose intolerance, often report persistent sugar cravings; however sugar and refined carbohydrate foods must be limited if hyperinsulinaemia is to be avoided. Eating regularly can help to maintain better glycaemic control and reduce the risk of sugar cravings, dietary indiscretions and rapid weight fluctuations.

Chromium and magnesium are vital to the maintenance of normal glycaemic control and their role in the prevention and treatment of PCOS and related disorders has already been discussed. Chromium picolinate or chromium-nicotinic acid complex (GTF) are reported to be the most therapeutically active forms of chromium. Doses for control of insulin resistance range from 200–800 mcg of chromium daily. A high dietary magnesium intake should be encouraged (see pages 361–2); when supplements are required, doses of 400–800 mcg daily are desirable.

In addition, a wide range of whole foods, vegetables, fish, seeds and seed oils should be advised in order to obtain the other trace nutrients and essential fatty acids which can help to improve insulin resistance. These foods are also known to reduce risk of progression towards glucose intolerance and heart disease. Omega-3 essential fatty acids may also be useful to reduce the adverse effects induced by a high fat intake.<sup>73</sup> Fibre is also useful and improves impaired glucose tolerance.<sup>74</sup>

Epidemiological studies in humans suggest that individuals with higher intakes of fat are more prone to develop disturbances in glucose

metabolism, type 2 diabetes or impaired glucose tolerance than those with lower intakes. A decrease in saturated fat intake in combination with increased intake of monounsaturated fatty acid-containing foods improves insulin sensitivity without affecting insulin secretion.<sup>75</sup> N-acetyl-cysteine can improve insulin sensitivity in women with PCOS who have elevated inulin levels at doses of 1.8 g per day for normal weight and 3 g per day for obese patients.<sup>76</sup>

*Galega officinalis* contains guanidine as well as chromium salts,<sup>77</sup> which may explain its traditional use for managing glucose intolerance but in large doses over long periods of time there is a possible risk of hepatotoxicity.<sup>78</sup> (The drug Metformin (biguanide), is a synthetic guanidine and is useful for the treatment of insulin resistance.) In a study on mice given dried *Galega officinalis* as 10 per cent of their diet, a reduction in the amount of body fat led to weight loss. A hypoglycaemic effect was also noted.<sup>79</sup> The significance of this for women with obesity and insulin resistance in PCOS is unclear and human studies are required.

*Panax ginseng* and *Eleutherococcus senticosus* may have a role in the normalisation of impaired glucose tolerance.<sup>80</sup> American ginseng also improves glucose tolerance possibly by enhancing insulin secretion.<sup>81</sup> *Trigonella* (ground fenugreek seeds) has been shown to decrease insulin resistance and increase insulin sensitivity, as well as reducing serum triglycerides in mild type 2 diabetic patients. HDL cholesterol also increased significantly, suggesting an additional benefit in reducing cardiovascular disease risk.<sup>82</sup> At doses equivalent to 15 ml per day in humans, *Smilax glabra* (sarsaparilla) was shown to significantly decrease blood glucose in mice in an insulin tolerance test. The proposed mechanism of action was improved insulin sensitivity.<sup>83</sup>

For women who have already developed diabetes, a more extensive treatment regime may need to be adopted. Oxidative stress contributes to the complications associated with diabetes, and it has also been suggested that insulin resistance may be accompanied by intracellular and plasma production of free radicals.<sup>84</sup> Experimental and clinical data suggest that the supplementation of insulin-resistant or diabetic states with antioxidants such as vitamin E normalises oxidative stress and improves vasodilation and insulin sensitivity.<sup>85</sup> Vitamin E improves insulin action in healthy, elderly and type 2 diabetics. Similar results can be obtained by vitamin C administration.<sup>86</sup> Coenzyme Q10 may reduce the risk of pancreatic beta cell failure in those women who have established glucose intolerance.<sup>87</sup>

## Ensure regular menstrual bleeding

Although many women with PCOS experience oligomenorrhoea or amenorrhoea, a considerable number will also describe erratic and heavy

bleeding patterns consistent with dysfunctional uterine bleeding (DUB). Stimulation of the endometrium by oestrogen—usually oestrone—in combination with the absence of ovulation and therefore progesterone, can lead to inadequate transformation of the endometrium. The uterine lining is shed erratically giving rise to the DUB pattern of bleeding (see pages 254–8). With or without this bleeding pattern, women with PCOS are predisposed to endometrial hyperplasia and cancer and steps must be taken to protect the endometrium from the cellular change caused by elevated and unvarying levels of oestrogen.

Risk of endometrial cancer for all women is associated with advancing age, a high BMI, irregular menstrual cycles and elevated oestrogen levels. Six to eight periods per year should provide adequate endometrial protection for women with PCOS; however, normal weight women who are 35 or less can menstruate less often for short periods provided they understand the consequences of spotting and report this symptom immediately. Oestrone levels tend to rise when insulin resistance is untreated, and androgen levels and body weight are above normal. Routine blood oestrogen assays evaluate oestradiol levels (not oestrone) which are often low in PCOS and are of no value in predicting endometrial hyperplasia risk.

When oestrone levels are high, as occurs when women are obese, phyto-oestrogens competitively inhibit endogenous oestrogen at target tissues and reduce risk of over-stimulation of these tissues.<sup>88</sup> Increasing fibre intake is associated with lower serum oestradiol levels,<sup>89</sup> and may reduce risk of cancer development.<sup>90</sup> Other natural remedies that may protect the endometrium are outlined on page 262 in the section on endometrial hyperplasia.

Dietary and lifestyle changes to improve insulin resistance may be all that is required, and should be the basis of the treatment plan. Many normal weight women with PCOS report large variations in cyclic regularity occurring in association with relatively small weight changes. For instance, some women will stop menstruating (and ovulating) when they gain an extra few kilograms and/or stop exercising. Interestingly, this pattern has also been observed among women who have a BMI below the normal range (<20). Women who report these cycle changes will usually respond favourably and quickly to measures to treat insulin resistance. In these women, menstrual cycle regularity and ovulation are apparently closely linked to the degree of insulin resistance, which is in turn determined by a relatively narrow BMI range. Obese women should aim to lose weight in addition to adopting a low glycaemic diet for insulin resistance.

The herbal remedies that regulate the menstrual cycle do so by reinstating ovulation in most instances. This may be an undesirable outcome for some women who have relied on their sub-fertility as a form of contraception and have used an *ad hoc* approach to birth control. The Pill may be a more suitable option for this group of women,



although there are some associated risks (see above). Peony and Liquorice Combination can improve menstrual cycle regularity, as can the other herbs described in the section on improving fertility.

## Reduce and treat the consequences of excess androgen levels

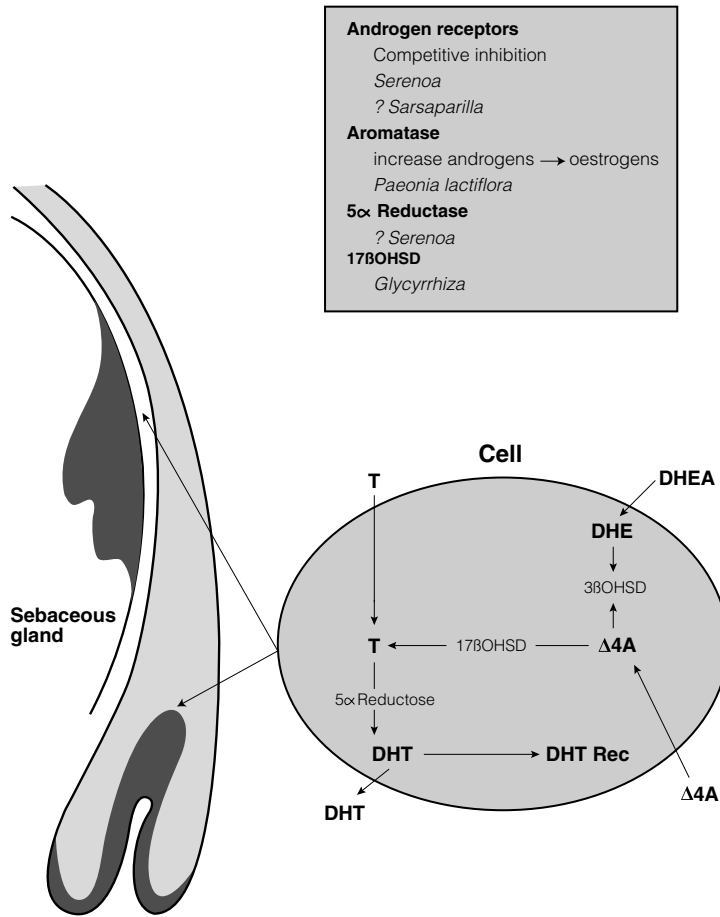
Circulating androgen levels are closely related to the degree of insulin resistance and the amount of abdominal body fat. Steps to reduce these two features of PCOS will also reduce insulin-induced ovarian androgen production. Herbs that inhibit 5-reductase-induced conversion of testosterone to dihydrotestosterone (DHT) or 17-hydroxysteroid dehydrogenase (OHSD)-induced androstenedione conversion to testosterone, will also reduce elevated androgens.

A recent paper discussing the beneficial effects of *Serenoa repens* on androgenic alopecia concluded that it appeared to be a new type of anti-androgenic for 'the treatment of benign prostatic hypertrophy, hirsutism and so forth'.<sup>91</sup> *Serenoa repens* (saw palmetto) has been shown to inhibit 5 $\alpha$ -reductase conversion of testosterone to DHT,<sup>92</sup> as well as inhibiting the action of 17-hydroxysteroid dehydrogenase on androstenedione.<sup>93</sup> The extent to which *Serenoa* reduces levels of DHT has been questioned<sup>94</sup> and it is likely that much of the anti-androgenic action of this herb is related to inhibition of androgen receptor binding.<sup>95</sup>

Glycyrrhetic acid in liquorice seems to inhibit the enzyme 17 $\beta$ -hydroxysteroid dehydrogenase which converts androstenedione to testosterone in the ovary<sup>96</sup> and the hair follicle. While an inhibition of receptor binding has not been identified for liquorice, there is a possibility that this may be one of the actions of *Smilax spp.* (sarsaparilla). This herb has reported anabolic<sup>97</sup> and sexual rejuvenating effects in men and is reported to act as an anti-androgen in women. *Smilax* contains the saponin, sarsapagenin, which can be synthetically transformed in the laboratory to testosterone. It is unlikely that this transformation occurs in the body.<sup>98</sup> A more likely outcome with the use of sarsaparilla in PCOS is to reduce insulin resistance and thereby have an indirect effect on androgens.

*Paeonia lactiflora* contains paeoniflorin, a monoterpene glycoside. This constituent is thought to act on the aromatase enzyme in the ovary to promote the synthesis of oestradiol from testosterone and therefore reduce the production of the androgens in a dose-dependant manner.<sup>99</sup> Peony-containing formulas may also improve progesterone levels by normalising ovarian function when the activity of aromatase is inhibited.<sup>100</sup>

Recent studies have shown that N-acetyl-cysteine improves circulating insulin secretion, peripheral insulin resistance and also reduces androgens at doses of between 1.8–3 g daily in women with PCOS.<sup>101</sup>



**Figure 16.3 Possible interactions between herbs and enzymes in the pilosebaceous unit**

Reducing the bioavailability of androgens is another useful strategy. Phyto-oestrogens and fibre increase levels of SHBG<sup>102</sup> which binds to androgens, rendering them relatively less biologically active. Fibre also improves impaired glucose tolerance,<sup>103</sup> which can be expected to reduce androgen levels.

Other herbs may have an indirect effect on androgen levels or receptor binding. *Cimicifuga racemosa*<sup>104</sup> and *Humulus lupulus*<sup>105</sup> reduce LH with continued use and may be useful in the reduction of androgens in PCOS. *Humulus* can be used when stress and nervous tension accompany PCOS, and *Cimicifuga* is useful as a uterine tonic.

Androgen excess can accompany a number of other gynaecological complaints. Recommendations for treatment are outlined on pages 80–3.

### Improve ovulation and fertility for those women wanting to become pregnant

Ovulation rates and fertility are directly related to the degree of insulin resistance when a woman has PCOS. A low GI diet is one of the essential first steps in treating PCOS. Dietary changes and exercise aimed at reduction in central body fat are also the best initial management for obese women seeking to improve their reproductive function.<sup>106</sup> Weight loss improves fertility,<sup>107</sup> and as little as a 5 per weight reduction reduces insulin levels, improves menstrual cycle regularity and increases ovulation rates.<sup>108</sup> Obesity also adversely affects the outcome of pregnancy by increasing the spontaneous miscarriage rate.<sup>109</sup>

The two-herb formula, Peony and Licorice Combination (see page 357), has been the subject of trials in the treatment of infertility in PCOS. It improves androgen levels and can regulate the menstrual cycle and thus protect the endometrium. This combination is a suitable first-line treatment for infertility associated with PCOS, and is frequently combined with other herbs that contain steroidal saponins if ovulation and/or pregnancy do not result from its use.

The steroidal saponin-containing herbs also regulate ovarian function and increase fertility. Historically, these herbs have been referred to as ‘oestrogenic’, more for the effect they have on endogenous oestrogen production than for any oestrogen-like action in their own right. Their precise action is unknown, but they seem to have a central effect and may behave like weak anti-oestrogens. *Chamaelirium luteum* was once the primary herb for ovulatory complaints, and an additional action on ovarian cysts meant it was the herb of choice in PCOS. However, *Chamaelirium* is now endangered and should not be used. *Tribulus terrestris*, another steroidal saponin-containing herb, can be recommended instead, and has proven to be just as effective, if not more so (see pages 430–1 for more details on *Tribulus*). Other herbs in this category are *Dioscorea villosa*, *Aletris farinosa* and *Asparagus racemosus*.

They are usually prescribed for ten-day intervals in the early follicular phase of the cycle, or given for ten days of every month when women have amenorrhoea.

The 'female tonic' herbs have also been traditionally used for ovulatory disorders. They are also often referred to as oestrogenic, again because of the observed effect on ovulation and menstruation. Included in this group are *Angelica sinensis*, *Cimicifuga racemosa* and *Rehmannia glutinosa*, as well as the steroidal saponin-containing herbs already mentioned.

*Vitex agnus-castus*, although shown to stimulate ovulation, has not proven to be a reliable herb for PCOS. We have observed that women with PCOS who are given *Vitex* can experience a worsening of menstrual cycle regularity. Although this does not occur in every case, it does raise the possibility that *Vitex* has an adverse effect on ovulation when a woman has PCOS. Research on the specific action of *Vitex* in PCOS is warranted before its use can be endorsed.

## Reduce risk of cardiovascular disease

Having PCOS increases the risk of heart disease by seven to eight times above the general population. Obesity is a known risk factor for cardiovascular disease and many women with PCOS have abnormal lipid ratios.<sup>110</sup> Many of the recommendations for reducing insulin resistance such as a very low fat diet; aerobic exercise training; appropriate weight loss; chromium, vitamin E and magnesium supplementation; and increased soluble fibre intake are reported to be likely to correct the diabetes-associated changes to vascular smooth muscle, and thus lessen risk for cardiovascular disease.<sup>111</sup>

Elevated triglycerides are a common finding in glucose intolerance and type 2 diabetes. Preventative dietary strategies, plus exercise, weight loss and avoidance of excessive alcohol intake should be advised.<sup>112</sup> Soy protein with intact phyto-oestrogens increases HDL-cholesterol in healthy individuals with normal cholesterol levels.<sup>113</sup> Genistein, also from soy, also reduces risk of cardiovascular disease.<sup>114</sup> A high intake of oily fish combined with weight loss reduces triglyceride levels and increases HDL cholesterol.<sup>115</sup> Cholesterol clearance from the gut is improved by fibre and a high fibre intake is advisable.<sup>116</sup>

Policosanol, an oily substance derived from the waxy coating of the stems and leaves of sugar cane, has been shown to lower total cholesterol levels, especially LDL cholesterol,<sup>117</sup> and to inhibit platelet aggregation.<sup>118</sup> Therapeutic doses of policosanol are between 5–10 mg per day. No serious adverse events have been observed with long-term use.<sup>119</sup>

When symptoms of heart and blood vessel disease are apparent, a more aggressive approach to treatment is warranted. The majority of studies show that omega-3 fatty acids are able to reduce blood pressure

in hypertensive patients, but not in normotensive individuals.<sup>120</sup> When patients on lipid-lowering drugs were also given omega-3 EFAs, a significant decrease in total cholesterol, triglycerides and insulin was observed.<sup>121</sup> Hyperlipidaemia and excess of adipose tissue increase platelet aggregation and blood coagulation, and decrease fibrinolysis. Both regular physical activity and dietary fat reduction decrease blood lipids and body fat, thereby diminishing the risk of thrombosis.<sup>122</sup> *Panax ginseng* has also been observed to normalise lipid profiles.<sup>123</sup>

### PEONY AND LIQUORICE COMBINATION

*Glycyrrhiza glabra* (liquorice)

- Glycyrrhetic acid seems to inhibit the enzyme 17 $\beta$ -hydroxysteroid dehydrogenase that converts androstenedione to testosterone in the ovary.<sup>124</sup> In one study, a liquorice-containing formula was shown to reduce testosterone produced by the ovaries, but not that produced by the adrenal gland.<sup>125</sup> This suggests that the effects of liquorice at the low doses prescribed were primarily on the ovarian enzyme, 17 $\beta$ -hydroxysteroid dehydrogenase.
- 17 $\beta$ -hydroxysteroid dehydrogenase is also active in the hair follicle where it also converts androstenedione into the more active testosterone (see Figure 16.3). This points to a possible role for *Glycyrrhiza glabra* in the treatment of hirsutism.
- High doses of glycyrrhetic acid also inhibit 11 $\beta$ -hydroxysteroid dehydrogenase, which results in decreased conversion of cortisol to cortisone and the (well-documented) state of apparent mineralocorticoid excess.<sup>126</sup> It is unclear whether sufficient activity is apparent at lower doses to be of therapeutic benefit. In PCOS, overactivity of 11 $\beta$ -hydroxysteroid dehydrogenase seems to be a factor in androgen excess. It may be that doses of glycyrrhetic acid which do not cause the mineralocorticoid effect will sufficiently inhibit 11 $\beta$ -hydroxysteroid dehydrogenase to provide an alternative site of activity for *Glycyrrhiza* in androgen excess.

*Paeonia lactiflora* (Peony)

- The active constituent in *Paeonia* seems to be paeoniflorin, a monoterpene glycoside.
- Paeoniflorin is thought to act directly on the ovary to reduce the production of the androgens in a dose-dependant manner. It increases the activity of aromatase enzymes which promotes the synthesis of oestradiol from testosterone.<sup>127</sup>
- Peony-containing formulas may also improve progesterone levels by normalising ovarian function when the activity of aromatase is inhibited.<sup>128</sup>

#### Liquorice and peony combination

- This formula reduces testosterone levels<sup>129</sup> and improves the oestradiol to testosterone ratios after four weeks of administration. It has been proposed that the formula acts on the ovary first by promoting the activity of aromatase enzyme. This leads to a greater rate of synthesis of oestradiol from testosterone, improved pregnancy rates and, after prolonged administration, a significantly lower LH to FSH ratio.<sup>130</sup>
- Peony and Liquorice Combination also stimulates pituitary dopamine receptors<sup>131</sup> and this action might be responsible for the gradually improving LH/FSH ratio.

#### Dose:

Liquorice and peony combination contains equal amounts of each herb. The dose used in trials was 7.5 g of dried herb daily, in a divided dose. Equivalent fluid extract dose is 3 ml daily of 1:1 fluid extract of *Glycyrrhiza glabra*, and 7 ml of 1:2 fluid extract of *Paeonia lactiflora* daily.

*Glycyrrhiza glabra* 1:130 ml

*Paeonia lactiflora* 1:270 ml

Total 100 ml

Dose 5 ml BD

- The usual contraindications to *Glycyrrhiza glabra* use should be observed. Prolonged administration of large doses leads to hypokalaemia, hypernatraemia, oedema, hypertension and cardiac disorders.<sup>132</sup>
- Relatively small doses over a long period are used for PCOS; however, the following recommendations may be necessary:
  - a diet high in potassium and low in sodium
  - blood pressure surveillance especially with increasing duration of use
  - serum potassium levels may need to be monitored
  - decoctions of *Taraxacum officinale* leaf can be used to reduce the risk of hypokalaemia and hypertension.
- *Glycyrrhiza glabra* should not be prescribed at the same time as spironolactone (Aldactone), a common anti-androgenic and anti-hypertensive drug which also causes potassium depletion.



#### Self care

Studies have shown that dietary and lifestyle changes can play a significant role in the management of PCOS,<sup>133</sup> and many writers recommend

these strategies as essential components in the management of this complaint.<sup>134</sup> The important points to consider are the regularity of meals, the *type* of carbohydrates and fats, the inclusion of phyto-oestrogens and fibre, and dietary intake of chromium and magnesium-rich foods. In addition, obese women will need to restrict kilojoule intake by restricting the *amount* of fats and carbohydrates. Ultimately, the most important feature of a diet is that it is manageable and sustainable. Short-term diets that are excessively restrictive are likely to suffer from poor compliance, and a 'sensible', sustainable diet is the best option for overweight PCOS women.

Generally speaking, carbohydrate foods that have not been refined should be encouraged, and include grains and legumes that have an intact fibrous outer coat. Whole grains and legumes are digested much more slowly, allowing for a slower release of sugars into the bloodstream, more energy over a longer period and a reduction in appetite. Another way to achieve these effects is to consume a dessert spoon of vinegar or lemon juice with a meal (as a dressing, for example). Eating regularly reduces fluctuations in blood sugar levels and sugar cravings. Women with PCOS may need to adopt a strict eating pattern similar to that of the hypoglycaemic diet (see pages 150–2).

Carbohydrate foods can be selected from those with a low glycaemic index. The GI of a food is the measure of its blood sugar-raising potential. Ideal carbohydrate foods for individuals with insulin resistance are those with a GI below 55, which have a higher ratio of a type of starch known as amylose than high GI foods. Amylose is less affected by cooking; and its digestion takes place more slowly, which delays the absorption and release of glucose into the bloodstream. As a result, a low GI diet improves insulin sensitivity. A good cookbook on this topic is *The Glucose Revolution: G.I. Plus* by Jennie Brand-Miller and Kaye Foster-Powell (published by Hodder Headline Australia).

Phyto-oestrogens and fibre have a beneficial effect on blood sugar abnormalities and reduce the severity of symptoms associated with androgen excess by making the androgens less biologically available.<sup>135</sup> This is described in more detail in Chapter 18 'Oestrogen-like compounds in plants'.

Cutting down fat intake, especially of saturated fats, is essential to reduce kilojoules. Monounsaturated fats and foods containing omega-3 EFAs are important substitutes. Increasing foods high in chromium such as whole grains, brewer's yeast, high fibre cereals and black pepper is useful,<sup>136</sup> as well as increasing foods that are a rich source of magnesium (see pages 361–2).

Some very obese women may need to adopt a strict dietary regime. Studies on obese women with PCOS have shown that a short-term, very low kilojoule diet resulted in a twofold increase in SHBG which was mirrored by a fall in serum insulin. Similar biochemical changes were observed during a long-term (six to seven months) diet and were

associated with an improvement of menstrual function and fertility.<sup>137</sup> Another similar dietary regime resulted in improved glucose tolerance and lower cholesterol and triglyceride levels.<sup>138</sup> Weight loss should be achieved by reducing the type and volume of carbohydrates, and a ratio of one serve of carbohydrate to one serve of protein is a suitable way to achieve this. For simplicity, one serve of either carbohydrate or protein can be equated to the size of the palm of the individual's hand.

### EXAMPLES OF LOW GI FOODS

Breads	Dense multi-grain or seeded bread Pumpernickel Sourdough rye
Rice	Basmati Doongara
Other grains	Pearl barley Semolina Bulgur wheat
Breakfast cereal	Porridge Unsweetened muesli Rice bran
Pasta	Most pasta and noodles except corn pasta and rice noodles
Pulses	All beans and lentils Tofu and tempeh
Vegetables	All vegetables except potatoes (limited amounts of sweet potato or yam can be used as an alternative)
Fruit	Temperate-climate fruits such as apples, pears
Dairy/soy	Low-fat milk and yoghurt Soy milk



## MAGNESIUM

Magnesium is vital for the maintenance of bone density, the prevention of heart attacks and the functioning of all muscles.

- Bone health

Magnesium is almost as important for bone health as calcium. It can suppress the activity of hormones which normally encourage the removal of calcium from bone. It also improves the absorption of calcium from food and increases its retention in the body.

A high intake of calcium inhibits the absorption of magnesium. Foods traditionally thought of as being useful for bone density, such as dairy products, are also relatively low in magnesium (100 ml of whole milk contains 115 mg of calcium, but only 10–15 mg of magnesium) which raises doubts about the suitability of large intakes of dairy products for bone health. Magnesium, either alone or with calcium, offsets the usual overnight bone mineral loss.

- Heart disease

Magnesium protects the heart muscle from excess excitability which can cause irregularities in the heartbeat.

- PMS

Magnesium can reduce the symptoms associated with premenstrual tension.

### Deficiency signs and symptoms

- Weakness and/or tiredness, poor muscle coordination, apathy.
- Insomnia, hyperactivity.
- Susceptibility to toxic effects of digoxin, abnormalities of the heart's rhythm, abnormal heart tracing (ECG).
- Premenstrual tension.
- Muscle cramps, grimaces, tremors of the tongue, 'flickering' eyelids.
- Loss of appetite, nausea, constipation.
- Confusion, disorientation and memory impairment, learning disabilities.
- Vertigo.
- Difficulty swallowing or throat constriction (globus hystericus).

These symptoms can have serious causes, but when no obvious cause can be found, magnesium supplements or improved dietary magnesium intake may help.

**Table 16.1 Sources of magnesium (mg per 100 gm)**

The RDA for magnesium is 400–800 mg daily

<b>Grains</b>		<b>Vegetables</b>	
wheat bran*	520	beet tops	106
wheatgerm	300	silverbeet	65
whole wheat flour	140	spinach	59
oatmeal	110	raw parsley	52
muesli	100	beans	35
rye flour	92	green peas	33
white flour	36	broccoli	24
		beetroot	23
<b>Seafood</b>		<b>Fruit</b>	
shrimps	110	dried figs	92
<b>Beans and nuts</b>		dried apricots	65
brazil nuts	410	avocado	30
soya flour	290	banana	20
almonds	260	grapefruit juice	18
peanuts	180		
walnuts	130		

\* Foods such as bran, which are rich in magnesium, may not provide the best source of minerals. Magnesium can become bound to the phytates in bran which reduce absorption. Whole foods from a wide variety of sources is the best way to attain a good intake of easily assimilable magnesium.

# Section F

## Setting it right

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# 17

## Food for health

### Key words

alpha-linolenic acid	linoleic acid
anti-oxidant	monounsaturated fat
caffeine	omega-3 fatty acid
carcinogen	omega-6 fatty acid
cellulose	phyto-oestrogen
eicosanoid	polyunsaturated fat
essential fatty acid	saturated fat
gamma-linolenic acid	theophylline
HDL cholesterol	therapeutic diet
lactose intolerance	trans-fatty acid
LDL cholesterol	triglyceride
lignans	xanthines

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The idea that food can be used as a therapeutic tool is largely foreign to the medical profession, but natural therapists usually incorporate dietary suggestions into the treatment plans of their patients. Eating a sensible, regular and highly nutritious diet will not fix all ills, but can contribute to good stamina and minimise the risk of illness.

The following dietary recommendations are amongst the most common suggested by natural therapists. The daily diet is based on the now widespread knowledge that diets high in vegetables, complex carbohydrates and fruits, and low in saturated fats, are associated with the lowest rate of developing degenerative diseases.

# **TWENTY IMPORTANT DIETARY RECOMMENDATIONS FOR WOMEN**

## **1. Eat a varied and interesting diet**

A good diet does not have to be boring or taste like chaff—and there's certainly no need to eat foods that are unpalatable just because 'they're good for you'. Some of the healthiest and longest-living people in the world eat the most interesting and tasty diets. Southern Europeans, for instance, have low levels of cardiovascular disease; and Japanese women have much lower levels of breast cancer than Western women—and neither of their diets is boring.

## **2. Drink plenty of fluids every day**

Water is vital. About two litres of water every day is the minimum amount of fluid a person should drink, and this should increase in hot weather and when exercising—as a general rule, a dry mouth means that dehydration has already started.

Fluids, like food, should be varied and should not come from coffee, tea and alcohol alone. Two or three glasses of plain water, preferably filtered, throughout the day are essential. Fruit juices (some of which have as much sugar as soft drinks) should be diluted. 'Fruit juice' drinks usually contain added sugar.

## **3. Eat fresh and organically grown foods where possible**

The average volume of food consumed has reduced dramatically in comparison to past generations, making quality all important. Fresh is best—there are less preservatives, the food is less likely to be rancid, nutrient levels are higher and it tastes better. It is easier to see if fresh food has been spoiled or is old and past its 'use by' date. Where possible, buy organic foods to minimise exposure to chemicals.

## **4. Stay on 'therapeutic diets' only until the desired outcome is achieved**

A therapeutic diet is prescribed with a particular outcome in mind, lowering cholesterol or improving anaemia, for example. Therapeutic diets need not be lifelong (fortunately, because some are very strict) and

should only be maintained until the desired results have been obtained. Occasionally, some of the basic principles will need to be maintained—lower saturated fat intake is sensible for everyone, especially for those with high cholesterol—but it should not be necessary to stay on a rigid regime indefinitely.

Sometimes therapeutic diets do not work and it may be necessary to take additional medication or try an entirely different approach. If there are undesirable side-effects such as excessive weight loss, weight gain, bloating or diarrhoea, the diet should be stopped. Therapeutic diets are not appropriate for all conditions and a failure to respond is often the fault of that diet and not the person on it.

## **5. Have at least five to seven different types of vegetables and three pieces of fruit daily**

Vegetables and fruit contain a good range of vitamins, minerals, trace elements, essential fatty acids, anti-oxidants and fibre. They are also good sources of a variety of components which impart specific health-giving properties: cabbages and tomatoes reduce cancer risk; legumes contain phyto-oestrogens; bitter components flush the gall bladder; fruit pectin lowers cholesterol; and celery lowers blood pressure and reduces acid build-up in joints.

Vegetable consumption should be varied. Preparation by steaming, stir-frying or baking reduces nutrient loss. Two to three orange, red or yellow vegetables, a minimum of two green vegetables, and at least one of the cabbage family such as broccoli or cabbage—and some garlic or onion—should be included daily because of their cancer-preventing and blood lipid-lowering properties.

Fruit should not be eaten instead of a vegetable-filled meal (fruits are generally lower in minerals and higher in sugars than vegetables). Fruit is best consumed whole and not juiced, to retain the fibre and slow the absorption rate of sugars.

## **6. The main energy foods should be complex carbohydrates**

Carbohydrates are energy foods which can be consumed either as whole foods (this means that the food is unrefined—brown flour instead of white flour, for example), or as refined carbohydrates. Complex carbohydrates from whole grains and legumes, dried beans and peas, nuts and seeds, soya products and some of the root vegetables, should constitute the major part of any diet. Commonly eaten energy foods include breakfast cereals and muesli, bread, rice, beans, tofu, pasta and potatoes.

These complex carbohydrates are high in fibre and many also contain phyto-oestrogens. They can lower blood cholesterol, stabilise blood sugar, regulate bowel movements, reduce the appetite and ensure a good supply of regular energy. The slow energy release leads to greater stamina and fewer energy slumps after eating. This is important for anyone troubled by blood sugar symptoms, especially women who have premenstrual sugar cravings.

The milling of grains removes the husk and the germ as well as most of the nutrients, leaving the highly palatable, but nutritionally depleted refined carbohydrate (as in white flour, for example). Refined carbohydrates are the biggest source of ‘empty’ foods in the diet (an empty food contains very few nutrients but plenty of kilojoules) and tend to contribute to weight gain. They are a rapid source of energy for a ‘quick-fix’, but the blood sugar increases quickly and then drops rapidly causing fatigue, vagueness and irritability.

Complex carbohydrates contain some of the amino acids which make up proteins and can be combined in a meal so that they become a substitute for animal protein. Carbohydrate combining should be used by vegetarians to make sure that adequate amounts of protein are available on a daily basis. Here are the common combinations:

- Grains with beans: tofu and rice (Asia), lentils and rice (India), tortilla and beans (Mexican).
- Grains and nuts: peanuts and rice (Southern Asia), nut butters and bread (bread-eating countries); rice and cashews (Asia).
- Beans and seeds: sesame seed paste and beans (Middle East).

This doesn’t have to be as complicated as it first appears. Many people instinctively cook like this or follow traditional recipes which incorporate these food combinations. Combining carbohydrates gives the energy benefits of protein, as well as the positive benefits of complex carbohydrates without a high animal fat intake.

## **7. Ensure that the diet contains adequate fibre**

Fibre is no longer considered to be the indigestible and unprofitable part of food. Its health benefits include a reduced incidence of constipation and other bowel complaints, and a reduction in the incidence or severity of diabetes, gall stones and cardiovascular disease. A high fibre diet lowers the risk rate of breast and colon cancer.

All plant foods contain different types of fibre intermingled with proteins, fats and carbohydrates. The type and concentration of fibre varies in different parts of the plant and as the plants age. The main types of fibre are celluloses, hemicelluloses, pectin, gums, mucilages and lignins.

Cellulose is probably the best known type of fibre and is a compo-



ment of all plants. It attracts water which results in an increase in stool size and a decrease in transit time. Cellulose is broken down in the gut to form important substances called short chain fatty acids, which seem to protect the bowel wall and lower the incidence of colon cancer. Wheat bran is an important source of cellulose, as are all ‘fibrous’ vegetables like celery and carrot.

Most of the other types of fibre are referred to as soluble fibre. They disperse in water and are found in relatively high concentrations in dried beans, oat and barley products. They have provoked a lot of interest because of their role in reducing cholesterol by binding to bile acids (bile acids are required for the digestion and absorption of fats—less bile acids means less fat uptake and lower cholesterol levels).

Lignins are also important forms of fibre. They are found in a large variety of fibrous foods including wheat, rye and linseed meal, and are converted in the body into mammalian lignans. They can also be converted into the weak oestrogens, enterolactone and enterodiol, by bacteria in the gut, and their consumption is associated with a reduced incidence of oestrogen-dependent cancers and menopausal hot flushes.

Dietary fibre increases the numbers of healthy intestinal bacteria (*Lactobacillus*, for instance). Bacteria comprise a significant proportion of the stool weight and their presence tends to reduce the tendency to constipation. Wheat bran, for instance, increases stool weight and volume by supplying bulk as well as by stimulating an increase in the numbers of intestinal bacteria.

The best source of dietary fibre is from whole foods, but occasionally it may be necessary to use processed fibre products (wheat, oat or rice bran, for example), to effectively treat some diseases.

## **8. The ‘bad fat’, ‘good fat’ dilemma**

The low-fat diet is the answer to all our health problems—or so we have been led to believe. If we eat fat we will become obese and unloved, develop cholesterol problems and ultimately, heart disease. So far has this craze gone that a synthetic oil has been developed that provides no kilojoules and is not absorbed. (Probably just as well!) But reducing fat intake without an understanding of the differences between fats is likely to cause more problems than it solves.

In reality, we all need a reasonable level of fats in our diet in order to thrive. The question then becomes: which are the ‘bad fats’ and which are the ‘good fats’?

### **Saturated fats**

Saturated fats are abundant in animal products (pork, beef, lamb, chicken and dairy foods) and in the tropical oils (coconut and palm

oils). They build cell membranes and are an energy source to be used, or stored as fatty tissue. Saturated fats are not essential and can be made from other fats, sugars and starches. They are often solid at room temperature, or become solid when they are refrigerated. Excessive saturated fat intake is associated with elevated cholesterol levels, heart disease, obesity and an increased risk of some cancers.

Reduce saturated fats in the diet by selecting low-fat dairy products, using lean cuts of meat trimmed of all visible fat, removing chicken skin, reducing or avoiding saturated fat spreads such as butter, and checking for fat content of commercially produced foods.

## Unsaturated fats

The unsaturated fats are chemically different from saturated fats because they contain one or more double bonds. This means they have a structure which makes them less inclined to aggregate or stick together, and more inclined to disperse and remain liquid at room temperature. The fluidity of the unsaturated fats confers beneficial properties.

Unsaturated fats are found in cooking oils and margarine, seeds, nuts, fish and some vegetables. They are more unstable than saturated fats and susceptible to oxidative damage (rancidity) or structural changes when they are exposed to heat, light or oxygen.

There are two main types of unsaturated fats—the monounsaturates containing one double bond; and the polyunsaturates which have more than one double bond.

## Monounsaturated fats

Monounsaturated fats are the best vegetable oils to cook with. They are the most stable of the unsaturated fats when exposed to heat, light or oxygen. Pour them into a pre-heated pan to reduce heating time and store them in the refrigerator in opaque or dark glass bottles. Never re-use oils. Olive oil is the best known monounsaturated oil and when used as a substitute for saturated fats helps to lower cholesterol and reduce the risk of heart disease. Canola, peanut and avocado are other monounsaturates.

## Polyunsaturated fats

The polyunsaturated fats are extremely important. There are two types—the omega-6 group and the omega-3 polyunsaturated fatty acids. See Figure 6.1, page 89.

Two of the individual polyunsaturated fats are known as ‘essential fatty acids’ because they cannot be manufactured by the body and must be eaten in foods. They are linoleic acid which is the first fatty acid in the omega-6 pathway; and alpha-linolenic acid, at the beginning of the omega-3 pathway.

Essential fatty acids are necessary for the normal function and development of most tissues including the kidney, liver, blood vessels, heart and brain. Deficiencies lead to excessive scaliness of the skin, reduced growth rates and infertility in both males and females; and can also cause a greater susceptibility to infection, and fragile red blood cells.

The omega-3 and omega-6 fatty acids are the precursors to the production of all eicosanoids (prostaglandins, leukotrienes and thromboxanes) and many of their actions are associated with these end-products. The omega-6 fatty acids, which are usually consumed in large quantities in the diet, tend to produce eicosanoids which are relatively more pro-inflammatory than those eicosanoids derived from the omega-3 fatty acids. For this reason, the dietary ratio of omega-3 to omega-6 fatty acids should be 1:5 (which is approximately the ratio of fatty acids in breast milk) rather than the current dietary ratio of about 1:14. Increasing oily fish, reducing cooking oils which contain high levels of omega-6 (sunflower, safflower and corn oil) and replacing them with oils containing omega-3 (canola oil) or low levels of omega-6 (olive oil) will improve this ratio.

### The omega-3 fatty acids

There are three important omega-3 fatty acids. The first is called alpha-linolenic acid (ALA) and is found in linseed, hemp, canola, soy bean, walnut and mustard seed oils, as well as dark green, leafy vegetables. The other two important fatty acids in the omega-3 series are usually known only by their initials—EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid). They are found in the oils of cold-water fish and marine animals. All omega-3 fatty acids can be made in the body from alpha-linolenic acid, the only *essential* omega-3 fatty acid.

The omega-3 fatty acids are used as supplements to treat conditions which have an inflammatory or allergic component including rheumatoid arthritis, asthma, psoriasis and other skin complaints. They are also used to prevent and treat cardiovascular disorders, and are especially indicated when an individual has a tendency to blood clot formation.

- Linseeds or linseed (flaxseed) oil  
These are very rich sources of the plant-derived omega-3 essential fatty acids (ALA). As a supplement to the diet, flaxseed oil can be taken at between 1–2 tablespoons daily. Linseeds can be ground and included in the diet. They must be refrigerated immediately after grinding.

### Alpha-linolenic acid content of some oils and seeds

Linseed (flaxseed) oil	60 per cent
Pumpkin seeds	15 per cent
Canola oil	10 per cent
Mustard seed oil	10 per cent
Soya bean oil	7–9 per cent

- Oily fish

Include oily fish in at least four meals a week.

Fish containing high levels of EPA and DHA

Atlantic salmon	Ocean trout
Blue-eye cod	Pilchards
Blue grenadier	Rainbow trout
Blue mackerel	Redfish
Blue warehou	Sardines
Gemfish	Sea mullet
Golden perch	Silver trevally
Herring	Silver warehou
King George whiting	Tuna
Luderick	Yellowtail kingfish

### The omega-6 fatty acids

The important omega-6 essential acids are called linoleic acid, gamma-linolenic acid and arachidonic acid. Of these, linoleic acid is the only true essential fatty acid because the others can be synthesised from it. However, gamma-linolenic acid (GLA) is often lacking in the modern diet and its synthesis from linoleic acid is very easily disrupted. Supplements are often necessary to rectify this imbalance. Arachidonic acid is found in animal products and is usually present in abundance in the normal diet.

- Seeds and seed oils: Linoleic acid is found in abundance in seed oils such as safflower, soya bean, corn, sunflower, canola and grape seed oils.

Linoleic acid content of some oils

Safflower oil	75 per cent
Sunflower oil	60–70 per cent
Walnut oil	60 per cent
Corn oil	55 per cent
Soya bean oil	50 per cent
Peanut oil	35 per cent
Canola oil	20 per cent
Olive oil	8 per cent

Evening primrose, star flower and black currant seed oils are all very good sources of linoleic acid and also contain beneficial amounts of GLA. These oils are available in capsule form and serve as precursors to the series 1 prostaglandins.

- Vegetables: Although the levels are low when compared to seeds, most vegetables are sources of linoleic acid.

## Cholesterol

Cholesterol is a fat-like substance in the same chemical family as the steroid hormones (oestrogen, progesterone, testosterone). It is found in all animal fats but not vegetable fats. Hidden sources are manufactured foods such as biscuits, chips, muesli bars and other convenience foods. Cholesterol is utilised in the body to make steroid hormones, myelin nerve sheaths and cell membranes. It is synthesised in the liver from fats in the diet and circulates in the blood in combination with protein and fat (lipoprotein).

Atherosclerotic (vessel-narrowing) plaques contain large amounts of cholesterol, suggesting a relationship between cholesterol intake and heart disease. However, cholesterol metabolism and excretion is very complex. Increased dietary intakes of cholesterol lead to a reduced synthesis of cholesterol in the liver, but higher excretion rates.<sup>1</sup> Reducing cholesterol intake lowers blood cholesterol, but does not affect overall mortality rates,<sup>2</sup> or reduce the incidence of atherosclerosis.<sup>3</sup>

Other dietary factors appear to be more important than restricted cholesterol intakes to both reduce blood cholesterol levels and the incidence of cardiovascular disease. Reduced intakes of saturated fats and trans-fatty acids (both discussed in this section) lower blood cholesterol levels more than a restriction of dietary cholesterol. Increasing fibre intake and exercising also reduce cholesterol levels.

The type of cholesterol is also an important factor in the development of heart disease. Cholesterol is transported into the blood vessel walls by a carrier molecule called low-density lipoprotein (LDL). This is one of the initial stages in plaque formation. Fortunately, there is another carrier called high-density lipoprotein (HDL) that transports cholesterol back to the liver for storage or conversion.

When LDL levels are high in comparison to HDL, cholesterol is more likely to be deposited in an atherosclerotic plaque. Conversely, high levels of HDL are protective. Women with *lower* HDL levels are at significantly more risk of developing cardiovascular disease than women with *elevated* LDL levels.<sup>4</sup> Low fat diets, or substituting saturated fats with polyunsaturated fats, decreases *both* LDL and HDL cholesterol,<sup>5</sup> and is not good dietary advice to reduce risk of heart disease.

Oxidised LDL cholesterol is also a risk factor for cardiovascular disease because it increases the formation of atherosclerotic plaque in arteries. Anti-oxidants such as vitamin E,<sup>6</sup> and compounds found in red wine and grape seed extracts,<sup>7</sup> protect against LDL oxidation.

On the other hand, a diet rich in monounsaturated fatty acids significantly reduces total cholesterol and LDL cholesterol but does not alter HDL cholesterol.<sup>8</sup> Certain types of the polyunsaturated fats, such as the omega-3 series, and especially oily fish, also reduce the risk of cardiovascular disease by reducing blood clotting and atherosclerotic damage to the blood vessels.

## Triglycerides

High serum triglycerides are a risk factor for cardiovascular disease. Fats, sugars, alcohol or refined carbohydrates consumed to excess are converted into triglycerides and stored in the fat. High levels of circulating triglycerides can cause blood cells to clump together, and increase the risk of diseases such as cardiovascular disease, kidney failure, hypertension and cancer.<sup>9</sup> Lowering the intake of fats, added sugars, alcohol and refined carbohydrate lowers tri-glyceride level.

## Oxidative damage

Oxidation occurs when free radicals cause damage to foods or cells in the body. This process can cause foods to 'go off' or become rancid. In the body, free radical damage is associated with a large number of problems such as ageing, cancer and heart disease.

Anti-oxidants are components found in foods which protect both food and cells from oxidation and free radical damage. The principal anti-oxidants are vitamins E and C, beta-carotene, the flavonoids and the phenolics. Correct storage of foods, particularly oils, also reduces the tendency to oxidation or rancidity by minimising exposure to heat, light and air.

## Trans-fatty acids

Oils can be processed so that they become solid—for example, margarine and vegetable shortening. This process requires high temperatures and hydrogenation to produce the saturates and trans-fatty acids which result in a hardened product. Hydrogenated vegetable oils are also common components of manufactured foods.

In their unaltered state, nearly all unsaturated fats are in the *cis*-configuration. When oils are heated, particularly the polyunsaturated oils, their shape changes to the trans configuration. Oils in the trans configuration (a description of their shape) cause platelets to become sticky, blood cholesterol to increase and an alteration in the ratio of LDL cholesterol to HDL cholesterol. Trans-fatty acids can also interfere with the production of the useful group of prostaglandins which may reduce the severity and incidence of PMS, dysmenorrhoea and a host of inflammatory problems.

## What to buy and eat

An overall reduction in fats is advisable for most people. Animal fats contain cholesterol as well as saturated fats and should be restricted. The overall levels of polyunsaturated fats consumed as 'vegetable oils' should be reduced as well. Some of the polyunsaturated fats which contain the essential fatty acids (unrefined linseed or flaxseed oil, pumpkin, walnut, soya bean, safflower and sunflower oils, for example) should be included in regular, small amounts, preferably added to cooked or raw foods such as salads. Regular fish consumption reduces the risk of degenerative diseases such as heart disease, arthritis, some cancers and auto-immune diseases.

The best oils to buy are those which have been manufactured without heat and which are stored correctly in dark glass bottles. All oils and oil-containing foods should be refrigerated. Monounsaturated fats such as olive and canola oils are the best oils for cooking and general consumption.

## 'Best practice' cooking, preparation and storage

- Avoid excessive consumption of heated oils: Heating induces irreversible changes to oils which leads to oxidation or free radical formation.
- Rediscover alternatives to cooking with oils: Many foods can be cooked in just a little water, or even dry-fried in a non-stick pan. Fish, eggs and vegetables can be poached in water or a fruit or vegetable puree, and fish and vegetables can be baked rather than roasted in oil.
- Add oils before serving: Food with an adequate oil content can be recognised as satisfying. Rather than cooking in oils, however, add oils to food *after* cooking. Oils with a high essential fatty acid content can be made into dressings or sauces and added to cooked food prior to serving. This will improve the sense of satiety when eating steamed, baked or poached foods.

- Add cold-pressed oils of linseed, safflower and canola to the diet: These can be taken in tablespoon doses once or twice a day or added to the seed breakfast (see page 296), used in salad dressings, poured on cooked food such as steamed vegetables, pasta or potatoes, or mixed with yoghurt in a ratio of about 1–2 parts oil to 10 parts yoghurt. Try following the European tradition. Spread breads with oils such as olive oil, but add a little of the oils rich in essential fatty acids too—canola or linseed oils, for example.
- Make your own spreads: Satisfying alternatives to butter and margarine can be made from avocado, tahini, yoghurt, chickpeas, nut butters or vegetable-based dips.
- Store oils carefully: Omega-3 and omega-6 oils are highly susceptible to damage, so they must be treated with care. For maximum therapeutic benefit, they should be bought in small quantities as oils that are unrefined, mechanically pressed and in opaque or dark glass bottles. This ensures that the fatty acids are not adversely affected by light, heat or oxygen. They are not for cooking and should be stored in the refrigerator. They can be used as salad dressings or added to food after cooking.

## 9. Include dairy products in moderation

Many people are confused about dairy products—are they ‘good for you’ or not? Dietitians often see the enormous potential for improving nutrient intake, especially calcium, and recommend a high intake. Some people, however, are sensitive to dairy products, or at least some aspects of them, and may be wiser not to eat them at all.

It is possible to have difficulty with lactose (milk sugar), or to one of the proteins, usually casein or beta-lactoglobulin (the curds and whey of nursery rhymes). Rarely, an apparent intolerance to all types of dairy products is seen.

### Lactose intolerance

Lactose is milk sugar and is found only in animal milks, including human breast milk. Only one-third of the world’s population inherit the ability to digest it after weaning. They are usually descendants of Northern European, Middle Eastern or Central African peoples, and maintain high levels of intestinal lactase (the enzyme to digest lactose) as adults. Descendants from most other populations groups, lose this ability early in childhood.<sup>10</sup>

A transient lactose intolerance can develop after a bout of infectious diarrhoea, particularly if caused by *Giardia lamblia* which often affects



young children and travellers. Lactose-containing foods should be avoided until symptoms disappear. The incidence of lactose intolerance also seems to increase with age; about 30 per cent of the elderly are affected.

Sufficient quantities of lactose-containing foods need to be eaten before symptoms develop (the 'threshold level'). Dairy foods have differing amounts of lactose. Low levels are found in most cheeses including Parmesan, cheddar, Edam, Gouda and reduced-fat Swiss. Nimbin™ brand cheese contains no lactose, and butter has very little. The highest amounts are in milk (especially low-fat milk), cream and low-fat creamed cottage cheese. Yoghurt also contains large amounts of lactose, but rarely causes intolerance (see following).

Symptoms of lactose intolerance develop because the accumulation of undigested lactose irritates the bowel wall and causes bloating, abdominal discomfort, flatulence and sometimes diarrhoea. Osteoporosis is more common in people with a lactose intolerance, possibly because they avoid dairy products to prevent the symptoms. Lactose intolerance may also be associated with an increased risk of cataracts.<sup>11</sup>

Proper management of lactose intolerance requires a reduction in the intake of dairy products which have a high lactose content. Complete abstinence is unnecessary. Cultured milks, yoghurt and cheeses are usually well tolerated and can be eaten in small portions throughout the day to keep the lactose below threshold levels where symptoms develop.

## Milk protein intolerance and allergy

Milk products can cause either *acute allergic reactions* or *intolerance* in susceptible individuals. The main culprits seem to be either of the milk proteins beta-lactoglobulin or casein. Beta-lactoglobulin is the main protein in whey. It is present in milk, yoghurt and all but the hardest of cheeses. Casein makes up the 'curd' or solid part of milk when cheese is being made. It is present in all milk products apart from those which consist solely of whey such as whey powder.

*Acute allergic reactions* cause wheezing and difficulty breathing, or in milder cases, acute allergic skin reactions. *Dairy intolerance* is at this stage poorly understood, but can cause a wide range of symptoms which include:

- excessive catarrh, phlegm, wheezing, sneezing, cough, blocked nose or ears
- diarrhoea, stomach cramps, bloating, nausea, or discomfort; colic in infants<sup>12</sup>
- joint pains, muscular aches and pains, or more serious complaints such as rheumatoid arthritis

- eczema, hives
- migraines, mood changes or depressive states

It is sometimes possible to identify which constituent is causing a problem by selectively withholding and then reintroducing different types of dairy product. This is complicated and a practitioner skilled in food intolerance may need to be consulted—or try yoghurt.

## Yoghurt

Yoghurt is an important food. It is easily digestible, provides bacteria which assist with the growth of healthy intestinal bacteria, has more calcium per unit volume than milk, and may help to reduce the risk of breast and other oestrogen-dependent cancers.<sup>13</sup>

It is also well tolerated by those with a dairy or lactose intolerance. Bacteria in the yoghurt starter cultures (usually *Lactobacillus bulgaricus* and *Streptococcus thermophilus*) produce enzymes which convert lactose into the non-irritant lactic acid,<sup>14</sup> and ‘digest’ the proteins in milk which are related to many of the sensitivity reactions.

When protein molecules are split into smaller amino acid components by the bacteria, they are not recognised by the body as allergy-promoting substances. Lactic acid also acts on casein and breaks it down into smaller components, making the milk protein more digestible as well as less allergenic.<sup>15</sup>

Additional milk solids added to yoghurt during manufacture increase the calcium and protein content of yoghurt, but all dairy products are relatively magnesium-poor and should not be used as the sole source of minerals for bones. (Bone needs magnesium to ensure that calcium is maintained within its structure and not excreted again.) Additional magnesium-rich legumes, vegetables and nuts, are needed in the diet to balance the poor calcium/magnesium ratio of dairy products.

Yoghurt should contain live cultures; many of the snack-type yoghurts, especially the flavoured and ‘fruit’ yoghurts, do not.

## 10. Include phyto-oestrogenic foods in the diet

Phyto-oestrogens (plant oestrogens) are structurally similar to animal oestrogen and are found in a large and growing number of common foods and medicinal plants. Dietary phyto-oestrogen intake is associated with a reduced incidence of oestrogen-related disease. They are discussed in the next chapter.

## 11. Ensure an adequate and regular intake of protein foods

When people go on ‘healthy’ or ‘weight loss’ diets, they often drastically reduce or stop most of their protein intake. Protein is found in animal products such as meat, eggs, fish, milk and cheese, and also in the vegetable proteins. Neither type is better or worse—both categories have additional qualities and characteristics which determine which type is more or less acceptable.

Vegetarians (lacto-ovo), for example, can obtain protein from eating vegetable proteins, dairy products and eggs; vegans from eating combinations of vegetable proteins. There is a greater difficulty (but not impossibility) for vegetarians to obtain iron, and for vegans to get enough vitamin B<sub>12</sub> as well. The advantage of being a vegetarian is a lower intake of fat and less likelihood of developing many of the chronic degenerative diseases; the disadvantage is a tendency to anaemia and fatigue.

Meat eaters have an advantage when it comes to iron intake. Iron in meat is easier to absorb and it is present in much greater quantities. Animal protein is also of a better quality and meat eaters can have a more relaxed attitude to nutrient intake, but still maintain energy levels. On the downside, eating meat increases the intake of saturated fats and the risk of a number of diseases, such as heart disease and cancer. Deep-sea fish is beneficial because it contains high levels of essential fatty acids. A suggested diet could contain lean red meat in small quantities, some free-range chicken without the skin, plenty of fish, a few eggs (no more than three a week) and low-fat dairy products. Animal proteins such as these can be consumed at one meal daily. The protein intake at the other meals should come from properly combined vegetable sources.

Deciding how much protein to eat in grams is quite difficult. Young women between the ages of eleven and twenty should eat about 1 g of protein for every kilogram of their body weight. Women from twenty onwards need about 0.75 g for every kilogram. On average, this means a woman should consume 45–55 g protein each day.<sup>16</sup>

**Table 17.1 Approximate levels of protein in common foods**

Meat (100 grams)	20–25 grams
Fish and seafood (100 grams)	15–20 grams
Beans/legumes (1 cup)	7.5–15 grams
Whole grains (1 cup)	5–12 grams
One cup of milk or yoghurt	8 grams
One egg	6 grams
Cheese (30 grams)	6–8 grams
Vegetables and fruits (1 cup)	2–4 grams

## **12. Develop an awareness of the important minerals**

Key pages outlining the important minerals are included throughout this book. Calcium is included in Chapter 9 ‘Menopause’; magnesium is discussed in relation to hormone and blood sugar abnormalities in Chapter 16 ‘Ovarian cysts’; iron in Chapter 11 ‘Menorrhagia’; and zinc in Chapter 7 ‘Adolescence’.

## **13. Be aware of the relationship between food and the seasons**

Before commercial food preparation, refrigeration and improved transport facilities, most people ate seasonal foods from their area. We can now get most foods most of the time and the idea of eating only seasonal fruits and vegetables probably seems like an unnecessarily restrictive practice.

All fruits and vegetables can be assigned with certain qualities in the same way that medicinal herbs are. Summer foods are generally juicy and light, in the cooler months foods tend to be dense and compact with a high component of carbohydrate and protein. Compare lettuce with cabbage, zucchini with carrot, or peaches with apples, for example. In summer, moist, easily digested raw foods make sense, but in winter they don’t provide enough carbohydrate to counterbalance the energy expenditure needed to stay warm.

Winter foods should be mainly beans, legumes and root vegetables; salads can be made from root vegetables and cabbage. These are Warming and comforting foods on a cold winter’s day. Summer foods need to be lighter and have a higher moisture content. Most summer fruits and vegetables have Cooling properties—melons are particularly Cooling while bananas which tend to be dense and compact are Warming.

## **14. Try to vary food flavours**

There are five main flavours in the diet: bitter, sweet, sour, salty and spicy or pungent. In Australia we rely heavily on the sweet and salty flavours (just look into the shopping trolleys at the supermarket). Some cultures include all or most of the flavours in their cooking as a matter of course—Thai food for example, is cooked with the addition of salty, sweet, spicy and sour flavours.

Each of the flavours has subtle effects on digestion and health. Bitter foods, for example, improve digestion and bowel function by stimulating the bile flow. Bitter green vegetables are commonly used in some parts of Europe and radicchio, chicory, dandelion leaves and silverbeet are

often included in the diet to aid digestion. (Spinach is not a bitter because it doesn't taste bitter.) Grapefruit is sour and bitter, and the old practice of having half a grapefruit before a fatty breakfast such as bacon and eggs makes a lot of sense. (Not eating a fatty breakfast makes even more sense!) Dandelion coffee is a gentle and effective bitter that is available as a beverage.

Warming spices in the diet improve sluggish digestion and can be used for complaints of the upper gastrointestinal tract such as nausea, dyspepsia (belching) and indigestion. Ginger, cardamom, cumin and coriander are all useful—ginger tea is particularly helpful for nausea. These spices can be brewed in ordinary black tea to assist with digestion. Warming spices are useful for those who feel cold, have difficulties with cold weather or catch colds easily.

Sour foods are drying and can be used to prevent excessive mucous membrane congestion and moistness. Excessive consumption of sweet foods often causes phlegm or catarrh in susceptible individuals which sour foods can help to counteract. Many sour foods, such as citrus fruit, are useful to protect the mucous membranes from infections. Sour foods also aid digestion.

## **15. Do not overeat**

Overeating is associated with obesity and a shorter life expectancy. The digestive tract is chronically overburdened and the incidence of gall bladder disease increases. The heart has to work harder, and blood lipid profiles are more likely to be abnormal. The risk of high blood pressure also increases.

## **16. Avoid foods that cause digestive upsets or a sense of ill-health**

This should be obvious, but sometimes the desire to 'do the right thing' overcomes commonsense and people try to eat what they think they should rather than what they can. Numerous diets in recent years have been offered as the panacea of all ills—some people benefit from such diets, but others will develop obvious problems such as abdominal upsets or diarrhoea, or become excessively tired. It is simply not possible for one dietary regime to be suitable for all people, or even for any one individual forever.

Raw food diets can be a problem, for example, because raw food is quite difficult to digest. Bloating, flatulence or even diarrhoea can occur, depleting the uptake of nutrients and leading to a deterioration rather than an improvement in health. Substitutes should be found if

foods cause intolerance or are disliked—anaemic women don't have to eat meat if they don't want to, and dairy products might cause problems for someone with osteoporosis. Trading one health problem for another isn't a good idea.

## **17. Limit intake of sugar and salt in cooking and food choice**

### **Sugar**

Sugar is not considered an essential food, and was not a major part of our diet until the mid-nineteenth century. All types of sugar should be minimised, including brown and unrefined sugars, as well as the foods which are prepared with sugar such as cakes, biscuits, puddings, soft drinks, fruit juices, cordials, jams, ice-cream and lollies.

Many commercially prepared foods contain added sugar which is not apparent on tasting. Canned foods such as peas, bean mix and beetroot, cereals, dry biscuits, and many condiments such as sauces, pickles and mayonnaise are common examples. Sugars are included to increase flavour, or as a preserving agent.

Between 25–50 per cent of Australian women eat more than the recommended amount of refined sugar. The amount of sugar consumed between 1985 and 1990 increased, according to nutritional surveys conducted in Victoria. The increase coincided with an advertising campaign by the sugar industry and women between 18–29 years were the most affected.<sup>17</sup>

Excess consumption of sugar has been linked to coronary heart disease, hypertension and increased serum cholesterol and triglycerides; an increased risk of breast cancer, hyperactivity, dental caries, mineral loss via the urine, obesity, formation of cholesterol, gall stones and functional hypoglycaemia.

### **Salt**

Between 40–60 per cent of Victorian women consume more than the recommended daily allowance of salt.<sup>18</sup> Salt intake is associated with high blood pressure and increases the excretion of minerals in the urine. Most sodium enters the diet by way of manufactured foods (cheese, sausage, processed and canned vegetables, biscuits, spreads, etc.) and not through adding salt during cooking or at the table. Salt should be limited to around 3–5 g daily.

## **18. Limit intake of caffeine-containing beverages**

Caffeine-containing drinks have an honoured place in our society as a tonic for body, mind and spirit. They contain highly active substances known as xanthines which are alkaloids and are stimulants to the central nervous system. Caffeine is the major active ingredient in coffee; tea contains theophylline and caffeine; and cocoa and chocolate contain theobromine as well as caffeine. Of the xanthines, caffeine is the most pronounced stimulant and theophylline is milder.

Caffeine-containing beverages increase anxiety and aggravate insomnia. The blood lipid profile is altered by their consumption (and with decaffeinated coffee but not filtered coffee<sup>19</sup>) and the blood pressure increases. In the long term, caffeine may affect mineral retention and lead to an increased risk of osteoporosis (due to increased excretion of calcium and magnesium).

Excessive caffeine intake is also associated with a number of common gynaecological conditions including endometriosis, fibroids, PMS and benign breast disease. Caffeine has also been shown to lower fertility,<sup>20</sup> and there has even been a proposed link between caffeine consumption and cancer. Gynaecological problems have been associated with the equivalent of two cups of coffee or four cups of tea every day. 'Plunger' coffee has the least harmful effects. Boiled (Turkish) coffee should be completely avoided if there are problems with high cholesterol levels.

## **19. Alcohol consumption should be limited**

Alcohol-related problems were described by the Australian Senate Standing Committee on Social Welfare (1977) as being of epidemic proportions. Deaths directly related to alcohol make up 26 per cent of all drug-related deaths (71 per cent from tobacco, 2 per cent from others, 1 per cent from opiates). A host of other more subtle health problems are caused or aggravated by alcohol. Some are caused by depletion of minerals such as calcium, magnesium, potassium and zinc, and vitamins A, C and the B complex, especially B<sub>1</sub>.

Women are more affected by alcohol and for longer than men. They have a lower body water content (a woman's body contains approximately 49 per cent body water, a man's about 58 per cent) and so a given volume of alcohol is diluted into a smaller volume of body water. They also metabolise alcohol more slowly because they have a smaller liver cell mass than men.

Government authorities acknowledge these differences by issuing different warnings for women and men. Two standard alcoholic drinks will take a woman to the legal blood alcohol limit for driving, but this figure may be influenced by hormonal fluctuations associated with the

menstrual cycle (around the period and ovulation, alcohol is thought to be metabolised more slowly), cigarette smoking and dietary habits.

Excess alcohol consumption has been linked to cancers, hypertension, heart disease, foetal abnormalities and liver disease. The National Health and Medical Research Council have made the following recommendations for women:<sup>21</sup>

- Women should not exceed two standard drinks a day or fourteen standard drinks a week on a regular basis.
- Two to four drinks a day or 14–28 drinks a week are to be considered hazardous, and more than four drinks a day or 28 drinks a week are to be considered harmful.
- Abstinence from alcohol is highly desirable during pregnancy.
- Everyone should have at least two alcohol-free days a week. (A three-day break between drinking to allow the liver time to recover might be even better for a woman.)

## **20. Be aware of which foods reduce or increase cancer risks**

Regular consumption of some commonly eaten foods, especially fruit, vegetables and cereals, is associated with a lower incidence of cancer at many body sites including the uterus, breast, cervix, ovary, lung, skin, stomach and colon.

Although researchers have not identified all of the factors associated with tumour growth, it is known that there are two critical stages, called the ‘initiation’ and ‘activation’ stages of cell growth. A carcinogen can make a cell susceptible to change or ‘initiate’ change, but abnormal cell growth will not occur unless ‘activators’ stimulate the altered cell. For breast cancer to develop, for instance, the known activators include oxidative cell damage, oestrogen and some types of prostaglandins.

Some foods may reduce cancer risk because they contain one or more of the numerous anti-carcinogens found in plant foods. In the past decade, over 40 foods have been identified as having cancer-preventive properties.

### **Protective foods**

#### **Fruit and vegetables**

Although it is possible to single out specific foods with protective qualities, a review of about 200 worldwide studies found overwhelming evidence indicating that just by having a high intake of fruit and vegetables, the risk of developing cancer is approximately halved.<sup>22</sup> Some individual studies found an even more marked protective effect from



vegetables. Greek research showed low vegetable consumers to have ten times more risk of developing breast cancer than women with a high vegetable intake.<sup>23</sup>

Considerable interest has been given to the possibility that increasing specific nutrients, especially the anti-oxidants, may be even more protective. The anti-oxidants, vitamin A, C and E, beta-carotene and selenium, are known to block various phases of cancer development. As well, anti-oxidants act synergistically with each other and with dietary components to exert a protective effect.<sup>24</sup>

Vitamin C and E, for example, can change the potential carcinogen, nitrosamine (a compound made from nitrites in foods), into less harmful compounds in the stomach before it has been absorbed; selenium and beta-carotene can also restrict carcinogen formation in the gut. But the main protective effects of the anti-oxidants occur during the initiation and activation phases of cellular change—in other words, the anti-oxidants protect individual groups of cells from carcinogens which have managed to bypass the usual defences.

All of the anti-oxidants are potentially protective at this point, but some seem to be particularly protective to some tissues. For example, cervical cancer incidence is lower when women have better intakes of the carotenoids, especially beta-carotene;<sup>25</sup> and a low beta-carotene intake has also been associated with breast cancer.<sup>26</sup> But despite the links with specific nutrients, there is a recurring suggestion that foods contain many different protective compounds which play an important role, and that it is the vegetables or fruits in their entirety, rather than individual components, that are protective.

Some vegetables and fruits which seem to be particularly useful will be discussed separately, but it is probably sufficient to simply eat as wide a range as possible. Some of these should be raw, but it is not necessary to eat a wholly raw vegetable and fruit diet:

- Cabbage family

A high consumption of vegetables from the cabbage family, primarily cabbage, broccoli and brussels sprouts, is associated with a reduced incidence of cancer of the lung,<sup>27</sup> bowel<sup>28</sup> and pancreas.<sup>29</sup> Of particular interest to women is the observation that some components in these vegetables increase the metabolism and excretion of oestrogens, which has raised the possibility of a positive protective effect against oestrogen-dependent cancers,<sup>30</sup> particularly breast and uterine cancer. So far, the only research has been conducted on animals,<sup>31</sup> and it is too early to make any firm statements about the positive effects for women.

- Onions and garlic

Interest in garlic and onion in relation to cancer prevention is two-fold. First, a number of researchers have noted a positive association between garlic consumption (in particular) and reduced

risk of cancer,<sup>32</sup> and second, garlic contains high levels of naturally occurring selenium (a mineral with powerful anti-oxidant properties). Considerable effort has gone into identifying those agricultural practices which will enhance the selenium content of garlic,<sup>33</sup> because naturally occurring selenium seems to have less potential toxicity at high doses than selenium given as a supplement.<sup>34</sup>

At the moment, however, a statement that ‘garlic reduces cancer risk’ is just not possible. Researchers are in agreement that there is evidence of a positive effect from eating garlic, but not on what that effect might be. For instance, although there have been indications in animal research that garlic can reduce the incidence of breast cancer,<sup>35</sup> this has not been borne out by studies of large numbers of women who eat garlic regularly.<sup>36</sup>

At this stage it seems that garlic reduces the incidence of cancers in the gastrointestinal tract, primarily the stomach, colon, liver and oesophagus. There is a possible reduction in breast cancer risk, but as yet this has been only shown experimentally. Another role for garlic, along with cucumber, onion and tomato, is to reduce the mutagenic effects of chemotherapy, according to research in China. This research may be used in the future to design diets to prevent the return of cancer.<sup>37</sup>

Raw garlic is probably most protective, but the tradition to eat it cooked in food is much more acceptable to those who worry about the ‘social’ aspects of garlic. Add a few more cloves or a little more onion than recipes suggest.

- Red, yellow and orange vegetables and fruits

The red, yellow and orange vegetables and fruits often contain high levels of beta-carotene. This red pigment is a precursor to vitamin A in humans and is one of the major anti-oxidants and cancer-preventative food components. It is found in high levels in carrots, sweet potato and pumpkin, and in cantaloupe, papaya, oranges, apricots and peaches. Dark green leafy vegetables also contain high levels of beta-carotene.

Beta-carotene intake is associated with a lower level of cancer in many studies, and it may be one of the major food components responsible for the reduced cancer risk seen with a high level of fruit and vegetable intake.

Tomatoes are low in beta-carotene, but contain lycopene, another carotenoid with anti-oxidant properties. Tomato consumption is linked to a lower incidence of digestive tract cancers, particularly in Mediterranean populations where it is a major food component.<sup>38</sup> Lycopenes are also found in other red-skinned fruits and vegetables such as berries.

Beetroot is commonly self-prescribed by cancer patients in Germany and Switzerland.<sup>39</sup> In the 1950s, doctors who were working with cancer found that beetroot seemed to slow or stop cancer

growth. They prescribed 200–250 g of finely grated beetroot daily and found that, in many cases, the progression of cancer was halted. It is unknown whether beetroot contains agents which can inhibit the initiation or promotion stages of cancer.

A daily intake of several yellow, orange or red vegetables, as well as one or two pieces of yellow or orange fruit is advisable. A serve of dark green leafy vegetables, either as a salad or cooked, will also increase beta-carotene intake, and provide a good source of other nutrients.

- Citrus fruits

Citrus fruits are associated with a lower incidence of both cancers of the gastrointestinal tract and the breast.<sup>40</sup> There are likely to be different mechanisms for these protective effects: the vitamin C is most likely to be responsible for the reduction in cancers of the stomach (see pickled and cured food); the pectin fraction is more likely to be involved in breast cancer reduction.

### Soya products

In countries where soya intake is high, there is a lower incidence of breast, colon and prostate cancers. This is believed to be related to the presence of phyto-oestrogens (which act as anti-oestrogens); however, some of the studies also showed a lowered risk of non-hormonal cancers, indicating that soya products may have other protective constituents.<sup>41</sup>

In fact, five other naturally occurring components in soya beans have been shown to individually inhibit cancer cell formation. (These are the proteases, fibre, saponins, sterols and phytic acid.) In comparison to other foods, soya products have relatively high levels of all of these components, which may work synergistically as protective agents.

The common soya products are tofu, miso, soya milk, soya flour, soya grits and textured soy protein. Of these foods, the most consistent protective effects are seen with the non-fermented products (soya milk, flour, grits; tofu and textured protein), but not with miso.<sup>42</sup>

### Green tea

Green tea consumption is strongly associated with a lower cancer risk in the gastrointestinal tract. It can reduce the risk of cancer of the oesophagus, stomach and large intestine, especially in countries where large amounts of pickled or preserved foods are eaten.<sup>43</sup> It reduces liver cancer risk<sup>44</sup> and returns liver enzymes to normal.<sup>45</sup> Green tea also seems to reduce the incidence of skin cancer (in mice) caused by ultra-violet radiation<sup>46</sup>—but don't try it as an alternative to sun-block creams! There may also be positive effects against breast cancer.<sup>47</sup>

Green tea also improves cholesterol levels and increases the levels of HDL (helpful) cholesterol.<sup>48</sup> Drinking too much tea may be a problem, though. More than five cups per day increased the risk of pancreatic

cancer in one study,<sup>49</sup> and increased the incidence of lung cancer in another.<sup>50</sup>

### **Fibre and cereal grains**

Dietary fibre is well known for its ability to reduce the risk of colon cancer. Fibre increases the production of the short chain fatty acids which protect the bowel wall from abnormal cell change. Fibre intake is specifically important for women because it reduces the risk of oestrogen-dependent cancers, including breast cancer.

The best way to safely include fibre in the diet is to eat it as part of whole foods. Fibre from different sources has different effects on the bowel wall and not enough information is available to confidently predict which type of fibre gives the greatest protection against colon cancer.<sup>51</sup> At any rate, there are other positive effects when foods are eaten whole, from their phyto-oestrogen, trace mineral and vitamin content,<sup>52</sup> and so whole grains and cereal products should be favoured over fibre-only cereals and supplements. Psyllium is also highly protective, and wheat and psyllium together have better effects than either alone.<sup>53</sup> A list of high fibre foods and cereals (chosen because they are low in fat and salt) is included on page 393.

### **Yoghurt and fermented milk products**

Fermented milk products have been linked to a lower incidence of cancer of the breast<sup>54</sup> and stomach;<sup>55</sup> and to a limited degree, to a reduced incidence of bowel cancer.<sup>56</sup> There is also evidence that the bacteria normally found in yoghurts and fermented milks can inactivate carcinogens in the bowel.<sup>57</sup>

A Dutch study which looked at a combination of factors associated with a lower incidence of breast cancer found that the most beneficial dietary combination consisted of a low fat, high fibre diet with a high intake of fermented milk products.<sup>58</sup> There is some suggestion that the lower incidence of colon cancer may also be related to the calcium in milk products.<sup>59</sup>

## **Foods to reduce or avoid**

### **Fats**

The relationship between fat in the diet and cancer incidence is unclear. Breast cancer and fat had been linked because of the observation that Western women had a higher incidence of breast cancer than Asian women who ate much less fat. But over the past ten or fifteen years the significance of a high fat intake has been questioned because a

number of studies have found little association between breast cancer risk and fat intake.<sup>60</sup>

However, a review of the research data from 20 countries on cancer of the breast, cervix, lung and colon in women *did* find a relationship between fat intake and risk. Saturated fats were particularly implicated and were associated with increased risk of breast and colon cancer. The polyunsaturated fats were also associated with breast cancer risk, but the fish oils (omega-3 polyunsaturated fatty acids) slightly reduced risk. The monounsaturated fats did not have any effect at any cancer site.<sup>61</sup>

In summary, fat is less of a problem than it was initially supposed to be, but certain fats are associated with increasing risk, particularly of breast cancer. Women are advised to eat as little saturated (animal) fat as possible; reduce polyunsaturated fats; buy good quality oils and store them correctly to prevent rancidity; use the monounsaturated fats for salads and cooking; eat plenty of fish; and generally keep fat and oil in the diet to a minimum. Additional information on fats and oils is included on pages 369–76.

## Alcohol

There is evidence linking alcohol consumption to an increased breast cancer risk;<sup>62</sup> however, alcohol consumption is also associated with a lower risk of cardiovascular disease. It may be wise for women with a high risk of breast cancer but a low risk of heart disease to abstain from alcohol.<sup>63</sup> Alcohol also seems to increase the incidence of colon cancer, particularly beer drinking.<sup>64</sup>

## Coffee

Excess consumption of coffee has been linked to the development of bladder cancer,<sup>65</sup> but there is very little evidence that it has any effect on other cancers. In fact, in some studies, coffee consumption was associated with a lower risk of bowel cancer.<sup>66</sup> Other (adverse) effects of coffee are discussed on page 383. Its consumption to excess is not recommended.

Many women are worried about coffee consumption and an increased risk of breast cancer or benign breast disease, but this has not been borne out by the research either,<sup>67</sup> and in one study, coffee seemed to reduce the breast cancer risk of lean women, but ‘might have the opposite effect in relatively obese women’.<sup>68</sup>

## Restricting kilojoules

An overall increase in risk is seen with increasing body weight above normal, particularly in relation to breast cancer. Women with high kilojoule intake, and those who don’t exercise, also have an increased

risk.<sup>69</sup> The best advice is to eat a varied diet in moderation and exercise regularly.

## **THE DAILY DIET**

**Include these food groups every day**

### **Fresh vegetables**

A minimum of seven different vegetables daily; comprising as many different colours as possible.

### **Fresh fruit**

Fresh, seasonal fruits, three pieces daily.

### *Whole grains and beans/legumes*

Include four to five serves of grains such as rice, corn, millet (should be hulled); and/or beans such as chickpeas, lentils, red kidney beans, lima beans, soya beans and products. A serve is equivalent to a slice of bread or one cup of cooked grain or beans. Potatoes are also included in the complex carbohydrate category. One medium-sized to large potato equals one serve.

### **Seeds and nuts**

- Seeds: linseeds, sesame seeds, sunflower seeds, pumpkin seeds.
- Nuts: almonds, hazelnuts, walnuts, pecans, cashews, pine nuts and peanuts.

Nuts and seeds have a high ratio of oils and should be kept to a maximum of half a cup daily when excess weight gain is a consideration.

### **Yoghurt and cultured milks**

Include at least one cup of low-fat yoghurt or buttermilk daily. If sensitive to cow's milk, include soya, goat's or sheep's yoghurt instead. Yoghurts should contain live cultures.

### **Fibre**

Fibre should come from whole foods such as grains, nuts, seeds, fruit and vegetables and not from fibre-only breakfast cereals (All Bran™, Bran Flakes™, etc.).

### **Fats and oils**

Include three teaspoons of seed oils in the diet daily. Try a mix of safflower, sunflower, linseed (flaxseed) or canola oils. Cook with

monounsaturated oils, preferably olive or canola oil. To make 'better butter' mix equal quantities by weight of a good quality olive oil and butter. Keep refrigerated.

### Protein

Protein is found in meat, fish, eggs, dairy products and properly combined vegetable proteins. Some protein should be taken with every meal.

### Meal suggestions

Commence the day with one of the following:

- the juice of a lemon diluted in a glass of warm water
- $\frac{1}{2}$  a grapefruit
- citrus juice
- a whole piece of fruit

### Breakfast

- Homemade muesli: raw oatmeal, rice flakes, puffed millet, sunflower seeds, linseeds, sultanas, chopped almonds or cashews, dried paw paw, coconut and chopped pumpkin seeds. Add low-fat cow's milk, yoghurt or soya milk, and chopped fresh fruit.
- Fresh fruit in season with yoghurt and seeds or chopped nuts.
- Wholegrain bread, toasted, with nut butter, hommous, low-fat cheese, miso, with or without sprouts. Avoid the usual sweet spreads such as honey or jams. Butter is not necessary.
- Cooked cereal such as oatmeal, millet meal, brown rice or buckwheat, with added seeds or soya grits as desired or suggested. Add milk of choice and fruit or a little honey.
- Energy drink: Blend together low-fat yoghurt with either fresh fruit of your choice or fruit juice (about 50:50), and add seeds and rice bran, e.g. linseeds, almond meal, wheatgerm, sunflower seeds, 1 teaspoon of each.

### Lunch

- Wholegrain bread sandwich with a mixture of salad vegetables. Include a little protein such as tuna, salmon, egg, low-fat cheese, hommous.
- Salad of mixed vegetables such as lettuce salad, coleslaw, tabouli salad, grated beetroot, tomatoes, carrot or celery. Protein should be included either in the form of correctly combined vegetable proteins or animal proteins as above.

- Soup with the addition of beans and grains, a little yoghurt or Parmesan cheese.
- Any of the dinner choices or the energy drink.

### Dinner

The evening meal is usually extremely varied, being only limited by the imagination. It should contain: at least three different vegetables, cooked or raw depending on season and preference; some protein; and a serve of complex carbohydrate e.g. rice, root vegetables, beans, pasta.

To keep animal protein to a minimum, combine meat with grain or bean dishes. Examples might be lamb and chickpea casserole, or similar combinations, common in the Middle East and the southeastern European countries; pasta and tomato sauce with tuna; stir-fry vegetables with a little meat, and served with rice, common in Asia.

Other examples for the evening meal:

- vegetables with rice and tofu
- stir-fry beef and vegetables with rice
- vegetables with lentils and rice
- fish with vegetables or salad
- minestrone soup with beans and Parmesan cheese.

### Fluids

- Limit caffeine-containing beverages to two cups of coffee or four cups of tea (not strong!).
- Drink at least two to three glasses of plain water daily.
- Restrict alcohol to two glasses every three days.

## HIGH-FIBRE DIETS

Fibre is sometimes included in therapeutic diets to achieve a specific outcome such as lowering of blood fats (cholesterol) and oestrogens; to reduce the incidence of gall bladder disease and colon cancer; for weight loss; or control of constipation.

The recommended daily intake for fibre is 30 g from whole foods and not as fibre-only breakfast cereals.

Table 17.2 gives the amounts of foods that need to be eaten to obtain 10 g of fibre. Obviously, no one wants to eat eight cups of rice or five slices of bread at a sitting, and so the way to use this table is to select foods to make up between 10 and 15 g from cereal and grain categories; another 15 g from vegetables and legumes; 3–5 g from fruit; and a small optional portion from nuts and seeds. For example:

- 1 cup Kellogg's Just Right and 2 slices multigrain bread is equivalent to 10 g.



- 1 cup cooked beans as a salad for lunch and an evening meal that includes 1 potato,  $\frac{1}{2}$  cup spinach,  $\frac{1}{2}$  cup cooked carrot and  $\frac{1}{2}$  cup cooked broccoli is easily equivalent to 15 g.
- 3 pieces of fruit and a small handful of seeds and nuts equals 5 g.

**Table 17.2 Amounts of common foods providing 10 g fibre**

**Grains**

2 cups cooked rolled oats  
 $\frac{3}{4}$  cup whole cooked barley  
 2 cobs sweet corn  
 3 slices whole rye bread  
 3 slices bran-enriched bread  
 5 slices wholemeal bread  
 4 slices multigrain bread  
 $\frac{2}{3}$  cup oat bran  
 $\frac{1}{2}$  cup natural bran  
 $3\frac{1}{2}$  cups cooked brown rice  
 8 cups cooked white rice

**Legumes**

1 cup cooked mixed beans  
 1 cup cooked peas  
 1 cup baked beans  
 80 grams tofu

**Nuts and seeds**

90 grams almonds  
 1 cup peanuts  
 100 grams pistachio nuts  
 $\frac{3}{4}$  cup pecans  
 $\frac{3}{4}$  cup sunflower seeds

**Breakfast cereals**

Uncle Toby's Vitabrits 85 grams or  $5\frac{1}{2}$  biscuits  
 Kellogg's Just Right 100 grams or 2 cups  
 Uncle Toby's Fibre Plus 65 grams  
 Kellogg's Sustain 136 grams or  $2\frac{1}{2}$  cups  
 Kellogg's Puffed Wheat 115 grams or  $5\frac{1}{2}$  cups  
 Sanitarium Weet-Bix 90 grams or 6 biscuits  
 Sanitarium Weet-Bix Hi Bran 50 grams or 2.5 biscuits  
 Sanitarium Lite Bix 85 grams or  $5\frac{1}{2}$  biscuits  
 Uncle Toby's Crunchy Oat Bran Cereal 65 grams  
 Uncle Toby's Crunchy Oat Bran Cereal with Fruit 75 grams  
 Willow Valley Oat Bran Breakfast Cereal 70 grams or 1 cup  
 Willow Valley Oat Bran and Fruit Cereal 120 grams  
 Purina Muesli Flakes 135 grams  
 Kellogg's Komplete Oven-Baked Muesli 130 grams or 13 tablespoons  
 Uncle Toby's Muesli Flakes 105 grams  
 Uncle Toby's Natural Swiss Formula Muesli 80 grams

\* These cereals have been chosen because they have a low salt and fat content and a high fibre content.

**Vegetables**

3 cups steamed mixed vegetables  
 2 cups cooked carrots  
 2 cups cooked cabbage  
 3 cups cooked broccoli  
 1 cup steamed spinach  
 2 cups cooked sweet potato  
 2–3 medium steamed potatoes with skin

**Fruit**

$3\frac{1}{2}$  medium apples  
 3 oranges  
 100 grams dried figs  
 10 dried apricots  
 $3\frac{1}{2}$  bananas  
 2 passionfruit  
 400 grams blueberries  
 4 kiwi fruit peeled  
 6–7 nectarines  
 $2\frac{1}{2}$  pears  
 20 grams prunes

Source: 'Modern Nutrition in Health and Disease' and 'Food for Health'<sup>70</sup>

# 18

## Oestrogen-like compounds in plants

### Key words

beta-sitosterol	genistein
biochanin A	isoflavonoid
competitive inhibition	lignan
coumestans	oestradiol
coumestrol	oestrogen receptor
daidzein	phyto-oestrogen
enterodiol	phytosterol
enterolactone	resorcylic acid lactones
equol	steroidal saponin
(FSH)	triterpenoid saponin
formononetin	zearalenone

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### THE PHYTO-OESTROGENS AND SAPONINS

One of the first indications that plants produced hormones which might affect mammals, including humans, came from the discovery that ‘plant oestrogens’ in clover were responsible for infertility in sheep.<sup>1</sup> Gradually, it became apparent that plant oestrogens occurred widely throughout the plant community and that their regular consumption could affect human health.<sup>2</sup> The term ‘phyto-oestrogen’—literally, a plant-derived compound able to behave like an oestrogen and activate the mammalian oestrogen receptor—was coined to describe this group of substances which are found in a large range of grains, seeds, legumes and medicinal plants, as well as some other commonly eaten foods.

Plant hormones are essential to the plant’s growth, maturation and seed-producing potential. The levels of phyto-oestrogens in plants

change as the plant grows and matures—very early plant growth, such as when seeds first sprout, is associated with high levels of some of the phyto-oestrogens. Levels also increase when a plant is producing seeds or when it is stressed by drought or insect attack.

The drought-related increases in phyto-oestrogens seem to reduce the fertility of grazing animals by acting as a type of contraceptive. The result is fewer animals to eat the plant, which improves plant survival.<sup>3</sup>

Six main plant components with oestrogen-like effects consumed by humans are known to influence health. The first group is the isoflavones, coumestans and lignans, which are collectively known as the (phenolic) phyto-oestrogens and which occur in a number of commonly eaten foods. The triterpenoid and steroidal saponins form another group found largely in medicinal herbs. Of the phytosterols,  $\beta$ -sitosterol has oestrogenic action; and the final group are the resorcylic acid lactones, which are contaminants of plants stored in damp conditions.

## Phyto-oestrogens

The phyto-oestrogens belong to the family of plant substances known as flavonoids, and all have oestrogenic effects. The oestrogenic flavonoids are sometimes collectively referred to as the phenolic phyto-oestrogens because of the structural similarity of the oestrogen molecule—the diphenylpropane ring structure—which allows phyto-oestrogens to bind to the oestrogen receptor.

Phyto-oestrogens are particularly important for women and are known to influence the menstrual cycle,<sup>4</sup> to reduce the incidence of oestrogen-responsive cancers,<sup>5</sup> and to decrease the frequency and severity of menopausal symptoms.<sup>6</sup> Asian women who eat a traditional diet excrete higher amounts of oestrogen than Western women, a factor which some researchers believe accounts for their lower risk of breast cancer.<sup>7</sup> Soya products consumed regularly in Asian countries contain abundant amounts of phyto-oestrogens, and are said to be responsible for these positive effects,<sup>8</sup> although other factors contained in soy products (see pages 402–8) also have anti-cancer and other beneficial effects.

Unlike oestradiol, none of the phyto-oestrogens can trigger the full range of oestrogen-like actions. So, for example, physical maturation—ovulation and menstruation—cannot occur in response to a phyto-oestrogen interacting with an oestrogen receptor. A study on the long-term effects of soy formula fed to infants showed that at adulthood there were no significant developmental or reproductive differences between infants who were fed soy formula and those fed cow's milk formula.<sup>9</sup> Phyto-oestrogens have a much more limited biological role and are capable of achieving only some of the consequences associated with endogenous oestrogens—such as a reduction in hot flushes.

The study of the health benefits (and risks) of this group of phyto-oestrogens is a complex and ever-evolving area of science, with recent research suggesting that each of the various phyto-oestrogens may have a range of different effects in specific tissues.<sup>10</sup> Simply put, phyto-oestrogens share many biological activities with endogenous oestrogens because of their structural similarities and because they both interact with oestrogen receptors. From there on the issues become profoundly more complicated.

First, variable oestrogen-like responses occur when phyto-oestrogens form a complex with an oestrogen receptor. This effect might be pro- or anti-oestrogenic (an oestrogen agonist or antagonist) depending on the physiological environment. For example, when post-menopausal women, who are relatively oestrogen deprived, consume phyto-oestrogens, an oestrogen-like effect is observed. Alternatively, pre-menopausal women may gain an anti-oestrogenic effect brought about by competitive inhibition of endogenous oestrogens by the phyto-oestrogens.<sup>11</sup> In *in vitro* studies, oestrogenic or anti-oestrogenic effects will be influenced by the presence of oestrogens in the test system, and will also depend on the concentration of the phyto-oestrogen used.

In addition, the oestrogenic activity seems to be in part related to the type of 'fit' between the oestrogen receptor and the phyto-oestrogen—known as oestrogen receptor binding affinity. Finally, new research has revealed the presence of at least two different types of oestrogen receptor (the  $\alpha$  and  $\beta$  receptors). Phyto-oestrogens appear to have preferential binding affinity for the  $\beta$ -receptor.<sup>12</sup>

This is really just the tip of the iceberg. Research is evolving on a daily basis on the many effects of phyto-oestrogens, including their non-hormonal actions (see pages 407–8). In this chapter, the focus is on what health-care providers can reasonably suggest to women who seek advice to promote health or treat a complaint. On the evidence to date, it seems realistic to suggest that women of all ages consume phyto-oestrogens regularly as part of a balanced diet. It is possible that the most benefit may be gained if exposure to phyto-oestrogens begins early in life, prior to puberty.<sup>13</sup>

The issues surrounding isolated phyto-oestrogenic substances are much more complex, and recommendations will need to be made on a case-by-case basis. The considerations are: what the isolate is prescribed for; whether the woman is pre- or post-menopausal and what kind of pre-existing conditions exist (breast cancer, for example). The potential benefits and risks associated with the use of the phyto-oestrogen isolates are discussed on page 400.

## Isoflavones

This group is mainly found in soya products and other legumes. Of the many different isoflavones now identified, the most important in terms

**Table 18.1 Different classes of common phyto-oestrogens**

Flavones	apigenin luteolin
Flavonols	kaempferol quercetin
Flavanones	naringenin 8-prenylnaringenin
Isoflavones	biochanin A genistein formononetin daidzein
Coumestans	coumestrol
Lignans	matairesinol enterolactone seciosolariciresinol enterodiol

of their oestrogenic potential are formononetin, genistein, daidzein and biochanin A. Formononetin is converted by gut bacteria containing the enzyme  $\beta$ -glycosidase to daidzein, and a further proportion is converted to various metabolites, the main one being equol. However, studies have shown that some individuals are unable to convert daidzein to equol.<sup>14</sup> About one-third of formononetin is absorbed from the gut and circulates in the bloodstream unchanged.

Biochanin A is converted in the same way to the isoflavone genistein. A trial examining levels of genistein and daidzein metabolism showed that the administration of antibiotics reduced plasma levels of both isoflavones.<sup>15</sup>

Assessment of activity compared to oestradiol in cell culture bio-assays indicates that the isoflavones have relatively weak oestrogenic effects (see Table 18.2); however, genistein has a binding affinity to the oestrogen  $\beta$ -receptor which is almost equivalent to that of oestradiol (see Table 18.2).

**Table 18.2 Relative oestrogenic activity of phyto-oestrogens in human cell culture bio-assays compared with oestradiol<sup>16</sup>**

17 $\beta$ -oestradiol	100
Coumestrol	0.2
Genistein	0.084
Equol	0.061
Daidzein	0.013
Biochanin A	<0.006
Formononetin	<0.0006

Much of the extensive research on soy products that show protective effects in the cardiovascular system,<sup>17</sup> bone-density enhancing effects,<sup>18</sup> protection against breast cancer in pre-menopausal women<sup>19</sup> and the non-proliferative effect on the endometrium<sup>20</sup> can be attributed to the effects of the isoflavones in these foods. Some of these benefits are derived from the oestrogenic action of these compounds; others are

much more likely to be related to the non-hormonal effects of phyto-oestrogens (see pages 407–8).

The average vegetarian or Asian diet is estimated to contain between 30–100 mg of isoflavones per day, with the average Western omnivorous diet containing considerably less.<sup>21</sup>

## Coumestans

Of the coumestans, coumestrol is the only one to possess oestrogenic activity. It is found in legumes such as soya products, peas and beans, and is in highest amounts in sprouted legumes such as alfalfa, mung bean or snow pea. Compared to the endogenous oestrogens, the oestrogenic potential of coumestrol is rather weak, as shown in Table 18.2. However, coumestrol has a seven-fold higher affinity for the  $\beta$ -receptor than the  $\alpha$ -receptor and binds with essentially the same affinity as oestradiol to the  $\beta$ -receptor.<sup>22</sup> This preferential activity for the  $\beta$ -receptor may influence actual effect.

Asian diets often contain large amounts of sprouted legumes, including soy bean sprouts and typically provide a rich source of coumestrol. The typical Western diet, however, traditionally contains few of these types of foods and is generally a poor source.

**Table 18.3 Coumestrol content of foods (mg per 100 g)<sup>23</sup>**

Sprouted soya beans	34.0
Soya beans (dry)	17.0
Sprouted alfalfa	4.68
Red clover sprouts	28.1
Lentils	17.0
Kidney beans	17.0
Split peas	11.0
Green beans	11.0

## Lignans

The plant lignans are found in fibre-rich foods like seeds, grains and beans—linseeds are a particularly rich source. Like the isoflavones daidzein and biochanin A, the lignans need to be modified in the bowel by bacteria before they can have an oestrogenic effect in the body. Once modified, they are referred to as ‘mammalian lignans’. The most important mammalian lignans are enterolactone and enterodiol.

The lignans have a much weaker oestrogenic effect than the isoflavones and unlike the isoflavones do not have an anti-oestrogenic effect in the presence of oestrogens.<sup>24</sup> In other words, pre-menopausal women with oestrogen-responsive conditions such as fibroids or endo-

metriosis will benefit from the isoflavone-mediated antagonistic effects on the oestrogen receptor, but will not gain this benefit from lignans.

Linseeds (flaxseed) contains much higher levels of oestrogenic lignans than other foods—65 mg per 100 g compared to an average of 6 mg in other foods.<sup>25</sup> Flaxseed oil, although a rich source of omega-3 fatty acids, does not contain lignans.

## Flavones, flavonols and flavanones

The phyto-oestrogenic flavones, apigenin and luteolin, are found in abundant amounts in yellow and white fruits and vegetables. Of the flavonols, quercetin has the most important effects in relation to cancer risk reduction, but both of the oestrogenic flavonols (kaempferol and quercetin) possess only weak oestrogenic activity.

Naringenin is a flavanone and is a component of all citrus fruits, although it is concentrated in the rind. Citrus peel is often recommended in Chinese herbal medicine for the treatment of benign breast lumps and as an adjunct to the treatment of breast cancer. This traditional use may have its origins in the oestrogen-antagonist effects of naringenin.

## Medicinal compounds derived from soy

There are considerable differences between the types of soy products that are available for the management of menopausal and post-menopausal complaints. Many of these products are highly processed in order to obtain the isolated compound and in no way resemble the original soybean from which they were derived. The health benefits and risks of such products should therefore be assessed in a different light to those seen when soy is consumed as part of the diet. Whole soy contains isoflavones, phytosterols, saponins, fibre, oligosaccharides, lecithin, tocopherols and other vitamins. To attain all of the health benefits of soy, such as improvements in bone density, cardiovascular health and reduction in hot flushes, it may be necessary to consume supplements that are as close to this nutritional profile as possible. Long-term studies on all of the different types of soy compounds are needed to test this hypothesis.

## Soygerm

Soygerm is derived from the soybean by a relatively simple process, in much the same way as wheatgerm is obtained from wheat. The nutritional profile of soygerm is similar to whole soy; however, several nutrients are found in higher quantities than in whole soybeans, such

as tocopherols, oligosaccharides, phytosterols and slightly more protein and isoflavones. The high level of oligosaccharides in soygerm act as a prebiotic (support probiotic growth).

Soygerm supplements may prove a viable alternative for those women who have difficulty incorporating soy foods into their diet and are a better option than the more processed soy protein isolates (see below).

## Soy protein isolates

Isolated protein compounds can be derived from soy via a series of complex procedures that involve dehulling, flaking, then defatting soybeans by hexane extraction. The protein and carbohydrate portions are then separated and the flavour compounds and oligosaccharides removed. Finally, the protein is concentrated by alkali extraction and removal of the fibre. Part of this processing involves an acid wash in aluminium vats which can lead to unacceptably high levels of aluminium in some soy products. The manufacture of soy protein isolates also involves high temperature processing that denatures the protein extensively, therefore lowering its nutritional value.

Soy protein isolates have been shown to reduce hot flushes and improve bone density.<sup>26</sup> Research on lipid profiles has been conflicting. One study of peri-menopausal women showed no changes in lipids and there was no adverse effect on clotting profiles<sup>27</sup> (unlike hormone replacement), or on abnormal lipid profiles.<sup>28</sup> The safety of these isolated protein compounds awaits longer trials to determine whether their use can be recommended to prevent disease.

## Isolated isoflavones

A number of isoflavone isolates derived from soy are promoted for the treatment of menopausal symptoms and associated problems. Studies on these products have been conflicting. One study using 61.8 mg of isoflavones given to peri-menopausal women reported a reduction in bone resorption markers and a reduction in total and LDL cholesterol after four weeks.<sup>29</sup> In another study, short-term oral isoflavone supplements did not improve endothelial function in healthy menopausal women,<sup>30</sup> and a trial assessing the reduction of menopausal hot flushing found no improvement compared with placebo.<sup>31</sup> In general, positive effects on menopausal flushing are modest, while the benefits on heart and bone await further trials before accurate statements can be made. A positive outcome from a trial assessing the use of soy isoflavone supplement on menstrual migraine incidence suggests an oestrogen-like



effect of the isoflavone can moderate the adverse impact of declining oestrogens during the menstrual phase of the cycle.<sup>32</sup>

## Ipriflavone

Ipriflavone, a synthetic isoflavone derived from the soy isoflavone, daidzein, was discovered in the 1930s. Over 150 studies on safety and effectiveness, both animal and human, have been conducted to assess prevention of bone loss in post-menopausal women.<sup>33</sup> A number of early studies showed positive effects in reduction or stabilisation of bone loss in this group, possibly related to increased rates of bone formation.<sup>34</sup> Studies on ipriflavone administration to prevent bone loss immediately after oophorectomy did not prevent acute bone loss;<sup>35</sup> however, ipriflavone effectively halted bone resorption when women were prescribed a GnRH agonist.<sup>36</sup> Ipriflavone given to post-menopausal women with low bone mass stopped, but did not improve, bone density loss.<sup>37</sup>

Ipriflavone appears to be devoid of an oestrogen-like action in the breast and uterus; however, in a recent study, around 13 per cent of women developed lymphocytopenia (abnormally low lymphocyte level), from which 80 per cent had recovered spontaneously after two years.<sup>38</sup> This points to a need for trials to establish safety with long-term use.

## Phyto-oestrogenic medicinal plants

### *Medicago sativa* (alfalfa/lucerne)

*Medicago sativa* is an important stock feed, which has been introduced into the human diet in the form of sprouts. Medicinally, *Medicago* as a tea or extract is prescribed for convalescence or vitamin deficiency because it contains high levels of vitamins A, C, E and K. The presence of iodothyromines also makes *Medicago* a useful remedy for mild hypothyroidism.<sup>39</sup>

*Medicago* also contains significant amounts of phyto-oestrogens, including genistein and daidzein, as well as coumestrol when sprouted. Some practitioners recommend this herb as a tea for post-menopausal women when endogenous oestrogen levels are low, or for pre-menopausal women with oestrogen-dependent conditions. No tradition exists to justify this practice, which seems to be based on an extrapolation of the benefits of *dietary* phyto-oestrogens to extracts and teas. Isoflavones are not well extracted in water and herbal teas are therefore not a good source of these phyto-oestrogens; however, alfalfa sprouts can be expected to have some beneficial effects because of their high coumestrol levels.

## *Trifolium pratense* (red clover)

*Trifolium* has been used for centuries as a ‘blood cleanser’ for psoriasis and eczema; as a poultice for acne and ulcers; and for irritable coughs, bronchitis and whooping cough.<sup>40</sup> It has also traditionally been used as a component of cancer therapy—the flowers were applied to breast lesions, some of which were presumably cancerous,<sup>41</sup> while the leaves, flowers and roots were also taken as a medicine.

*Trifolium* is an important phyto-oestrogenic plant containing biochanin A, a potent inhibitor of the carcinogen benzo[a]pyrene in cells.<sup>42</sup> This ability to inhibit carcinogen activation suggests that biochanin A is a potential chemoprotective agent<sup>43</sup> and seems to validate traditional use of the plant.

Infertility in sheep grazing on clover may be due to the isoflavones in the foliage which cause a non-responsiveness in the uterus, cervix and vagina to endogenous oestrogen.<sup>44</sup> This apparently potent oestrogenic effect has prompted the manufacture of tablets containing concentrated isoflavones extracted from *Trifolium pratense* as an alternative to HRT for post-menopausal women (see following). This is not a traditional herbal use for *Trifolium* and safety data on the long-term effects of oral ingestion of the isoflavone-rich herbaceous part of the plant is needed before herbalists encourage this practice. Taking a tea of red clover flowers or leaves is not an effective option to increase isoflavone intake because, as already mentioned, isoflavones are not well extracted in water.

## Promensil

Promensil is a concentrated isoflavone product derived from *Trifolium pratense* (red clover). Initial clinical studies on Promensil did not show reduced menopausal flushes compared to placebo, but one subsequent trial has shown some benefit.<sup>45</sup> An unpublished study evaluating effect of red clover-derived isoflavones—25, 50 or 75 mg per day Promensil™ for six months followed by a two-month placebo washout in 50 postmenopausal women—showed an increase in bone density at the proximal radius and ulna in all treatment groups.<sup>46</sup> Long-term trials are needed to establish the safety and efficacy of these concentrated isoflavone extracts.

## **Phyto-oestrogens exert oestrogenic and anti-oestrogenic effects**

The oestrogenic or anti-oestrogenic activity of a phyto-oestrogen can vary depending on whether it has been assessed by *in vitro* studies,

clinical observation or epidemiological data. In addition, as already mentioned, agonist or antagonist effects are dependent on the oestrogen status of the individual. For example, while some *in vitro* studies on genistein assessed this phyto-oestrogen to be strongly oestrogenic, clinical observation suggests an anti-oestrogenic effect, since genistein is one of the phyto-oestrogens consumed amongst populations with a low incidence of breast cancer.

*In vitro* testing is commonly used to make judgments about the oestrogenicity of phyto-oestrogens (see Table 18.2), but these assessments cannot be neatly extrapolated as being relevant to clinical benefits or risks. The identification of at least two different oestrogen receptors, found in variable concentrations in oestrogen-receptive tissues, adds another layer of complexity to this already complicated area of women's health.

### Oestrogenic effect

Early research into phyto-oestrogens was mainly focused on their potential benefit for menopausal symptoms. Associations were drawn between Asian diets high in phyto-oestrogens and an absence of menopausal complaints.<sup>47</sup> This has led to phyto-oestrogens in food and various supplements being promoted as an alternative to HRT for menopausal symptoms. Most studies that have shown symptom reduction have been based on phyto-oestrogens consumed in the diet. Studies on isolated isoflavone supplements have been less conclusive. In general, with either dietary or supplemental phyto-oestrogens, research has revealed that the benefits are modest rather than dramatic. In addition, many menopausal studies observed a strong placebo effect.<sup>48</sup>

Potentially more promising areas of research on the oestrogenic effects of phyto-oestrogens are the beneficial changes to bone density, and the reduction of cholesterol and other cardiovascular risks when women regularly consume phyto-oestrogens as part of their normal diet.

### Anti-oestrogenic effect

Interest in phyto-oestrogens as potential anti-oestrogens was initially sparked by the low rates of breast cancer observed in Asian women who consume a diet high in phyto-oestrogens.<sup>49</sup> Incidence of breast cancer increases significantly amongst Japanese women if they adopt a Western diet after migrating,<sup>50</sup> and this was assumed to be related to the anti-oestrogenic effects of phyto-oestrogens in their traditional diet.

When a woman is pre-menopausal, her endogenous oestrogens bind to receptors, causing cell proliferation which leads to an escalating number of cells and hence receptor sites. When phyto-oestrogens are available, they compete with endogenous oestrogens for the same binding sites—the more phyto-oestrogens available, the weaker the effect of endogenous oestrogen.<sup>51</sup> This anti-oestrogenic action of phyto-estrogens is termed ‘competitive inhibition’ and is believed to reduce the incidence of oestrogen-responsive conditions such as breast cancer by restricting the growth-promoting effects of endogenous oestrogens.<sup>52</sup> Tamoxifen, a drug used to treat breast cancer, is structurally similar to the isoflavone molecule.<sup>53</sup>

Studies have shown that there is a five to ten fold decrease in the risk of developing breast and endometrial cancer amongst women who regularly consume soy products.<sup>54</sup> Other possible explanations for the reduced incidence (of breast cancer) include lack of an inherited predisposition to cancer, longer menstrual cycles or the effects of other compounds of soy food.<sup>55</sup>

In recent years, the anti-oestrogen theory has been the topic of some debate. *In vitro* research and research in animals has raised some contradictory findings and concern. Many studies are conducted on the isoflavone genistein, considered one of the most active of the phyto-oestrogens. While the majority of *in vitro* studies show that genistein inhibits proliferation of breast cancer cells, a number have shown stimulatory effects. The results depend on the specific conditions used in the experiments, such as the presence or absence of oestrogen, the concentration of the phyto-oestrogen, and the particular cell line—whether oestrogen receptor dependent or independent.<sup>56</sup> A number of studies have shown that at high concentrations, such as would occur in a soy-rich diet, genistein inhibits cellular proliferation, but at lower concentrations cellular stimulation occurs.<sup>57</sup>

As a result of this, some writers have voiced concern about the safety of consuming phyto-oestrogens in the diet when a woman has breast cancer. However, although caution is warranted about consuming excessive quantities of concentrated isoflavone supplements, the balance of evidence strongly suggests that the many benefits of including a variety of phyto-oestrogens in foods in the diet far outweigh the risks. Consuming whole foods containing phyto-oestrogens is a very different proposition to adding isolated isoflavones to cell lines in a test tube. In a review article on the health benefits of phyto-oestrogens, the authors conclude: ‘An overview of the epidemiological, clinical trial, animal model, and cell culture data suggests that phyto-oestrogens may confer cancer protective benefits. However, there are many variable factors to be considered, the literature contains several inconsistencies, and there are many important questions remaining to be answered.’<sup>58</sup>

## Selective (o)estrogen receptor modulating effect (the SERM-like effect)

The recent discovery of different types of oestrogen receptors helps to explain how phyto-oestrogens can have selective effects on different tissues. So far, two oestrogen receptors have been named and identified—oestrogen receptor  $\alpha$  (ER $\alpha$ ) and oestrogen receptor  $\beta$  (ER $\beta$ ), and it is possible that more will be discovered in the future. The distribution and concentration of these receptors varies between tissue types—both are found in tissues such as the breast, uterus, ovary and vascular epithelium, but whereas ER $\beta$  predominates in the brain, bone, lung and prostate, ER $\alpha$  is found in the kidney, pituitary and reproductive tract. The different distribution may help explain why phyto-oestrogens target some tissues while having little effect on others.

Although oestradiol with its high affinity for oestrogen receptors can bind equally with both receptors, it is probable that other compounds have a preferential affinity for one receptor or the other. Phyto-oestrogens, especially coumestrol and genistein, tend to have a preferential affinity for the  $\beta$ -receptor.<sup>59</sup> This is similar to the selective estrogen-receptor modulator drugs known as SERMs which are used to treat conditions as diverse as breast cancer and osteoporosis. This contributes to the understanding of how phyto-oestrogens can have effects that would be considered ‘oestrogenic’, such as an increase in bone density,<sup>60</sup> and cardiovascular protection and reduction in menopausal symptoms, while at the same time possessing actions that would be considered anti-oestrogenic—for example, inhibition of cancer initiation and progression. Table 18.4 shows the relative binding affinity of various phyto-oestrogens for the  $\alpha$  and  $\beta$  receptors.

**Table 18.4 Binding affinity of various phyto-oestrogens for ER $\alpha$  and ER $\beta$ <sup>61</sup>**

Compound	Relative binding affinity (determined from solid-phase competition experiments)	
	ER $\alpha$	ER $\beta$
Oestradiol*	100	100
Genistein	4	87
Daidzen	0.1	0.5
Formononetin	<0.01	<0.01
Biochanin A	20	140
Ipriflavone	<0.01	<0.01
Coumesterol	20	140
Zearalenone	7	5

\*Receptor binding affinity arbitrarily set at 100 for oestradiol.

## Non-oestrogen-receptor effects of phyto-oestrogens

Phyto-oestrogens consumed in the diet display a range of biological actions that are not related to their oestrogenic effect. These effects might be mediated by the phyto-oestrogens themselves; alternatively, they might be due to other components of isoflavone or lignan-rich foods. These effects can be arbitrarily divided into two types of actions—those on steroid hormones, and other non-hormonal actions.

### Effects on endogenous hormone metabolism and availability

Phyto-oestrogens can influence endogenous steroid hormone metabolism and availability through mechanisms that have no relationship to their interaction with the oestrogen receptor.

### Stimulation of SHBG synthesis

The isoflavonoids and lignans, when consumed as whole foods, stimulate liver production of sex hormone-binding globulin (SHBG).<sup>62</sup> SHBG binds to the sex hormones, especially androgens and oestrogens, and acts as a carrier protein. When the major portion of these hormones is bound to SHBG in the blood, they are less available to bind to hormone-sensitive tissues. A diet high in lignans and isoflavones has been shown to increase levels of SHBG in post-menopausal women, and may therefore reduce free circulating oestrogens, potentially decreasing breast cancer risk.<sup>63</sup>

### Aromatase inhibition

Aromatase is the enzyme responsible for the conversion of androstenedione into oestrone in fat cells. Lignans and isoflavones have been shown to inhibit aromatase *in vitro*.<sup>64</sup> The levels of inhibition can vary, depending on which of the plant oestrogens are tested. This results in a reduction of the production and availability of endogenous oestrogen.

### 5 $\alpha$ -reductase inhibition

Isoflavones and lignans reduce the conversion of testosterone to DHT via inhibition of 5  $\alpha$ -reductase enzyme activity. This can be expected to benefit those women with conditions related to androgen excess.

## Inhibition of 17 $\beta$ -hydroxysteroid dehydrogenase

The enzyme 17  $\beta$ -hydroxysteroid dehydrogenase is involved in the conversion of androstenedione to testosterone in the ovary and hair follicle. The isoflavone, daidzein has been shown to strongly inhibit this enzyme *in vitro*.<sup>65</sup>

## Non-hormonal effects of phyto-oestrogens

Many of the health benefits provided by phyto-oestrogens are due to mechanisms other than their interaction with oestrogen receptors—for example, their influence on cell proliferation, protein synthesis, angiogenesis and lipid oxidation.<sup>66</sup>

### Effect on tyrosine kinase enzymes and growth factors

A number of phyto-oestrogens have been shown to inhibit tyrosine kinases, enzymes which play an important role in cell proliferation and transformation.<sup>67</sup> Tyrosine kinase inhibitors have potential as anti-cancer agents in both prevention and treatment regimes. Lignans and isoflavonoids, especially genistein and quercetin, seem to inhibit cancer cell proliferation.<sup>68</sup>

### Inhibition of DNA topoisomerases

These enzymes are involved in cellular differentiation and proliferation. The flavonols, flavones and isoflavones have been shown to regulate these cellular functions, which can reduce risk of cancer.<sup>69</sup>

### Inhibition of angiogenesis

Some phyto-oestrogens inhibit new blood vessel formation in cancerous tissue, especially genistein.<sup>70</sup>

### Apoptosis

Studies have demonstrated that isoflavones inhibit apoptosis (programmed cell death), especially genistein. Positive effects have been demonstrated with breast cancer cells,<sup>71</sup> leukemic cells<sup>72</sup> and prostate cells,<sup>73</sup> amongst others.

## Antioxidant effects

Many of the flavonoids, but especially genistein<sup>74</sup> and kaempferol,<sup>75</sup> have been shown to possess strong anti-oxidant effects. This can be expected to potentiate other anti-cancer effects of the phyto-oestrogens.

## Hepatoprotective effects

Studies have shown that both dietary legumes and legume extracts have a hepatoprotective action. Mung bean extract showed the best effect on serum transaminase activity. The hepatoprotective effects of the extracts were dose dependent.<sup>76</sup>

## Health benefits from phyto-oestrogens

Lignans and isoflavonoids have subtly different effects from each other, resulting from their interaction with oestrogen-sensitive cells in, for example, the breast, uterus and ovary, and the hypothalamic-pituitary unit. The changes brought about by these hormone-like effects, seem to depend on the relative potency of the phyto-oestrogen in question; its availability; the activity of intestinal bacteria; and whether the woman is pre- or post-menopausal.

## Reduced risk of hormone-related cancers

The regular consumption of soya products in the diet seems to lower the risk of developing breast cancer, demonstrated in both epidemiological<sup>77</sup> and case-control studies.<sup>78</sup> The protective effects are attributable to the phyto-oestrogens and to other constituents of phyto-oestrogen-rich foods that are also protective. In study populations who consume high quantities of soya foods (for example, an Asian diet), it is also possible that soya acts as a marker for other dietary differences that may be protective. As already mentioned, data suggests that consumption of soya products may need to start early in life—before puberty—to confer breast cancer protective effects. Epidemiological studies have shown a significant reduction in risk of breast cancer in pre-menopausal, but not post-menopausal, women who have a high soya protein intake.<sup>79</sup>

There are many mechanisms by which phyto-oestrogens reduce risk of cancer. An increase in SHBG is believed to be one way that these plant constituents lower the incidence of hormone-related diseases.<sup>80</sup> Aromatase inhibition is possibly more significant for obese women, as it reduces the conversion of androstenedione to oestrone in fatty tissue.

Increased urinary excretion of equol, a metabolite of the isoflavone



daidzein, has been associated with a reduced risk of breast cancer. This risk reduction has generally been presumed to be a consequence of increased isoflavone intake in the diet; however, the exact mechanism is unknown. One theory is that equol excretion is a marker for a more favourable hormonal profile, rather than merely reflecting increased isoflavone intake. Equol excretion may also indicate increased colonic bacterial enzymatic activity, which then increases faecal steroid excretion. Alternatively, equol itself, even with very modest isoflavone intake, may exert beneficial effects on the regulation of endogenous hormones.<sup>81</sup>

The urinary metabolite of oestradiol, 2-hydroxyoestrone, has been associated with decreased breast cancer risk, while the urinary metabolite 16  $\alpha$ -hydroxyoestrone is associated with an increased risk. When women consumed an average of 158 mg per day of isoflavones from dietary soy, their urinary excretion of 2-hydroxyoestrone increased, but not that of 16  $\alpha$ -hydroxyoestrone. This suggests that dietary isoflavones increase the metabolism of endogenous oestrogens to the protective 2-hydroxylated oestrogens in women, and this may play an important role in lowering 17  $\beta$ -oestradiol levels and the long-term risk for breast cancer.<sup>82</sup>

Protective mechanisms imparted by the phyto-oestrogens themselves, or other components of whole foods, point to a potential synergism from these foods in relation to cancer prevention and treatment. Phyto-oestrogens can inhibit cancer cell growth by arresting the cell cycle (especially quercetin), and inducing apoptosis (genistein and quercetin). Other mechanisms are anti-oxidant effects, and regulating cellular division and differentiation via inhibition of protein tyrosine kinases (quercetin and genistein) and DNA topoisomerases (flavones, flavonols and isoflavones).

While abundant evidence for the role of phyto-oestrogens in cancer *prevention* can be documented,<sup>83</sup> the position for women *with* oestrogen-receptor positive breast cancer is less clear. Phyto-oestrogens can reduce receptor site availability and therefore block endogenous oestrogen, a mechanism that is likely to confer protection to pre-menopausal women<sup>84</sup> as well as to obese post-menopausal women who have high circulating endogenous oestrogens because of the peripheral conversion of androgens in the fatty tissue.<sup>85</sup> In addition, there is ample *in vitro* evidence that phyto-oestrogens, particularly genistein, inhibit breast cancer cell growth via a number of different mechanisms.<sup>86</sup>

*In vitro* data suggesting a stimulatory effect of various phyto-oestrogens on breast cancer cell lines should be interpreted with caution, as these findings are not consistent with the protective effects observed in populations who consume phyto-oestrogens. After a review of the literature, one author concluded that soy did not adversely affect survival of women with breast cancer and that if women liked soy products, they should continue to eat them.<sup>87</sup> Final confirmation of the safety of these foods will come from long-term studies that specifically

document survival rates of post-menopausal women with breast cancer who consume high levels of dietary phyto-oestrogens.

## The menstrual cycle

Other more immediate benefits from dietary phyto-oestrogens include lighter periods and longer menstrual cycles.<sup>88</sup> Including the phyto-oestrogens in the diet, especially lignans, has been shown to improve length of the luteal phase and progesterone levels,<sup>89</sup> which may be of benefit to peri-menopausal women who have a higher risk of dysfunctional uterine bleeding and endometrial hyperplasia.

Soy isoflavones in combination with *Angelica sinensis* and *Cimicifuga racemosa* have been shown to reduce the severity and incidence of menstrual migraines, possibly by a hormone-modulating effect.<sup>90</sup>

## Conditions associated with androgen excess

The symptoms of excess androgen production seen in polycystic ovarian syndrome and familial androgen disorders may be reduced by phyto-oestrogens. When diets contain high levels of phyto-oestrogens, SHBG levels increase.<sup>91</sup> SHBG reduces the availability of androgens and may limit their masculinising effects.

## Bone density

Although both animal<sup>92</sup> and human studies demonstrate that phyto-oestrogenic soy isoflavones favourably impact on bone health, the exact mechanism is still unclear,<sup>93</sup> and not all studies have reported favourable results.<sup>94</sup> However, positive results seem to correlate with genistein and daidzein intakes in Japanese women such that those women with the highest intakes had spinal bone mineral density 7.7 per cent greater, and a femoral neck bone density 12 per cent greater, than women with the lowest intakes.<sup>95</sup> A similar examination of American diets showed that those women consuming more genistein-rich foods had the highest bone density at both the spine and hip.<sup>96</sup> Amongst 30–40 year olds, soy intake had a significant effect on the maintenance of bone mineral density.<sup>97</sup> Because of the other positive effects of soy products on health, it seems prudent to recommend that women of all ages consume soy as part of a healthy lifestyle. (See also ‘Osteoporosis’, pages 181–98.)

## Cardiovascular health

Japanese women have a low incidence of and mortality from breast cancer and cardiovascular disease, and experience fewer menopausal symptoms compared to Caucasians. The observation that this is related to soy products in the diet is increasingly being supported by trials, especially when soy protein rather than isolates are used. A study of isoflavone rich soy protein on menopausal women showed improvement of bone density, hypertension and menopausal symptoms,<sup>98</sup> as did another study of postmenopausal monkeys.<sup>99</sup> No definite experimental evidence exists as yet to establish that the cardiovascular benefits of soy protein are accounted for by its isoflavones. One study on the effects of 300 mg daily of an isolated isoflavone compound on blood lipids found no change.<sup>100</sup> Dietary soy intake, however, reduced plasma total cholesterol, LDL cholesterol and triglycerides.<sup>101</sup>

In keeping with these findings, the US Food and Drug Administration recommends 25 g per day of soy protein as part of a diet low in saturated fats for cholesterol reduction.<sup>102</sup> Although soy products can be used in the prevention of cardiovascular risk in post-menopausal women, one study reported that compliance to a soy-rich diet was poor.<sup>103</sup> Foods such as breads and breakfast cereals, which are part of the usual Western diet, might be a more viable alternative for some women. These foods, enriched with a combination of soy protein (soy grits and/or soy flour) and whole linseed (flaxseed), are gaining popularity as healthy additions to the diet of menopausal and peri-menopausal women. Regular consumption has been shown to reduce LDL and total cholesterol in menopausal women with elevated cholesterol levels.<sup>104</sup> Flaxseed supplementation improves lipid profiles but has no effect on bone density in post-menopausal women.<sup>105</sup> When women are given supplemental soy protein with the aim of achieving improvement in the lipid profile, the product should contain whole soy protein rather than a soy isolate.

## Post-menopausal complaints

In post-menopausal women the phyto-oestrogens have a mildly oestrogenic effect because they become the most prevalent oestrogens in a relatively oestrogen-poor environment. Recently, Australian researchers decided to test just how effective the phyto-oestrogens were for hot flushes by giving dietary supplements of either 45 grams of soya flour or wheat flour. Both these foods contain phyto-oestrogens, but those in soya flour are more potent than those in wheat. As was expected, the soya flour decreased hot flushes by a larger margin: 40 per cent compared to 25 per cent in the wheat flour group.<sup>106</sup>

One cup of soya beans is reported to contain about 300 milligrams of isoflavone.<sup>107</sup> Assuming that the oestrogenic activity of the isoflavones is about 0.1 per cent of oestrogen preparations used for menopausal women, this is equivalent to about 0.45 milligrams of conjugated oestrogens. The dose of Premarin tablets, a common form of hormone replacement therapy, ranges from 0.3 milligrams to 0.625 milligrams.

Increasing soya intake can be as easy as substituting soya for ordinary milk and using soya flour in cooking. Tofu is very useful, and as little as 100 g per day can reduce hot flushes and vaginal dryness. Dried or fresh (frozen) soya beans can be added to soups and bean dishes. As little as 25 g or about two heaped dessert spoons of ground linseeds per day can help to reduce symptoms associated with low oestrogen levels, including vaginal dryness.<sup>108</sup> Linseeds contain lignans and can be used in cooking or ground and added to drinks or breakfast cereals.

The lignans and some of the isoflavones require normal levels of bowel bacteria and women who have taken, or who are taking antibiotics can be expected to gain less benefit. Yoghurt may help restore these necessary bacterial colonies.

## Saponins

The saponins have a similar structure to the steroidal hormones oestrogen, progesterone, the androgens and cortisone which have cholesterol as their starting compound. This structural similarity has meant that pharmaceutical companies can use the saponin-containing plants to manufacture steroid hormones, especially progesterone and cortisone.

Saponins, when present in large amounts, can cause an unpleasant irritating sensation on contact with the mucous membranes (saponins are 'soaps'). This is usually experienced as an irritation of the back of the throat and can make these herbs somewhat difficult to take. Traditionally, they were indicated for menstrual irregularity, abnormal bleeding patterns, infertility, menstrual pain and menopausal symptoms.

The saponins are divided into two groups depending on their structures—the steroidal saponins and the triterpenoid saponins. Only some of the saponins from either group are capable of eliciting an oestrogen-like response, and these medicinal plants belong to the hormone regulatory or tonic categories of herbs.

### Triterpenoid saponins

Some triterpenoid saponins found in medicinal plants have steroid-like structures. Oestrogen-like effects have been observed after adminis-

tration of some of these plants, especially *Cimicifuga racemosa*, *Panax ginseng* or *P. quinquefolius* and *Glycyrrhiza glabra* or *G. uralensis*.

The triterpenoids do not seem to elicit direct oestrogenic effects, but cause secondary changes in the reproductive tract through stimulation or modification of the function of the hypothalamic-pituitary-ovarian axis.<sup>109</sup> *Cimicifuga racemosa* has been shown experimentally to reduce the levels of LH, an effect attributed to the triterpenoids. *Cimicifuga* also contains formononetin, but the effect of this isoflavone on LH release is very slight.<sup>110</sup> This herb can be used for symptoms of menopause,<sup>111</sup> and may also be useful for menstrual disorders associated with an elevated LH, such as polycystic ovarian syndrome.

There are numerous reported oestrogenic effects of *Panax ginseng*, a well-known tonic herb. Effects on gonadotrophin release combined with a local oestrogen-like response, have been suggested.<sup>112</sup> Isolated medical reports have shown changes in vaginal and cervical cytology;<sup>113</sup> abnormal vaginal bleeding;<sup>114</sup> as well as breast pain and lumpiness<sup>115</sup> consistent with an oestrogenic effect amongst post-menopausal women who took prolonged doses. The triterpenoid saponins (ginsenosides) are widely reported to possess these qualities. Properly prescribed, *Panax ginseng* is a herb with low toxicity and is beneficial for all women, particularly during times when the body is adapting to physical changes.

*Panax quinquefolius* (American ginseng) is another type of ginseng which possesses an oestrogen-like action. This herb has been examined in light of its potential anti-oestrogenic effects *in vitro*. Initial studies showed that *Panax quinquefolius* had a protective role against breast cancer, possibly via an effect on the oestrogen receptor.<sup>116</sup> It was subsequently found that combining the herb with drugs used for breast cancer *in vitro* resulted in a synergistic inhibition of cancer cell growth.<sup>117</sup> Another study also revealed that *Panax quinquefolius* inhibited breast cancer cell growth,<sup>118</sup> but despite these promising findings, it was the single investigation that showed a potential adverse effect from this herb (again an *in vitro* study) that created most interest in the media.<sup>119</sup> As already mentioned, *in vitro* studies are not a reliable test system to evaluate the true *in vivo* outcomes from the use of a herb. In the case of the ginsengs, traditional use in many countries is for the prevention of cancers, which points to a protective effect rather than a deleterious one.

Glycyrrhizin, a triterpenoid from *Glycyrrhiza glabra*, has a weak affinity for the oestrogen and androgen receptors, and for SHBG; but has no affinity for progesterone receptors.<sup>120</sup> Compared to oestradiol, its oestrogenic effect is weak.<sup>121</sup> Glycyrrhetic acid, which is metabolised from glycyrrhizin in the bowel, inhibits the synthesis of testosterone from androstenedione;<sup>122</sup> and the whole herb reduces prolactin secretion.<sup>123</sup> These two different hormonal effects result in increased fertility by improving ovulation rates in conditions such as PCOS and hyperprolactinaemia. This *outcome* has been traditionally

described by herbalists as ‘oestrogenic’. Steroidal saponin-containing herbs are also referred to in this way for this and other reasons.

## Steroidal saponins

Steroidal saponins are found in varying amounts in a number of commonly eaten foods such as root vegetables like carrots and yams, the deadly nightshade family, especially potato; asparagus and grains. Many of the important medicinal plants used for gynaecological complaints also contain steroidal saponins, usually in larger quantities, including *Chamaelirium luteum*, *Trillium erectum*, *Dioscorea villosa*, *Aletris farinosa*, *Tribulus terrestris* and *Asparagus racemosus*.

Steroidal saponins probably need to be acted upon by bacteria in the bowel before they can be absorbed and initiate oestrogenic activity. In the bowel, bacteria cleave a sugar molecule from the steroidal saponin, which then becomes a sapogenin. One of the important sapogenins, diosgenin, is produced in this way from the herbs *Chamaelirium luteum*, *Trillium erectum*, *Trigonella foenum-graecum*, *Dioscorea villosa* and *Aletris farinosa*. Because diosgenin is the pharmacological constituent common to all of these medicinal plants, some of their biological effects are similar.

Considerable confusion surrounds these plant components. Media reports have erroneously claimed that plants containing steroidal saponins have a hormonal effect which is ‘stronger than the Pill’—claims recognised as absolute nonsense by anyone with even a rudimentary understanding of plant pharmacology. Others claim that these plants contain ‘natural progesterone’ (see below) because they contain dioscin, which can be converted in a laboratory to progesterone. There is no evidence that dioscin can be changed into progesterone in the body.

There is also some related confusion amongst herbalists concerning the use of the steroidal saponin-containing herbs. Traditional use of these herbs (often referred to as women’s tonics) is to improve fertility. This has earned them the reputation of being ‘oestrogenic’. Because of this some herbalists abstain from using these herbs for conditions associated with oestrogen excess—for example, endometriosis and fibroids—believing the herbs to be capable of mimicking the effects of oestrogens.

Once converted from steroidal saponins, sapogenins can bind to oestrogen receptor sites like the isoflavones, coumestans and lignans, but their binding capacity (and therefore potency) is very weak. It seems unlikely that the observed effects of the sapogenins are due to a direct interaction with oestrogen-sensitive tissues. A more probable explanation of the consequences of giving these and the closely related triterpenoids is the interplay between the hypothalamic-pituitary-ovarian

axis which increases the production of oestrogen and progesterone by initiating ovulation.

Conditions like endometriosis, which are believed to be exacerbated by excessive exposure to oestrogens, are associated with a shorter follicular phase, reduced oestrogen *clearance* (not excess oestrogen production) and an inadequate luteal phase with lower than normal progesterone production. Herbs which can stimulate ovulation usually normalise the length of the follicular phase and can also improve the balance between oestrogen and progesterone by regulating ovulation. Provided that the steroidal saponins are prescribed according to the traditional indications, such as menstrual irregularity, abnormal bleeding, infertility caused by failure to ovulate, and painful periods, they should be beneficial rather than harmful.

In Europe, *Tribulus terrestris*, a herb with high levels of protodioscine, has been synthesised into a herbal preparation known as Tribestan. Tribestan increases FSH and oestradiol in pre-menopausal women; improves fertility; and reduces hot flushes without increasing oestradiol levels in post-menopausal women.<sup>124</sup> This implies that the primary site of action of the steroidal saponins in this herb is in the hypothalamus.

## Wild yam creams

Wild yam creams are popularly recommended for their reported progesterogenic effects to treat a range of premenstrual and menopausal disorders. Users of these creams, however, report quite varied responses in effectiveness—some claim they are ineffective; others cite miraculous results for complaints like premenstrual breast soreness and menopausal flushes. Wild yam creams *may* have therapeutic effects, but the actual mechanisms for this are not yet known. Some herbalists and manufacturers suggest that the progesterogenic action of wild yam creams is due to the transdermal uptake of the steroidal saponin, dioscin, which is converted into progesterone in the body. Independent trials found that menopausal women did not benefit from the use of these creams and there were no detectable differences in hormone profiles between the women who used the cream and those who used a placebo.<sup>125</sup>

The assumption that progesterone will be produced after transdermal uptake of components from wild yam is quite illogical, especially considering that the starting compound for progesterone in the body is cholesterol. In fact, if transdermal applications of a starting compound could be reasonably expected to produce progesterone, rubbing the body with butter should have a greater (and far cheaper) effect. It is also unreasonable to assume that the application of a wild yam cream would in some way favour the *in vitro* production of one steroid hormone (progesterone) over others, corticosteroids or androgens, for instance.

Dioscin has been used for many years as a starting material for the commercial production of a number of steroidal drugs, including progesterone and the corticosteroids. For dioscin to become progesterone, a carefully controlled series of chemical steps is performed in a laboratory—the same process does not occur in the body when substances like wild yam are applied to the skin or taken orally. When a salivary analysis of progesterone levels was performed on women using wild yam creams and compared to that of non-users, no differences in salivary progesterone were found.

The traditional uses for wild yam (*Dioscorea villosa*) include bilious colic, colitis, dysmenorrhoea, prevention of miscarriage, arthritic complaints, diverticulitis and appendicitis. It can also be used for nausea in pregnancy in small but frequent doses. The dose range is 6–10 ml daily, taken orally.

Very little is known about the therapeutic effects of saponins such as dioscin. They are converted to sapogenins before absorption from the gut and much of the interest has focused on the biological activity of the sapogenins, in this case, diosgenin. Research on animals shows oestrogenic changes in tissues after administration of diosgenin, but no progesterogenic activity.<sup>126</sup> Transdermal applications of wild yam bypass this important saponin to sapogenin step, meaning that wild yam applied to the skin can be expected to have quite different effects and indications to wild yam taken orally.

Saponins are known to cause haemolysis (breakdown of red blood cells) if injected into the bloodstream, but their biological effects once absorbed transdermally remain obscure. It is not known whether the effect of dioscin is similar to diosgenin—that is, weakly oestrogenic—or whether it may be capable, also like diosgenin, of increasing endogenous progesterone production via an effect on the hypothalamic-pituitary unit. This may explain the lack of effect commonly seen in post-menopausal women who have stopped ovulation and, therefore, progesterone production.

Progesterone does not occur in plants in appreciable amounts, and the progesterone precursors found in plants, such as dioscin, must be commercially processed before they can behave like progesterone. In addition, progesterone receptors are more selective than oestrogen receptors—near enough is not good enough. Only progesterone and the commercially synthesised progestogens are known to interact with progesterone receptors and exert a progesterogenic effect.

## Phytosterols

Of the phytosterols,  $\beta$ -sitosterol is the most significant and has oestrogenic activity.<sup>127</sup> This compound is ubiquitous in the plant kingdom and when isolated from *Glycyrrhiza glabra* (licorice), was shown to possess



oestrogenic activity 400 times weaker than oestradiol.<sup>128</sup> However, only small fractions are absorbed,<sup>129</sup> and so its oestrogenic potential from food is almost inconsequential.

The major role for the phytosterols is in the intestine where they compete with cholesterol for absorption, leading to lower cholesterol levels.<sup>130</sup> Phytosterols have also been shown to experimentally inhibit the development of colon cancer.<sup>131</sup> High levels of phytosterols are found in all edible oils, but corn, rice bran, sesame seed and wheat germ oils contain the highest levels.<sup>132</sup>

## Zearalenone

Zearalenone, unlike the other phyto-oestrogens, is not produced in the plant itself, but by moulds which contaminate poorly stored cereal crops. It is reported to be 80 times less active than oestradiol in primates; however, the effects of zearalenone are known to vary widely amongst other animal species. Isolated zearalenone (as a drug) has been used for post-menopausal symptoms and as a contraceptive Pill.<sup>133</sup>

**Table 18.5 Edible plants with recognised oestrogenic compounds<sup>134</sup>**

Isoflavones	Coumestans	Resorcylic acid lactones	Lignans	Steroid saponins	Others
soya bean*	alfalfa	oats	linseed*	liquorice*	fennel
chickpea	soya sprouts*	barley	rye	potato	carrot
cherry	cow pea	rye	buckwheat		aniseed
alfalfa	green bean	sesame seed	millet		hops
parsley	kidney beans	wheat	sesame and sunflower seeds		cabbage family
liquorice	split peas	peas	legumes and beans		sage
whole grains	mung beans	corn	whole grains		rhubarb
mung bean	olives	rice			beetroot
					yeast
					plum
					garlic

\* Contains high levels of phyto-oestrogen.

### TEST METHODS FOR ASSESSING OESTROGENICITY

There are a number of methods to assay a plant's oestrogenic potential. The oestrogenic effect of a substance can be measured in experimental animals or testing can be *in vitro*. *In vitro* test systems are limited. They are only appropriate to indicate if a substance is oestrogenic, not to predict the action of a substance in humans.

Following is a brief discussion of the common *in vitro*<sup>135</sup> and *in vivo* tests used to evaluate the oestrogenic activity of phyto-oestrogens:

#### *Animal studies to determine oestrogenicity*

The oestrogenic effect of a phyto-oestrogen can be measured in experimental animals. One way this might be done is to give mice a particular phyto-oestrogen to assess the effect on tissues. For example, a mouse could be given genistein to determine whether uterine enlargement or oestrogenic changes in cells of the vagina are seen. Other animals might be given oestradiol or another oestrogenic compound with a known effect. A comparison between the effects of the test substance and the phyto-oestrogen gives the oestrogenic potency of the phyto-oestrogen relative to the test substance. Sometimes a comparative human dose is determined from the test information by extrapolation from the mg/kg dose that gave rise to a particular effect in a test animal.

#### *In vitro test systems for the detection of oestrogenicity*

There are a number of research methods used to assess the oestrogenic potential of endogenous oestrogens and phyto-oestrogens. These are the analysis of binding affinity, oestrogen screening, reporter gene assays and analysis of gene expression. *In vitro* test systems do not distinguish between or predict oestrogenic and anti-oestrogenic effect in the body. In fact, these tests may underestimate or overestimate the *in vivo* oestrogenic potency of phyto-oestrogens.<sup>136</sup>

##### i) Receptor-binding affinity

The principle of the receptor-binding assay is the determination of the binding affinity of a compound to a receptor. Some phyto-oestrogens have a higher affinity for the  $\beta$ -receptor (ER $\beta$ ) than for the  $\alpha$ -receptor (ER $\alpha$ ). Genistein is the most notable and has a 20 times higher affinity for ER $\beta$  than ER $\alpha$ . Coumestrol has a 7 times higher affinity for ER $\beta$ .<sup>137</sup> This test is easy to perform but does not distinguish between pro- and anti-oestrogenic effects.

##### ii) Oestrogen screen

The oestrogen screen is widely used to determine oestrogenic potency of natural compounds and measures the ability of a substance to stimulate the growth of oestrogen-dependent cell lines *in vitro*. One of the limitations of this study is that only growth-stimulating substances are detectable and therefore this testing system cannot be used to study all phyto-oestrogenic effects. An example of oestrogen screen is when the phyto-oestrogen genistein is added to oestrogen-

dependent human breast cancer cell lines to establish the proliferative effect of genistein in these cells.

### iii) Reporter gene assays

Another test system used is the measurement of transcriptional activity (reporter gene assay). This is an analysis of the ability of a substance to activate the transcription of an oestrogen-sensitive promoter (a reporter gene) in cell lines or yeast. Reporter gene assays are very useful and powerful tools to identify substances that are able to activate oestrogen-dependent transcription and to determine their oestrogenic potency. They can be used to determine whether a substance possesses oestrogenic or anti-oestrogenic potential.

### iv) Analysis of gene expression

This test system is the most valid procedure to characterise the oestrogenicity of a substance *in vitro* and is able to study tissue-specific effects. This test analyses the ability of a substance to induce messenger RNA expression of oestrogen-sensitive genes in cell culture. It is a somewhat complex procedure, which may limit its use.

# 19

## Herbs

### Key words

abortifacient  
anti-haemorrhagic  
anti-spasmodic  
astringent  
carminative  
emmenagogue  
haemostatic

nervine  
*partus praeparator*  
photosensitivity  
polysaccharide  
sapogenin  
saponin  
spasmolytic  
uterine tonic

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One of the fundamental tenets of herbalism is that the body is a self-repairing organism that almost always seeks to return to a state of equilibrium. Herbs are ideal agents to support healing and the return of normal function because they are gentle and effective.

Women and herbs have had a strong association throughout recorded history and a complex understanding of the causes and treatment of many gynaecological complaints has developed over the centuries. Modern science has, by and large, only supported and extended these understandings.

This chapter describes the traditional and contemporary use of a group of herbs used commonly in the treatment of women's complaints. It is not intended as a manual for the untrained, but as an overview of the scientific and traditional uses of the herbs in gynaecology.

### HERBS WHICH AFFECT THE UTERUS

There are a number of herbs that can affect the activity of the uterine muscle. These herbs can be thought of as lying somewhere along an imaginary spectrum of action—from the relaxant and anti-spasmodic

group of herbs called spasmolytics, to the herbs which can increase spasm and initiate muscular contraction.

When muscular activity is increased in hollow organs such as the uterus or bowel, expulsion of the contents of the organ will be the result. In the uterus this may bring on a period or cause a miscarriage; in the bowel, these herbs can stimulate peristalsis and effect the regularity of the bowel movements. Those herbs which increase muscular activity in the uterus are termed emmenagogues.

In addition to the spasmolytics and emmenagogues, another group of herbs also affects the uterine muscle. These herbs improve uterine muscle tone and are called the uterine tonics.

The grossly oversimplified indications for herbs influencing uterine muscle are: spasmolytics for pain, emmenagogues after childbirth or to initiate menstrual flow, and uterine tonics to regulate the activity of the uterus. Experimentally, it can be shown that the tonics, spasmolytics and emmenagogues initiate a number of different effects on uterine muscle which can be summarised as follows:

- Tonics *increase the tone* in the muscle and improve the overall strength of the organ. (Tone is assessed while a muscle is at rest and is the ‘resistance to passive elongation or stretch’.)<sup>1</sup>
- Spasmolytics *slow the rate and decrease the amplitude* of uterine contractions. This will affect the number of contractions in the uterine muscle per unit of time.
- Emmenagogues *increase the amplitude* of the contraction and therefore affect the expulsive activity of the uterus.

## THE UTERINE TONICS

Uterine tonics are key herbs in gynaecology. They have a normalising effect on the uterus and assist with normal uterine function. The uterine tonics have a pivotal role in herbal prescriptions and are usually prescribed as part of a formula if a complaint involves the uterus. The primary aim of the herbalist is to restore homeostasis—to support normal function and the inherent capacity of the body to self-regulate and repair. Tonics are central to this aim and are used to achieve a ‘balanced’ effect from a formula. If an emmenagogue is used to increase the expulsive capacity of the uterus, a tonic is added to moderate this effect. If a spasmolytic is used to relax, the addition of a tonic will maintain uterine tone.

Each of the uterine tonics has specific indications which are described in the section dealing with that herb. As a group, the uterine tonics are prescribed:

- for all conditions where uterine pain is a feature;
- for all complaints associated with abnormal bleeding patterns;

- for all conditions associated with prolapse, malposition or enlargement of the uterus;
- as *partus praeparators*. These formulas for pregnancy are used to regulate uterine tone until labour commences, assist with a smooth delivery and regular contractions during labour, and help with involution of the uterus after birth;
- as herbs that have a general and as yet unspecified action on the micro-environment of the endometrium. This action may account for the observed improvement in fertility and a reduction in the rate of miscarriage when uterine tonics are prescribed;
- as herbs to improve fertility. Some of the uterine tonics (and a number of other common gynaecological herbs) contain various constituents which have hormonal effects. These effects may account for some of the fertility-enhancing and regulatory actions of these herbs.

#### THE UTERINE TONICS

*Angelica sinensis* (Dang Gui)

*Aletris farinosa* (true unicorn root)

*Caiohyllum thalictroides* (blue cohosh)

*Chamaelirium luteum*

(helonias or false unicorn root)

*Rubus idaeus* (raspberry leaves)

### ***Rubus idaeus/R.strigosus* (Red raspberry leaf)**

*Rubus idaeus*, the red raspberry, is a native of Europe, North America and Asia. The roots were once eaten like turnips;<sup>2</sup> the fruit contains vitamins A, B, C and E, pectin, ferric citrate (a type of iron)<sup>3</sup> and calcium, and is useful to prevent anaemia;<sup>4</sup> and the leaf is used medicinally. The active constituents of *Rubus idaeus* leaves are largely unknown; however, flavonoids, unspecified polypeptides and tannins have been described.<sup>5</sup> The leaves also contain the compound known as fragarine which is responsible for the uterine tonic effect.<sup>6</sup>



#### Uterine tonic effects

*Rubus idaeus* has been used for centuries as a popular uterine tonic and a *partus praeparator*. Traditionally,

the herb was drunk as a tea for period pain and heavy periods, as well as before and during pregnancy to prevent or relieve nausea, to ease labour and to assist with breastmilk production.<sup>7</sup> The active constituents of raspberry leaves seem to possess contradictory effects—on one hand relaxing the uterine muscle and on the other initiating contractions. This has confounded researchers, but confirmed herbalists' belief in raspberry leaves as a uterine tonic.

In 1941, several constituents collectively named 'fragarine' were discovered in the leaf and shown to have a relaxing effect on the pregnant uterus. Contractions were diminished in force and frequency, and occurred at evenly spaced intervals. Secondary contractions were eliminated.<sup>8</sup> In addition to these effects, other researchers found that if the muscle was relaxed, the herb *induced* contractions.<sup>9</sup>

But how, if the effect of raspberry leaves was primarily to relax the uterus, could the herb assist with labour? Or as the researchers put it: 'It is difficult to understand how uterine relaxation should assist parturition [labour]; rather it would be thought to delay it by diminishing the force available to bring about the birth of the child.'<sup>10</sup>

Yet another team of researchers isolated several constituents from raspberry leaves, some of which increased uterine contractions, while others relaxed the uterus. They concluded that although raspberry leaves contain a powerful 'spasmolytic', the overall effect was to stimulate the uterine muscle. This, they said, made the traditional use of *Rubus* 'difficult to assess . . .'.<sup>11</sup>

It wasn't until 1970, when the leaf (as opposed to its isolated constituents) was tested on uterine muscle, that a reason for the beneficial effect of raspberry leaf was proposed. These later researchers suggested that *Rubus* would prevent or reduce the risk of incoordinate uterine action (a common cause of difficulty and failure to progress in labour), by regulating the action of the uterine muscle.<sup>12</sup>

Raspberry leaves (and all other uterine tonics) should be used with care in the first trimester of pregnancy because of a slight possibility of miscarriage. It is unwise to use *any* medication during the first three months of pregnancy unless absolutely necessary. When trained herbalists use raspberry leaf for nausea in pregnancy or threatened miscarriage, it is usually prescribed with other herbs which offset this possibility. To improve labour, there seems to be no additional benefit in starting the herb earlier than the eighteenth week.

A recent study examined the effects of *Rubus* in pregnancy, and found only minor differences between the study group and the control.<sup>13</sup> The only clinically significant findings were a shortening of the second stage of labour by an average of ten minutes, and a lower rate of forceps deliveries in the *Rubus* group compared to the control group (19.3 per cent versus 30.4 per cent). The dose of the herb in this study was quite low, however, and may have impacted on the results. Another

retrospective study compared the safety and efficacy of *Rubus* leaf products consumed by a group of mothers during their pregnancy, with a group of mothers who did not take the herb.<sup>14</sup> While this type of study is poorly controlled, it did find that *Rubus* appeared to shorten labour with no identified side-effects for the women or their babies. The authors suggested that women who ingested raspberry leaf appeared to be less likely to have their membranes ruptured by artificial means, require a caesarean section, forceps or vacuum birth compared to the women in the control group.

There is some confusion about the use of raspberry leaves for conditions that are not associated with pregnancy. Experimentally, *Rubus* has not been shown to affect the non-pregnant uterus,<sup>15</sup> despite its historical and current use for period pain and heavy bleeding. *Rubus* contains tannins, but tannins are usually not absorbed in any quantity from the gut. Any therapeutic effect, then, must be due to other constituents in the herb.

Raspberry leaves have very high levels of manganese, moderate levels of iron, calcium and selenium, and the vitamins A and C. Perhaps this breakdown of nutritional components gives the best clue to the reported effectiveness of *Rubus* in heavy menstruation. Vitamin C and iron can both improve menorrhagia. For dysmenorrhoea, it is seldom useful alone.

Gynaecological indications for *Rubus* can be summarised as follows:

- As a *partus* in the latter five months of pregnancy.
- To aid in involution of the uterus after delivery.
- To aid with production and maintenance of breastmilk.
- As an adjunctive treatment for menorrhagia.
- As a general and uterine tonic following surgery to the uterus—for example, the removal of fibroids, termination of pregnancy or a curette.

## Additional effects

Raspberry leaves are astringent because of the tannin content, and are used to treat diarrhoea and inflammation of the throat and eyes. Garden and wild varieties have similar therapeutic properties.<sup>16</sup>

Raspberry leaves taste pleasantly aromatic with a slight bitterness. They are Cool and Dry.

## Dose

Fluid extract: 2–10 ml, or dried leaf 2–8 g, three times daily.

One recipe for raspberry leaf tea follows: Make a strong cup of raspberry leaf tea and squeeze into it the juice of an orange. Take 3 cups of this mixture daily in the last months of pregnancy.



*Rubus* in the form of dried leaf is very bulky and fluffy. Prescriptions of 1 teaspoon per cup three times daily results in low doses which may not be therapeutically active.

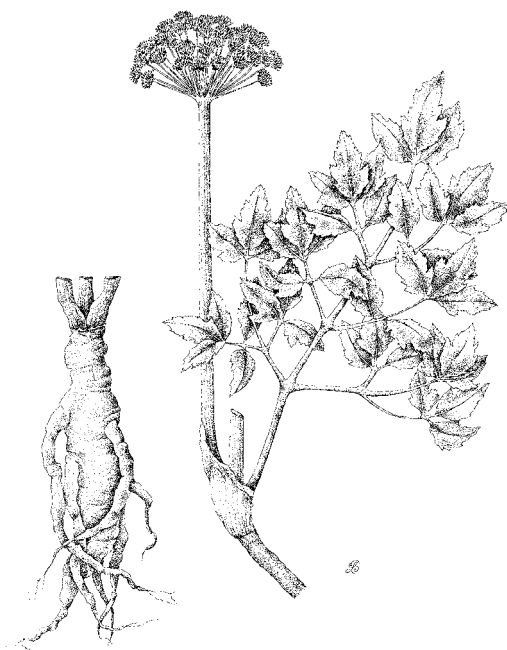
## ***Angelica sinensis* (Dang Gui)**

Dang gui is another of the important tonic herbs for the uterus. It shares a general tonic effect with the other uterine tonics. These herbs have a number of similar actions and can be used interchangeably in some instances, but the unique combination of indications for *Angelica sinensis* have secured it a prominent place in herbal medicine.

Dang Gui has been the subject of a great deal of research. The herb or its active constituents have liver-cell protective effects against a variety of poisons including carbon tetrachloride,<sup>17</sup> paracetamol<sup>18</sup> and aflatoxins.<sup>19</sup> Dang Gui also slows the heartbeat, increases coronary circulation, controls various types of arrhythmia, reduces blood pressure and improves blood flow to the periphery.<sup>20</sup> It also has a slight cholesterol-lowering effect, a property it has in common with other herbs which contain beta-sitosterol. When given *Angelica sinensis*, irradiated mice had longer survival times and adult female mice maintained a higher fertility rate;<sup>21</sup> the latter effect is thought to be related to a protective effect on ovarian tissue.

*Angelica sinensis* also regulates prostaglandins synthesis and can regulate experimentally induced inflammatory responses caused by prostaglandins release.<sup>22</sup> Thromboxane A<sub>2</sub>, which is a member of the prostaglandins family, increases blood viscosity and promotes blood clotting. Its activity is regulated by *Angelica sinensis*. This may form the basis of the observed improvement of blood circulation by this herb.<sup>23</sup>

In traditional Chinese medicine, *Angelica sinensis* is referred to as a *blood tonic*, and has general and non-specific affects on the blood and circulation.<sup>24</sup> *Blood tonics* are prescribed for pallor, weakness, dizzi-



ness, dry skin, late or absent periods, pale menstrual flow, weakness after the period, after giving birth, or while breastfeeding. *Angelica sinensis* has been shown to improve red blood cell counts,<sup>25</sup> and a number of theories have been proposed to explain the observed *blood tonification* properties. Although some writers report the presence of B<sub>12</sub>,<sup>26</sup> the validity of this must be queried on the grounds that it is highly unlikely that plants manufacture B<sub>12</sub> in large quantities, or at all. Other investigations have shown polysaccharides to be responsible for the *blood tonification*;<sup>27</sup> however, they do not survive digestion, and it is likely that other factors are yet to be discovered which may more fully explain the effects of *Angelica sinensis* on blood quality.

*Angelica sinensis* is also used for constipation associated with debility and (often) old age. Symptoms include sluggishness of the bowel due to debility and dry, hard or pebble-like stools.<sup>28</sup> Another traditional use is for the treatment of coughs and shortness of breath. Researchers found that the herb relaxed bronchial smooth muscle and had an anti-asthmatic effect.<sup>29</sup>

### Uterine tonic effects

Dang Gui is frequently used in a wide range of gynaecological conditions—amenorrhoea, dysmenorrhoea, irregular menstruation and leucorrhoea. It is primarily a herb for the uterus and for improving the quality and circulatory dynamics of the blood. It is said to potentiate the action of vitamin E, a property which may explain its popular use at the time of menopause.

One of its most important effects is the impact on the uterus. As with *Rubus*, *Angelica sinensis* appears to contain a number of components which can increase tone, strengthen contractions, improve the orderly rhythm of contractions and relax the uterine muscle. A controversial point is whether *Angelica sinensis* is 'oestrogenic'. Mice given *Angelica sinensis* were reported to exhibit oestrogenic effects,<sup>30</sup> but this is often disputed.

The essential oil ligustilide<sup>31</sup> and ferulic acid<sup>32</sup> seem to be the major components with the uterine spasmolytic effect. Other components, some not identified, have an excitatory effect on uterine muscle. The sum total of all components is a slight increase in uterine activity—a mild emmenagogic effect, but which also seems to cause the contractions to become more orderly.<sup>33</sup> This herb should not be used in the first trimester of pregnancy unless prescribed by a trained herbalist as part of a traditional formula.

Herbs which have a spasmolytic effect on the uterus and improve the circulation are particularly indicated in the treatment of dysmenorrhoea. Apart from normalising uterine activity, they ease and, in some instances, increase the pelvic blood flow, which in turn relieves pelvic congestion and pain. Traditionally and experimentally, *Angelica*

*sinensis* in combination with *Paeonia lactiflora*<sup>34</sup> and *Ligusticum wallichii*<sup>35</sup> is superior to *Angelica sinensis* alone. For menstrual pain that becomes worse with cold and is associated with a slow start to menstruation, *Angelica sinensis* is prescribed with *Cinnamomum*.

Traditionally, *Angelica sinensis* is also used as a *blood tonic* to regulate the period and to enhance the fertility of women who are *blood deficient*. It is usually prescribed with other herbs during the follicular phase of the cycle. It is sometimes poorly tolerated by those with weak digestion, and may need to be combined with *Zingiber*, *Cinnamomum* or bitters.

#### Dose

3–30 g dried herb or 2–4 ml fluid extract three times daily.

It is Warming and Moistening.<sup>36</sup>

### ***Chamaelirium luteum* (False unicorn root, Helonias)**

*Helonias dioica* was the early name for *Chamaelirium luteum*, the false unicorn root, which has a reputation as a uterine and ovarian tonic. It has been used historically for a wide variety of gynaecological complaints from amenorrhoea and menorrhagia to irregular menstruation and period pain. It is also used as a bitter tonic to improve digestion, and to assist women with poor stamina and low spirits.

Although it is usually described as a uterine tonic, early research on its ability to affect muscle tone and rate or amplitude of contractions were consistently negative.<sup>37</sup> It is still recommended however as a herb to prevent miscarriage.<sup>38</sup> Another far more interesting traditional use is to regulate ovarian function and problems which originate 'in the first half of the cycle'.<sup>39</sup>

*Chamaelirium* is often referred to as an amphoteric to the ovary—as having the ability to regulate and normalise ovarian function.<sup>40</sup> Research on this herb is scarce and certainly nothing as elaborate as an investigation into the effects on the ovary have been performed.



However, *Chamaelirium* contains steroidal saponins, which are converted in the gut to the sapogenin, diosgenin. This constituent has been shown to have possible effects on ovarian function via its action on the hypothalamic-pituitary unit (see pages 414–15).

*Chamaelirium* is a wildcrafted herb and its popularity in recent times has led to over-harvesting, so that the herb is very close to extinction. Until commercial cultivation is in place it is strongly recommended that this herb should not be used. Other herbs which may be useful substitutes include *Aletris farinosa*, *Tribulus terrestris*, *Paeonia lactiflora*, *Dioscorea villosa* and *Asparagus racemosus*.

#### Dose

1–2 ml of fluid extract, three times daily.

### ***Aletris farinosa* (True unicorn root)**

*Aletris farinosa*, commonly known as the true unicorn root, is a member of the lily family. It has a long history of use as a uterine tonic, first by Native Americans, then by the early American settlers, and now by many herbalists worldwide. The part used is the dried rhizome and root.

#### Uterine tonic effects

*Aletris* was popularised by Ellingwood, one of the early American herbalists, who claimed that it should be given to tired, overworked and anaemic women who were suffering from the consequences of giving birth too frequently. He and others found it especially helpful for anaemia, constipation or leucorrhoea of peri-menopausal women.<sup>41</sup> Good results are also achieved with pelvic floor weakness and prolapse, particularly in older women with low back pain.<sup>42</sup>

This is one of the best uterine tonics for women with a sense of pelvic heaviness or congestion, and seems to be especially beneficial for women in their forties and fifties.



*Aletris* can be taken by women of any age, however, for conditions which are accompanied by a sense of pelvic discomfort, heaviness, a dragging sensation, or a feeling 'as though everything might fall out'.

In the past, the true unicorn root, *Aletris farinosa*, and the false unicorn root, *Chamaelirium luteum*, were frequently substituted for one another. Both were used to regulate the activity of the menstrual cycle and as women's tonics, presumably because both (and many other plants besides) yield the steroidal sapogenin, diosgenin, which has a mild 'oestrogenic' effect.<sup>43</sup>

Early animal experiments revealed that *Aletris* can have contradictory effects on uterine muscle, and can exert the entire spectrum of effects from relaxation to stimulation in the same animal species and between different animal species.<sup>44</sup> In most experiments, however, *Aletris* reduced the amplitude of uterine contractions which may explain its historical use, in combination with spasmolytic herbs for the prevention of miscarriage. Because of the conflicting reports on its actions, and because it needs to be used in combination with other herbs, its use by the untrained, especially during pregnancy, is unwise.

As is common with all uterine tonics, *Aletris* is recommended for the whole spectrum of gynaecological disorders, from light or absent periods, to periods which are too heavy or too frequent; for period pain and infertility; for the symptoms associated with a retroverted uterus and for leucorrhoea. This property is shared by all tonic herbal remedies—they are seen to regulate irrespective of the problem. The additional herbs in the formula direct the therapeutic effect towards the desired outcome.

## Additional effects

The bitter and spasmolytic properties of *Aletris* are responsible for its effects in the gastrointestinal tract. It can be prescribed as a digestive tonic for loss of appetite arising from inadequate digestion; for flatulent colic or for nervous dyspepsia. The bitter principle in this herb also imparts a mild laxative effect.

Like all bitter tonics, it is strongly indicated during convalescence and especially for debilitated women who are recovering from surgery or childbirth. Recovery from hysterectomy, particularly in the first weeks post-operatively when constipation, flatulence, pelvic discomfort and debility are common complaints, is one of the modern indications for this herb. Again, however, over-harvesting has pushed this herb to the edge of extinction and its use should be curtailed. Other uterine tonics combined with general tonics such as *Withania somnifera* can be used as a substitute.

## Dose

1–2 ml, three times daily.

It is Warming and tastes sweet, then bitter and soapy.<sup>45</sup>

## *Tribulus terrestris*

*Tribulus* is a common weed of hot, dry wastelands throughout the temperate regions and has been used over a large part of the world as a medicinal plant. The use of the aerial parts of the plant for the treatment of sexual dysfunction is an Eastern European tradition. In Chinese medicine a decoction of the seed is used to treat red, swollen or painful eyes with increased lacrimation, and for itchy skin conditions, vertigo and as a galactagogue. In Ayurvedic medicine, the root is the main part used.

In Western herbal medicine, *Tribulus* is available in two forms—either as an extract of the whole plant, or as a compound containing isolated steroidal saponins. These preparations are prescribed for a variety of indications including erectile dysfunction, low sperm count or motility, and low libido in men, and poor ovulation rates or menopausal symptoms in women. The main steroidal saponin-containing compound used is a preparation called Tribestan (see below).

In recent times *Tribulus* used as a whole plant extract has gained some notoriety, especially in America where it is used for body-building; however, many studies refute its efficacy for this purpose. An animal study of a *Tribulus* extract found the plant possessed hepato-protective activity.<sup>46</sup> The *Tribulus*-containing product Vitaton was reported to improve sperm motility<sup>47</sup> and to increase endurance in animals, but these studies were not published. Those that have been published on Vitaton are all negative for anabolic activity and performance enhancement.

A saponin from *Tribulus*, protodioscin, was found to increase erectile function in animals. The precise mechanism of this action is unclear;<sup>48</sup> however, this may have some bearing on the reported sexual rejuvenation seen in males prescribed this herb.

An animal study of *Tribulus terrestris* reported that the decoction significantly inhibited gluconeogenesis and was also shown to influence glycometabolism. Reduced triglyceride and plasma cholesterol levels were also observed.<sup>49</sup>

## **Tribestan™**

A standardised preparation containing furostanol saponins as the saponin protodioscin is marketed as Tribestan. It is available in Australia as a tablet containing 100 mg of protodiosan.

The company in Bulgaria that has the patent for Tribestan has conducted practically all of the research on the product. Much of this work has not been published and all data provided about Tribestan must be evaluated in this light (see [www.tribestan.com](http://www.tribestan.com)).

Studies on rats have apparently suggested an increase in mitotic activity and an increase in the number of Sertoli cells in the testes, which has been suggested to lead to an increase in sperm numbers. This effect is apparently mediated via FSH.

Studies on the sexual activity of boars following administration by Tribestan showed that administration of the herbal compound resulted in an increased libido. Sperm motility and morphology were also apparently improved. In animals, the preparation was shown to have a low toxicity and few side-effects.

Studies have also been conducted in men who were given Tribestan 1.5 g daily for 30–40 days. Libido and sexual function improved. Men treated for 60 days showed improved sperm motility and those treated for 90 days had improved sperm numbers. A reduction in serum cholesterol was also noted.

## Use in gynaecology

A trial using Tribestan for primary and secondary ‘endocrine sterility’ was conducted by the same Bulgarian company. There were three treatment groups. Women in the first group were given Tribestan 250–500 mg tablets three times daily for 2–3 months. The second group was given the same dose of Tribestan, but from day 5 to 14, or from day 1 to 12 of the menstrual cycle for three months. The final group was given 250–500 mg tablets of Tribestan three times daily, with the ovulatory stimulant drug clomiphene citrate or another ovulatory stimulant drug from day 5 to 9 for three months. Control groups were similarly infertile women treated with other fertility drugs.

In the first group there was no change in ovulation rates and a high rate of undesirable effects was noted, including longer menstrual cycles, menorrhagia, increased libido and general nervousness with insomnia. Following cessation of the herbal treatment many of the women reported feeling excessively fatigued. In the second group, 24 of the total of 36 patients developed normal ovulation patterns (67.7 per cent) but only two became pregnant. In the combined Tribestan and ovulatory stimulant drug group, the results were better with the combination of drug and herb than either alone.

Tribestan has shown promising results for the treatment of a range of menopausal symptoms, including hot flushes, sweating, insomnia and depression. In one study of 50 menopausal women, 52 per cent experiencing natural menopause and 48 per cent experiencing post-operative menopause, 98 per cent reported improvement of symptoms

after treatment. The dosage for Tribestan varied, but it was usually given at a dose of between 500–750 mg daily after higher initial doses. No significant changes in FSH, LH, prolactin, oestradiol, progesterone or testosterone were observed. However, FSH tended to be higher in the treatment group.

## ***Caulophyllum thalictroides* (Blue cohosh)**

*Caulophyllum*, an important remedy for female complaints, has come to us from the Native Americans. Historically, it was used to prepare the uterus for labour (*partus praeparator*), for period pain and for various ‘inflammations’ of the uterus. It is generally classed as a uterine tonic.

Like other uterine tonics, *Caulophyllum* seems to possess constituents with contradictory actions and it is also recommended for apparently disparate complaints. Early research showed that the alcoholic extract of the whole herb increased uterine tone, but decreased the rate and amplitude of contractions.<sup>50</sup> The saponin fraction, however, seems to increase the amplitude of the contraction and cause a small increase in rate.<sup>51</sup>

Some recently published reports on this herb have raised concern about the use of *Caulophyllum* in the latter stages of pregnancy. The herb has been linked to two cases of neonatal heart failure when consumed as a parturient to facilitate labour.<sup>52</sup> In one case the mother allegedly took three times the prescribed amount of *Caulophyllum*; however, the exact amount taken was not stated, making it difficult to assess the potentially toxic effects claimed.<sup>53</sup> A third case described a potential toxicity associated with *Caulophyllum* and *Cimicifuga* used together during pregnancy that apparently resulted in neurological toxicity in the newborn.<sup>54</sup> These claims were formally disputed on the grounds that the toxic effects suggested would only occur if much higher doses than reported were consumed.<sup>55</sup> It would be wise to exercise caution with this herb during pregnancy until this issue is clarified.

### **Dose**

0.5–1 ml three times daily; not more than 0.25–0.5 ml in the first trimester of pregnancy, and always with *Viburnum prunifolium*. This herb should only be prescribed for pregnancy-related complaints by a trained herbalist.

## **SPASMOLYTICS**

The spasmolytics or antispasmodic herbs have a relaxing effect on the smooth muscle and can slow or regulate the rate of contractions, both



in the case of the uterus and in peristalsis in the bowel. Spasmolytics are frequently used to alleviate organ pain caused by excessive muscle contraction. When muscle spasm is severe, the blood flow and oxygen supply to the organ is impaired (ischaemia), resulting in pain. Relaxation of the affected muscle brings relief.

Included in this section are the spasmolytics *Viburnum opulus* and *V. prunifolium*, and *Ligusticum wallichii* from the Chinese pharmacopoeia. Other spasmolytics (discussed elsewhere) are *Dioscorea villosa* and *Paeonia lactiflora* with *Glycyrrhiza glabra*.



### Specific uses in gynaecology

Spasmolytics reduce spasm and calm uterine activity:

- They are specifically indicated when the pain is colicky, crampy or contraction-like.
- They are used to calm the uterus in pregnancy and as an aid to the prevention of miscarriage and early labour.

### ***Viburnum opulus* / *V. prunifolium***

*Viburnum opulus* (cramp bark) and *Viburnum prunifolium* (black haw) are often discussed and prescribed interchangeably, having very similar therapeutic effects; however, individual herbalists may show a particular preference for one or the other, and some texts describe slightly different indications.

Native Americans used a decoction of the bark of *Viburnum opulus* for swollen glands, mumps and eye disorders;<sup>56</sup> as a diuretic; or as a tea and tobacco substitute.<sup>57</sup> *Viburnum prunifolium* has been extensively used to treat spasmodic dysmenorrhoea—one writer in 1877 reporting it to be superior to any other remedy for this problem. It is also used to prevent miscarriage;<sup>58</sup> to prevent cramps and to tone the uterus after fibroid removal.<sup>59</sup>

Both *Viburnum* spp. have been the subject of considerable controversy as to their efficacy. Studies between 1910 and 1920 found *Viburnum* spp.

to have no significant action on the uterus,<sup>60</sup> while later research showed *Viburnum prunifolium* root bark to relax the uterus.<sup>61</sup> Several reasons for these inconsistencies have been suggested. The uterine strips tested may have been from different parts of the uterus—from the upper or lower segments which have different contractile characteristics; or they may have been taken from uteri at different times in the menstrual cycle (the uterine muscle is much less irritable just after the period).

However, much of the problem seems to have arisen because of frequent substitution, usually with *Acer spicatum* (mountain maple)<sup>62</sup> instead of *Viburnum*. In 1939 up to fifteen different plants were being sold instead of *Viburnum prunifolium*.<sup>63</sup> Samples also varied widely in their physical state, often being contaminated with plant parts devoid of therapeutic effect.<sup>64</sup>

Positive results have been achieved with both *Viburnum prunifolium* and *V. opulus*, and both have been the subject of a considerable amount of research. A patent formula containing *Viburnum prunifolium* extract was trialled in 1932 on 100 patients with primary dysmenorrhoea with excellent results. In 1940, it was concluded that *Viburnum* spp. had a sedative action on the uterus, based on experiments in which tracings of uterine muscle activity were obtained by placing a balloon in the uterus of women.<sup>65</sup>

The constituents responsible for the uterine sedative action are non-toxic and cause sedation of involuntary muscle, which is associated with a decrease in blood pressure.<sup>66</sup> Three components are reported to be uterine relaxants which act directly on the muscle. Scopoletin (a coumarin)<sup>67</sup> has long been suggested as important; as well as viopudial, a non-alkaloid material, which is also strongly anti-spasmodic.<sup>68</sup> The glucoside salicin which is converted into salicylic acid in the gut has also been suggested as possessing uterine sedative properties,<sup>69</sup> however, its presence in *Viburnum opulus* is not always confirmed<sup>70</sup> and the levels are very low.

This is an important herb in gynaecology and obstetrics. When the correct herb is available, it can be expected to relax the uterus and help to relieve dysmenorrhoea. Its use in pregnancy should be left strictly to



trained herbalists, but it is useful to prevent uterine overactivity at any stage of pregnancy, and has a place in the prevention of miscarriage where a viable pregnancy has been identified (with ultrasound imaging) and the cervix is closed.

Other observed effects of *Viburnum* relate to its effect on blood pressure. In anaesthetised dogs, it has been shown to lower blood pressure, slow the heartbeat and decrease myocardial contractility. The proposed mode of action is a potentiation of acetylcholine.<sup>71</sup> The leaves also contain varying amounts of arbutin, a urinary antiseptic also found in *Arctostaphylos uva-ursi* (bearberry). Some species (*Viburnum phlebotrichum*) contain very high levels and may have been substituted for bearberry leaves as a urinary anti-infective. The leaves need to be treated with hot steam while fresh, otherwise arbutin degrades rapidly.<sup>72</sup>

## Dose

The dose of *Viburnum prunifolium* is 4–8 ml three times daily; and of *Viburnum opulus*, 2–4 ml three times daily. Viburnin, a bitter glycoside, is responsible in part for the distinctive bitter taste of these two herbs and the upper end of the dose range is likely to cause nausea and occasionally vomiting. These herbs are rarely prescribed alone and are best combined with *Cinnamomum* or *Zingiber* to improve effectiveness and offset this possibility.

## ***Ligusticum wallichii* (Cnidium; Chuan xiong)**

*Ligusticum wallichii* is from the Chinese pharmacopoeia and is used primarily for its ability to relax smooth muscle. Angina pectoris, stroke, menstrual pain and uterine overactivity have all been treated with this herb. An active, short-acting substance—tetramethylpyrazine—has been shown to improve coronary blood flow (probably through non-specific relaxation of smooth muscle), to prevent arrhythmias and the release of inflammatory mediators,<sup>73</sup> and to relax uterine muscle. Tetramethylpyrazine is under investigation as an isolated agent to be used to reduce uterine contractions in pregnant women at term.<sup>74</sup>

*Ligusticum* is a component of a commonly used *blood tonic* in Chinese medicine, and is combined with *Angelica sinensis* and *Paeonia lactiflora*. It is often assumed that the term *blood tonic* refers to a herb with the ability to improve blood parameters as measured by blood tests. However, in this instance, the improvement is in both quality and regularity of menstrual blood flow and not in quantifiable blood test results. *Ligusticum* may have a hormonal action, but much of the outcome is related to the spasmolytic effect on the uterus.

Both *Ligusticum wallichii* and *Angelica sinensis* also contain ferulic acid, and both herbs have an inhibitory effect on uterine contraction in

rats when given intravenously and orally. Tetramethylpyrazine and ferulic acid, given in combination at doses individually insufficient to inhibit uterine contraction, act synergistically.<sup>75</sup> Traditionally, these two herbs are combined to treat menstrual disorders and coronary insufficiency leading to chest pain.

*Ligusticum* is also part of a traditional formula used in the treatment of anxiety, insomnia and related symptoms.<sup>76</sup> It has been shown to have a mild sedative action, but the effects of the whole formula (Suan Zao Ren Tang or Zizyphus Combination) are much stronger.

## Dose

*Ligusticum* is acrid and Warm and as a fluid extract (1:2) can be given in doses 2–6 ml, one to three times daily.

## THE EMMENAGOGUES OR UTERINE STIMULANTS

Emmenagogues are used when there is a need to increase the strength of uterine contractions, usually so that the uterine contents can be efficiently expelled. They are usually prescribed when the period is slow or delayed (for example, by shock), and can be used to initiate menstruation caused by hormonal irregularities. Traditionally, they have also been prescribed to bring on a late period due to pregnancy, but this is dangerous, illegal and frequently unsuccessful. Additionally, almost all of the information on the correct dose, timing and route of administration for an abortifacient effect has been lost or forgotten.

Emmenagogues can also be prescribed for certain conditions which are associated with excessive bleeding, historically referred to as ‘poor uterine tone’. This is characterised by symptoms of heavy flow, little or no pain and large clots. These symptoms may be inherited; due to poor diet or lack of exercise; or to conditions such as fibroids or a prolapse which prevent the uterine muscle from behaving normally. In such cases, complex differentiation and treatment of the causes is required.

After a miscarriage, a useful combination is an emmenagogue with a uterine tonic. The expulsive activity of the emmenagogue aids removal of retained tissue and the uterine tonic assists with healing and regeneration of the uterine lining. Following childbirth, emmenagogues can be used to assist with normal involution and to reduce bleeding after delivery caused by a ‘relaxed’ uterus. They can also minimise the risk of intra-uterine infection by expelling any retained placenta or membranes after delivery.

They are also indicated after a termination of pregnancy (TOP), especially when a suction curette has been performed and there is a

possibility of tissue remnants which may later cause a pelvic infection. The combination of emmenagogues and bacteriostatic herbs for women who have refused to take antibiotics (commonly prescribed after this procedure as a prophylactic measure) reduces the risk of a pelvic infection.

Heavy menstrual flow caused by lack of tone and following repeated pregnancies can respond well to the stimulant action of the emmenagogues; however, as usual, herbs which are both tonic and stimulant herbs are most suitable. Long-term treatment is usually required.

Emmenagogues should only be used by trained herbalists. Their indications are complex and they are difficult to prescribe, needing appropriate dosage, duration of use and combinations with other herbs. As Hoffmann points out: 'These [emmenagogues] are quite powerful herbs that have a specific stimulating action on the womb. This is not necessarily all that healing and they can be very irritating and potentially dangerous in too high a dose.'<sup>77</sup>

## ***Ruta graveolens* (Rue)**

*Ruta* has been called the 'herb of grace' and was once believed to possess metaphysical powers. Both Leonardo da Vinci and Michelangelo claimed that *Ruta* had improved their eyesight and their creative inner vision. Reported uses include as an insect repellent (leaves contain a powerful insecticide), to increase the appetite, to treat hysteria and epilepsy, and as a homoeopathic for rheumatism, arthritis and neuralgia.<sup>78</sup> It is also used for bronchial and croupy conditions and for amenorrhoea where pregnancy has been excluded.<sup>79</sup>

*Ruta* is also used for strained eyes and headaches from eye strain; as a tea to expel worms; to strengthen fragile blood vessels; and as an ointment for sprains, gout and rheumatic pains.<sup>80</sup> It contains coumarins which may cause photosensitivity and a skin rash on contact.<sup>81</sup>

*Ruta* is a traditional remedy for the treatment of convulsions by Amazonian rural populations.<sup>82</sup> Studies have shown *Ruta* to have a variety of anti-spasmodic effects. Anti-convulsant effects have been observed in mice;<sup>83</sup> and the alkaloids possess a definite spasmolytic character in the gastrointestinal tract,<sup>84</sup> indicating that *Ruta* is suitable for the alleviation of some intestinal spastic disorders such as gall bladder colic. *Ruta* also exhibits an anti-spasmodic action on heart muscle and its action has been compared to known coronary vasodilators.<sup>85</sup>

According to oral reports from Chile, clinically verified cases of multiple sclerosis (MS) have been improved for indefinite periods by long-term use of *Ruta* tea. Nine of these patients were examined for the effects of the tea on lesions in their visual pathways and of these, five showed improvements.<sup>86</sup> In another report, MS patients noticed improvement in vision and considerably decreased spasticity after drinking *Ruta* tea, lasting for about a day. No unwanted side-effects were reported.<sup>87</sup>

## Use in gynaecology

*Ruta* has been used for centuries as an abortifacient worldwide and many early references to its use can be found. Soranus, a gynaecologist in the second century AD, used *Ruta* in one of his four recipes for oral contraceptives and abortifacients; Dioscorides said that *Ruta* 'extracts the menses'. Another writer used a mixture of egg, *Ruta* and dill in a vaginal suppository as an abortifacient. In other early writings, emmenagogues and abortifacients were listed according to their activity. *Ruta* was considered to be one of the extremely strong and dangerous drugs.<sup>88</sup>

*Ruta* is a traditional abortifacient among Hispanic people in New Mexico, and is used as a tea for abortion purposes throughout Latin America.<sup>89</sup> The activity of the herb is thought to be caused by a combination of the anti-oestrogen principles and other constituents which induce uterine muscle excitability.

Recent studies were performed on rats and hamsters to test for possible post-coital antifertility activity. *Ruta* was shown to inhibit implantation in rats, but not in hamsters. The difference in results between the species may be attributable to antagonism of the pre-implantation oestrogen surge which occurs in rats and not in hamsters, indicating that the anti-oestrogenic effects of rue extracts may not be strong enough for hamsters<sup>90</sup> (or humans).

An active constituent, chalepentin, has been isolated from *Ruta*, which may increase uterine muscle excitability and inhibit hormone production when given in the very early stages of conception (days one to four in rats).<sup>91</sup> An alkaloid, skimmianine, increases the spontaneous contractions of the guinea pig uterus.<sup>92</sup>

The safety and efficacy of *Ruta* as an abortifacient in humans is under review. It is wise to note that in rats, dosages which resulted in an anti-fertility rate of about 50 per cent also killed about 10 per cent of the animals.<sup>93</sup> Until further information about this herb is available, this use for the termination of pregnancy is not only illegal, but dangerous.

*Ruta* is now mainly used in gynaecology to bring on delayed periods (due to shock, stress or other causes) in combination with the uterine tonics. Its use by the untrained is unwise.

## Dose

It is Warming and Drying and the dose is 0.5–1 ml three times daily.

## ***Artemisia vulgaris* (Mugwort)**

The Latin name of mugwort refers to Artemis, the goddess of hunting, young women, and of childbirth. All of the herbs from the *Artemisia*

family help during and after childbirth, by regulating and strengthening contractions and aiding with the expulsion of the placenta.<sup>94</sup> Other historical and contemporary uses include the treatment of anorexia, atonic gastritis and worm infestations, brought about by a bitter effect which imparts stimulant and antiseptic effects to the digestive tract,<sup>95</sup> as a mild nervine which improves depression and tension; and in the past, the root was used for palsy, fits and epilepsy.<sup>96</sup>

### Use in gynaecology

*Artemisia vulgaris* is used largely as a uterine stimulant to improve congestive dysmenorrhoea and to bring on a delayed period. Like *Ruta*, it is discussed extensively in early writings as an abortifacient. A poem known as the *Salernitan Regimen of Health*, of which there have been over 300 editions, names *Artemisia vulgaris* as the major abortifacient.<sup>97</sup> However, on the issue of safety and efficacy, there is the justifiable concern that ‘many emmenagogue herbs damage the foetus rather than completely terminating the pregnancy’.<sup>98</sup>

In China, *Artemisia vulgaris* is used in combination with other herbs to prevent miscarriages associated with debility and *blood deficiency*. It is also used, with other herbs, to regulate the period and stop menstrual pain. Moxa, a form of *Artemisia vulgaris* often prepared as a long cigar-like stick, is burnt on the needles during acupuncture treatments for conditions associated with Cold and Damp.



### Dose

0.5–2 ml three times daily. *Artemisia vulgaris* should be avoided during lactation and pregnancy. It is Cool and Dry.

### ***Salvia officinalis* (Sage)**

Sage has antiseptic, carminative, drying, memory enhancing and uterine stimulant activities. Thujone, which comprises less than 1 per cent of the whole plant (30 per cent of the volatile oil content), is antiseptic and carminative, but is also relatively toxic. Sage is used as a mouthwash, gargle and/or taken internally for inflammations or infection of

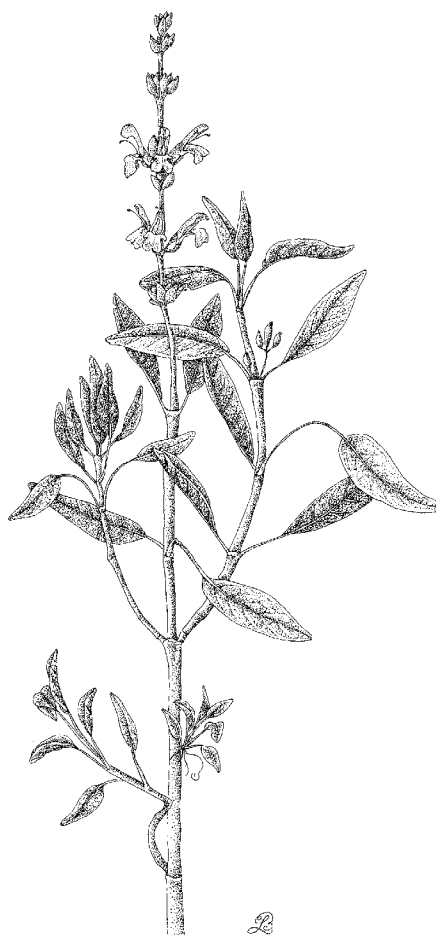
the mouth and throat, including gingivitis, glossitis, stomatitis, laryngitis, pharyngitis, tonsillitis and quinsy; and can also be taken internally to relieve bronchitis, asthma, catarrh and sinusitis. It can be used as an inhalant at the first signs of acute respiratory infection to disinfect the airways. Recent investigations have concentrated on the antioxidant properties of *Salvia*, suggesting a host of benefits when consumed in the diet to reduce oxidative stress and lipid peroxidation.<sup>99</sup>

As a compress it promotes the healing of wounds. The phenolic compounds in sage are anti-bacterial, especially to *Staphylococcus aureus*. Thujone is also a strong antiseptic, but is toxic and the tea should be taken only for a week or two at a time because of the potentially toxic effects. Thujone-containing herbs are contraindicated in epilepsy.

Excess sweating of any origin seems to respond to sage. It is traditionally used to improve circulation during convalescence and to reduce night sweats. A useful wine for debilitating sweating associated with serious illnesses such as AIDS, is reported to be 80–100 g of fresh sage leaves to a litre of wine. This is to be taken by sherry glass doses (about 60 ml) before lunch and dinner.<sup>100</sup> Sage also reduces salivation and lactation and can be used for sweating associated with menopause.

A small study examined the effects of a product containing *Salvia* and *Medicago* (alfalfa) on menopausal hot flashes. Twenty out of the 30 women in the study reported the complete disappearance of hot flashes and night sweats, while four women showed good improvement and the remaining six showed a reduction in symptoms. Basal levels of oestradiol, LH, FSH, prolactin and TSH were unchanged and no side-effects were reported.<sup>101</sup>

Traditionally, sage tea has been used as a tonic to the nervous system, the thujone being potentially restorative and calming. Large doses, however, cause nervous excitability. It is excellent for nervous exhaustion and can be used to improve clarity of thought and vitality.





## Use in gynaecology

Sage is another of the abortifacient herbs and should be avoided in pregnancy. It is often used for delayed or scanty periods; or for congestive period pain. It is also useful as a tonic in the last weeks of pregnancy and after childbirth to expel the placenta. Sage contains oestrogenic principles and is useful for menopausal problems, especially night sweats and hot flushes.

## Dose

1–2 ml three times daily, not to be prescribed in pregnancy by the untrained.

## ***Mentha pulegium* (Pennyroyal)**

The latin name for *Mentha pulegium* is derived from *pulex*, meaning flea, because of its ability to repel fleas and other insects. It is a popular remedy to promote sweating during colds, and is used for flatulence, dyspepsia and abdominal pain due to wind, an effect brought about by the volatile oils (mainly pulegone, and menthone).

## Use in gynaecology

*Mentha pulegium* is another herb with a long tradition as an abortifacient. Its emmenagogic action was mentioned in plays and other writings in ancient Greece and in Europe in the Middle Ages; a picture in a thirteenth-century herbal shows *Mentha pulegium* being used on a pregnant woman as an abortifacient; and Pliny (23–79 AD) describes *Mentha pulegium* as an emmenagogue that also dispels a dead foetus.<sup>102</sup>

Again, there are safety issues. It is just as likely to damage the foetus as cause an abortion; the oil taken internally is highly toxic and there are a number of cases of the deaths of women who took the oil to induce abortions.

*Mentha pulegium* is used for insufficient and painful menstruation to strengthen uterine contractions; and for delayed periods (with *Tanacetum vulgare*).

## Dose

*Mentha pulegium* is Warming and Drying and the dose is 1–4 ml, three times daily.

## ANTI-HAEMORRHAGIC HERBS

The anti-haemorrhagics are ‘astringent’ herbs and are a large category of (usually) tannin-containing plants which reduce blood loss. This effect is seen on the stomach lining, the bowel wall, on the skin, and in the urinary, respiratory and reproductive tract. Almost all tannin-containing plants are Drying and leave a ‘drying’ and ‘puckering’ sensation in the mouth. Thus, astringency is experienced as something like the sensation felt after drinking strong black tea and may have been one of the properties early herbalists used to identify this class of herbs.

The haemostatic (haemorrhage-arresting) affect of astringents is brought about by the ‘curdling’ of proteins when tannins are in direct contact with bleeding tissues, such as on the skin or in the gut. Because of this effect in the gastrointestinal tract, long-term administration of tannin-rich plants can reduce the uptake of nutrients. They should, therefore, only be prescribed for short periods of time.

Tannins are poorly absorbed, but those that are broken down and absorbed into the bloodstream have little appreciable astringent action on internal organs or tissues. In the reproductive tract, the anti-haemorrhagic herbs used to correct bleeding of uterine origin, although often high in tannins, contain other components which are responsible for the reduction in bleeding.

### ***Achillea millefolium* (Yarrow)**

Historically, *Achillea millefolium* gained its notoriety as a plant with the ability to stop the bleeding of wounds, a reputation which soon spread to include bleeding anywhere in the body. *Achillea* contains small amounts of the tannins usual in astringent herbs, but its ability to stop gynaecological bleeding is considered to be related to other constituents, notably the flavonoids and the alkaloid achilleine.<sup>103</sup>

*Achillea* is used for a wide range of complaints worldwide, some of them apparently contradictory.<sup>104</sup> For example, it might be used by one culture for amenorrhoea and by another for abnormally heavy bleeding; or for constipation in one place and to stop diarrhoea elsewhere. Its use in gynaecology can be variable too—in some areas it was used frequently and for a wide range of complaints, but in others no use was found for it at all. One aspect which is agreed upon by all is that it is safe for long-term use.

Some of the apparent discrepancies in the traditional use of *Achillea* can be explained by the different levels of the volatile oils in plants from different areas. For example, the American and eastern European species are azulene-rich, while *Achillea* from western Europe and England is azulene-free. Azulene, the brilliant blue compound found in

the volatile oil of a number of plants, has an anti-inflammatory effect, and is particularly useful as a topical application to treat skin disorders. The native North Americans (azulene-rich area) used *Achillea* as a dermatological agent for inflamed and itching skin as well as for bleeding, but did not use it for gynaecological complaints, as was common in other parts of the world.

*Achillea* has traditionally been used to promote sweating during colds, for bleeding haemorrhoids, for menstrual irregularities,<sup>105</sup> as a bitter digestive and for spasmodic bowel pain.<sup>106</sup> The flavonoid apigenin exerts anti-platelet activity and can reduce the incidence of thrombosis while at the same time being anti-inflammatory and spasmolytic.<sup>107</sup> The actions of *Achillea* in reducing the tendency to clot formation and also having the ability to stop abnormal bleeding are an example of the complexity to be found in plant medicines.

### Use in gynaecology

*Achillea* has been referred to as ‘a balanced and amphoterically acting emmenagogue’.<sup>108</sup> The stimulating effect of the thujone and the spasmolytic effect of the various flavonoids are responsible for the apparently contradictory effects on the uterine muscle, the sum total of which results in uterine stimulation without excessive spasm. The flavonoids also possess haemostatic effects due to a decrease in capillary fragility and permeability. The bioflavonoid, rutin, is in part responsible.<sup>109</sup>

The constituents in *Achillea* explain some of the wide range of uses for the plant in gynaecology, from assisting with cases of amenorrhoea to relieving menorrhagia; and acting as a uterine relaxant to relieve pain and a uterine stimulant to increase muscular tone and initiate menstrual flow.

### Dose

*Achillea* tea is prepared by covering 15 g of the dried herb with boiling water and infusing overnight. After straining, the tea is taken in divided doses over the next day during times of heavy menstruation. It is described as Drying (Culpeper). The dose of fluid extract is 2–4 ml three times daily.

### ***Alchemilla vulgaris* (Ladies’ mantle)**

At various times in history *Alchemilla* seems to have excited much interest. The alchemists are reported to have used the dew droplets that formed on its leaves as part of their tonics for longevity (and gave it

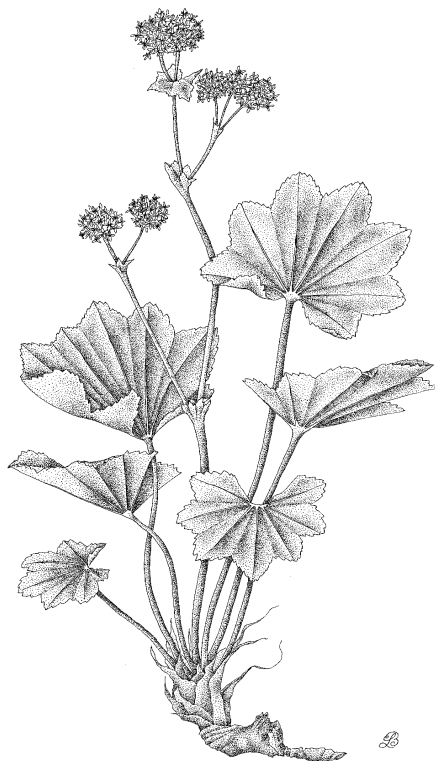
the name *Alchemilla*); and its common name is attributed to its suggested resemblance to the Virgin Mary's cloak.

*Alchemilla* is useful for skin complaints and wounds, and has nervine, astringent and anti-inflammatory effects. A recent animal study investigated a number of plant extracts, including *Alchemilla vulgaris*, for potential anxiolytic activity. The extracts were found to be non-sedating but potentially useful in modulating anxiety states.<sup>110</sup> It can be used for insomnia, diarrhoea and to reduce inflammation associated with rashes. Its astringency makes it useful as a suppository for controlling the severity of haemorrhoids.<sup>111</sup> Flavonoids in ladies' mantle can reduce capillary permeability and may protect connective and elastic tissues from degradation.<sup>112</sup>

### Use in gynaecology

Although little is known about its actions, *Alchemilla* has been used in traditional and folk medicine for women's complaints, including menorrhagia, leucorrhoea, as an emmenagogue and to promote contractions during labour. It can also be used to treat period pain and regulate the menstrual cycle.

It is popular in Europe for menorrhagia around adolescence. In one trial, 341 young women between eleven and seventeen were given *Alchemilla* for ten to fifteen days before the expected next period. The flow was reduced, the cycle shortened and premenstrual administration prevented the menorrhagia from recurring.<sup>113</sup> Despite a lack of research, *Alchemilla* is a reliable herb for menorrhagia and dysfunctional uterine bleeding in all women, especially those experiencing heavy bleeding during the hormonal fluctuations common to adolescence and the perimenopause.<sup>114</sup> This may support the popular belief that *Alchemilla* is progestogenic. It is likely that the flavonoid compounds found in *Alchemilla* are responsible for the astringent and toning action on the uterus, but evidence of the proposed hormonal action awaits



further research. The herb may also be useful in post-menopausal women suffering from urinary incontinence.<sup>115</sup>

## Dose

*Alchemilla* is Drying and Cooling. It should be used at the high end of the dose range: 1.5–2.5 ml three times daily to reduce menorrhagia.

## ***Hydrastis canadensis* (Golden seal)**

*Hydrastis* is a useful haemostatic herb which has very slight oxytocic activity due to the presence of trace amounts of hydrastinine. Its main effect on excessive bleeding is believed to be due to its effect on the capillaries. *Hydrastis* is commonly used with other herbs in a mix for menorrhagia, particularly the uterine tonics, as well as the tannin-containing herbs such as *Achillea* and *Geranium maculatum*. It is bitter and Cold and makes an excellent choice for bleeding associated with Heat, either from infection or due to pent-up emotions (Liverishness). See also pages 537–9 and 551.

## Dose

0.25–1 ml of the tincture three times daily. *Hydrastis* is contraindicated in pregnancy.

## ***Capsella bursa-pastoris* (Shepherd's purse)**

The common shepherd's purse, *Capsella bursa-pastoris*, named after its seed pods which resemble small purses, has a long history of medicinal use in Europe, China, Japan and Arabic countries. In Asia it is also eaten as a food (it is a member of the cabbage family and has the usual acrid taste). The plant has diuretic, anti-inflammatory, anti-ulcer, oxytocic and anti-haemorrhagic actions.<sup>116</sup> Tumour-inhibiting<sup>117</sup> and antimicrobial<sup>118</sup> effects have also been identified.

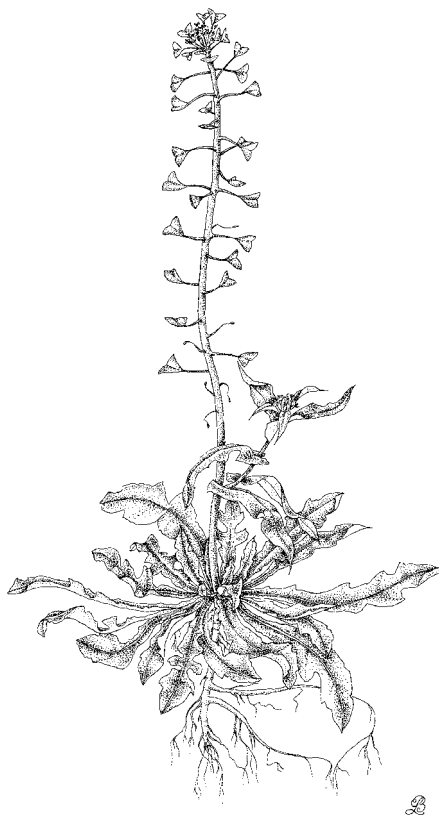
## Use in gynaecology

*Capsella* is indicated for menorrhagia of practically any origin (but differentiation of the causes must always precede treatment). It has Drying and Cooling properties and can be used for uterine bleeding accompanying pelvic infection. It combines well with *Trillium* and

*Hydrastis*, but this combination is only for the brave because of the very strong taste.

At one time *Capsella* was injected for the treatment of haemorrhages;<sup>119</sup> however, little is known of the active constituents that impart anti-haemorrhagic effect. There is some suggestion that they may be related to a white fungus that resides on the plant,<sup>120</sup> which may explain some of the inconsistencies noted in clinical use, since the fungus may not always be present.

It should be taken as an extract because of the production of toxic agents (nitriles) when the plant is subjected to water temperatures above 45°C, and is contraindicated in cases associated with hypothyroidism.<sup>121</sup>



## Dose

The usual dose is 1–4 ml of the extract.

## ***Lamium album* (White deadnettle)**

The white deadnettle epitomises one of the common incongruities of herbal medicine. While there is popular and continued use, especially in Europe, as well as clinical evidence of the plant's effectiveness, very little research into the efficacy or even the active constituents has been undertaken. One herbalist sums up the situation thus: 'Popular medicine has become firmly attached to this drug, which is in contrast to the lack of information on its efficacy. No gynaecological trials have been done . . . Yet women keep asking for the drug and using it.'<sup>122</sup>

*Lamium* is a bitter digestive with abundant amounts of trace minerals. It is described as Hot and Drying (Culpeper), Warming (Hildegard of Bingen), Cooling, astringent and pungent (Holmes).<sup>123</sup> The differences may point to the use of different parts of the plant. In Germany, there are two officially recognised forms, the flowers and the aerial parts.<sup>124</sup>

It is possible that Holmes, in describing *Lamium* as Cooling, is describing the properties of the whole plant. (He lists the whole plant as the part used in his text.)

### Use in gynaecology

*Lamium* is a tannin-containing herb, but its anti-haemorrhagic action in the reproductive tract is almost definitely explained by other constituents, similar to those found in *Capsella bursa-pastoris*, namely histamine, choline and tyramine, which may explain the common actions of both of these plants.<sup>125</sup> *Lamium* also contains flavonols, which may be responsible for some of the haemostatic properties.

*Lamium* is useful for many different types of menstrual complaints associated with bleeding irregularities. Examples are late, irregular and light periods related to weakness, nutritional deficiencies and overwork; late and heavy periods caused by stress or nervous tension; heavy periods associated with a lack of uterine tone; and bleeding between periods associated with hormonal irregularities. As always, a diagnosis must be sought before treatment is started for any of these complaints.

### Dose

2–4 ml three times daily.

### ***Panax notoginseng* (Tienchi ginseng)**

*Panax notoginseng* is a valuable herb. It has been used to stop bleeding in China for centuries, and also became famous as a component of the patent medicine Yunnan Bai Yao. During the Second World War, American pilots (the Flying Tigers) followed the example set by the Chinese army and carried Yunnan Bai Yao in case of traumatic injury and haemorrhage.<sup>126</sup> It can also be used as a poultice for external bleeding. In Chinese medicine it is considered to be a very safe anti-haemorrhagic agent because 'it can stop bleeding without causing congealed blood'.

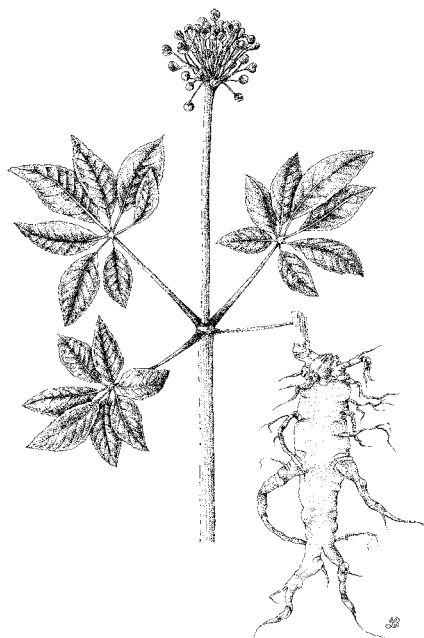
Many of the active constituents in *Panax notoginseng* have been isolated and studied, particularly those that have an effect on the heart and blood. It shortens coagulation time (the time taken for a blood clot to form);<sup>127</sup> and reduces the deleterious effects of shock from severe blood loss;<sup>128</sup> but also prevents platelets from clumping.<sup>129</sup>

The sum total of these effects seems to be completely contradictory; however, *Panax notoginseng* can be relied upon to stop haemorrhage and improve circulation. It can be used for conditions associated with

increased capillary permeability, bleeding associated with idiopathic thrombocytopaenia (ITP), trauma, nose bleeds or menorrhagia.

*Panax notoginseng* has been investigated as an effective treatment for cardiovascular disorders.<sup>130</sup> It has been shown to relieve the symptoms of angina pectoris and also reduces high blood pressure.<sup>131</sup> It also lowers serum cholesterol levels,<sup>132</sup> and as part of a traditional formula (containing *Ligusticum wallichii*, *Carthamus tinctorius* and *Salvia miltiorrhiza*) can reduce damage to brain tissue caused by lack of blood supply (ischaemia) after a stroke (in rats).<sup>133</sup> In other animal

research, it was shown to increase cerebral circulation in rats and rabbits<sup>134</sup> and to improve memory in mice.<sup>135</sup>



### Use in gynaecology

The obvious application for *Panax notoginseng* is for menorrhagia caused by conditions such as fibroids, dysfunctional bleeding and heavy bleeding after the birth of a child. It is an acute remedy and is usually prescribed at the time of bleeding only. Traditionally, *Panax notoginseng* is contraindicated during pregnancy because it 'promotes the circulation of blood', but the exact pharmacological reasons for this precaution are unclear.

To stop bleeding, *Panax notoginseng* is traditionally given as a tablet, and this may be a wise practice to continue to ensure the active constituents are available. Because it is so effective at stopping bleeding (but not treating the cause), it is absolutely essential that the reason for menorrhagia be identified before treatment is commenced.

*Panax notoginseng* is also useful for conditions associated with localised, congestive pain; and heavy and/or dark clotted menstrual blood, which may be accompanied by immobile abdominal masses. This group of symptoms is known as *blood stagnation* in traditional Chinese medicine, and can accompany complaints such as fibroids, endometriosis and primary dysmenorrhoea with congestive pain. For these types of complaints, *Panax notoginseng* should be prescribed as an extract, or the tablets (tienchi tablets) should be taken with wine.



## Dose

This herb is sweet, slightly bitter and slightly Warm. The usual dose is between 1–3 ml three times daily for *stagnant blood* symptoms, or one 500 mg capsule or tablet every two to four hours for menorrhagia.

## **Trillium erectum (Beth root)**

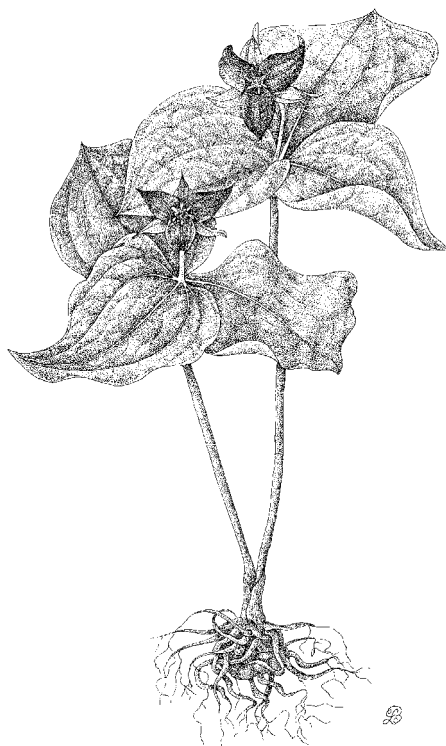
As has happened with other native American herbs, increased demand for *Trillium* has led to over-harvesting and the herb is now threatened in the wild. Other herbs such as *Alchemilla vulgaris*, *Lamium album* and *Capsella bursa-pastoris* should be substituted when *Trillium* is clinically indicated. As its common name suggests, *Trillium* is used as an aid to labour and as an anti-haemorrhagic to be used in and after the third stage of a birth. It is also used in any situation where abnormal bleeding is a feature of a gynaecological complaint.

*Trillium* contains the steroidal saponin trillarin;<sup>136</sup> and yields the sapogenins diosgenin, bethogenin and trillogenin,<sup>137</sup> as well as penno-genin, nologenin and fesogenin.<sup>138</sup> Diosgenins are discussed elsewhere (see pages 414–15) and seem to be capable of interacting with the receptor sites for hormones in the hypothalamic-pituitary unit. The other sapogenins may also play a role, but have not been investigated. These steroidal substances provide a possible explanation of the hormone-regulating effect and perhaps even the anti-haemorrhagic effects of the herb.

*Trillium* was considered to be the best herb for women with menorrhagia between 30–50 years because of its range of functions; however, its use should now be limited. Long-term administration is usually required; but the tannin fraction should inspire caution and symptoms such as constipation may indicate adverse effects from tannins on the gut wall.

## Dose

*Trillium* is Drying and usually prescribed in doses of 0.5–2 ml three



times daily, or as a tablet (follow manufacturer's recommendations as these are usually compound formulations).

## **HERBS WITH AN INFLUENCE ON THE HYPOTHALAMIC-PITUITARY UNIT**

A number of herbs are used for menstrual disorders which are associated with a disturbance of the hypothalamic-pituitary-ovarian axis (HPO axis). These disorders can manifest in many ways and sometimes cause a wide range of seemingly contradictory complaints, including heavy periods or no periods at all, to irregular cycles and premenstrual syndrome (PMS).

Many herbs and some foods are known to influence pituitary hormones—luteinising hormone (LH), follicle-stimulating hormone (FSH) and prolactin. Soy products, which contain phyto-oestrogens, can depress mid-cycle surges of both LH and FSH<sup>139</sup> and lead to longer menstrual cycles. Herbs containing the steroidal sapogenin, diosgenin (see pages 414–15), also seem to influence these hormones; and beer can increase prolactin levels.

The principal herbs used by herbalists in the treatment of hormonal imbalance are *Vitex agnus-castus*, *Paeonia lactiflora* and *Cimicifuga racemosa*. Each has a range of effects which are now known to be brought about by their ability to influence the activity of the hypothalamic-pituitary-ovarian hormones.

### ***Vitex agnus-castus* (Chaste tree berries)**

*Vitex* has been used as a medicinal plant for centuries. Hippocrates (450 BC) suggested it be used to treat injuries, inflammations, enlargement of the spleen and to help the uterus expel the afterbirth; others around this time used it to reduce headache and fever and to stimulate perspiration; to dispel wind and flatulence and check diarrhoea. Dioscorides (50 AD) recommended *Vitex* for inflammation of the uterus; in Persia, it was used to cure insanity, madness and epilepsy; and Pliny, first century AD, used the berries to promote menstruation, reduce fever and headaches, stimulate perspiration and to promote lactation in new mothers.

*Vitex* was also used 'to cool passions'—some said it was infallible, others claimed it had a very stimulating property, but this may have depended on gender (and many of the old herbals were lacking in information on this point). The dried fruits have a peppery taste and were used in monasteries as a condiment, supposedly to suppress libido. A common name for *Vitex* even today is monk's pepper. In Rome, the

Vestal Virgins carried twigs of it as a symbol of chastity. The eclectics in the nineteenth century used a tincture of berries for impotence and 'sexual melancholia', but whether this was for men, women or both sexes is unclear.

### Use in gynaecology

*Vitex* is said to be a herb for the luteal phase and can be useful for a large number of gynaecological complaints, especially those that occur or worsen premenstrually. Positive effects have been noted in acne,<sup>140</sup> post-traumatic epilepsy,<sup>141</sup> mouth ulcers,<sup>142</sup> and herpes simplex (cold sores and genital herpes)<sup>143</sup> which worsen before the period. As well, many of the common premenstrual symptoms, such as fluid retention<sup>144</sup> and breast soreness,<sup>145</sup> improve with *Vitex*. These complaints may be caused by latent hyperprolactinaemia.

Latent hyperprolactinaemia is a syndrome characterised by lower than normal progesterone secretion and normal to mildly elevated prolactin levels. It is thought to cause a spectrum of menstrual disorders which can range from the usual symptoms of PMS, to altered menstrual cycle lengths, to complete absence of ovulation and menstruation. Its causative factors are not entirely understood, but seem to be in part related to stress leading to an alteration of the activity of the hypothalamic-pituitary-ovarian axis.

*Vitex* seems to be capable of improving amenorrhoea,<sup>146</sup> menstrual irregularities,<sup>147</sup> and especially cyclic changes associated with latent hyperprolactinaemia.<sup>148</sup> In one trial, thirteen women with elevated prolactin levels and irregular cycles were given Mastodynon N (a German herbal preparation containing *Vitex* extract). Following a decrease in prolactin levels, normal cycles returned in all cases.<sup>149</sup>

In another study, 52 women with luteal phase defects due to latent hyperprolactinaemia took part in a randomised double-blind versus placebo study. They were given a daily dose of 20 mg of *Vitex*. Prolactin levels were normalised after three months, and deficits in the luteal progesterone production were eliminated. There were no side effects and two of the women treated with *Vitex* became pregnant.<sup>150</sup>



Some recent well-designed trials on the efficacy of *Vitex* on premenstrual syndrome, mastalgia and infertility have been published. One randomised, double-blind, placebo-controlled trial compared *Vitex* with placebo in 170 women with premenstrual syndrome over three menstrual cycles. Women undertook self-assessment of irritability, mood alteration, headache, breast fullness and other menstrual symptoms, and were also assessed for changes in clinical global impression. The study showed that *Vitex* was an effective and well-tolerated treatment for the relief of symptoms of premenstrual syndrome in 52 per cent of the trial participants compared with 24 per cent for placebo.<sup>151</sup>

A multi-centre open trial investigated the efficacy and tolerance of *Vitex* in 1634 patients suffering from PMS. A specific questionnaire was developed for determining the effect of *Vitex* on the four characteristic PMS symptom complexes of depression, anxiety, craving and fluid retention. After three menstrual cycles, 93 per cent of patients reported a decrease in the number of symptoms or symptom complexes or even cessation of PMS complaints, and 85 per cent of physicians rated the treatment as good or very good. The severity and frequency of breast pain reduced after three months. The majority of patients assessed the tolerance of *Vitex* as good or very good. Adverse drug reactions were suspected in only 1.2 per cent of patients, but none was serious.<sup>152</sup>

In a prospective multi-centre trial, the efficacy of a *Vitex agnus-castus* extract was investigated in 43 patients with PMS. The patients took 20 mg extract daily for three menstrual cycles. Symptoms in three post-treatment cycles were compared to baseline cycles before administration of the herb, using menstrual distress questionnaire as the tool for self-assessments. At the end of the study, symptoms were reduced in the late luteal phase by 47.2 per cent. While symptoms gradually returned after treatment cessation, a difference from baseline remained for up to three cycles.<sup>153</sup>

Another double-blind, placebo-controlled study examined the tolerability and efficacy of *Vitex agnus-castus* extract for premenstrual mastalgia, with treatment or placebo given over three menstrual cycles. Mastalgia during at least five days of the cycle before the treatment was the strict inclusion condition. The results showed the intensity of the cyclical breast pain diminished in the *Vitex* group and the herb was well tolerated.<sup>154</sup>

Rats have been used to identify the mechanism of action. An active dopamine-like principle in *Vitex* binds to the lactotrope cell in rat pituitary cells, inhibiting prolactin release.<sup>155</sup>

Researchers have also examined the *in vitro* pharmacological effects and actions of ethanolic *Vitex agnus-castus* fruit extracts. A relative potent binding inhibition for dopamine D2 and opioid receptors was observed, suggesting a dopaminergic effect of *Vitex* and additional pharmacological actions via opioid receptors.<sup>156</sup>

Although some types of infertility respond to *Vitex*, especially when

associated with elevated prolactin levels, self treatment should not be undertaken. An article in a British medical journal reported that a woman on her fourth cycle of a drug-free *in vitro* fertilisation (IVF) program, who self-administered *Vitex* (dose not stated), produced increased numbers of ovarian follicles and developed symptoms suggestive of mild ovarian hyperstimulation (symptoms not stated).<sup>157</sup> *Vitex* is a complex herb and the correct dose and timing of administration are essential.

*Vitex* can also be used to promote the secretion of breastmilk (as a galactagogue), especially in the first ten days after delivery. In one controlled trial of 817 patients, milk production tripled in 20 days.<sup>158</sup>

How *Vitex* improves breastmilk production is unknown, and seems particularly curious in the light of recent findings that *Vitex* lowers prolactin levels (prolactin is necessary for the initiation of normal milk production after delivery). It may be that the effect of *Vitex* on prolactin secretion is dose dependent. In the studies of breastmilk production, a low-dose homeopathic preparation of *Vitex* (mother tincture), which is about ten times weaker than the usual herbal preparations, was used. A clinical study involving men showed that lower doses caused a rise in prolactin and higher doses a much reduced secretion.<sup>159</sup>

During the peri-menopausal phase, *Vitex* can be used to regulate the menstrual cycle by initiating regular ovulation. It is very useful for peri-menopausal women with menstrual irregularities as well as premenstrual symptoms, and in some cases, normalises elevated FSH levels as well as menstrual cycle regularity.

*Vitex* affects the hypothalamic-pituitary-ovarian axis. As such, it should be prescribed by a trained practitioner familiar with its actions and contraindications. It should be started in the early part of the cycle, preferably prior to ovulation, and is usually given as a single dose in the morning. Dosage is important—doses which are too high or too low may worsen some conditions, and should be adjusted according to the problem treated, any additional symptoms, and the age of the woman.

*Vitex* should not be prescribed when hormonal preparations are used, including the Pill, HRT or any of the commonly prescribed progestogen drugs such as Provera, Primolut, Duphaston and danazol. Ovarian ultrasound studies of women on the Pill who simultaneously take *Vitex* have shown that ovulation can occur. It should be prescribed cautiously (and only by a practitioner) for young women (under 20) for whom the hypothalamic-pituitary-ovarian interplay is still fragile and easily disrupted.

For full benefit, *Vitex* is usually prescribed for between three and nine months. Longer-term administration is necessary in some cases and there are reports of women taking *Vitex* for up to sixteen years without ill-effect.<sup>160</sup> Positive changes to the menstrual cycle are usually evident in the first month; however, some women report longer or shorter cycles than usual initially, until stabilisation occurs.

## Dose

Dose of fluid extract 1:2: 1–4 ml daily; tablets or capsules 500–1000 mg per day.

The German preparation, Agnolyt, contains 9 g of *Vitex* fruit tincture (1:5) per 100 g extract, and is prescribed at a dose of 40 drops per day.

## ***Paeonia lactiflora*** **(Peony; bai shao)**

*Paeonia lactiflora* is an important herb from the Chinese pharmacopoeia. In traditional Chinese medicine (TCM) three different types of peony are used—the white peony (*Paeonia lactiflora*), red peony (also usually from *Paeonia lactiflora*, but collected from wild plants and known as *chi shao*), and peony bark from *Paeonia suffruticosa* (*mu dan pi*). ‘Peony’ without specific reference to the type usually indicates white peony/*bai shao*.

In TCM, *Paeonia lactiflora* is commonly used in combination with *Bupleurum falcatum*, *Ligusticum wallichii* and/or *Angelica sinensis* for a wide range of gynaecological problems; or combined with liquorice for muscle spasm and inflammation. It is said to ‘calm the foetus’ (which may allude more to an effect on the uterine muscle than the foetus) and is considered to be safe in pregnancy.

## Use in gynaecology

*Paeonia lactiflora* is effective in the treatment of PMS, polycystic ovarian syndrome (PCOS), hyperprolactinaemia, ovulatory failure, infertility, endometriosis and adenomyosis, androgen excess, mastalgia and menopausal symptoms. These conditions have at their core various hormonal irregularities, including elevated androgens, low progesterone, high or low oestrogen, and elevated prolactin, all of which peony has been shown to influence. Menstrual pain and uterine overactivity during pregnancy also improve with the administration of peony.



In China and Japan, where peony has been widely researched, much of the experimental work has been performed using traditional Chinese formulas which contain varying numbers of different herbs. It is sometimes, therefore, not possible to draw firm conclusions about the action of peony *per se*; however, many of the biological effects seem to be due to paeoniflorin, a monoterpene glycoside which is the major active constituent.

*In vitro* experiments showed that paeoniflorin affected the ovarian follicles through its action on aromatase enzyme.<sup>161</sup> Aromatase is widely distributed throughout the body, including the ovaries, the liver and fatty tissue. It plays an important role in the development of the follicle and the biosynthesis of steroid hormones; the functioning of the corpus luteum and ovulation; and the conversion of androgens to oestrogens in both the fatty tissue and the ovary. Prolactin, GnRH and the glucocorticoids all inhibit the activity of aromatase.

Inhibition of aromatase activity can lead to low oestrogen levels and erratic ovulation. Peony-containing formulas seem to reverse these effects and can also increase progesterone levels. Interestingly, herb formulas containing peony will normalise ovarian function when the activity of aromatase is inhibited, but do not increase hormonal activity above normal or lead to the development of multiple ovarian follicles.<sup>162</sup>

Paeoniflorin reduces the production of the androgens in a dose-dependent manner through its effect on aromatase which promotes the synthesis of oestradiol from testosterone.<sup>163</sup> Elevated androgen levels, which can be associated with hirsutism, androgenic hair loss, acne and infertility, are seen in PCOS and obesity, and can occur after the menopause.

In menopausal women, aromatase increases the peripheral conversion (in the fatty tissue) of androgens to oestrogen and seems to reduce the incidence of hot flushes, especially when used with *Angelica sinensis*. *Paeonia lactiflora* can also be used for post-menopausal symptoms associated with androgen excess such as androgenic alopecia, although treatment needs to be continued for many months.

Peony-containing formulas can also be used to treat lowered rates of fertility due to androgen excess. The two-herb formula, Licorice and Peony Combination, reduces testosterone levels in women with PCOS and improves pregnancy rates.<sup>164</sup> The LH to FSH ratio is also normalised. The same formula is also useful for the treatment of hyperprolactinaemia via an effect on dopamine receptors in the pituitary, although the lowering of prolactin levels seems to be related to a synergistic reaction between the licorice and peony and not due to the peony alone.<sup>165</sup>

Conditions believed to be associated with relative oestrogen excess in relation to progesterone also respond well to peony-containing formulations, including adenomyosis and endometriosis,<sup>166</sup> uterine fibroids<sup>167</sup> and mastalgia.<sup>168</sup> The formula which has been the subject of

most research is Cinnamon and Hoelen Combination, which contains both *Paeonia lactiflora* and *Paeonia suffruticosa* as well as *Cinnamomum cassia*, *Prunus persica* (peach kernels) and *Poria cocos* (hoelen).

This formula is believed to act either as a GnRH antagonist, reducing levels of LH, FSH and oestrogen, or as a weak anti-oestrogen by competing with oestrogen in uterine or breast tissue.<sup>169</sup> The exact mechanism of action of this formula is unknown, however, and it is most likely that the beneficial effects arise from a synergistic action between all herbs in the formula rather than from *Paeonia lactiflora* or paeoniflorin alone.

Paeoniflorin can counteract the oxytocic effect of some drugs<sup>170</sup> and has been experimentally shown to have sedating, antispasmodic and anti-inflammatory effects.<sup>171</sup> It is used in association with liquorice for any condition characterised by abdominal pain associated with muscle spasm. Dysmenorrhoea and overactive uterine activity during pregnancy respond to *Paeonia lactiflora*. (Any condition associated with pregnancy must be treated by a trained herbalist with experience in this area.)

#### Dose

1:2 fluid extract: 1.5–3 mls per dose TDS.

### ***Cimicifuga racemosa* (Black cohosh)**

Traditional uses of this plant include a large range of gynaecological complaints, sore throats, bronchitis and rheumatic conditions. A vascular antispasmodic, *Cimicifuga* is also recommended for hypertension, owing to the blood pressure-lowering effect of one of its constituents, acteine.<sup>172</sup>

#### Use in gynaecology

*Cimicifuga* is considered to be specific for the treatment of musculo-skeletal disorders which may accompany menopause, and for the treatment of hot flushes.<sup>173</sup> It can also be used during adolescence for delayed menstruation caused by hormonal imbalance, especially when associated with stress and emotional factors.<sup>174</sup>

Recent research has shown *Cimicifuga* to contain three types of hormonally active substances, one of which suppresses luteinising hormone (LH) secretion after prolonged administration, and another two of which have weak oestrogen-like effects. LH surges are thought to cause flushing, and the suppression of this hormone by *Cimicifuga* is thought to control the symptom.<sup>175</sup> *Cimicifuga* has also been studied



for its effect on the vaginal cells of menopausal women. It is found both topically and orally to favourably alter the cells and reduce symptoms of vaginal dryness and irritation, and although this is not achieved rapidly, it has been shown to be as effective as synthetic oestrogen.<sup>176</sup>

Numerous clinical trials in Germany have attested to the efficacy of *Cimicifuga* for menopausal complaints. Thirty-six women treated in one trial reported significant improvements in hot flushes, sweating, insomnia, nervousness, irritability and depressive psychosis after four weeks of treatment, and highly significant improvements after twelve weeks.<sup>177</sup>

Another very similar study of 50 women, 39 of whom could not take hormone therapy, also showed highly significant results. Symptoms improved after four and twelve weeks, with dramatic changes in mood profiles, a decrease in depression, tiredness and dejection, as well as increased activity.<sup>178</sup> These improvements in mood may be related to the ability of *Cimicifuga* to bind to serotonin receptors as reported by researchers at the 2003 3rd World Congress on Medicinal and Aromatic Plants for Human Welfare in Chang Mai, Thailand.

A double-blind study compared low dose oestrogen therapy to *Cimicifuga* therapy in 80 women with menopausal symptoms. After three months, the women on the herb had significantly improved—the daily dose of oestrogen (0.625 mg conjugated oestrogens) was considered to be too low to have any effect.<sup>179</sup>

The effectiveness of *Cimicifuga* for younger women complaining of menopausal symptoms due to surgery has also been assessed. Sixty women under 40 years old, who had had a hysterectomy, and had one remaining ovary each, were tested in a controlled study for the effects of four different treatments—oestriol, conjugated oestrogens, combined oestrogens and gestagens, and *Cimicifuga*. There were no significant differences between groups concerning therapy success.<sup>180</sup>

Another controlled, randomised, double-blind parallel group study examined the efficacy, safety and tolerability of *Cimicifuga* in perimenopausal and post-menopausal women. The study compared two different doses (39 mg and 127.3 mg) of a *Cimicifuga* preparation over



a six-month period. Both groups of patients tolerated the treatments well, and menopausal symptoms decreased in approximately 70 per cent of the women regardless of dose. Vaginal cytology and hormone levels remained the same, indicating that *Cimicifuga* did not have an oestrogenic effect in this tissue.<sup>181</sup>

Two reviews have been published examining the clinical studies on *Cimicifuga* (including the proprietary product Remifemin™). This herb was found to demonstrate efficacy in the alleviation of menopausal complaints, and a favourable safety profile. The authors concluded that *Cimicifuga* had low toxicity, few and mild side-effects, and good tolerability.<sup>182</sup>

*Cimicifuga* can be used instead of HRT, as well as HRT, or as a treatment to 'wean' a woman off HRT. Remifemin™, a common German preparation, was used in 1738 menopausal patients, with only 20 per cent requiring additional hormone therapy. When combining HRT and *Cimicifuga* a smaller dose of hormone is required.<sup>183</sup> Half of all women who had already been prescribed HRT no longer needed hormones after being given *Cimicifuga*.<sup>184</sup>

When women want to stop hormone replacement therapy (HRT), it is usual to take both *Cimicifuga* and HRT together until the herb has taken effect (usually 6–8 weeks), then the HRT is stopped. The advantages of *Cimicifuga* are 'its outstanding sphere of action in the climacteric syndrome, the absence of toxic side effects and thus the possibility of long term therapy'.<sup>185</sup>

In recent years the apparent oestrogenicity of *Cimicifuga* in the reduction of menopausal symptoms has raised questions about potential adverse effects when women with breast cancer use this herb. *Cimicifuga* was found to have no inherent oestrogenicity, as measured by competitive binding to oestrogen receptors  $\alpha$  and  $\beta$ .<sup>186</sup>

Some animal studies have been undertaken to determine whether *Cimicifuga* has oestrogenic or stimulating effects on uterine tissue or oestrogen-receptor positive breast cancer cells. In one study *Cimicifuga* treatment did not stimulate cancerous growth and no significant differences in tumour number or size between the *Cimicifuga* groups and controls were noted. Prolactin, FSH and LH levels, and organ weights and endometrial proliferation were also unaffected. This lack of breast cancer-stimulating effects was considered important in establishing the safety of *Cimicifuga* for treatment of menopausal symptoms in women with a history of breast cancer in which HRT is contraindicated.<sup>187</sup> Another *in vitro* study found extracts of *Cimicifuga* to exhibit anti-oestrogenic properties. The herb was found to inhibit oestradiol-induced stimulation of breast cancer proliferation.<sup>188</sup> *Cimicifuga* appears to act similarly to the SERM drugs and in Germany the term 'phyto-SERM' has been coined to describe *Cimicifuga* and other natural products with similar actions (see page 405).

While these studies were positive, another on rats found that

*Cimicifuga* exerted oestrogenic effects. Specifically, uterine weight and oestrogen receptor levels increased with an increasing dosage of *Cimicifuga* (300mg/kg), and breast cancer cell growth was slightly more rapid in both the *Cimicifuga* group and 17 beta-oestradiol group, compared to controls.<sup>189</sup> It is important to note that this dosage is far higher than would normally be prescribed. It is likely that the herb acts as a modulator of oestrogen in a dose-dependent fashion.

## Dose

The usual dose of *Cimicifuga* is between 0.5–2 ml, two to three times daily. It is Cool and Dry.

## WARMING HERBS

When herbalists consider the manifestation of a particular illness in a particular individual, two important differentiations must be made—whether the person is constitutionally Hot or Cold; and whether the condition itself is Hot or Cold. Warming herbs play a part in Cold conditions such as cramping and in the early stage of a fever, where chills are common. They render Cold people more Warm, helping to support digestion and blood flow and thus increasing vitality and the ability to respond to illness more appropriately.

### ***Zingiber officinale* (Ginger)**

The common culinary herb *Zingiber officinale* is also a very important medicinal herb. Traditionally used for its Warming properties, *Zingiber* has now been found to have an astonishing array of additional uses.

It is an important herb in the first stage of acute infectious illness where it is traditionally used in conjunction with other herbs to facilitate a sweat. The outcome of using *Zingiber* is to cause a lowering of the temperature, an effect similar to that of aspirin.<sup>190</sup> It is possible that the observed benefits are also related to an anti-infective effect, as some components are known to have activity against the rhinoviruses which are implicated in the common cold.<sup>191</sup>

*Zingiber* is a valuable herb for nausea, especially when associated with pregnancy,<sup>192</sup> motion sickness,<sup>193</sup> and following surgery.<sup>194</sup> It also increases gastric motility (improves stomach emptying);<sup>195</sup> and experimentally reduces the incidence of gastric ulcers in animals.<sup>196</sup> In addition, it seems to lower cholesterol levels, at least in rats.<sup>197</sup>

Lately, research has also shown that *Zingiber* reduces platelet stickiness by inhibiting thromboxane synthesis;<sup>198</sup> reduces the risk of blood

clots (again, similar in effect to aspirin);<sup>199</sup> and has prostaglandin-inhibiting effects,<sup>200</sup> which make it useful as a preventative against cardiovascular disease. Inflammatory conditions such as arthritis and rheumatism also improve with *Zingiber*,<sup>201</sup> as may migraine headaches,<sup>202</sup> but the herb should be taken preventatively. In research conducted in India, *Zingiber* is shown to be theoretically useful in the prevention of cancer, due to its induction of certain hepatic microsomal enzymes.<sup>203</sup>

## Use in gynaecology

The Warming properties of *Zingiber* make it useful for period pain that is improved by the application of heat or warm drinks. It is not only the Warming qualities that improve pain, however. The pungent components have analgesic effects,<sup>204</sup> and the prostaglandin-inhibiting actions can be assumed to also play a role (although there are no specific studies that look at the anti-prostaglandin effect of *Zingiber* in period pain). *Zingiber* is also useful for the many women who experience nausea and vomiting with their period.

Premenstrual and menstrual migraines can be helped by *Zingiber*, but not when these occur around the menopause, as *Zingiber* often aggravates flushing.

## Dose

The taste is pungent; the quality Hot. *Zingiber* can be taken as a fresh herb, grated as a tea; as tablets; or as an extract. Tablet doses up to 1 g are usually effective, between four and eight hourly. The extract (tincture) dose is between 0.25–3 ml depending on strength. During pregnancy, lower doses are advisable.

## ***Cinnamomum zeylanicum* (Cinnamon)**

As well known as *Zingiber*, this Warming herb is the dried bark of a tropical evergreen tree. *Cinnamomum* is a common culinary herb known to stimulate appetite and digestion and is classed as a carminative which means it can help reduce the discomfort of intestinal griping. It is also used as an astringent, and has been used to reduce diarrhoea through a combination of anti-microbial and astringent effects.<sup>205</sup> *Cinnamomum* can be useful during the first stages of a cold, when drunk as an infusion with such herbs as *Achillea*, *Sambucus*, *Mentha* spp. and *Zingiber*.

## Use in gynaecology

*Cinnamomum* is commonly used in traditional Chinese medicine for 'Cold' period pain or pain related to *stagnant blood* (a constellation of symptoms including localised pain, dark clotted menstrual blood and immobile masses). It is often combined with *Angelica sinensis*, *Ligusticum wallichii* and/or *Paeonia lactiflora*. *Cinnamomum* can also reduce excessive menstrual bleeding.<sup>206</sup>

## Dose

It is Hot and aromatic, and is taken at a dose of up to 1 g three times a day as an infusion, or as part of a herbal formula at a dose of between 2–4 ml, three times daily.

## ANODYNES

Herbalists have always used pain-reducing medicines—known as anodynes in herbal medicine—to reduce suffering from pain. One of the earliest, and still most effective, was the opium poppy, now pharmaceutically manufactured as morphine, codeine and pethidine. In situations where individuals suffer from recurrent and non life-threatening painful complaints—period pain, for example—the modern-day herbalist places less emphasis on reducing pain, and instead favours remedies that treat the underlying causes. Those anodynes still in use play a secondary role in these types of treatments.

### ***Corydalis ambigua* (Corydalis)**

*Corydalis ambigua* is a herb from the Chinese pharmacopoeia and is prescribed for the treatment of pain anywhere in the body. This herb is one of the strongest anodynes used in herbal medicine and has an analgesic affect estimated to be 1 per cent that of opium. It is more effective if used as an alcoholic or acetic acid extract, but is never used alone—one writer comments: 'This herb is very widely used in the treatment of pain. It may be used for any type of pain, if combined with appropriate herbs.'

This herb also has nervine effects and can be used as a hypnotic and sedative; it relaxes muscles and is used for skeletal muscle spasm; it is also cardiotoxic and can be used for cardiac arrhythmias, and with *Panax notoginseng* for angina pectoris. For migraines, *Corydalis* can be

used with *Tanacetum parthenium*, *Zingiber* or *Cinnamomum* (Cold migraines), bitters (Hot migraines), or with *Cimicifuga racemosa* for peri-menopausal migraines.

### Use in gynaecology

*Corydalis* is used to treat dysmenorrhoea with either congestive or crampy pain. In Chinese herbal medicine one of the traditional combinations is with *Angelica sinensis* and *Cinnamomum*; Western herbalists use the anti-spasmodics *Viburnum opulus* and *V. prunifolium* combined with uterine tonic herbs. *Corydalis* is also reported to stop excessive bleeding and is indicated for severe pain with menorrhagia. The mechanism for this action is unknown.

### Dose

It is acrid, bitter and Warm. Fluid extract (1:2) 1–3 ml, three times per day. *Corydalis* is contraindicated in pregnancy.

## ***Piscidia erythrina* (Jamaican dogwood)**

The medicinal part of *Piscidia erythrina* or *Piscidia piscipula* is the outer bark of the root. This plant, often found in ‘women’s tonics’,<sup>207</sup> is a mild sedative and relaxes smooth muscle. Traditionally, *Piscidia* has been used as an analgesic and narcotic for neuralgias; and as a fish poison (fish poisons from plants are not toxic to humans unless they are injected).<sup>208</sup> Its official indications today are as a sedative; to stop coughing, especially of whooping cough and asthma; as an anti-spasmodic and an anti-inflammatory.<sup>209</sup>

### Use in gynaecology

The anti-spasmodic and sedative effects are responsible for this herb’s efficacy for period pain. As early as 1916, research showed *Piscidia* to have strong anti-spasmodic effects on isolated strips of uterine muscle.<sup>210</sup> Doses of between 3–5 ml were later shown to be effective antispasmodics in cats and monkeys.<sup>211</sup> *Piscidia* has a very low toxicity, even at high doses, but is contraindicated in pregnancy.<sup>212</sup>

## Dose

This herb is Cooling and is prescribed at a dose of between 2–8 ml, three times per day.

## ***Anemone pulsatilla* (Pulsatilla)**

*Anemone pulsatilla* is an antispasmodic, sedative and central nervous system depressant with a specificity for painful and spasmodic complaints of the genito-urinary tract. The traditional indications for this plant were for complaints associated with ‘nervousness’—for conditions caused or accompanied by worry, a gloomy mentality, depression, a brooding disposition, or the tendency to look on the dark side of life.

This herb must always be prescribed by a trained herbalist—given in the wrong dose it can cause severe inflammation of the stomach and vomiting. The fresh plant is poisonous. *Anemone pulsatilla* is an emmenagogue (stimulates uterine contractions), and is contraindicated in pregnancy and while women are breastfeeding.

## Use in gynaecology

Painful and spasmodic conditions of the uterus, such as spasmodic period pain, and inflamed conditions of the genito-urinary tract including the pain of pelvic inflammatory disease (PID) and interstitial cystitis, all respond well to this herb: ‘Many unpleasant conditions of the urinary apparatus are relieved by pulsatilla, as frequent but ineffectual attempts at urination, the bladder giving a sensation as if bloated . . .’<sup>213</sup>

*Anemone pulsatilla* can be used for amenorrhoea caused by nervousness or stress. For period pain it is frequently combined with *Viburnum opulus* or *V. prunifolium*.

## Dose

The herb is described as Warm with a Cooling potential. The standard dose is 1–2 ml of the tincture (dried plant), daily.

## ***Tanacetum parthenium* (Feverfew)**

*Tanacetum parthenium* was historically used to treat fever, headache and migraine; to regulate menstruation; for difficulties during labour; for minor skin irritations; and for toothache.<sup>214</sup> It has been called the herbal aspirin, partly because, as a tea, it will increase perspiration and reduce fever. Its most common usage today, however, is for the treatment of migraine headaches and arthritic complaints. It also has a role in the control of menstrual pain.

A recent review of six randomised clinical trials examined the efficacy and safety of *Tanacetum* for the prevention of migraines. The combined data suggested that *Tanacetum* is an effective agent over placebo for preventing migraine. Only mild and transient side-effects were noted in a few cases.<sup>215</sup>

Some of the positive actions of feverfew are brought about by the effect on prostaglandin synthesis. *Tanacetum parthenium* blocks the enzymes necessary for the production of PGE 2 from arachidonic acid<sup>216</sup> (the actions of PGE 2 in the reproductive tract are discussed on page 87) which may in part explain its anti-inflammatory and muscle-relaxing effects.

*Tanacetum parthenium* also blocks the release of the inflammatory mediators (serotonin and histamine, for example) which, amongst other actions, cause vasodilation of blood vessels in the meninges.<sup>217</sup> Dilation of blood vessels is believed to be the precursor to the development of migraines and a number of common drugs (such as the ergot alkaloids) as well as feverfew seem to be capable of interfering with this response. Parthenolide, a sesquiterpene lactone in the fresh plant, has been shown to be one of the active components.<sup>218</sup>

Another as yet unidentified substance found in the dried leaf, which has a different mode of action, has also been found to cause vasoconstriction.<sup>219</sup> This indicates that two different mechanisms are operating to bring about migraine relief and prevention. Two clinical trials for migraine prophylaxis have confirmed that it is an effective remedy.<sup>220</sup> Researchers have also found that *Tanacetum parthenium* can inhibit the release of inflammatory substances found in the synovial fluid of rheumatoid arthritis sufferers. The extent of inhibition was greater than that achieved with the use of non-steroidal anti-inflammatory drugs (NSAIDs).<sup>221</sup>



### Use in gynaecology

*Tanacetum parthenium* can be used for women of all ages, and has been traditionally used as an emmenagogue to bring on delayed periods.



Recurrent premenstrual, mid-cycle or peri-menopausal migraines, which are believed to be caused by oestrogen fluctuations, also respond well. It must be used all month as a preventative for best results. Except in exceptional circumstances, it is not wise to use *Tanacetum parthenium* for the prevention of migraines associated with the use of the Pill. Stopping or changing the Pill is a much better option.

It is a bitter herb and can be used to treat 'liverish' premenstrual symptoms (or for that matter, liverish symptoms at any time) such as irritability, lethargy, headaches, constipation and digestive disturbances. During labour, it is said to increase the frequency and regularity of contractions and is reported to relax a rigid cervix.<sup>222</sup>

Women taking *Tanacetum parthenium* for migraines have reported both a reduction and an increase<sup>223</sup> in period pain while taking the herb. *In vitro* research has shown different effects with fresh and dried plant products. Researchers investigating the effects on smooth muscle found that the fresh plant inhibited muscle spasm, while the dried plant increased it.<sup>224</sup> Although *in vitro* research does not always equate well with therapeutic outcomes, it may be that women with period pain will benefit more from use of the fresh plant or fresh plant extracts.

## Dose

The effective dose of feverfew can be quite low at 50–100 mg per day, although doses of around 200 mg twice daily are often recommended. Doses up to 400 mg per day should be safe, but should only be prescribed by a trained herbalist.

An oft-repeated caution in the media that *Tanacetum parthenium* causes mouth ulcers is not related to the taking of tablets or extracts, but to the chewing of the fresh leaf, which may cause a type of contact dermatitis in susceptible individuals.<sup>225</sup>

Given as a 1:5 tincture, the dose is 0.25–0.5 ml, three times daily. *Tanacetum parthenium* is Cooling and bitter. It should be used cautiously during pregnancy, and only by a trained herbalist.

## OTHER IMPORTANT HERBS USED FOR GYNAECOLOGICAL COMPLAINTS

### Nervines

At some stage in their lives, nearly everyone will experience symptoms associated with anxiety or depression. Herbal medicines, known as nervines, can be used as a gentle and effective means of controlling symptoms while addressing some of the underlying causes. Nervines can

be divided into several classes—the nervine tonics which can be used for either anxiety or depression and are seen to have a ‘balancing effect’; the nervine sedatives which are calming; and the nervine stimulants, a common example of which is coffee. Nervines find a particular role in gynaecology in the treatment of premenstrual and peri-menopausal complaints; and as adjuncts to the treatment of period pain.

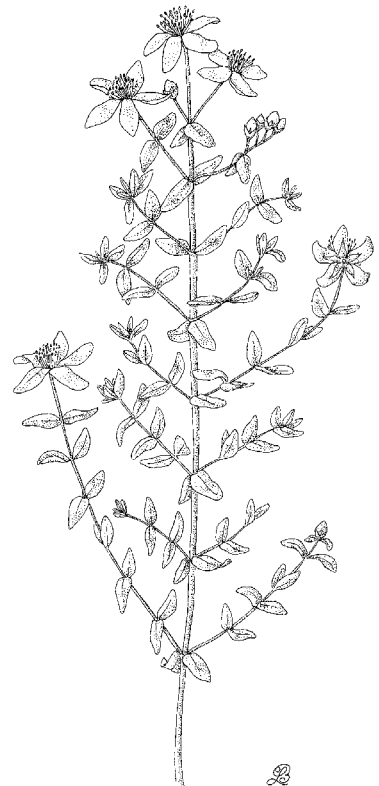
## ***Hypericum perforatum* (St John’s wort)**

*Hypericum* is possibly the most important nervine tonic in herbal medicine. It is specifically indicated for the treatment of mild to moderate anxiety depression.<sup>226</sup> Herbalists consider *Hypericum* to be especially useful during menopause,<sup>227</sup> but it is known as *the* herb to reduce anxiety or stress during any transition period.

*Hypericum* has been the subject of a number of clinical trials in Germany but the mode of action remains unclear. Early research suggested that hypericin, one of the active constituents, was a monoamine oxidase (MAO) inhibitor, but this was not confirmed.

In recent years numerous double-blind randomised trials have been conducted, examining the efficacy of *Hypericum* compared to placebo. While one study failed to find any benefit over placebo,<sup>228</sup> many others have found it to be an effective and well-tolerated herb for the treatment of mild to moderate depressive disorders.

One trial examined the efficacy of *Hypericum* extract in 375 patients with mild to moderate clinical depression for six weeks. Compared to placebo, *Hypericum* extract produced a significantly greater reduction in depressive symptoms and many patients went into remission.<sup>229</sup> Another six-week clinical trial also found that *Hypericum*-treated patients consistently responded better than placebo. Tolerability was very good, with no adverse drug reactions.<sup>230</sup> In another large study of 2166 patients suffering from mild to moderate depression, between 83.7 and 88.6 per cent improved after approximately seven weeks of treatment. The drug tolerance was good or very good for 99 per cent of all cases, with adverse drug reactions being only 0.41 per cent.<sup>231</sup>



A small study examined the possible beneficial effects of *Hypericum* for obsessive-compulsive disorder (OCD). Twelve subjects with a diagnosis of OCD of at least twelve months' duration were treated for twelve weeks with *Hypericum*. A significant change occurred at 1 week and continued to increase throughout the trial. At the conclusion of the trial 42 per cent were much improved while 50 per cent had minimal improvement and only 8 per cent had no change.<sup>232</sup>

A number of trials have also compared *Hypericum* to common anti-depressant medications, usually with favourable results. One double-blind randomised trial compared the efficacy and side-effects of *Hypericum* and the anti-depressant sertraline in 87 patients with major depression. There were no important differences in changes in depression between the two groups at twelve weeks, with significantly more side-effects in the sertraline group than in the *Hypericum* group, suggesting *Hypericum* is a good first-choice therapy.<sup>233</sup> Another trial compared sertraline, placebo and *Hypericum* and found that neither sertraline nor *Hypericum* were significantly different from placebo. In this trial, 31.9 per cent of the placebo-treated patients had improvement while only 23.9 per cent of the *Hypericum*-treated patients and 24.8 per cent of sertraline-treated patients had improvement. This study failed to support the efficacy of *Hypericum* in moderately severe major depression, but the commonly used drug sertraline was also ineffective.<sup>234</sup>

Two randomised, controlled, double-blind trials compared *Hypericum* and Prozac. In one, between 42–50 per cent of the *Hypericum* group responded and 52–58 per cent of the Prozac group, suggesting both medications were effective. The authors concluded that *Hypericum* is therapeutically equivalent to Prozac and is a rational alternative to synthetic anti-depressants.<sup>235</sup> In the other trial *Hypericum* extract and fluoxetine were compared in 240 patients with mild–moderate depression. Both treatment groups were equivalent in terms of response but the safety of *Hypericum* was substantially superior to fluoxetine and less adverse events were reported.<sup>236</sup>

Two trials have compared the efficacy and tolerability of *Hypericum* with the anti-depressant imipramine. Both involved between 263 and 324 patients with mild to moderate depression. Both agents were effective and differences between treatment groups were not significant. *Hypericum* was considered therapeutically equivalent to imipramine in treating mild to moderate depression but with a better tolerance profile.<sup>237</sup>

A recent study examined the acute effects of *Hypericum* on cognitive and psychomotor function, compared with amitriptyline. Amitriptyline impaired performance on a battery of psychological tests, while *Hypericum* had neutral effects on performance in the same tests. Thus the authors suggest that clinical doses of *Hypericum* do not impair attention, motor function or information processing.<sup>238</sup> Another study found that *Hypericum* did not have an acute memory-enhancing effect

in humans, however it possibly impaired working memory and recognition tests at higher doses. This observed impairment was thought to be due to modulation by neurotransmitters such as GABA and serotonin that have been noted to have memory-impairing effects.<sup>239</sup>

A noteworthy statistic is that German doctors prescribed 66 million daily doses of preparations containing *Hypericum* in one year.<sup>240</sup>

Combinations of *Hypericum* with other herbs have also been successfully trialled. A combination of *Hypericum* and *Valeriana* was compared to the drug Tryptanol (amitriptyline).<sup>241</sup> The herbal combination was found to be of equivalent benefit but without the frequently observed side-effects of lethargy and dry mouth. In an earlier double-blind trial, a *Hypericum* and *Valeriana* combination was shown to be more effective than Valium (diazepam).<sup>242</sup>

Mood-elevating effects may take up to four weeks to become apparent. When a more immediate effect is needed, *Hypericum* can be combined with other nervines such as *Piper methysticum*, *Valeriana* or *Scutellaria laterifolia*.

*Hypericum* has also been shown to contain substances (hypericin and pseudohypericin) that are active against enveloped viruses. These include the retroviruses (HIV); the herpes viruses; hepatitis A and B; influenza A, B and C; measles; and Rubella.<sup>243</sup>

There has been concern about the potential for *Hypericum* to interact with other drugs. The first suggested mechanism for this interaction was induction of the cytochrome P450 3A4 (CYP3A4) pathway. However, there is now a suggestion that additional herb–drug interaction mechanisms may exist. The magnitude of interaction between *Hypericum* and the drugs indinavir and cyclosporin observed in clinical practice is greater than that predicted by *in vitro* studies designed to test induction of cytochrome P450 pathways, leading to speculation that the multi-drug transporter, P-glycoprotein, may also be involved. Healthy volunteers were used to examine this theory and *Hypericum* or placebo was used to determine P-glycoprotein expression in the absence or presence of ritonavir, a similar class of drug to indinavir. *Hypericum* increased expression and function of P-glycoprotein, implying that it may account for the discrepancies between *in vitro* and *in vivo* data. Patients receiving drugs which are metabolised by CYP3A4, or are P-glycoprotein substrates, should not self-medicate with *Hypericum*, as clinically significant drug interactions are likely to occur.<sup>244</sup> These patients must seek the advice of a trained herbalist with experience in this area.

## Use in gynaecology

This herb is indicated in conditions where exhaustion and tension combine—a common finding in women who present with hormonal

problems. *Hypericum* is particularly useful in menopausal and perimenopausal women and may have a hormonal effect.<sup>245</sup>

A combination of *Hypericum* and *Cimicifuga racemosa* was studied in 812 women suffering menopausal symptoms.<sup>246</sup> Symptoms such as reduced concentration and hot flushes were significantly reduced, with 79 per cent of subjects electing to continue treatment after the trial.

A recent study examined the use of *Hypericum* in the treatment of postnatal depression in regard to the infant's safety and metabolism of *Hypericum* constituents in breastmilk and infant plasma. Four breastmilk samples from a mother taking *Hypericum* (fore- and hind-milk) were analysed. Only hyperforin was excreted into breastmilk at a low level, and hyperforin and hypericin (two major active components) were below the lower limit of quantification in this infant's plasma. No side-effects were seen in the mother or infant.<sup>247</sup>

## Dose

Doses can range from 2–8 ml per day of a 1:2 fluid extract containing between 0.4 and 1.0 mg per ml of total hypericins. Higher doses are recommended for acute viral infection (enveloped viruses); lower doses for long-term treatment of depression are from 2–4 ml per day.

*Hypericum* extracts (infusions or fluid extracts) may produce photosensitisation and increased sensitivity to pain and thermal stimuli at the upper end of the dose range. It is prudent to recommend that those on high doses avoid excessive exposure to the sun, especially fair-skinned individuals. These symptoms disappear once the herb is stopped.

## ***Leonurus cardiaca* (Motherwort)**

*Leonurus* is a nervine with cardiotonic actions and can be used for palpitations associated with anxiety and excessive worry, especially when they are a feature of insomnia. Its effects are gentle and progressive and long-term administration is usually advisable. *Leonurus* is also a safe and effective treatment for mild hyperthyroidism,<sup>248</sup> and has mild anti-hypertensive properties. Leonurine is an alkaloid in *Leonurus* which appears to be responsible for the anti-hypertensive and relaxant effects. This alkaloid has been shown to inhibit smooth muscle tone and promote vasorelaxation.<sup>249</sup>

## Use in gynaecology

The spasmolytic, sedative, diuretic, hypotensive and cardiotonic actions of *Leonurus* have secured it a place in the treatment of women's

complaints. It is also a mild emmenagogue and ‘provokes women’s courses’ (brings on the period)<sup>250</sup> (but large doses are needed) possibly because of the alkaloids strachydrine and leonurine.<sup>251</sup> It is often used in the last weeks of pregnancy to facilitate labour, and following childbirth to minimise blood loss. With *Viburnum prunifolium* (a uterine sedative), it is also used to treat hypertension in pregnancy.

This is one of the many herbs which possess the apparently contradictory actions of relieving spasm and stimulating uterine activity—an effect which seems to be brought about by a reduction in the irritability (spasticity) of the uterine muscle. This allows contractions to be followed by an adequate rest period when blood can circulate through the uterine muscle again. The more orderly uterine contractions reduce the pain of dysmenorrhoea, and allow childbirth to proceed smoothly.

For peri-menopausal insomnia, night sweats and palpitations, *Leonurus* is used in conjunction with *Humulus lupulus* and *Cimicifuga racemosa* with excellent results.

## Dose

*Leonurus* is Cooling and Drying and is used in doses of between 2–4 ml three times daily.

## ***Humulus lupulus* (Hops)**

*Humulus* is mainly useful for symptoms of restlessness, anxiety and insomnia,<sup>252</sup> although the bitter and smooth muscle-relaxing properties<sup>253</sup> also improve symptoms related to nervous indigestion, colon pain and spastic constipation. Irritable bowel syndrome, especially when triggered by episodes of stress, responds well to this herb. Its bitterness, however, makes it difficult to take as a tea.

## Use in gynaecology

Before mechanisation, women hop-pickers regularly started to menstruate two days after commencing to pick the hops. This was thought to be related to a hormonal principle in the cone-like fruits (strobiles) and three different groups of investigators identified an oestrogenic substance in relatively large amounts.<sup>254</sup>

Initially there was some debate as to whether the compounds in *Humulus* exerted an oestrogen-like action;<sup>255</sup> however, a potent phyto-

oestrogenic flavonoid, 8-prenylnaringenin, has recently been isolated, which possesses oestrogenic activity greater than other established plant oestrogens.<sup>256</sup> This phyto-oestrogenic compound has been examined for relative binding affinity to estrogen receptors *in vitro* and in the rat uterus.<sup>257</sup> 8-prenylnaringenin was capable of binding to oestrogen receptors  $\alpha$  and  $\beta$ , and was found to exert a greater oestrogen-like effect than the better-known phyto-oestrogens coumestrol, genistein and daidzein. The levels of this phyto-oestrogen in beer are low and not thought to pose any concern, and an *in vitro* test of the oestrogenic stimulation of the vaginal epithelium in the rat showed that concentrations about 500-fold greater than can be found in any beer were required.

Another *in vitro* study examined the proliferative effect of 8-prenylnaringenin in human breast cancer cells, finding that it stimulated growth and aggregation of these cells in a manner similar to 17-beta-oestradiol.<sup>258</sup> The flavonoid compounds of *Humulus* were also shown to possess anti-proliferative effects in another *in vitro* study of cancer cell lines, suggesting potential chemo-preventive activity against breast and ovarian cancer in humans.<sup>259</sup> While it is reasonable to assume that these phyto-oestrogenic compounds may behave like phyto-SERMS, it is also worthwhile to note that *in vitro* studies of active constituents do not accurately reflect the complex physiological interaction of compounds in the body, and these studies may not have any relevance to the actions of *Humulus* when ingested.

In addition to its sedative properties for insomnia, *Humulus* is used for 'sexual neuroses (wet dreams, premature ejaculation and to reduce sexual appetite in men)'. Some writers have suggested that rather than oestrogens, other hormonal substances, perhaps anti-androgens, might be responsible for this effect.<sup>260</sup> Another possible explanation for the hormonal effects of *Humulus* is that it possesses substances with an antigonadotrophic activity,<sup>261</sup> which suppress oestrogen, progesterone and luteinising hormone (LH) levels. These components could explain many of the observed actions of *Humulus*, from treating hot flushes and sexual neuroses, to improving menstrual regularity when women have polycystic ovarian syndrome (PCOS). The question of the hormonal activity of *Humulus* is far from resolved, however, and it may be that future research will confirm a multitude of effects.

*Cimicifuga racemosa*, which also suppresses LH levels, successfully treats hot flushes. *Humulus*, however, has the additional advantage of being sedative and is specifically indicated in the treatment of flushing that accompanies stress, worry or insomnia. *Humulus*, combined with *Cimicifuga*, is a useful treatment for PCOS. Only time will tell if this is purely an anti-gonadotrophic effect or if it is related to the speculated anti-androgenic effect as well. *Humulus* has also been shown to antagonise contractions induced by oxytocin (a spasmolytic effect),<sup>262</sup> which suggests a beneficial application for spasmodic dysmenorrhoea.

## Dose

*Humulus* is Cold and Dry. A tea can be made by infusing 1–2 g in boiling water; however, this is very bitter. The dose of the extract is 1–2 ml, two to three times daily.

## ***Verbena officinalis* (Vervain)**

The medicinal uses of *Verbena* were first recorded in Dioscorides' *De Materia Medica* written around 78 BC. Before and since, *Verbena* has been regarded as a useful herb for the treatment of an astounding array of illnesses. These include rheumatism; in fever management as a diaphoretic;<sup>263</sup> as a mild sedative and mood elevator (thymoleptic) for depression or melancholia; as a galactagogue;<sup>264</sup> and in asthma or migraine as an antispasmodic.<sup>265</sup>

A recent study in rats found that a *Verbena* extract potentiated a drug-induced hypnosis by reducing sleep latency and increasing sleeping time. The extract augmented total sleep time; and rapid eye movement (REM) sleep and non-REM sleep at the expense of wakefulness, confirming the traditional use of this plant as a sedative and possibly as a nervine tonic substance.<sup>266</sup>

In Germany *Verbena* is used when there are liver or gall bladder symptoms<sup>267</sup> and in France, writers have extolled its usefulness in neuralgia, including trigeminal neuralgia, for migraine, and as an anti-fever agent superior to quinine.<sup>268</sup> It is a bitter digestive, which may account for many of its indications.

Some authors have described *Verbena* as having anti-thyrotropic activity; however, this was not confirmed in research.<sup>269</sup>

## Use in gynaecology

*Verbena* potentiates the actions of prostaglandin E<sub>2</sub> on uterine muscle and has been investigated as a potentiating agent for prostaglandins-induced abortions.<sup>270</sup> It may also exhibit weak androgenic activity,<sup>271</sup> as well as nervous tonic and breast milk-increasing properties. *Verbena* can be used to treat spasmodic dysmenorrhoea and delayed menstruation, and to reduce the impact of menopausal symptoms due to its nervine properties.

## ***Valeriana officinalis* (Valerian)**

*Valeriana* is probably modern herbal medicine's best-known sedative. It has been a popular sleep aid since the seventeenth century, never more so than at present. *Valeriana* also finds applications in the treatment of anxiety, depression, neuroses, hypertension, some headaches and smooth muscle spasm in the digestive or reproductive tract.



A large amount of research conducted over the last twenty years has extensively reviewed the chemistry and pharmacology of *Valeriana*<sup>272</sup> and it has been shown to be effective in a number of clinical trials as a mild sedative. It decreased the time taken to fall asleep and improved the quality of sleep in one trial;<sup>273</sup> in another, a blend of standardised active ingredients was successfully used to treat a group of 120 children with a range of psychosomatic and behavioural problems including hyperactivity, restlessness, sleeplessness, constipation and headaches.<sup>274</sup>

A small Australian study published recently explored the potential for *Valeriana* to assist in the treatment of sleep problems in children with an intellectual disability. Five children with different primary sleep problems were randomly assigned *Valeriana* or placebo over eight weeks. *Valeriana* treatment led to significant reductions in sleep latencies and nocturnal time awake, lengthened total sleep time and improved sleep quality. The treatment was apparently most effective in children with deficits that involved hyperactivity.<sup>275</sup> Another study found that *Valeriana* was useful in reducing insomnia and improving sleep quality during benzodiazepine withdrawal. The effect was thought to be due to a mild anxiolytic action.<sup>276</sup>

Both *Valeriana* and *Piper methysticum* were found to be beneficial against stress in a randomised study. Following administration of either treatment, there was a reduction in systolic blood pressure. The reaction to mental stress, measured by heart rate, was found to decline in the *Valeriana* group but not in the *Piper* group. Individuals taking either herb reported less pressure during the task assigned, suggesting these herbs may be beneficial to health by reducing physiological reactivity during stressful situations.<sup>277</sup> These same two herbs were analysed in another study for their effects on stress and insomnia. Total stress severity was equally relieved by both compounds, as also was insomnia.<sup>278</sup> This study provides important information for practising herbalists. The effectiveness of both herbs in reducing symptoms of stress suggests that *Valeriana* could be used as a substitute for *Piper methysticum* as an anxiolytic.

## Use in gynaecology

*Valeriana* finds one of its major applications in gynaecology as a herb to potentiate the action of the spasmolytic herbs used in the treatment of dysmenorrhoea.

## Dose

*Valeriana* is Warming and slightly Drying. Doses of the extract range from 2–4 ml, three times daily. Up to 1 g of the dried root can be used as an infusion or decoction for a tea.

## ***Zizyphus spinosa* (Zizyphus)**

*Zizyphus*, like *Valeriana*, has been extensively studied. It has been in use since at least the fifth century AD, mainly for the treatment of illnesses whose symptoms include neurasthenia, insomnia, forgetfulness, palpitations, excessive dreams and nightmares.<sup>279</sup>

More recently, it has been extensively trialled as part of a traditional formulation called Suan Zao Ren Tang or Zizyphus Combination for the treatment of anxiety<sup>280</sup> and for insomnia.<sup>281</sup> This formula contains five herbs, and when each was tested for sedative activity, only *Zizyphus* and one other, *Ligusticum wallichii*, were found to possess any sedative activity. The other herbs exhibit synergistic activity, as the formula proved to be much more effective than any of the component herbs individually. Improvement in symptoms such as palpitations, chest pain and faintness were reported and, rather than a reduction in daytime performance and psychomotor skills as was seen in a comparative diazepam (Valium) group, the daytime performance and psychomotor skills of the Suan Zao Ren Tang group improved.<sup>282</sup> Reduction in aches and pains such as neck pain and lower back pain were also reported.<sup>283</sup>

### **Use in gynaecology**

*Zizyphus* prevents abnormal sweating and has been traditionally used for spontaneous sweating and night sweats, especially when accompanied by anxiety, irritability, palpitations and insomnia. These symptoms can occur during the peri-menopausal years, as well as being common symptoms of nervous exhaustion.

### **Dose**

*Zizyphus* is sweet, sour and neutral. The usual dose is between 1–3 ml, three times daily, of the fluid extract, but can be up to 15 ml in total in any one day.

## ***Piper methysticum* (Kava-kava)**

A plant from the pepper family, *Piper methysticum* is used in the Pacific region as part of religious ceremonies and in social settings, in kava bars, where it is used in a similar way to wine in southern Europe.<sup>284</sup> A kava-kava abuse syndrome has been reported in the Pacific region and in northern Australia,<sup>285</sup> but this is linked with intakes more than ten times the recommended therapeutic dose.

*Piper methysticum* has been in use in Europe for many years, mainly

as a gentle tranquilliser. An official German Commission E monograph recommends its use in nervous anxiety, stress and unrest,<sup>286</sup> and a number of trials have shown beneficial effects from the herb or its constituents in the treatment of anxiety, and an improvement in physical and psychological symptoms.<sup>287</sup> Local anaesthetic and antimicrobial properties also make it a useful component of preparations for urinary tract infections.<sup>288</sup>

*Piper methysticum* has been associated with acute liver damage, hepatitis and liver failure in a small number of cases in Europe, and a recent case in Australia of liver failure resulting in death was reported in a woman taking a combined herbal tablet which included *Piper methysticum*. Due to this rare adverse reaction, the herb has currently been withdrawn from sale and distribution, pending further investigations by the TGA. These few cases of hepatotoxicity due to kava consumption are likely to be idiosyncratic reactions, or a rare immunological reaction, possibly exaggerated by the type of extract consumed, and deficiencies in detoxifying enzymes brought about by concurrent drug use.<sup>289</sup>

## Use in gynaecology

*Piper methysticum* reduces the anxiety depression symptoms sometimes seen in association with menopause,<sup>290</sup> and can also be used for anxiety associated with PMS.

## Dose

Dose of the dried root is 1–3 g per day; of the fluid extract 2–6 ml, containing up to 210 milligrams of kava lactones per day.

## ***Withania somnifera***

*Withania* is a popular Ayurvedic herb, a nervine tonic with adaptogenic properties. The species name *somnifera* comes from the Latin *somnus*, which means to sleep, and alludes to the traditional use of *Withania* as a nervine and sedative.<sup>291</sup> It is indicated for exhausted states accompanied by poor sleep patterns, and additionally may be beneficial when reduced iron levels are associated with exhaustion. Hypotensive effects have also been reported.

*Withania* is a gentle tonic herb traditionally used for the treatment of premature ageing, impotence, debility and senility. Studies support traditional use to promote memory and cognitive function.<sup>292</sup> It is used to treat emaciation in people of all ages, including children and the

elderly. *Withania* is considered a specific for those convalescing from chronic illness. The roots are said to be beneficial in the treatment of inflammation, psoriasis, leukoderma, arthritis, bronchitis, asthma and ulcers. It is also applied topically to assist wound healing.<sup>293</sup>

*Withania* contains the steroidal withanolides, which are believed to be responsible for much of the adaptogenic properties of this herb. It is a mild immuno-stimulant which may explain the reported anti-carcinogenic properties.<sup>294</sup> Animal studies have found *Withania* to be useful in the prevention of immune suppression and leucopenia associated with irradiation therapy, and it is often recommended as an adjunct to radiation treatment.<sup>295</sup> The anti-oxidant<sup>296</sup> and mild immuno-enhancing effects suggest that *Withania* may also be beneficial during cancer chemotherapy.<sup>297</sup>

### Use in gynaecology

This herb has been traditionally thought to enhance reproductive function in men and women. It is considered to have aphrodisiac effects, and has been used to promote conception.<sup>298</sup> It was also traditionally used during pregnancy to aid foetal development. *Withania* is an important nervine tonic for women and is used as an adaptogen for the post-partum period, during convalescence and during episodes of prolonged stress. It can be used as an adjunct to other herbal treatment to prevent stress-induced hormonal changes.

### Dose

*Withania somnifera* is bitter, Warm and astringent. It is most effective when used at relatively high doses. The adult dose is 35–90 ml per week of a 1:2 fluid extract.<sup>299</sup>

## ADAPTOGENS

Adaptogens are a non-toxic group of herbs known to normalise physiological processes in times of increased stress. They help the body to *adapt*, having a ‘sparing’ effect on the adrenal glands, and often normalise the activities of other organs, especially the liver and heart. Adaptogens are not used to treat specific illnesses (although some are used for certain sorts of depressions),<sup>300</sup> but are prescribed to enhance vitality and improve resistance to the vicissitudes of life, disease and pollution.

An adaptogen, therefore, is like an old-fashioned tonic and is often indicated at those times of life when stress is high, during convalescence after surgery or illness, or during potentially difficult periods of change.

For women, these events are common following childbirth, during lactation, or around menopause. Adaptogens prescribed at these times would tend to be combined with herbs that have additional effects—after childbirth, a uterine tonic would commonly be given; while breastfeeding, nutritive tonics are indicated; and during menopause, herbs which have a regulating effect on hormone balance are useful.

After childbirth and while breastfeeding, adaptogens (*qi* tonics) are often combined with *blood* tonics in Chinese medicine. One of the common formulas is Ba Zen Tang (also known as Women's Precious Pills in pill form) which combines *Codonopsis pilosula*, *Glycyrrhiza uralensis*, *Atractylodes macrocephala* and *Poria cocos*, as the 'energy' or *qi* part of the tonic, with *Angelica sinensis*, *Ligusticum wallichii*, *Paeonia lactiflora* and prepared *Rehmannia glutinosa* as the 'nutritive' or 'blood' tonic.

Adaptogens commonly used during menopause are *Eleutherococcus senticosus*, *Panax ginseng* and *Glycyrrhiza glabra*. These herbs reduce menopausal symptoms, possibly by stabilising the body's hormone production, and helping the body to adapt during times of emotional or physical stress. They are often combined with the hormone regulatory herbs *Vitex agnus-castus* or *Cimicifuga racemosa*, or with nutritive tonics or Chinese *blood tonics*.

### ***Eleutherococcus senticosus* (Siberian ginseng)**

*Eleutherococcus* has been extensively studied and found to be virtually non-toxic at any reasonable dose. Soviet research found that *Eleutherococcus* was useful for times when dramatic increases in physical stamina were required.<sup>301</sup> However, its main indication is during times of stress associated with a wide variety of conditions ranging from extremes in weather, to mental and physical stress, to exposure to drugs and chemicals.

The effects of *Eleutherococcus senticosus* and *Panax ginseng* on stress levels were examined in endurance athletes. There was no change in immune system variables in either group, but a trend towards increased cortisol in the *Eleutherococcus* group. *Eleutherococcus* seems to increase or decrease the stress response relative to the level of stress, such that low stress levels increase the stress response and high levels decrease the stress response.<sup>302</sup> *Eleutherococcus* also inhibited the replication of a range of RNA viruses including rhinovirus, respiratory syncytial virus and influenza A virus,<sup>303</sup> and was also been shown to inhibit mast cell-mediated allergic reactions and cutaneous allergic reactions in rats.<sup>304</sup> The immune-enhancing actions of *Eleutherococcus* have been found to be most pronounced when the whole ethanolic extract is used.<sup>305</sup>

A recent review paper examined all of the research conducted on *Eleutherococcus*. Six compounds have now been identified, exhibiting

various levels of activity including anti-oxidant, anti-inflammatory, anti-cancer, hypocholesterolemic, immuno-stimulatory, choleric, anti-pyretic and anti-bacterial properties. An ability to decrease or moderate insulin levels and to protect against the adverse effects of radiotherapy was also noted.<sup>306</sup>

### Use in gynaecology

For women, *Eleutherococcus* is useful for any type of stress or during convalescence. It can be used for the symptoms of over-work or ‘burning the candle at both ends’, it can regulate stress-induced PMS symptoms; it is a useful general tonic after childbirth and following surgery; and it is one of the best adaptogens for the menopause, especially in combination with other herbs for low oestrogen symptoms.

*Eleutherococcus* is not known to interact with any drugs and its use is accompanied by few if any side-effects. Rarely, some women find that it makes them feel more tense, especially if they drink coffee (excess coffee intake should be avoided when taking both *Eleutherococcus* and *Panax ginseng*).

### Dose

The dose range is usually between 1–3 ml of the extract, three times daily; and *Eleutherococcus* can be taken for up to three months without a break—in fact, longer term (more than one month), low dose (around 1 ml or 1 g), twice daily is generally much more useful than higher doses for short periods.

## ***Panax ginseng* (Korean ginseng)**

*Panax ginseng* is one of the most commonly used adaptogens for stress. It is believed to be more ‘stimulating’ and tends to have an uplifting effect which is usually noticed fairly quickly. It is mildly oestrogenic and anabolic (growth promoting) and, in some circles is considered to be a ‘male’ herb. Women, however, can use *Panax* for stress, and particularly when there is a concurrent need for maintaining stamina under conditions of high physical output.

One series of controlled trials showed that *Panax* improved immune function,<sup>307</sup> and brain function (memory and performance).<sup>308</sup> It has also been shown to reduce the negative effects of the drugs used for chemotherapy, including improving stamina and the sense of well-being, and even normalising white blood cell levels.<sup>309</sup>

A recent placebo-controlled study examined the effects of *Panax*

*ginseng* on health-related quality of life. After four weeks of therapy, higher scores in social functioning and mental health scales were observed in patients given *Panax* compared to placebo; however, these differences did not persist to the 8-week time point.<sup>310</sup> Supplementation with *Panax* had no effect on positive or negative affect, or on total mood disturbance in another placebo-controlled study of healthy young adults.<sup>311</sup>

Another placebo-controlled double-blind study investigated whether a combination of *Ginkgo biloba* and *Panax ginseng* had any consistent effect on mood and aspects of cognitive performance, such as memory and attention. The most striking result was a dose-dependent improvement in performance on the 'quality of memory' factor for the highest dose, but a dose-dependent decrease in the performance of the 'speed of attention' factor.<sup>312</sup>

*Panax* should not be taken with herbs which contain large amounts of caffeine or by heavy coffee drinkers, because it can potentiate the undesirable effects of caffeine. It should not be taken by those with high blood pressure, acute asthma or acute infections, including viral infections. It is not known to interact with any drugs.

## Use in gynaecology

Recent studies in animals have shown that both Asian and American forms of ginseng may be a useful treatment for sexual dysfunction. These effects are thought to be due to a direct effect of ginseng on the central nervous system and gonadal tissues. Ginseng has also been shown to decrease prolactin secretion by a direct nitric oxide-mediated effect on the anterior pituitary.<sup>313</sup>

*Panax* can be of benefit before and during menopause. It eliminates menopausal symptoms in a significant number of women, supposedly an oestrogen-like effect or an indirect hypothalamic-pituitary response. Long-term unsupervised use, however, is inadvisable because there have been reports of changes in vaginal and cervical cytology;<sup>314</sup> abnormal vaginal bleeding;<sup>315</sup> as well as breast pain and cystic changes<sup>316</sup> among women taking prolonged doses of *Panax*.

*Panax ginseng* was compared to placebo in a study examining the health-related quality of life in menopausal women. *Panax* extract showed slightly better overall symptomatic relief; and scores for depression, well-being and health favoured ginseng over placebo. However, no statistically significant effects on physiological parameters including hot flushes were found, and the beneficial effects of *Panax* were not mediated by hormone-like effects, because parameters such as FSH and estradiol levels, endometrial thickness and vaginal pH were not affected by the treatment.<sup>317</sup>

## Dose

*Panax ginseng* is sweet, slightly bitter and Warm. It can be used as a single herb at a dose of 3 ml daily, in the morning, for 2 weeks. A break for two weeks before having another course is advisable.

## **Codonopsis pilulosa**

*Codonopsis pilulosa* is similar in action to *Eleutherococcus* and *Panax ginseng*, but is not as uplifting or as expensive. It has the usual effects of the adaptogens—improving vitality and stamina; and in addition, stabilises the blood pressure.

Whereas *Panax* is indicated for more profound collapse or conditions associated with an acute onset—after physical exertion or a period of difficult and stressful work, for example—*Codonopsis* is more useful for conditions associated with chronic fatigue, especially of the variety that interferes with digestion and assimilation, or causes symptoms of shortness of breath and heaviness in the limbs.<sup>318</sup>

It is an excellent remedy for post-viral fatigue syndrome, chronic fatigue syndrome or post-operative fatigue. It provides support during convalescence and can be used to return vitality to pre-illness levels. For debility associated with anaemia, *Codonopsis* is traditionally combined with *Astragalus membranaceus* and *Angelica sinensis*. In China, it is used for ‘wasting and thirsting syndrome’ (diabetes).

## Use in gynaecology

*Codonopsis* can be used for women who need an adaptogen, but for whom *Panax ginseng* may be too stimulating—for example, when anxiety is one of the predominant symptoms accompanying fatigue. In traditional Chinese medicine, *Codonopsis* is combined with *Bupleurum falcatum*, *Cimicifuga claburica* and *Astragalus membranaceus* for prolapses.

## Dose

*Codonopsis* is sweet and neutral (neither Hot nor Cold). It is always combined with other herbs; the dose of the fluid extract is between 1–4 ml, three times daily.

## **Schizandra chinensis**

*Schizandra chinensis* is an important herb from the Chinese *Materia Medica*. It has been traditionally regarded as an adaptogen and nervine



tonic to improve energy and fatigue, as an anti-ageing agent, and as an anti-tussive. It is often suggested as a reproductive tonic for men; for asthmatic coughs accompanied by exhaustion; for urinary incontinence; and to alleviate spontaneous swelling.<sup>319</sup> *Schizandra* is also hepatoprotective and anti-hepatotoxic. The nervine tonic effects of *Schizandra* are particularly evident when used in combination with *Hypericum perforatum* and *Withania somnifera*.

The main indications for *Schizandra* are as a hepato-protective, adaptogenic herb. It is indicated for the treatment of acute or chronic liver disease, such as hepatitis or chemically induced liver damage. *Schizandra* has been shown to inhibit lipid peroxidation in the liver. This may be attributed to the fact that it improves hepatic glutathione levels and increases microsomal glutathione S-transferase activity. *Schizandra* also sustains ascorbic acid and alpha-tocopherol levels, which supports claims of an anti-oxidant activity.<sup>320</sup>

Studies have identified lignan compounds in *Schizandra* that act as platelet-activating factor (PAF) antagonists.<sup>321</sup> PAF is involved in a broad range of physiological and pathological activities, including increased vascular permeability, acute inflammation, gastro-intestinal ulceration, asthma and thrombosis.<sup>322</sup> This supports its use as an anti-asthmatic and astringent, and to reduce risk of venous thrombosis.

*Schizandra* is also an adrenal adaptogen indicated for stress and fatigue, and is said to increase endurance and physical efficiency. In a randomised, double-blind crossover study of eighteen healthy horses, *Schizandra* was shown to reduce heart rate and respiratory frequency, increase plasma glucose and decrease lactic acid production.<sup>323</sup> *Schizandra* also has a role in reducing the incidence of illness.<sup>324</sup> This may be partially attributed to an increase in basal levels of nitric oxide, which is thought to have a role in non-specific immunity.<sup>325</sup> *Schizandra* is often used in combination with *Eleutherococcus* to increase stamina and improve adaptation in times of stress.

Human intellectual ability and work efficiency is enhanced by *Schizandra*.<sup>326</sup> In traditional Chinese medicine, *Schizandra* is also prescribed to improve vision and hearing, to enlarge the visual field and improve the adaptation to dark.<sup>327</sup> Anti-depressant activities have also been suggested.

## Use in gynaecology

*Schizandra* is indicated for gynaecological conditions associated with relative oestrogen excess, especially in endometriosis, because of its presumed effect on oestrogen metabolism and anti-oxidant activities. *Schizandra* may also be beneficial in the treatment of PMS associated with poor sleep, exhaustion, irritability and fluid retention, which also commonly accompany the symptoms of endometriosis (and other

gynaecological complaints). *Schizandra* is contraindicated if the woman wants to become pregnant, and must not be prescribed for pregnant women because it has a stimulatory effect on the uterus.

*Schizandra* can stimulate cytochrome P450 pathways and therefore may assist in the breakdown of some drugs. However, a possible role in the increased hepatic clearance and metabolism of oestrogens means that it may be contraindicated for those women taking the oral contraceptive pill. These theoretical considerations require further research to properly assess these possible drug interactions.

#### Dose

Dosage is 1.5–3 ml three times daily of 1:2 fluid extract. *Schizandra* is sour and Warm.

### ***Glycyrrhiza glabra* (Liquorice)**

Like *Panax* and *Eleutherococcus*, *Glycyrrhiza* has been the subject of extensive research. It is an adrenal adaptogen with expectorant, antibacterial properties which make it useful for infections in the respiratory tract. The saponin, glycyrrhizinic acid, has anti-viral effects when applied topically and is available in a cream to prevent and treat herpes of the mouth and genitals. *Glycyrrhiza* is also soothing (demulcent) and antispasmodic and is effective in the prevention and treatment of gastritis and stomach ulcers.

*Glycyrrhiza* has also been found to act as a moderate hypocholesterolemic and potent anti-oxidant agent, with the potential to protect against cardiovascular disease, in a placebo-controlled study. *Glycyrrhiza* also reduced systolic blood pressure by 10 per cent, which was sustained during the placebo consumption.<sup>328</sup> Other studies have suggested a hypertensive effect from chronic *Glycyrrhiza* consumption (see below).

The saponin aglycone, glycyrrhetic acid is excreted via the liver and seems to exert an anti-oxidant (and protective) effect on liver cells prior to excretion in the bile. *Glycyrrhiza* mimics the action of corticosteroid drugs, and there is a synergistic action between it and endogenous cortisol. *Glycyrrhiza* prolongs the biological activity of cortisol by retarding its breakdown and excretion.

*Glycyrrhiza* is one of the very few pleasant-tasting herbs—glycyrrhizin is 50 to 100 times as sweet as sucrose—and is frequently self-prescribed. The cortisone-like effect, however, should inspire caution, and points to one of the possible dangers of prolonged administration of *Glycyrrhiza*. It can cause an elevation of the blood pressure, fluid retention and potassium depletion with prolonged use. Experienced practitioners offset this possibility by either restricting the

duration of use or combining *Glycyrrhiza* with other herbs (*Taraxacum* leaf, for example). Those who self-administer are usually unaware of these cautions and practices.

## Use in gynaecology

*Glycyrrhiza* has oestrogenic properties which are discussed in Chapter 18 'Phyto-oestrogens'. Two compounds in *Glycyrrhiza*, glabrene and isoliquiritigenin, have been shown to bind to the oestrogen receptor and show tissue-specificity *in vivo* similar oestradiol.<sup>329</sup> Many women report (and some books recommend) that they take *Glycyrrhiza* as tea for menopausal symptoms; however, the possibility of side effects makes this a risky practice when consumed in high doses, except in the short term. The anti-androgenic effects of *Glycyrrhiza* are discussed on pages 357–8 in the section on PCOS.

## Dose

A study examined the effects of different amounts of *Glycyrrhiza* consumption on blood pressure in healthy volunteers. The various doses, 50–200 g/day were given for two to four weeks, corresponding to a daily intake of 75–540 mg glycyrrhetic acid. Systolic blood pressure increased by 3.1–14.4 mm Hg, demonstrating a dose-response but not a time-response relationship. Even doses as low as 50 g of liquorice (75 mg glycyrrhetic acid) consumed daily for two weeks were shown to cause a significant rise in blood pressure.<sup>330</sup> Other case reports of pseudo-aldosteronism, hypokalaemia, dysrhythmias and hypertension have all been linked to chronic *Glycyrrhiza* consumption.<sup>331</sup>

*Glycyrrhiza* is sweet and Warm. It should not be taken by anyone with hypertension or impaired kidney or heart function, without strict supervision; and must be avoided when taking spironalactone, amiloride, digoxin and a number of other cardio-active drugs. Its use should be restricted to less than six weeks. The usual dose is between 0.5–1.5 ml, three times daily. Its use should be restricted to less than six weeks unless closely supervised.

## THE BITTERS/LIVER HERBS

Bitters are a large and chemically diverse group of herbs. They are grouped together because they have a bitter taste, and it is the *taste* of bitterness that gives these herbs many of their therapeutic effects. The bitter taste on the tongue triggers a series of impulses which are carried

by the nervous system and culminate in physiological and biochemical changes in the gastrointestinal tract, liver and pancreas.

Bitters medicine has the ability to generally and non-specifically improve the overall state by improving digestion, assimilation and evacuation. These effects are brought about by increases in bile production, dilution and excretion; improved digestive enzyme and gastric acid production; regulation of peristaltic action; repair of the gut wall lining; and a general improvement in the micro-environment in the bowel. It is not surprising then, that for many Western herbalists, the term 'bitter' is synonymous with 'tonic'.

Even after years of using bitters, the number of possible therapeutic applications still seems remarkable. They can be used for all types of digestive disorders, including indigestion, lack of appetite and constipation; to protect the liver from damage; to reduce the risk of, or treat gall bladder disease; to regulate blood sugar levels; to lower cholesterol levels; to regulate the excretion of hormones; to increase the uptake of nutrients (themselves often being a rich source); and to exert a general tonic effect brought about through the culmination of all of these changes.

Of the countless bitter remedies, four are particularly useful. *Berberis vulgaris* has additional uterine stimulant properties and is anti-inflammatory; *Taraxacum officinale*, root and leaf, is safe and readily available for general use; *Silybum marianum* has protective and restorative effects on liver cells which makes it useful for women on hormonal preparations which affect the liver; and *Bupleurum chinensis*, the main 'liver' herb used in Chinese medicine, has additional calming effects, making it useful for PMS.

Herbalists consider bitters to be Cooling and (almost always) Drying, and they are often recommended for conditions associated with Heat and excess Moistness.

## ***Berberis vulgaris***

*Berberis vulgaris* is a bitter 'liver' remedy which contains a number of alkaloids including berberine. Berberine-containing herbs are used for infections of the mucous membranes of the mouth, the throat, sinuses, eyes, lungs, genito-urinary tract and gastrointestinal tract, because of their antimicrobial,<sup>332</sup> anti-infective<sup>333</sup> and immune-enhancing effects.<sup>334</sup> *In vitro* studies have shown Berberine to have antineoplastic functions by inhibiting DNA synthesis in activated lymphocytes, and recently it has also been shown to inhibit human leukaemia cells in both cytosol and intact cells.<sup>335</sup> The effect of berberine on the activity of tumour markers in human hepatoma cells was examined in another study. Berberine was shown to inhibit activity of

the markers in a dose- and time-dependent manner, further explaining its anti-tumour promoting activity.<sup>336</sup>

This herb is said to improve anaemia and malnutrition, and is a tonic for the delicate. It contains high levels of calcium, iron and selenium.<sup>337</sup> Native Americans used *Berberis vulgaris* with cayenne to enhance its liver stimulant properties. *Berberis vulgaris* is a strong bitter and at too high a dose can cause diarrhoea or abdominal cramps. The bark from the stem and root is used as medicine.

### Use in gynaecology

*Berberis vulgaris* is a very useful herb for women with congestive period pain where the flow is slow to start, or where the pain is relieved when the flow commences. This herb has no analgesic action, but seems to influence the events associated with this type of period pain. The flow is easier, redder and usually starts quickly; the heavy dragging pain is diminished; and the overall volume of menstrual loss is reduced.

The alkaloid berberine in *Berberis vulgaris* increases the activity of macrophages<sup>338</sup> which may in part account for the positive effects seen when this herb is prescribed for endometriosis.

### Dose

*Berberis vulgaris* is Cold, Drying and bitter. Dose is 0.5–2 g of dried bark or equivalent, three times daily, or 1–4 ml of a 1:2 tincture.

## ***Taraxacum officinale* (Dandelion root)**

*Taraxacum* has been used medicinally since at least the tenth century AD. The whole plant is bitter, but the root is considered to have the major 'liver' and digestive effects. It is a gentle remedy suitable for long-term use, either self-administered as a beverage, or as a herbal extract.

The root stimulates appetite, increases bile production and excretion, and has mild laxative properties.<sup>339</sup> It can be used for indigestion, bloating and flatulence after eating, or for signs of malabsorption such as light-coloured, floating and strongly smelling stools, perhaps with signs of undigested food.

*Taraxacum* root is available in most health food shops and large supermarkets and is usually sold as *Taraxacum* 'coffee'. Coffee and *Taraxacum* root beverages bear no taste resemblance whatsoever, so to avoid disappointment it is best not to think of *Taraxacum* root as 'coffee'. Many of the commercially available dandelion beverages are

also sweetened, which reduces their therapeutic effect. *Taraxacum* leaf is also bitter and a diuretic, and is used mainly where there is a need for increased urinary output (see the following section on ‘Diuretics’).

*Taraxacum* has anti-inflammatory effects and is traditionally used as an anti-rheumatic agent and as a general tonic. The polysaccharides and aqueous extracts have anti-tumour activities in animals.<sup>340</sup> A recent study in rat neural cells suggests that *Taraxacum* may inhibit interleukin-1 production;<sup>341</sup> it may also benefit the immune system by reducing the toxicity of cadmium by reversing the inhibition of nitric oxide, a molecule involved in immune regulation and defence.<sup>342</sup>

### Use in gynaecology

*Taraxacum* root is used as a general tonic after debilitating illness or surgery; to improve liver function generally, and especially in conditions associated with relative oestrogen excess such as endometriosis; or to protect the liver from the effects of hormonal preparations, including the Pill. It is also indicated as a gentle laxative to moisten the stool following childbirth and to increase milk flow if deficient.<sup>343</sup>

*Taraxacum* root is slightly bitter and Cooling, and makes a refreshing drink over summer; in winter it can be brewed with a little cinnamon and cardamom to make it more Warming. When *Taraxacum* root is prescribed by a herbalist, it will usually be in the form of an extract and be part of a mixture with a number of other herbs.

### Dose

Dose of the liquid extract is 2–8 ml, three times per day; dried root needs 1–2 teaspoons in one cup of cold water brought gently to boil, then left to draw for ten minutes, three times a day.

## ***Silybum marianum* (Milk thistle; St Mary’s thistle)**

Culpeper said of *Silybum marianum* that ‘the Germans were much fond of this remedy, but we find it to be of little use’.<sup>344</sup> How wrong he was! *Silybum marianum* seeds have been used therapeutically for at least 2000 years, especially in Europe.<sup>245</sup> They can protect liver cells from destruction by some of the most toxic substances known, including the death cap mushroom (*Amanita phalloides*) and carbon tetrachloride (drycleaning fluid).

Pooled data from 452 case records of *Amanita phalloides* poisoning show that with silibinin treatment (a constituent of *Silybum marianum*) mortality is reduced to 9.8 per cent compared with 18.3 per cent with standard treatment.<sup>346</sup> *Silybum* seed oil and the constituent silibinin have

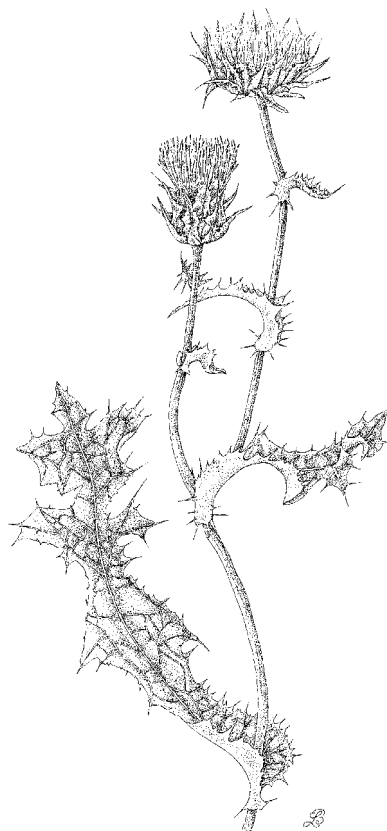
been shown to produce an anti-oxidant effect on liver tissues of rats poisoned with carbon tetrachloride by reducing lipid peroxidation, and increasing catalase activity.<sup>347</sup> Silibinin has been found to enhance the metabolism of some drugs via enzyme pathways in the liver.<sup>348</sup> Kidney cells are also protected by silibinin. *In vitro* experiments with kidney cells damaged by paracetamol, cisplatin and vincristin demonstrated that administration of silibinin before or after the chemical-induced injury can lessen or avoid the nephrotoxic effects.<sup>349</sup>

Until recently it has been almost universally accepted that there was not and could not be any pharmacological treatment for liver diseases. Since the research on *Silybum marianum*, however, there is now a substantial body of evidence indicating that this herb, via its active constituents, can exert an almost specific influence on liver parenchyma (functional tissues of the liver).<sup>350</sup>

In liver disease, cells can be found in various states from undamaged, to degenerating or irreversibly damaged. Normal cells are protected by *Silybum marianum* and any cells not yet irreversibly damaged are stabilised. 'These now healthy cells are able to become centres for regeneration as a secondary action of silymarin on the nucleus of these cells stimulates them to produce polymerase A and therefore more protein and accelerated regeneration of liver tissue.'<sup>351</sup> A study on rats found that *Silybum* was able to protect against some of the damage caused *in utero* by maternal alcohol consumption.<sup>352</sup> Patients with alcoholic liver disease and cirrhosis may benefit from *Silybum*, as it has been shown to reduce the mortality associated with these conditions.<sup>353</sup>

The protective compounds in *Silybum* are the flavonolignans, known collectively as silymarin, which protect the liver by stabilising liver cell membranes via non-competitive inhibition of lipoxygenase.<sup>354</sup> This anti-oxidant activity prevents or reduces the capacity of toxic agents to penetrate the cell, and reduces the damage done when they do enter the cell.<sup>355</sup> Herbal products are now available with standardised doses of silymarin.

Silymarin is hepatoprotective, anti-inflammatory, and has regenerative properties, and is beneficial for the treatment of some types of hepatitis. It also increases hepatocyte protein synthesis, decreases the activity of tumour promoters and stabilises mast cells.<sup>356</sup> Silymarin exhibited significant anti-inflammatory and anti-arthritic activities via inhibition of 5-lipoxygenase for anti-inflammatory and anti-arthritic



activities in a study on rats.<sup>357</sup> A comparison of silymarin to the anti-oxidant hypocholesterolemic drug, probucol, found a parallel action in respect of the hypocholesterolemic action. However, unlike probucol, silymarin increased high-density lipoprotein (HDL) cholesterol, decreased liver cholesterol content and partially prevented decreases in the liver anti-oxidant, glutathione.<sup>358</sup>

The herb *Silybum narianum* has been shown to have an anti-oxidant action and to inhibit copper-induced oxidation of human LDL.<sup>359</sup> The anti-oxidant effects of *Silybum* extract was also tested on the differentiation and survival of cultured rat neural cells. *Silybum* enhanced nerve growth factor and prolonged their survival in culture as well as protecting rat hippocampal neurons from oxidative stress-induced cell death.<sup>360</sup>

### Use in gynaecology

*Silybum* is useful at any time that a liver dysfunction is suspected of negatively influencing gynaecological problems, such as in cases of suspected relative oestrogen excess, where hepatic breakdown of oestrogen may be impaired. It is also a gentle laxative.

### Dose

Research with silymarin suggests oral doses of 140 mg three times a day are safe and effective (this represents up to 10 ml of a 1:1 fluid extract three times a day, which may be excessively laxative).

## ***Bupleurum falcatum***

This is the most commonly used herb in Chinese medicine and is used in 80 per cent of all traditional formulas. Apart from 'bitter' effects, such as improving bile flow and excretion, increasing gastric acid levels, and peristalsis, *Bupleurum* also reduces fever, especially when associated with influenza;<sup>361</sup> and may have potential clinical value in the treatment of chronic viral infection and in the management of immunocompromised patients.<sup>362</sup> Another study in mice found that polysaccharides from *Bupleurum* stimulated lymphocytes in spleen cells.<sup>363</sup> It also has analgesic and anti-convulsant properties.<sup>364</sup>

However, one of this herb's most interesting effects is its anti-inflammatory action. The major active components in *Bupleurum*, known as saikosaponins, seem to be capable of initiating anti-inflammatory effects,<sup>365</sup> while at the same time improving the endogenous secretion of corticosteroids.<sup>366</sup> Saikosaponin-A was shown to have an inhibitory activity against allergic asthma, possibly due to both antagonism of the histamine action and inhibition of allergic mediators.<sup>367</sup>



Saikosaponin 1 and 2 exert potent *in vivo* anti-inflammatory effects on mouse-ear oedema by generating cyclooxygenase and lipoxygenase metabolites and inhibiting arachidonic acid.<sup>368</sup> One study on rats showed that the anti-inflammatory result did not occur when the adrenal glands were removed, indicating a synergistic interaction between the corticosterone produced in the body and the anti-inflammatory effect induced by the saikosaponins in *Bupleurum*.<sup>369</sup>

The combined administration of saikosaponins and corticosterone increases the anti-inflammatory effects when compared to corticosterone alone;<sup>370</sup> and in some models, the anti-inflammatory effect can be compared to prednisolone.<sup>371</sup> The traditional use of *Bupleurum*-containing formulas for a wide variety of inflammatory complaints, such as gout, rheumatoid arthritis, osteoarthritis and intercostal neuralgia, may be explained by these findings.

*Bupleurum* is also hepatoprotective against experimentally induced liver damage<sup>372</sup> and is usually combined with liquorice for complaints associated with liver disorders. The traditional indications are for right-sided upper abdominal pain and tension or resistance along the costal margin. *Bupleurum* may also be useful in the treatment of chronic kidney disorders such as nephrotic syndrome, especially in combination with Western medicine. Relapses are less frequent amongst adults with nephrotic syndrome,<sup>373</sup> and a study conducted on children over a ten-year period using a combination of prednisolone and *Bupleurum*-containing formulas led to improvements in protein loss and a reduction in cholesterol levels.<sup>374</sup>

*Bupleurum* has sedative and tranquillising effects and causes a slight decrease in blood pressure. A reduction in serum cholesterol levels is also observed. Nausea, diarrhoea or flatulence associated with prescriptions of *Bupleurum* may indicate that the dose is too high. Adjusting the dose or alternatively, adding liquorice, can help to prevent or relieve these symptoms.<sup>375</sup>

## Use in gynaecology

Traditionally, *Bupleurum* is prescribed for menstrual disorders associated with stress and worry, which culminate in amenorrhoea, irregular periods, dysmenorrhoea and PMS. For these complaints, *Bupleurum* is usually combined with *Paeonia lactiflora* and *Angelica sinensis*.

Taste is bitter, and the herb is slightly Cooling.

## Dose

Dose for gynaecological complaints is 2–3 ml, three times daily. Higher doses are needed to reduce fever.

## DIURETICS

A diuretic is any substance that increases urine output above current or normal levels. The diuretic activity of herbs has been questioned, probably because of the understandable confusion caused by those old herbals which describe any herb used in the urinary system as a diuretic. Of those herbs still used as diuretics, research has revealed variable results. Some are only effective if the patient has a diminished urine output, whereas in drug-testing programs only healthy subjects are used; others are simply weak diuretics with limited application for increasing urinary output.

A number of different methods are used to improve diuresis in the body:

- Increasing blood flow to the kidney will increase glomerular filtration rate and therefore increase urine output. Xanthine-containing herbs, including *Coffea arabica* (coffee), are examples of this. Xanthines also decrease sodium and chloride reabsorption.
- Increasing sodium and chloride excretion (salidiuretics) will lead to increased urine output. Herbs with this property include *Taraxacum officinalis* (dandelion leaf) and *Betula pendula* (birch leaf). *Juniperus* (berries) are also known to increase chloride output in rats.<sup>376</sup>
- Ingesting substances that are not well reabsorbed—for example, plants containing a high level of potassium such as dandelion leaf, corn silk, or sugars that are not metabolised such as sorbitol, mannitol and inositol—will cause an increase in osmotic pressure (osmotic diuresis).
- Ingesting substances that reduce the levels of, or interfere with, anti-diuretic hormone (for example, alcohol) will also improve diuresis.

### ***Taraxacum officinale* (Dandelion leaf)**

Young dandelion leaves add a bitter freshness to summer salads and sandwiches, and are often an ingredient in European-style salad mixes. Their vitamin A content is higher than in carrots (14 000 IU per 100 g),<sup>377</sup> which makes them a valuable addition to any diet.

Apart from its culinary advantages, dandelion leaf is a very safe and effective diuretic that, unlike most diuretics, adds to, rather than depletes, the body's stores of potassium. It is a rich source of potassium at 4.5 per cent dry weight.<sup>378</sup> The diuretic activity of dandelion has been questioned; however, the poor results seen in these experiments can be explained by poor study design—where the herb was given in one or two doses; the incorrect plant part was used (the root instead of the leaf); or it was given in sub-therapeutic doses (one-fifteenth of the usual dose).

The diuretic activity of dandelion leaf (given correctly) was compared to the drug Furosemide (Lasix) in mice and was found to be as potent, when tested over a month of daily administration.<sup>379</sup>

### Use in gynaecology

*Taraxacum* leaf assists with the symptomatic relief of fluid retention common before menstruation. It is also useful for oedema and hypertension associated with pregnancy. The rich mineral content is also beneficial—*Taraxacum* leaf contains substantial amounts of many nutrients including potassium, calcium, magnesium and iron.

### Dose

The usual dose of the dried leaf is 4–10 g by infusion (herbal tea) three times daily; of the fluid extract, 4–10 ml, three times daily; and of the fresh juice, 10–20 ml, three times daily.

Dandelion leaf is Cooling and Drying.

## ***Juniperus communis* (Juniper berries)**

*Juniperus* has been a popular diuretic, anti-rheumatic and urinary antiseptic for generations in Europe. A blood sugar-lowering effect has also been proven in animal studies,<sup>380</sup> which confirms the traditional use of *Juniperus* in diabetes mellitus.

For most of this century, *Juniperus* berries have been thought to contain an essential oil that was irritant to the kidneys and they have not been used when kidney infection or disease is a possibility. The oil of *Juniperus*, however, is not a renal irritant (in rats).<sup>381</sup> Adulteration with needles, branches and unripe berries (berries take 2–3 years to ripen) during distillation has been suggested as the cause for the higher levels of the urinary irritants a and b pinene, which may have led to the unfair dismissal of this herb as dangerous.

### Use in gynaecology

*Juniperus* has a reputation as a fertility control agent<sup>382</sup>—which has been confirmed, at least in rats.<sup>383</sup> Its main mode of action is to prevent implantation of the fertilised ovum at doses between 300–500 mg per kg; however, an abortifacient action has also been confirmed.<sup>384</sup> This herb should not be used in pregnancy by the untrained and should be used very cautiously in large doses for any complaint. The injudicious use of juniper oil has caused death and the oil is therefore unavailable.

The mild diuretic activity of *Juniperus* makes it a suitable premenstrual remedy which is particularly suited to women who develop urinary irritation or symptoms of low-grade urinary tract infections prior to their period. The mild emmenagogic activity can also be useful to bring on a delayed period caused by hormonal irregularities, especially when associated with discomfort and bloating. However, the appropriate treatment of the cause of the hormone imbalance should always be given priority.

A recent in vitro study found that two constituents from *Juniperus* spp. exhibited effective anti-tumour activities in cervical carcinoma and human ovarian carcinoma cell lines.<sup>385</sup>

## Dose

*Juniperus* is Warm and Dry and is given in doses of 5 g of dried berries, two or three times daily as an infusion; or 2–4 ml of the fluid extract, three times daily. Juniper should not be used in the first trimester of pregnancy, and the daily dose should not exceed 3 g or 6 ml.

## ***Equisetum arvense* (Horsetail)**

*Equisetum* is a very primitive plant that makes an excellent diuretic with haemostatic, astringent and antiseptic effects. Of note is its high silica content (1.2–6.9 per cent), which may be extracted in hot water by simmering for around three hours over a low heat. For use as a diuretic, a simple infusion is all that is needed to extract the saponins that are the likely active ingredients.

Traditionally, *Equisetum* has been used for urethritis, cystitis with haematuria, enuresis and incontinence.<sup>386</sup> Mild kidney infections, urinary gravel and recurrent stones also respond to *Equisetum*, and the therapeutic effect is aided by both its diuretic and antimicrobial properties. In the case of kidney stones, it has been suggested that the mucous membranes lining the urinary tract are protected from bacterial attack by *Equisetum*. This in turn aids the excretion of microscopic stones because they are less able to adhere to healthy epithelium.<sup>387</sup>

Other properties include a proposed connective tissue strengthening ability and a haemostatic action which is not due to vasoconstriction, and has no effect on blood pressure.<sup>388</sup> An anti-inflammatory action has also been identified which is related to the inhibition of an enzyme in the prostaglandins cascade (prostaglandin synthetase).<sup>389</sup> This may explain the traditional use of *Equisetum* for conditions associated with inflammation and swelling such as rheumatoid arthritis.<sup>390</sup>

Although many of the actions of *Equisetum* were once attributed to its high silica content, it now seems likely that the flavonoids and saponins are responsible for most of the therapeutic effects.<sup>391</sup> *Equisetum* contains

anti-thiamine factors which should be noted before embarking on long-term therapy.<sup>392</sup>

### Use in gynaecology

*Equisetum* is safe, gentle and well tolerated, even at high doses and during long-term use. It is indicated for heavy menstruation, especially when accompanied by premenstrual fluid retention. It can be given throughout the cycle and not just during or prior to menstruation, and is a useful herb for any age group, although some say it is better suited to peri-menopausal women.<sup>393</sup>

The positive effects on menorrhagia seen with *Equisetum* may be due to the inhibition of prostaglandin synthetase<sup>394</sup> since it has been shown that an altered PGF 2 $\alpha$ :PGE 2 ratio can be associated with excessive menstrual loss.<sup>395</sup> This is only speculative, since no research has ever been undertaken. *Equisetum* also contains the flavonoid luteolin (said to be found only in American and Asian plants),<sup>396</sup> which has been shown to have an affinity for oestrogen-binding sites in the rat uterus.<sup>397</sup> The significance of this in uterine bleeding is unclear.

### Dose

*Equisetum* is Cold and Dry and given in doses of between 1–4 g as a decoction (see above); or between 2–4 ml of the fluid extract, two to three times daily.

## HERBS FOR INFECTION CONTROL

Herbalists are not solely interested in killing bacteria or fungi as their primary way of controlling infection, and the herbs used for infection control do not behave like conventional antibiotics. Instead, the focus of treatment is on the person with the infection—their immune responses and natural defences. As such, many herbs improve the resistance to infections generally and non-specifically, and while they might have an antiseptic effect, this is seen as a bonus rather than their primary mode of action.

Of course, some infections are so extreme that antibiotics are necessary to save lives or prevent serious complications. Many infections, however, are trivial, while others, although more serious, are not life-threatening, and have nuisance value rather than causing grave harm to health and well-being. Included in this latter group are colds and flus, sinusitis, sore throats and low-grade vaginal infections. It is to these types of infections that the herbs in this section are directed.

## ***Echinacea* species**

*Echinacea* is one of the best-known medicinal plants used in the West for infection control. In Germany, for example, over 10 million units of various *Echinacea* products are sold annually, and an enormous weight of evidence suggests a high degree of safety and very low toxicity. A range of *Echinacea* preparations have been found to have immuno-stimulatory, anti-inflammatory, free radical-scavenging and anti-oxidant properties.<sup>398</sup> A recent open prospective study suggested that *Echinacea* might be effective in reducing chemotherapy-induced leucopenia.<sup>399</sup>

*Echinacea* can be invaluable as part of a long-term therapy to reduce susceptibility to and symptoms of various infections such as colds and influenza,<sup>400</sup> asthma and other inflammatory processes.<sup>401</sup> The three main *Echinacea* species have exhibited immune-enhancing activity in experimental models,<sup>402</sup> including the stimulation of phagocytic activity.<sup>403</sup>

A number of trials have examined the efficacy of *Echinacea* in the treatment of the common cold. Recent review articles have found that the majority of the available studies report positive results and good safety and tolerability.<sup>404</sup> For example, the median time of illness was six days for *Echinacea* compared to nine days in the placebo group for common cold symptoms.<sup>405</sup> Another large, randomised, double-blind, placebo-controlled study investigated the efficacy and safety of different doses and preparations of *Echinacea purpurea* for the common cold and found most preparations were effective in symptomatic treatment and all treatments were well tolerated, with adverse events not higher than placebo.<sup>406</sup> Treatment with *Echinacea* tea at early onset of cold or flu symptoms was found to be more effective for relieving cold symptoms in a shorter period of time than with placebo.<sup>407</sup> A combination of *Echinacea*, *Baptisia* and *Thuja* was found to be effective and safe, with a rapid onset of improvement of cold symptoms, especially when administration of the herbal remedy was commenced as soon as practical after the occurrence of the initial symptoms.<sup>408</sup> A product containing



*Echinacea purpurea* and *Glycyrrhiza glabra* demonstrated immunostimulating potential, both *in vitro* and *in vivo*, and a synergistic action was thought to potentiate the effects.<sup>409</sup> Other studies have shown no benefit from *Echinacea*, however. Treatment with fluid extract of *Echinacea* did not significantly decrease the incidence, duration or severity of colds and respiratory infections compared to placebo in one study,<sup>410</sup> and there was no statistically significant benefit over placebo for Echinaforce in the treatment of frequently recurrent genital herpes in another.<sup>411</sup>

Traditionally, *Echinacea* has been used for recurrent infections, colds and flus, boils and snake-bite. The Native American use of *Echinacea* for snake-bite has been supported in part by modern research showing anti-hyaluronidase activity.<sup>412</sup> (Hyaluronidase is a substance in snake venom that enhances the spread of venom by loosening the 'glue' (hyaluronic acid) between the cells, allowing the venom to spread widely throughout the system.) This same activity makes the topical application of *Echinacea* useful for preventing the spread of bacteria and viruses into damaged flesh.

A number of reports have suggested that *Echinacea* use is associated with an increased risk of allergy. This has been demonstrated in a small number of atopic patients and in some cases the allergic reactions were thought to be due to a cross-reactivity between *Echinacea* and other environmental allergens.<sup>413</sup>

## Use in gynaecology

*Echinacea* is a useful herb for the prevention of those chronic recurrent infections which occur in the premenstrual phase, such as recurrent sinusitis, genital herpes, acne and colds. It is also a useful adjunct to the treatment of pelvic inflammatory disease and can also be useful in the control of some of the common vaginal infections, in conjunction with other (often topical) treatments.

A retrospective study on 206 women who used *Echinacea* products during pregnancy found that gestational use of *Echinacea* during organogenesis (first trimester) is not associated with an increased risk for major malformations.<sup>414</sup>

## Dose

The dose of *Echinacea* can vary from between 1–5 ml, one to four times daily. In general, higher and more frequent doses are used in acute infections, while lower doses are indicated for prevention of infection. *Echinacea* is Cool and Dry.

## ***Hydrastis canadensis* (Golden seal)**

*Hydrastis* has high levels of the antimicrobial alkaloid berberine, as well as a number of other alkaloids. It has a well-founded reputation as the major herb for inflammatory, infective or catarrhal conditions of the mucous membranes, and is a major herb for the treatment of digestive underactivity.

Its considerable antibiotic qualities are manifest against organisms as diverse as *Staphylococcus aureus* (golden staph), *Shigella boydii* (dysentery), *Candida albicans* (thrush) and *Mycobacterium tuberculosis* (TB).<sup>415</sup> *Hydrastis* also increases immune responses by increasing the activity of macrophages.<sup>416</sup> A later study of *Hydrastis* confirmed antibacterial activity against six strains of micro-organisms including *Staphylococcus aureus*, *Streptococcus* spp. and *E coli*.<sup>417</sup> *Hydrastis* also increased the primary IgM response during the first two weeks of treatment, suggesting the herb might enhance immune function by increasing antigen-specific immunoglobulin production.<sup>418</sup>

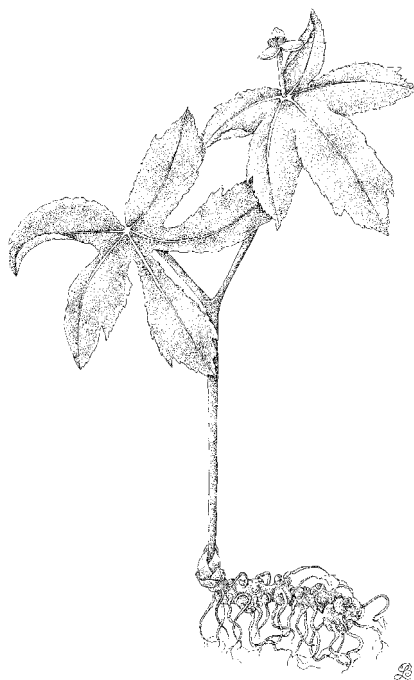
### **Use in gynaecology**

*Hydrastis* is a useful haemostatic herb which is also oxytocic. Its main effect on excessive bleeding is believed to be due to its effect on the capillaries, although the improvement of uterine tone also slows bleeding. *Hydrastis* is commonly used with other herbs in a mix for menorrhagia, particularly the tonics and tannin-containing herbs such as *Achillea millefolium*, *Trillium erectum* and *Geranium maculatum*.

It is bitter and Cold and is useful for infections associated with Heat, with signs of yellow discharge and fever. Its considerable antimicrobial qualities make *Hydrastis* useful for topical application for a host of gynaecological infections—for example, as a component of vaginal suppositories for the treatment of candidiasis, trichomonas and gardnerella.

### **Dose**

The daily dose is between 0.5–2 ml, three times daily. *Hydrastis* is currently endangered due to extensive harvesting of wild





plants and its use should be restricted until commercial crops are established.

## ***Calendula officinalis* (Marigold)**

Extracts of the flowers of the *Calendula* (sometimes called pot marigold) have long been known to have topical anti-inflammatory and wound-healing activity,<sup>419</sup> as well as anti-tumour activity.<sup>420</sup> Like *Echinacea*, *Calendula* has been found to possess immuno-stimulating polysaccharides,<sup>421</sup> however, these are probably not active once ingested.

*Calendula* has an antimicrobial effect and is used to treat bacteria, viruses and fungal infections of the upper gastrointestinal tract and upper respiratory tract. *Calendula* is also used in the treatment of gastric ulcers and a protective effect on the mucus membranes has been noted.<sup>422</sup> The plant extracts from *Calendula*, *Arctium* and *Geranium* were combined with acyclovir to treat 52 patients suffering herpes lesions. The combination yielded better results, with faster healing of ulceration, than with acyclovir alone.<sup>423</sup>

Applied topically, the combination of antiseptic, astringent and wound-healing qualities make it the herb of choice for the first-aid treatment of cuts, abrasions and sores.

### **Use in gynaecology**

*Calendula* can be taken internally for the treatment of excessive menstrual flow and seems to play a role in bringing on late periods. It is also a circulatory stimulant and reduces pelvic congestion, effects which when combined with its antimicrobial effects make *Calendula* ideal for pelvic infections and inflammation. It also has a reputation as a mild antispasmodic.<sup>424</sup>

*Calendula* can be applied locally as a wash, douche or lotion, or made into a vaginal pessary for the treatment of candidiasis (thrush), trichomonas, and gardnerella infections. Infused oils of *Calendula* and *Hypericum* are traditionally used



to improve wound healing, and this effect was tested on caesarean section wounds. Healing was significantly better in the group of patients treated with a *Hypericum-Calendula* mixture.<sup>425</sup>

### Dose

*Calendula* is bitter and Cold. It is prescribed as dried flowers, 1–4 g, three times daily as a tea; as a tincture (1:5) up to 1 ml, three times daily; or up to 2.5 ml, three times daily as a fluid extract.

## ***Thuja occidentalis***

*Thuja*, also known as *Arbor vitae* or tree of life, has been a popular immune stimulant in Europe for many years.<sup>426</sup> There, it is widely available in a preparation called Esberitox, which also contains *Baptisia tinctoria* and *Echinacea purpurea*.

*Thuja* has been shown to stimulate the first phase of phagocytosis,<sup>427</sup> but unlike *Echinacea* (which stimulates later phases of phagocytosis), *Thuja* also improves the ability of lymphocytes (NK cells) to recognise and kill virally-infected T cells.<sup>428</sup> It also has antiviral activity against a range of other viral families.<sup>429</sup> Thus, *Thuja* is useful in the treatment of simple and genital warts, either taken orally or applied locally. It is also used in the treatment of most common colds, acute conjunctivitis, hepatitis A and upper respiratory conditions.

### Use in gynaecology

*Thuja* was used by the native inhabitants of the northern Americas as part of a treatment for uterine cancer, and has maintained a reputation for being useful in treating tissue growths such as nasal and uterine polyps.

*Thuja* has an emmenagogic action which means that it must not be used in pregnancy or while breastfeeding due to the presence of thujone in the plant; however, the same activity can be used to help bring on late periods when the reason for the lateness has been appropriately investigated.

### Dose

It is important that the recommended dose not be exceeded. Dried herb: 1–2 g or by infusion; fluid extract: (1:1) 2 ml daily; tincture: (dried plant 1:5) 1 ml; tincture: (fresh plant 1:5) 2 ml daily. All doses are for three times daily administration.

## ***Melaleuca alternifolia* (Tea-tree oil)**

Tea-tree oil is extracted from a shrub native to northern New South Wales. The essential oil is a powerful bactericidal and has broad-spectrum antimicrobial activity and fungicidal activity against many infective agents, including *Staphylococcus aureus* and *candidiasis*.<sup>430</sup> It has also been shown to exhibit antibacterial and antiviral activity against skin infections such as acne, herpes and scabies.<sup>431</sup> Recent research also suggests anti-inflammatory properties for tea-tree oil through the suppression of inflammatory mediators.<sup>432</sup>

It is a superb first-aid topical antiseptic; however, it is best diluted because it can be irritating if applied as the pure oil. A cream or olive oil base is commonly used.

A randomised, double-blind, placebo-controlled study examined the efficacy of tea-tree oil on superficial fungal infection of the nail. After sixteen weeks, 80 per cent of patients using medicated cream were cured, as opposed to none in the placebo group. Four patients in the active treatment group experienced subjective mild inflammation without discontinuing treatment. During follow-up, no relapse occurred in cured patients and no improvement was seen in medication-resistant and placebo participants.<sup>433</sup>

### **Use in gynaecology**

May be included in vaginal suppositories for the treatment of thrush, trichomonas infections and gardnerella. It should not be taken internally.

# 20

## Drugs and surgery

### Key words

adenoma	gonadotrophin-releasing hormone
adenomyosis	HDL cholesterol
adhesions	hormone replacement therapy (HRT)
amenorrhoea	hyperprolactinaemia
androgenising drug	medroxyprogesterone
anti-oestrogen	melasma
chloasma	norethisterone
conjugated oestrogens	progestogen
danazol	prostaglandins
dydrogesterone	testosterone
ethinyl oestradiol	thromboembolism
fibroadenoma	

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Not many of us relish the idea of having surgery or taking drugs, but sometimes they are necessary to adequately treat some gynaecological complaints or when natural therapies do not work effectively enough on others. The major drugs and surgical procedures mentioned in the previous sections are discussed in more detail in this part of the book.

Some natural therapies can help with preparation for, or recovery from, surgery. It is also possible to take vitamins, minerals or herbs to offset the side-effects of some drugs or to improve their effectiveness.

# DRUGS

## Hormonal contraceptives

### Combined oral contraceptives

The Pill is available in monophasic, biphasic and triphasic preparations. Each of the tablets in the monophasic Pills (Brevinor, Microgynon) have the same dose of oestrogen and progestogen. They are sometimes used 'back to back'—that is, without a break for a menstrual bleed—for women with conditions such as severe migraines, menorrhagia or endometriosis. Biphasic (Biphasil) and triphasic (Triphasil, Triquilar and Logynon) Pills have varying amounts of oestrogen and progestogen throughout the cycle to follow the pattern of the secretion of endogenous hormones. In the biphasic regimens, the dose of oestrogen is constant, but the dose of progestogen is increased in the second half of the cycle. The oestrogen in the triphasic Pill is increased mid-cycle to prevent breakthrough bleeding and the progestogen is increased incrementally throughout the (Pill) cycle. Some Pills contain androgen-blocking agents (Diane, Brenda) and are used for acne and excessive male-pattern hair growth. A lot of factors need to be considered when prescribing oral contraceptives, and a doctor or gynaecologist skilled in this area should be consulted if difficulties are experienced.

When taken correctly, the Pill is an effective contraceptive, but other benefits are less obvious to all but the researcher and scientist because they are largely related to prevention of conditions and are almost entirely determined by epidemiological studies. They include a reduced rate of ovarian and endometrial cancer, benign breast disease, benign ovarian cysts, pelvic inflammatory disease, period pain, reduced menstrual blood loss and anaemia.<sup>1</sup>

Today's low-dose oral contraceptives are much safer than the earlier, higher-dose Pills. Usually these Pills contain 30–35 mcg of ethynyl-oestradiol (older and high-dose Pills contain 50 mcg). The side-effects of oral contraceptives are well known and can include venous thromboembolism (blood clots), stroke and heart attack. The risk is small<sup>2</sup> except for Pill users who also smoke. Menstrual changes such as breakthrough bleeding or spotting can occur, and some women experience androgenic effects, including weight gain and acne, which are associated with the progestogen (synthetic progesterone) component of the Pill.<sup>3</sup> One per cent of women develop post-Pill amenorrhoea during the first twelve months after cessation of the Pill.<sup>4</sup> Amenorrhoea in women who have taken the Pill is thought to be no more common than amenorrhoea seen in the general population.<sup>5</sup> Breast cancer risk with long-term use of the Pill has been shown to be negligible.<sup>6</sup> Some women also report an increase in mood swings, depression and decreased libido while on the Pill.

These negative symptoms are more common when a woman first starts the Pill and may settle after two cycles, or they may necessitate a change to a different brand. For this reason doctors usually advise waiting for two months before trying a new Pill. Pills which contain high oestrogen levels are more likely to be associated with depression—this can be reduced by taking a lower dose of oestrogen (30–35 mg)<sup>7</sup> and/or taking 50–100 mg vitamin B<sub>6</sub> at the same time.<sup>8</sup>

Apart from its use as a contraceptive, the Pill can be prescribed for menorrhagia. It usually reduces bleeding by thinning the endometrial lining. The Pill can also be used for dysmenorrhoea, especially when a contraceptive is needed as well, or when prostaglandin inhibitors have not helped. The Pill improves dysmenorrhoea about 90 per cent of the time by preventing ovulation and reducing the production of the series 2 prostaglandins which cause muscle spasm.

The Pill improves PMS symptoms in some women, has no effect in others and makes some women worse. It is difficult to predict which women will respond well, although women eighteen years and less experienced much more tearfulness on the Pill in one study.<sup>9</sup> When effective, the Pill is believed to control the symptoms of PMS by superimposing a more balanced hormonal profile. Taking a monophasic Pill is the most suitable option for women who experience PMS.<sup>10</sup> The biphasic and triphasic Pills, which simulate the hormonal changes of the menstrual cycle, can tend to be associated with an increased incidence of PMS in some women.

Pill regimes have been used to control the symptoms of premenstrual breast soreness and lumpiness. The rationale for these prescriptions is based on the observation that women on the Pill have a lower incidence of cyclic breast complaints including fibroadenoma and adenoma. Pills containing low doses of ethinyl oestradiol and relatively potent progestogens (such as norethindrone acetate) are recommended. The ethinyl oestradiol reduces ovarian oestrogen secretion while the effects of oestrogens in breast tissue are modulated by the progestogen. Improvement is noted in up to 90 per cent of women, especially when oestrogen levels in the Pill are low.<sup>11</sup> Some doctors recommend that women 40 and over, or women with abnormal HDL:LDL cholesterol ratios should take 400–1200 IU vitamin E while on this regime to prevent progestogen-induced reduction in HDL and increase in LDL.<sup>12</sup>

Taking the Pill reduces the menstrual fluid volume and the risk of developing endometriosis.<sup>13</sup> The latest contraceptive pills have much lower levels of oestrogen and seem to reduce the amount of both normal endometrium *and* the amount of endometriosis. This is particularly the case when the Pill is used continuously (without a break for 'periods') to create a pseudo-pregnancy state.<sup>14</sup> The Pill compares favourably with other drug regimes for endometriosis that have more serious side-effects such as a decrease in bone density.<sup>15</sup>

However, the Pill is not as effective for advanced endometriosis and

is not suitable for women who want to become pregnant. In one study, most women had a return of symptoms within six months of stopping the Pill.<sup>16</sup> The pregnancy rate of women who have endometriosis is also low following the use of the Pill, suggesting that the Pill does not influence the severity of the endometriosis.<sup>17</sup>

All the oral contraceptives can *potentially* increase the size of fibroids because of the oestrogen component; however, it has been shown that fibroids do not necessarily increase in size when women take the Pill, that menstrual blood loss reduces significantly and that blood-iron levels increase.<sup>18</sup> A woman with fibroids should discuss the risks and benefits of oral contraceptives in her particular case with her doctor.

Significant numbers of different drugs interact with the Pill. These include some anti-epileptic drugs, some antibiotics and possibly the anti-fungal medication, Griseofulvin, which can all decrease the contraceptive effect of the Pill. Some drugs are cleared more slowly from the body when women are on the Pill. Theophylline, the anti-asthma drug, is one of these.

Paracetamol-containing painkillers, such as Panadol, reduce the metabolism and excretion rate of the Pill, leading to higher oestrogen levels than required for contraception. Women on thyroxine may need to increase their dose if they are also prescribed the Pill. Some sedatives, tranquillisers and anti-depressant drugs may not work as well; others show increased availability, such as the tri-cyclic anti-depressants Tofranil and Melipramine.<sup>19</sup> Women on the Pill should consult their doctor or pharmacist about the relevance of these and other possible drug interactions.

The Pill can cause increased pigmentation of the skin, which is known as chloasma or melasma. This usually occurs on the face and becomes much darker with exposure to the sun. It is thought to be caused by oestrogen and can occur in pregnancy, or sometimes when women are neither pregnant nor on the Pill. Stopping the Pill does not necessarily mean that it will go away completely, although it does tend to fade. Sunblock is necessary, and skin creams or peels that contain glycolic acid can lighten the pigmentation. Dermatologists sometimes recommend creams containing hydroquinone or the acne treatment, isotretinoin (Roaccutane), when the condition is severe.

Symptoms or conditions which indicate that the Pill should be stopped immediately include blood clots, high blood pressure or serious headaches. Women who smoke should not take the Pill because of an increased risk of developing these complaints. Doctors do not usually treat post-Pill amenorrhoea until a pregnancy is desired, when they will prescribe fertility drugs like Clomid. Until this time, the usual medical recommendation is for the woman to go back on the Pill to maintain her bone density.

Combined Pills containing oestrogen and progestogen influence a

number of nutrients, some positively, others negatively. Requirements for vitamins B<sub>2</sub>, B<sub>3</sub>, B<sub>6</sub>, folic acid and zinc increase, but the need for iron is reduced because of the smaller blood loss during the period. Calcium is retained in the bones more effectively when women take the Pill, but this does not indicate a lower requirement because most women do not get enough calcium in their diet anyway.

Blood levels of vitamin A increase while taking the Pill and so vitamin A supplements (including cod liver oil), should not be taken with the Pill. The absorption of beta-carotene (the precursor to vitamin A) from food, however, may be lower and so it is wise to eat plenty of orange or yellow vegetables such as carrots, pumpkin and sweet potato.

The serum copper level increases on the Pill and may be partly responsible for the mood changes. High copper levels can lead to a zinc deficiency and zinc supplements may be necessary, especially for vegetarians and vegans. Information on zinc is included in Chapter 7 'Adolescence'. The usual dose of zinc is 15–30 mg per day.

Side-effects, including mood changes and bloating, are often associated with the progestogen component of the Pill. Taking vitamin B<sub>6</sub> 50–100 mg or a B complex with 50 mg of B<sub>6</sub> in the week before the period can reduce these symptoms. Herbal diuretics, especially dandelion leaf tea, can help with fluid retention symptoms. One or two teaspoons per cup twice daily (but not before bed!) is the usual dose. Many women also report that evening primrose oil (between 1000 and 3000 mg per day) is useful for many of the symptoms they experience while taking the Pill.

The risk of deep vein thrombosis (DVT) is higher when women on the Pill undergo extended periods of physical confinement such as air travel or prolonged bed rest. When a long trip is contemplated, extra precautions should be taken to reduce risk of thromboembolic events. These include taking ginger at doses of 500 mg three times daily and vitamin E 500 IU daily for several weeks before and a week after travel.

Women who smoke and take the Pill may reduce their risk of blood clot formation if they take 500 IU of vitamin E every day. It is not advisable for women who have a pre-existing heart condition or high blood pressure to self-prescribe vitamin E and they should consult a practitioner first.

## Progestogen-only contraceptives

Progestogen-only contraceptives are available as tablets (levonorgestrel or norethisterone); injection—Depot (medroxyprogesterone acetate); and progestogen-releasing intrauterine contraceptive devices (levonorgestrel). The progestogens suppress the LH pulsatile release and inhibit ovulation. Progestogens also thicken the cervical mucus, making sperm transport difficult, and thin the endometrium so that implantation cannot occur.



These Pills, often referred to as Mini Pills, are often used when women are breastfeeding, or when there is a prior history of thromboembolism. The progestogen-releasing IUD is a useful option for women with menorrhagia who also need contraception.

Injected progestogens are indicated when there are problems with poor compliance or when gastrointestinal problems interfere with absorption of oral preparations. Depo-Provera is an injectable form of medroxyprogesterone acetate and is used as a long-term contraceptive. It can cause a number of side-effects, including prolonged episodes of menstrual irregularity and heavy bleeding, or alternatively amenorrhoea can persist for many months after cessation of the drug. A recent study indicating this type of contraceptive has adverse effects on bone density raises questions about its suitability for young women requiring contraception.<sup>20</sup>

## The progestogens

Progestogens suppress endometrial proliferation and produce secretory endometrium in the second half of the menstrual cycle if there has been prior oestrogenic stimulation. Accepted medical indications for progestogen use are as a component of the Pill or HRT; in the management of endometriosis; for the treatment of dysfunctional uterine bleeding, and to prevent or treat endometrial hyperplasia. Different types of progestogens are prescribed according to the type of complaint. Other factors may need to be taken into account, such as the androgenic capacity of a particular progestogen.

Cyproterone acetate is a progestogenic anti-androgen and is used when acne and excess hair growth are considerations. It can be used with oestrogen in the Pill (Diane, Brenda) as a contraceptive, and is also available for menopausal women in some types of HRT preparations (Climen) to prevent hirsutism. Dydrogesterone, hydroxyprogesterone and medroxyprogesterone (Provera) are progestogens that have few androgenic effects and also have less effect on lipids than the more androgenic progestogens. This makes them suitable for contraceptive purposes, especially where there is evidence of increased risk of thromboembolic events (such as among smokers), and for women using HRT post-menopause. The progestogens with the most pronounced androgenic effects are levonorgestrel, norgestrel and norethisterone.

The third-generation progestogens, gestodene, desogestrel and etonorgestrel, are included in some combined oral contraceptives. These progestogens have less androgenic activity and are less likely to cause acne, weight gain and hirsutism. Gestodene and desogestrel have approximately double the tendency to cause venous thromboembolism than levonorgestrel, perhaps because they are often prescribed to older

women. They are rarely used as the first choice of oral contraceptive for this reason.

Progestogens can cause symptoms of nausea, bloating, acne, breast tenderness, weight gain and mood changes which may be related to the androgenising (male hormone) effects of the drugs.

Progestogens are commonly prescribed for heavy periods and dysfunctional uterine bleeding, even though many women who have these problems do not have irregularities in progesterone production.<sup>21</sup> The progestogens cause complete shedding of the endometrium when the medication is stopped. This often corrects the abnormal bleeding.

These drugs need to be given for about 21 days—usually from day five to day 25 of the menstrual cycle. They are usually prescribed for between one and three menstrual cycles, but sometimes longer administration is needed. The androgen-like side-effects and blood lipid abnormalities associated with Primolut N and the norethisterones restrict their use to no more than 6–12 months.

An alternative treatment for menorrhagia is the levonorgestrel-releasing IUD (Mirena). This type of direct delivery of a progestogen causes the endometrium to shrink after about three months' use, and many women report very light periods, spotting or amenorrhoea.<sup>22</sup> The IUD is also a contraceptive device and is sometimes suggested as the progestogen component of HRT when women have difficulties with oral progestogens.

Provera can be used to treat premenstrual breast pain. It is usually prescribed between day five to 25 to modulate the effects of oestrogen on breast tissue and to suppress pituitary-ovarian function. Although up to 80 per cent of women improve on Provera, many experience an initial worsening of their symptoms and up to 40 per cent will relapse after stopping the drug.

Provera and Duphaston (dydrogesterone) are the common progestogens used for endometriosis. These preparations can be given in the last part of the cycle, but are usually given continuously to create a pregnancy-like state with no period. About 30 per cent of women are troubled by spotting and breakthrough bleeding until the drug starts to work or the dose is adjusted. These drugs are relatively inexpensive (compared to some of the others used for endometriosis) and can give significant pain relief without serious long-term side effects.

On the downside, Duphaston can cause unpleasant side-effects including increased hirsutism, mood changes and a deeper voice. Fertility is not improved after using either of the progestogens. The return to a regular cycle may be delayed for many months and endometriosis may return after progestogen therapy.

Progestogens are necessary for menopausal women taking oestrogens who have not had a hysterectomy. They are given continuously at a low dose to cause endometrial thinning, or intermittently at higher doses to induce endometrial shedding. Provera (medroxyprogesterone acetate)

10 mg is commonly used and is prescribed for ten to twelve days each month. Alternatively, lower doses of between 2.5–5 mg are given continually to shrink the endometrium and protect it from the over-stimulatory effects of oestrogen.

When side-effects from progestogens are a problem, the B vitamins, herbal diuretics or evening primrose oil can sometimes reduce symptoms. Some women using progestogen as a component of HRT stop the drug if they develop symptoms, or alternatively use wild yam creams as a substitute. This is an extremely risky practice and will substantially increase the risk of oestrogen-induced endometrial cancer. Wild yam cream (see pages 415–16) is not progesterogenic and will not protect the endometrium against these adverse effects. These women would be advised to either stop the HRT entirely or to speak to their doctor about a suitable alternative.

### Danazol (Danoncrine)

Danazol is another progestogen which can cause pronounced androgenic effects such as male-pattern hair growth, deepening of the voice, weight gain, acne, and changes to the sexual organs such as atrophy of breast tissue, and hypertrophy of the clitoris. Severe and life-threatening strokes or thromboembolism, and increased intracranial pressure have also been reported with the use of danazol. Long-term use may cause serious toxicity including jaundice and hepatitis.<sup>23</sup> Some women find it also causes severe mood changes and symptoms like premenstrual syndrome.

This drug needs to be carefully prescribed after due consideration of the risks and benefits for each woman. For endometriosis, danazol is prescribed in high doses (between 200–800 mg per day) to stop ovulation, suppress the period and cause the endometrium (both inside and outside the uterus) to shrink. Spotting can be a problem and is usually managed with a change in dose. Danazol improves period pain and other pelvic pain, seems to have beneficial effects on the immune abnormalities of endometriosis,<sup>24</sup> is better than other progestogens in improving fertility, and does not have an adverse effect on bone density.

This progestogen can also be used on a daily basis to suppress ovulation for the treatment of breast pain<sup>25</sup> and to improve lethargy, anxiety and increased appetite associated with PMS.<sup>26</sup> For these conditions, it is used at doses of around 200 mg which cause less side-effects and tend not to stop the period. This is generally an unpopular treatment because the side-effects are unacceptable; however, some women with PMS reported a reduction in breast pain, fatigue, food cravings and anxiety. Doses of around 200 mg for two to four months have been trialled for benign breast disorders and have led to a reduction in pain and lumpiness in 70 per cent of women.<sup>27</sup> Recurrence of symptoms was observed in between 6–10 per cent of another group of women who

were followed for four years.<sup>28</sup> There has been some success using danazol during the second half of the cycle only for premenstrual breast pain.<sup>29</sup> This regime does not stop ovulation and the exact mechanism involved is unknown.

Danazol is sometimes used when abnormal bleeding has not responded to other treatments, but usually only when surgery is undesirable or not indicated, or when there are long waiting lists for hysterectomy. The dose is between 200–400 mg daily.

Side-effects from danazol are difficult to control, especially at the higher doses required for the treatment of endometriosis. However, trying the supplements suggested for the Pill can sometimes alleviate unpleasant symptoms.

## **Hormone replacement therapy (HRT)**

The accepted medical indications for HRT are for the short-term treatment of hot flushes and vaginal dryness, and for women who have established osteoporosis. HRT is no longer recommended as a long-term *preventative* treatment for heart disease and osteoporosis in healthy women since the release of two studies in July 2002 showing more harm than good from ‘continuous’ oestrogen and progestogen,<sup>30</sup> and an increased risk of ovarian cancer among long-term use of oestrogen replacement.<sup>31</sup> A hoped-for benefit in reducing risk of Alzheimer’s disease or improving cognitive function has also not eventuated, and preventative HRT for these disorders is similarly not recommended.

The Women’s Health Initiative study (WHI) was a long-term study designed to evaluate risks and benefits of HRT when taken by *post-menopausal* women to prevent coronary heart disease, hip fracture and other conditions. The study did not set out to investigate the effects of HRT being used in peri-menopause and recently menopausal women to treat symptoms experienced at the time of menopause. As a result, two-thirds of the women were over 60 and many were overweight. Fifty per cent were previous or current cigarette smokers when they entered the study, and about 30 per cent had received treatment for high blood pressure. More than 10 per cent had raised cholesterol levels and were being treated with medication.

The biggest increase in disease risk seen amongst the women taking HRT was in the cardiovascular system. For every 100 000 women taking continuous HRT for one year, there were seven more cases of heart disease, eight more cases of stroke and eight more cases of pulmonary embolus or deep venous thrombosis (DVT) than in women not on this medication. The age and health profile of the women on the trial means that these statistics probably cannot be extrapolated to the entire HRT-taking community. The other risk seen with HRT was an increase in invasive breast cancer, with eight more cases per 100 000 women

taking HRT over those not taking HRT. On the positive side, there were five fewer cases of hip fracture and six fewer cases of bowel cancer, but when the overall risk of disease outweighed the observed benefits, the trial was stopped early, just over five years after it was started.

Since the release of the WHI study findings there has been considerable confusion amongst women over what these findings mean for them. The use of HRT for an individual needs to be assessed in the light of their particular background risk of developing either heart disease, breast cancer or osteoporosis, all of which increase with age. The physical, inherited and other characteristics that increase an individual's risk of developing these conditions are summarised in Table 20.1 'Factors associated with increased risk of breast cancer' (page 516) and Table 20.2 'Factors associated with increased risk of cardiovascular disease' (page 518). (Table 9.8 'Osteoporosis questionnaire' appears on page 201.)

Since the risk of breast cancer increases with both age and duration of use, younger women (50 and under) who take HRT for less than five years have a relatively low increase in breast cancer risk above women not taking HRT. As a woman ages, however, this risk changes, and women over 55 who have no compelling reason to be on HRT should cease medication. The picture with cardiovascular risk is somewhat different because risks of heart attack, emboli and stroke increase soon after commencing HRT, and in the WHI study, this risk remained higher for the duration of the trial.

## **Types of HRT**

HRT can be given as an oral medication of oestrogen with or without progesterone, as an oestrogen-impregnated patch, as a vaginal cream or pessary, or as an oestrogen (and sometimes testosterone) implant.

### **Oestrogen only**

Women who have had a hysterectomy can use oestrogen replacement without taking progestogens for endometrial protection. A woman who has an intact uterus will need to take progestogens either continuously at a small dose to cause endometrial atrophy, or cyclically at a higher dose, to simulate the protective effect of cyclic endometrial shedding.

The types of oestrogens available are the natural oestrogens (oestradiol, oestriol or oestrone), synthetic oestrogens (dienoestrol, ethinyloestradiol), and conjugated equine oestrogens (Premarin). The natural oestrogens are favoured over the synthetic versions because they cause fewer liver-related side-effects, they are metabolised quickly, exert weaker oestrogenic effects, and are less likely to cause problems with long-term use.

## Tablets

Oestrogen in tablet form is recommended for menopausal symptoms such as hot flushes and may be suggested to prevent or treat osteoporosis.

- Premarin: a conjugated form of oestrogen synthesised from pregnant mares' urine.  
Dose range: 0.3–1.25 mg daily.
- Proginova: oestradiol valerate. This oestrogen is fairly rapidly metabolised and excreted, with less adverse affect on the liver than some other forms of oestrogen.  
Dose range: 1.0 mg–4.0 mg daily.
- Estrofem: micronised oestradiol. This is one of the natural oestrogens and is available as 1 mg, 2 mg and 4 mg tablets.  
Dose range: 1 mg–4 mg.
- Zumenon: micronised oestradiol. Available only as a 2 mg tablet.  
Dose: 2 mg daily.
- Genoral and Ogen: piperazine oestrone sulphate.  
Dose range: 0.625 mg–2.5 mg.
- Ovestin: oestriol. Needs to be given in large doses, but has very little effect on the endometrium and its use is associated with minimal vaginal bleeding.  
Dose range: 1.00 mg–4.00 mg.

## Patches and gels

Patches take advantage of the fact that oestrogen absorption through the skin is very efficient. An oestrogen-impregnated, adhesive patch is applied to the skin, usually the buttock, through which oestrogen is easily absorbed into the body. Climara, Dermestril, Estraderm, Femtran and Menorest are the names of commonly available patches. Gels containing oestrogen, such as Sandrena, are also available and are rubbed onto the skin daily. The benefits and risks of oestrogen patches and gels as compared to oestrogen tablets are not yet established, but patches are much less likely to cause nausea or liver and gall bladder problems because transdermal applications of oestrogen avoid the first pass effect (via the liver) of oral oestrogens. The dose of oestrogen in patches and gels is therefore lower because of the lower initial rate of hepatic conjugation and excretion.

Oestrogen patches are usually prescribed for menopausal women, but other conditions can also respond to oestrogen replacement therapy. Transdermal oestradiol has been tested in women with PMS as a method of blocking ovulation and creating a hormonal picture similar to the asymptomatic follicular phase of the cycle. A progestogen is also necessary as part of the therapeutic regimen to prevent uterine endometrial hyperplasia. Patches delivering 100 mcg of oestradiol per day (plus ten days of progestogen) bring symptom relief and block ovulation. Oestro-

gen patches are also sometimes effective for women who experience menstrual migraines. They are applied during the late luteal and early follicular phase of the cycle.

Patches are changed once or twice weekly, depending on the formulation, and must be applied to a different area each time. They cause skin irritation in between 10–20 per cent of women, which is reduced if the alcohol in the patch is allowed to evaporate prior to application. Oestrogen absorption through patches is accelerated when body temperature rises and sweating occurs. It is advisable that the patch be removed during strenuous exercise or other activities that increase the skin temperature.

- Climara: 2 mg, 3.8 mg, 5.7 mg and 7.6 mg patches containing oestradiol that release 25, 50, 75 and 100 mcg per 24 hours respectively. The patches are changed weekly.
- Dermestril: oestradiol patches in strengths of 2 mg, 4 mg and 8 mg that are changed every 3–4 days.
- Estraderm: oestradiol patch of different strengths (2 mg, 4 mg and 8 mg), which release 25 mcg, 50 mcg and 100 mcg respectively. The 4 mg patch that releases 50 mcg is equivalent to 0.625 mg of Premarin and is favoured as the protective dose for prevention of osteoporosis.
- Femtran: oestradiol patch of the same strengths as Climara and also changed weekly.
- Menorest: oestradiol patches in strengths of 3.28 mg, 4.33 mg, 6.57 mg and 8.66 mg, changed every 3–4 days.
- Sandrena gel: a gel containing oestradiol at a dose of 1 mg per sachet. The gel is applied daily.

### Vaginal creams, pessaries or rings

Oestrogen can be inserted as a vaginal cream, pessary or ring for the treatment of atrophic vaginitis or other urogenital symptoms such as urinary frequency or stress incontinence. Vaginal creams are inserted with a dose-determined applicator and typical treatment regimes are described below.

- Ovestin contains oestriol at a dose of 1 mg/g. The cream is inserted every night for three weeks and then twice weekly.
- Premarin contains conjugated equine oestrogens at 0.0625 per cent. Premarin cream is used at doses of 0.5–2 g daily for three weeks with one week off.

It is recommended that women see the prescribing doctor about three months after commencing these treatments.

Pessaries available are Ovestin Ovula (oestriol) or Vagifem (oestradiol) and are similarly indicated for atrophic vaginitis. Both are used

every night for two to three weeks then twice weekly after that, with a reassessment in three months. Oestrogen-impregnated rings are used less often but are indicated for symptoms associated with oestrogen deficiency in the genitourinary system. The only ring available is ESTring. Rings must be fitted by a doctor or gynaecologist and can sometimes cause vaginal bleeding, irritation or discharge.

Creams, pessaries and rings are preferable to tablets or patches when symptoms of vaginal dryness and urinary symptoms such as burning and irritation are the only menopausal symptoms requiring treatment. Creams and pessaries have a mainly local effect on the tissues of and around the vagina and vulva and their use is associated with very low risk of heart disease or breast cancer. Creams and pessaries do not improve bone density.

### Implants

Implants are small 'tablets' of oestrogen which are injected subcutaneously with a local anaesthetic, usually in the lower abdomen. The oestrogen is gradually absorbed and the implant needs replacing every four to eight months or when plasma levels of oestrogen drops. Women with a uterus require a progestogen as well. Serum oestradiol levels should always be checked prior to inserting another implant because some women have been found to develop menopausal symptoms even when oestradiol levels remain high. This has meant that implants are less frequently used now. The implants are usually oestrogen alone, but sometimes oestrogen and testosterone is used, especially for women with low libido. Oestradiol implants are available in strengths of 50 mg or 100 mg.

### Combination oestrogen/progesterone

Oestrogen combined with a progestogen is the form of HRT recommended for women who have not had a hysterectomy. The preparations might be in the form of separate or combination tablets, or patches that have non-varying levels of oestrogen and progestogen. This is referred to as 'continuous' HRT. Alternatively, 'sequential' HRT contains oestrogen only in tablets or patches for about fourteen days and then oestrogen with progestogen for another ten to fourteen days. With sequential HRT, larger-dose progestogens are used to transform the endometrium so that it will shed when the drug is withdrawn. With continuous HRT, smaller doses are used and the endometrium tends to atrophy and is thought to be less prone to cancerous change.



## Sequential HRT

Sequential HRT consists of continuous oestrogens prescribed with intermittent progestogens and is usually given to peri-menopausal women short term to treat menopausal symptoms. A withdrawal bleed will usually occur when the progestogen portion of the treatment is stopped. This form of HRT is better tolerated by peri-menopausal women who still have endogenous hormone production which can override the effects of the replacement hormones and cause erratic uterine bleeding. Sequential HRT can be prescribed in the form of tablets or patches.

Some tablets are packaged like the Pill in blister packs and one tablet is taken daily. The first fourteen tablets contain oestrogen alone and the next contain oestrogen and a progestogen, usually norethisterone acetate, medroxyprogesterone acetate or dydrogesterone. Brands include Divina, Femoston, Premia 5 and 10, Trisequens and Trisequens Forte. Climen and Climen 28 contain cyproterone acetate and are useful for those women who develop hirsutism secondary to low oestrogen and a relative over-exposure to the effects of androgens during the menopause. Other tablet forms of sequential HRT are Menoprem and Provelle-14, which are conjugated oestrogens given continuously with a separate tablet of medroxyprogesterone acetate from days 15–28 of the cycle.

The sequential patches Estracombi and Estalis Sequi consist of oestrogen for two weeks, then a combined patch of oestrogen with a progestogen for two weeks. They are changed every three to four days. Estrapak-50 is an oestradiol-containing patch that is combined with oral medroxyprogesterone acetate 10 mg for ten–fourteen days of the 28-day cycle.

It is not clear whether sequential HRT carries similar risks to that shown with the same type of continuous HRT. It has been proposed that fewer days of progestogens may reduce risk of cardiovascular disease and be safer for long-term use for those women with osteoporosis. This is a less popular method of HRT for older women who do not usually want to be troubled by menstrual bleeding years after it would normally have stopped.

## Continuous HRT

Post-menopausal women are usually prescribed continuous HRT as either tablets or patches. The smaller doses of progestogen ensure endometrial thinning which reduces the risk of hyperplastic change and uterine bleeding. The main indications for this type of HRT are menopausal symptoms or osteoporosis.

Conjugated equine oestrogens and medroxyprogesterone acetate were the type of continuous HRT involved in the WHI trial of postmenopausal women. WHI revealed that healthy women should not

use this type of HRT regime for prevention of disease because they were more likely to develop an illness than prevent one. The trial was stopped after 5.2 years instead of the planned 8.5 years because of these findings.

For post-menopausal women with osteoporosis, continuous HRT is still considered a valuable treatment, especially when used for no more than five years and by women with low risk factors for cardiovascular disease or breast cancer. When there is evidence of substantial risk of these diseases, other drug options should be considered. For those women with osteoporosis who are considering going off HRT or who have already done so, carefully considered advice should be given regarding the options available to them to manage this condition. The non-drug options are limited, and at this stage cannot be backed by clinical trials. These issues are discussed in more detail in the section on osteoporosis (pages 196–7).

Continuous HRT is available as low-dose daily progestogens combined with oestrogens in one tablet:

- Premia 2.5 Continuous: conjugated equine oestrogens 0.625 mg with medroxyprogesterone 2.5 mg, one tablet daily. Premia 5 continuous contains 5 mg medroxyprogesterone acetate.
- Kliovance: oestradiol 1 mg, norethisterone 0.5 mg, one tablet daily.
- Kliogest: oestradiol 2 mg, norethisterone 1 mg, one tablet daily.

Continuous oestrogen plus progestogen can also be given as two separate tablets:

- Menoprem Continuous: conjugated equine oestrogens 0.625 mg with medroxyprogesterone 5 mg, one tablet of each daily.
- Provelle 28: conjugated equine oestrogens 0.625 mg with medroxyprogesterone 5 mg, one tablet of each daily.

The combined oestrogen and progestogen patch is Estalis. Two strengths are available each containing oestradiol 50 mcg with either norethisterone 140 mcg or 250 mcg per patch, one patch every three to four days.

## **Risks and benefits associated with HRT**

Evaluating the possible risks or benefits of HRT use for an individual patient is quite complex and, as many experts on this topic have already stated, individual assessment of each woman is necessary to appropriately evaluate the most suitable course of treatment. The available data from research studies can guide the decision, but an assessment of the age of the woman, her individual risk profile, the type of HRT under consideration, the proposed dose and the duration of use of replacement hormones, and an assessment of her concurrent drug use will provide the most important information. Some of this information is lacking—

for example, it is still not clear what role if any progestogens play in breast cancer risk. This may become clearer after the release of findings from the oestrogen-only arm of the WHI trial.

Age is an important consideration in the decision-making process. The risk of osteoporosis for women less than 50 who have premature or surgical menopause increases in tandem with the number of years without ovarian hormones. Replacement hormones may be an appropriate option for these women and the usually low risk of heart disease and smaller risk of breast cancer needs to be weighed against the considerable risk of developing osteoporosis. The issues for women between 50 and 60 who have sufficient indications for HRT were not necessarily clarified by the WHI study, because the cohort were primarily older women with a different risk profile to this age group. Again, it will likely be the other features of the woman's history that are critical to the prescribing doctor in making a decision.

Dose of HRT may need to be altered, depending on the type of condition to be treated. There is an increasing trend to suggest the lowest effective dose, especially when HRT is prescribed for hot flushes. This may not be possible, however, when the primary aim is to manage osteoporosis, because effective doses for maintaining or improving bone density may be higher than those needed for symptom control.

The type of HRT may be selected to moderate the degree of risk. For example, topical oestrogens have a lower overall risk profile and should be suggested instead of oral HRT for urogenital symptoms. Synthetic oestrogens may increase the tendency to thromboembolic disease and natural oestrogens can be prescribed instead. The selection of the type of progestogen needs to be assessed in the light of the knowledge that some types used long term have been associated with abnormal blood lipid profiles.

The duration of use is emerging as the primary feature in breast cancer risk and even when HRT is used to improve bone density, another form of medication may need to be considered after five years of continued HRT use. Many medications, such as corticosteroids or high doses of thyroxine reduce bone density, and a range of bone-protective medications including HRT will need to be considered for women on these types of medication. Finally, each woman's individual risk profile for heart disease, breast cancer and osteoporosis will be critical factors in the decision-making process to evaluate the need or otherwise for HRT as well as deciding on which type to use.

## Breast cancer

The evidence for adverse effects on breast cancer risk with long-term use of HRT has been increasing for the past ten years.<sup>32</sup> Oestrogen replacement alone has been estimated to increase breast cancer risk

amongst post-menopausal women by 2 per cent, and oestrogen with a progestogen by 4 per cent, in one large multi-centre population study.<sup>33</sup> Other estimates suggest that the overall risk is 2.3 per cent each year for current use and recent use (HRT during the past four years).<sup>34</sup> A number of investigations have confirmed that breast cancer risk increases with increasing duration of use.<sup>35</sup> Once HRT has been stopped for more than five years, the risk diminishes to the same rate as in women who have not used HRT.

In view of the knowledge that breast cancer risk in the general population increases with age, older women have a greater background risk of breast cancer, which amplifies their drug-related risk when taking replacement hormones. The recent WHI trial, for instance, identified a 26 per cent increase of invasive breast cancer compared to placebo, which equated to 38 cases per 10 000 person-years compared to 30 cases per 10 000 person-years with placebo. There was no increase in risk in the rate of development of *in situ* breast cancers.<sup>36</sup>

**Table 20.1 Factors associated with increased breast cancer risk**

- 
- Obesity
  - Never having been pregnant and not having breastfed (or pregnancy and breastfeeding later in life)
  - Family history of breast cancer
  - HRT for more than five years
  - Increased breast density on mammogram before starting HRT
  - Diabetes
- 

## Endometrial cancer

Endometrial cancer can occur when oestrogen is given without a progestogen to a woman who has not had a hysterectomy. The risk increases the longer the woman stays on the oestrogen replacement therapy, and remains elevated for five or more years after stopping the treatment. This risk is reduced when progestogens are given for a short period of time and then withdrawn, causing a ‘period’; or when a low dose of progestogen is given continuously which leads to endometrial ‘shrinkage’ with eventual cessation of uterine bleeding after several cycles.

## Osteopaenia and osteoporosis

Women with osteopaenia are not routinely prescribed HRT and should improve their bone density by taking supplemental calcium or other nutrients, starting an exercise regime, staying a healthy weight, retaining agility and muscle strength, and eating a balanced diet (see pages 196–7). Hormone replacement is one option for women with osteoporosis, as oestrogens, including the oral contraceptive pill,<sup>37</sup> have a positive effect

on bone density. Women with substantial fracture risk are often prescribed HRT, but any positive effect will be lost within a few years at a rate similar to that seen in the immediate postmenopausal years<sup>38</sup> when HRT is stopped.

HRT and oestrogen replacement therapy (ERT) reduce the rate of bone turnover and resorption. Progestogens to protect against increased risk of endometrial cancer (from unopposed oestrogen) do not reduce the bone-preserving effects.<sup>39</sup> There are more than fifty randomised, placebo controlled clinical trials that show that ERT/HRT increases spine bone mineral density (BMD) by 4–6 per cent and hip BMD by 23 per cent, and maintains those increases after three years of treatment.<sup>40</sup> To date there is little consistent and conclusive research on the efficacy of HRT on fracture prevention from randomised clinical trials. Observational studies (which are considered less valid) indicate a significant reduction in fracture with ERT/HRT, ranging from a 25 per cent reduction in hip fracture amongst women who had ever used ERT/HRT, to a 35 per cent reduction in risk of non-spine fractures in current long-term users compared to never users. ERT/HRT was more effective if started within five years of menopause and if used longer than ten years.<sup>41</sup>

Until recently, HRT was the first choice for doctors in the prevention of bone loss. After the findings of the WHI study,<sup>42</sup> an Australian expert committee convened by the Therapeutic Goods Administration recommended against long-term use of HRT, but stated that continued use for women with osteoporosis could be considered as an option for some women after discussion of the risks and benefits between patient and doctor.<sup>43</sup> WHI examined the long-term effects of HRT and demonstrated a decreased risk of hip fracture over 5.2 years, with five fewer hip fractures in the HRT group (10 versus 15) than in the group not on HRT (equivalent to a 34 per cent risk reduction).<sup>44</sup>

Women are likely to be reluctant to embark on long-term HRT for prevention of osteoporosis, especially when there is little data to support a reduction in fracture risk but evidence of an increased breast cancer risk as shown in the WHI study. However, even before these results were published, about 75 per cent of women who begin ERT/HRT discontinue after six months, probably because of breast cancer concerns.<sup>45</sup>

## Cardiovascular disease

It has been observed that endogenous oestrogens exert cardio-protective effects in pre-menopausal women which led to the expectation that HRT given to menopausal women would have the same protective effects. However, the findings of the WHI trial which resulted in the termination of the oestrogen/ progestogen arm of the trial,<sup>46</sup> coupled with the recent Heart Estrogen/Progestin Replacement Study (HERS),<sup>47</sup> suggest that HRT does not confer any benefit in the prevention of stroke or heart

disease in otherwise healthy women. Two recent meta-analyses support this position,<sup>48</sup> which has also been endorsed by the American Heart Association.<sup>49</sup> The positive effects from preventative strategies that incorporate dietary changes such as consuming more oily fish and omega-3 essential fatty acids,<sup>50</sup> soy<sup>51</sup> and vitamin E-containing foods<sup>52</sup> is increasingly being verified in the literature.

**Table 20.2 Factors associated with increased risk of cardiovascular disease**

- 
- Obesity
  - Diabetes
  - Cigarette smoking
  - Hypertension
  - Elevated triglycerides, total cholesterol and low HDL cholesterol
  - Poor physical fitness
  - Inadequate diet, including a low omega-3 fatty acid intake
  - Hormonal medication including HRT and the Pill, especially when taken by women over 35
- 

## Gall bladder disease

Oestrogen changes the composition of bile and increases the amount of cholesterol in bile more than a dietary increase in cholesterol.<sup>53</sup> Because high levels of cholesterol in the bile are prone to precipitate out and form gall stones, women on the Pill and HRT are more prone to gall bladder disease than other women. To prevent this complication, an oestrogen patch is often suggested because transdermal oestrogens do not cause the rapid increase in oestrogens and the subsequent changes to the consistency of the bile.

## Colorectal cancer

Evidence is accumulating that the use of HRT reduces the risk of colorectal cancers in post-menopausal women. The Nurses Health Study showed an apparent protective effect amongst current users of HRT,<sup>54</sup> and the WHI study found a 37 per cent reduction in the incidence of colon cancer.<sup>55</sup>

## Side effects of HRT

PMS-like symptoms such as breast soreness, pain or swelling; fluid retention; nervousness and palpitations can occur with combined oestrogen and progesterone treatment. Some women stop taking the progestogen because of these symptoms, but taking oestrogen alone is associated with an increased risk of endometrial cancer.

Rarely, blood pressure can increase after starting HRT and so a repeat visit to the doctor who prescribed the drug should be arranged several weeks after commencement. Thromboembolic diseases such as DVT are also more common. The incidence of gall bladder disease is higher when women take HRT, but usually takes months or years to develop. Both these problems are associated with the impact of oestrogen on the liver and a change to patches is usually advised. Some women complain of weight gain, especially around the abdominal area.

Oestrogen, either too much or too little (depending on the individual's susceptibility) can cause the blood-vessel spasm which leads to migraines. Some women develop migraines on HRT, others experience total relief. Progestogens can be implicated as well and a change of dose and type of HRT is indicated.

Oestrogen-dependent conditions such as fibroids and endometriosis can be aggravated by HRT, and this may require cessation of treatment.

Women on HRT who develop bleeding between periods, after sex or at any time not normally expected, should immediately visit their doctor. An ultrasound, or hysteroscopy and biopsy of the endometrium may be indicated to rule out endometrial cancer.

### **REASONS TO AVOID HRT**

- Known or suspected pregnancy.
- Known or suspected cancer of the breast.
- Known or suspected oestrogen-dependent cancer.
- Undiagnosed abnormal vaginal bleeding.
- Active thrombophlebitis (inflammation of a vein with clot formation), or diseases associated with blood clotting abnormalities, including recent heart attack or stroke.
- Liver, kidney or pancreatic disease, and diabetes. Women with these problems may experience a worsening of their condition or additional side-effects from HRT. These occur because of the diverse effects of oestrogen on the metabolism of sugars, liver function, the workings of the liver and pancreas, and the excretion of minerals in the urine.

## **Tibolone (Livial)**

Tibolone, marketed under the name Livial, combines oestrogenic, progestogenic and androgenic activity, and is used as an alternative to HRT. It does not appear to stimulate the endometrium and is associated with relatively low rates of vaginal bleeding. Tibolone may therefore appeal

to post-menopausal women as a 'bleed-free' form of HRT. It has been approved for the treatment of hot flushes and prevention of bone loss.

Tibolone binds weakly to receptors for progesterone, androgen and oestrogen. Hot flushes were estimated to reduce to about half the incidence seen with placebo after analysis of trial results.<sup>56</sup> At a dose of 2.5 mg per day for two years, tibolone prevented bone loss in post-menopausal women and increased bone mass in women with established osteoporosis.<sup>57</sup> This form of HRT can also be prescribed to women with low libido because of the mild androgenicity.<sup>58</sup> Improvements in vaginal dryness, dyspareunia, sexual enjoyment and libido were demonstrated in one study.<sup>59</sup> It has been suggested that tibolone has the potential to reduce breast cancer risk, but larger long-term studies are needed to confirm this.

The androgenic action of tibolone is associated with a reduction in total and in HDL cholesterol, triglycerides and lipoprotein (a). However, the effects of tibolone on cardiovascular disease risk reduction await the outcome of large-scale trials or epidemiological studies.

## **Bio-identical HRT**

The term bio-identical refers to hormones synthesised from plant products that have the same biochemical structure as endogenous hormones. Hormonal analogues for progesterone, oestrogen and androgens (usually DHEA or testosterone) are available, and are usually prescribed in the form of troches or lozenges that are kept in contact with the buccal mucosa until they dissolve and are absorbed. They are prepared by compounding pharmacies and are said to be a unique formulation of hormones that are prescribed according to each women's need as determined by blood tests.

These hormones have been popularised on the basis that their structural similarity to the endogenous hormones means they are safer and are devoid of side-effects. The latter is probably so for many women, but whether these hormones can be said to be safer is open to considerable doubt.

The oestrogens available as oestradiol, oestrone and oestriol are no different structurally from the oestrogen replacement hormones in current use in some tablets, patches and gels. That they are 'uniquely formulated' should make no difference to their safety, efficacy or side-effects, because hormone preparations are normally inter-converted to other forms of oestrogen in the body irrespective of whether they are endogenous or prescribed. The risk of breast cancer with the long-term use of natural oestrogens could be expected to be identical to that identified with the oestradiol, oestrone and oestriol in current use.

Progesterone (not the progestogens) is metabolised in the liver and has a very short half-life. It must be administered as a lozenge, troche,



rectal suppository, vaginal pessary, cream, injection or implant to avoid rapid metabolism by the first pass effect. Progesterone has many enthusiastic supporters for the treatment of PMS and breast soreness,<sup>60</sup> even though properly controlled trials fail to show a better than placebo effect.<sup>61</sup> There have been no trials to evaluate the effectiveness of progesterone in causing adequate endometrial transformation (and therefore protection against risk of endometrial hyperplasia) amongst women using it long term for HRT, although some gynaecologists have reported that the endometrium usually shows adequate secretory changes when a biopsy is performed following administration of 'natural' progesterone. A suggested benefit in reducing osteoporosis risk has not been followed up with trials.

DHEA supplements did not improve any of the menopausal symptoms (mood, dysphoria, libido, cognition, memory or well-being) above placebo.<sup>62</sup> In addition, it is not approved for use in Australia. With all of the uncertainties surrounding this form of HRT, it would seem advisable for women to use other types of replacement hormones until bio-identical hormones have been adequately trialled.

## **Hypothalamic and pituitary hormones**

### **GnRH agonists**

GnRH is secreted by the hypothalamus to initiate the release of luteinising and follicle-stimulating hormones from the pituitary gland. Drugs with a similar chemical structure to GnRH are called GnRH analogues. GnRH analogues either mimic the action or stop the secretion of an individual's GnRH, depending on the chemical structure of the drug and the way it is administered. Given continuously, they stop ovulation and are called GnRH agonists. They are primarily used to treat endometriosis and fibroids.

The GnRH agonists are used increasingly to reduce fibroid size and the amount of blood vessels surrounding it prior to a myomectomy because of the reduced rate of bleeding and the relative ease in removing a smaller fibroid. There is also the advantage of reducing excess menstruation pre-operatively, which allows time for anaemia to be corrected prior to surgery. They are not used unless surgery is to follow because once these drugs are stopped, the fibroid invariably grows again.

GnRH agonists can be used to treat endometriosis by inducing a temporary menopausal state. Compared to danazol, the GnRH agonists are equally effective in reducing the symptoms and the size of endometrial growths, but obvious side-effects are less severe.<sup>63</sup> (Bone density loss causes no symptoms until late in life, but should be considered in the decision to use GnRH agonists.) On average, endometriomas (endometrial cysts) have returned to their initial size four months after

stopping the treatment,<sup>64</sup> making some sort of additional treatment necessary. GnRH agonists have no additional benefits in improving fertility.<sup>65</sup>

GnRH agonists have also been trialled either alone or in combination with the Pill as 'add-back therapy' for premenstrual symptoms. This latter protocol is not commonly used, but require that a woman take the GnRH agonist with low doses of oestrogens and progestogens. Most women are not prepared to exchange PMS for menopausal symptoms and reduced bone density when GnRH agonists are used alone. Results of trials have been mixed. GnRH agonists alone did not help mood symptoms, but add-back therapy showed more promise.<sup>66</sup> Understandably, many women are suspicious of a drug protocol that aims to stop their own hormone production, but then add in the same type of prescribed hormones to stop symptoms. These sorts of treatments are controversial and are reserved for severe and intractable cases of PMS. This is a realistic option only for those women for whom all else has failed.

Occasionally, GnRH agonists are also suggested for abnormal bleeding which has failed to respond adequately to other methods.

GnRH agonists cannot be used as oral preparations because of their chemical make-up. Instead, they are either given as an injection (Zoladex), usually once per month in a long-acting form; or as a nasal spray (Synarel). They cause a pseudo-menopause and a temporary cessation of the period, but ovulation returns within about four weeks of stopping the drugs.<sup>67</sup> Menopausal symptoms such as hot flushes, dry vagina and headaches are common, and some women have difficulty with sexual intercourse because of vaginal dryness and lowered libido. Sylk, a vaginal lubricant made from kiwi fruit, can be used to improve comfort during sexual activity.

There is an early and significant bone density loss after commencing GnRH agonists.<sup>68</sup> Radial bone density (in the wrist) is not affected, but the bone density of the spine shows significant changes.<sup>69</sup> For some women, this may not be reversible and should be considered as part of their decision to use GnRH agonists. Oestrogen and progestogen given at the same time (add-back therapy) might prevent bone density loss (but aggravate the condition the GnRH agonists were prescribed for) and this regime requires further study.

Occasionally, women will develop ovarian cysts in the first two months of treatment with GnRH agonists, especially if they have a previous history of polycystic ovarian syndrome. These cysts will often resolve as the treatment progresses, but can grow large enough to require surgery or cessation of the drug.

Women who take GnRH agonists should ensure that their calcium and magnesium intake is adequate. Information on calcium is included on pages 199–200 and on magnesium on pages 361–2.

## Bromocriptine

Bromocriptine (Parlodel) is a dopamine agonist and reduces elevated prolactin, stops lactation and re-instates ovulation, cyclic regularity and fertility when women have hyperprolactinaemia. Prolactin-secreting tumours can decrease in size with continued use and because bromocriptine also improves oestrogen levels, it is useful when there is a risk of low bone density.

Bromocriptine has also been used to treat PMS and breast pain,<sup>70</sup> but the validity of this treatment has been questioned. Breast soreness is the only symptom to consistently respond and the drug often causes unacceptable side-effects.<sup>71</sup> These include nausea, vomiting, dizziness, headaches and a blocked nose. These are usually only transitory and can be reduced if the drug is taken at night or given as a suppository.

Women on bromocriptine continue or start to ovulate. If they do not want to become pregnant they will need to use a barrier contraceptive such as a diaphragm or condoms. The inhibitory (dopamine-like) effect on the hypothalamus is only temporary and most women with hyperprolactinaemia who discontinue the drug stop menstruating again.

## Cabergoline

Cabergoline is a newer dopamine agonist, a long-acting ergot derivative that is used for the treatment of hyperprolactinaemia. It is effective in improving cyclic regularity and fertility relatively quickly,<sup>72</sup> and has the additional benefit of reducing tumour size in some women.<sup>73</sup> Side-effects such as nausea, vomiting, dizziness and postural hypotension can be minimised by taking the drug at night. Cabergoline is often prescribed once or twice weekly, which tends to reduce adverse effects even further. Safety in pregnancy is still under review and some doctors recommend that women wanting to become pregnant should be given bromocriptine instead because it has a longer history of safety with pregnant women.

## Other drugs used for gynaecological complaints

### Prostaglandin inhibitors

More correctly called the prostaglandin synthetase inhibitors, these drugs prevent the production of the series 2 prostaglandins (by inhibiting the enzyme synthetase) which cause increased uterine muscle spasm and heavier periods. These drugs are also known as 'non-steroidal anti-inflammatory drugs' (NSAIDs). They can be bought without a prescription from a chemist. Aspirin is a well-known prostaglandin

inhibitor, but is not very effective for period pain. The newer and more effective drugs in this class include Ponstan, Naprogesic, ACT 3 and Nurofen.

Prostaglandin inhibitors are rapidly absorbed and can reduce pain in about half an hour. They can be used for the relief of primary or secondary dysmenorrhoea, or to relieve moderate to severe period pain associated with endometriosis.<sup>74</sup> Some women use them only when they have pain, others prefer to start to take them before the expected onset of the period. There seems to be no difference in effectiveness if the drugs are taken before the start of the period,<sup>75</sup> but it is wise to commence treatment early if vomiting accompanies pain. Otherwise, keeping the dose in the lowest effective range is always sound advice.

These drugs reduce menstrual blood loss by blocking the conversion of prostaglandins into prostacyclin 2.<sup>76</sup> Prostacyclin 2 stops platelets from clumping together, and dilates blood vessels: the net result being an increase in bleeding. Women who have heavy periods and who continue to ovulate seem to respond better to these drugs than women who are not ovulating. They also seem to work better in combination with the Pill or progestogens, and some doctors recommend these treatments be combined.<sup>77</sup>

Ponstan (mefenamic acid) has also been used to treat mood swings, fatigue, headache, breast pain and the general aches and pains which accompany PMS.<sup>78</sup> The series 2 prostaglandins cause vasodilation in the breast which leads to engorgement and pain. Prostaglandin inhibitors improve cyclic breast pain by reducing these effects. These drugs should be restricted to a seven-day interval,<sup>79</sup> making them unsuitable for the many women who experience breast pain or PMS for more than seven days before their period.

Prostaglandin inhibitors do not reverse the prostaglandins imbalance which causes excessive menstruation, pain or PMS and will have to be used indefinitely until the cause/s of the imbalance are identified and rectified. This prospect is not appealing to many women, especially since these drugs have many side-effects.

About 25 per cent of people using prostaglandin inhibitors experience side-effects associated with the gastrointestinal system. Symptoms can include nausea, vomiting, stomach pain, indigestion, diarrhoea, heartburn, abdominal cramps, constipation, abdominal bloating and flatulence.<sup>80</sup> These drugs should always be taken with food to try to minimise the risk of gastric ulceration and should be avoided by women with a history of gastrointestinal disease.

A number of other complaints can be aggravated by the use of prostaglandin inhibitors and they may cause problems for those who have poor liver function, asthma, clotting disorders, lupus and heart disease. Women with any of these disorders should seek medical advice before using these drugs. Prostaglandin inhibitors can mask the signs of

infection and should not be taken when period pain is known or suspected to be caused by pelvic inflammatory disease.

Prostaglandin inhibitors are given to control symptoms and are only necessary while the complaint occurs. Slippery elm can help to prevent gastric ulceration associated with these drugs. One teaspoon mixed into apple juice, or equal quantities of apple juice mixed with yoghurt, and taken at the same time helps to protect the stomach lining.

## Selective oestrogen-receptor modulators (SERMs)

Selective oestrogen-receptor modulators or SERMs, such as raloxifene (Evista) and tamoxifen (Genox, Nolvadex, Tamoxen) are compounds that have oestrogen agonist activity at some sites and antagonist activity at others. These drugs appear to share anti-oestrogenic effects in breast oestrogen receptors, but have different effects in endometrial tissue. Both have agonistic activity in bone and on lipids.

### Raloxifene (Evista)

Raloxifene shares the benefits of oestrogen on bone, but does not have the adverse effects on the breast and endometrium. Like oestrogen, raloxifene decreases bone turnover by inhibiting resorption. It also lowers total and LDL-cholesterol, although it does not raise HDL-cholesterol. Unlike oestrogen therapy, raloxifene does not increase triglycerides.<sup>81</sup>

Trials on the effectiveness of raloxifene show that it increases bone density of between 2–3 per cent for both spine and hip after two and three years, which is less than the observed effects of bisphosphonates or oestrogen.<sup>82</sup> In terms of fracture prevention, raloxifene was shown to decrease the risk of vertebral fracture by 30–50 per cent in postmenopausal women with osteoporosis over three years.<sup>83</sup> The decreased risk was marginally better in women taking 120 mg daily compared to standard 60 mg daily dose. Raloxifene also decreases incidence of breast cancer compared to placebo, similar to tamoxifen, but did not increase risk of endometrial cancer.

Raloxifene may worsen menopausal symptoms like hot flushes and increases the risk of venous thromboembolic events, such as deep vein thrombosis, and pulmonary embolism. Raloxifene should be avoided by women who are immobilised for prolonged periods.<sup>84</sup>

### Tamoxifen (Genox, Nolvadex)

Tamoxifen is a synthetic anti-oestrogen compound that competes with endogenous oestradiol for oestrogen receptors, and in addition, lowers prolactin levels. It is prescribed as an anti-oestrogen, at doses between 20–40 mg, when women have oestrogen-receptor positive cancers.

Tamoxifen is prescribed to lower the risk of recurrence or relapse of oestrogen-receptor positive tumours of the breast. It is given for up to five years following the treatment of the primary tumour and has been reported to reduce the recurrence rate from between 13–47 per cent. Tamoxifen is also indicated for the management of metastatic disease associated with breast cancer. Metastases of the skin, nodes and bone respond better to tamoxifen than cancers in organs such as the lung.

The drug commonly causes hot flushes, menstrual irregularity, nausea, headaches, fluid retention and vaginal dryness or irritation. The use of tamoxifen has been associated with an increase in endometrial hyperplasia, polyps and cancer, and caution is warranted when women report a prior history of endometrial hyperplasia. Venous thrombosis, stroke and pulmonary embolus risk also increases with tamoxifen and the drug is not recommended for women with significant risk or a history of these events.

## Diuretics

Diuretics have been one of the most commonly prescribed drugs for bloating and breast tenderness associated with PMS, based on the assumption that increased levels of aldosterone in the premenstrual phase causes fluid retention. The results of trials using different types of diuretics has been conflicting, and due to a tendency for some women to take more tablets than recommended, their use has diminished.<sup>85</sup>

Some diuretics deplete potassium levels and supplements may be required, but ask the prescribing doctor first before self-prescribing. Herbal diuretics such as dandelion leaf, one or two teaspoons per cup, twice daily, is a suitable alternative. Dandelion leaf has high levels of potassium and additional supplements are not required.

## Anti-depressants and anxiolytics

A number of recent trials have verified the effectiveness of the selective serotonin re-uptake inhibitors (SSRIs) in the treatment of severe PMS or premenstrual dysphoric disorder (PMDD). Fluoxetine (Prozac, Luvox), sertraline (Zoloft), nefazodone (Serzone) and citalopram (Cipramil) given throughout the menstrual cycle have been shown to be well tolerated and effective.<sup>86</sup> Some of the SSRIs such as citalopram<sup>87</sup> have also been shown to be effective when used during the luteal phase of the cycle only. Despite their effectiveness, the SSRIs have considerable side-effects, including gastrointestinal disturbances, headache, sedation, insomnia, weight gain, impaired memory, excessive perspiration and sexual dysfunction.

Venlafaxine (Efexor), a new-generation anti-depressant that selectively inhibits serotonin and noradrenaline re-uptake, has also been evaluated for effectiveness in the treatment of PMDD. Venlafaxine is significantly more efficacious than placebo for PMDD treatment.<sup>88</sup>

The tricyclic anti-depressants have also been used successfully, particularly nortriptyline (Allegron) and clomipramine (Anafranil, Clomipramine). The benzodiazepine Alprazolam has also been suggested as a treatment for PMS and PMDD; however, dependence and tolerance occur quickly and make these types of drugs less attractive options for these conditions.

The SSRIs are also increasingly prescribed for menopausal symptoms, but this is a controversial practice.

The herbal alternatives to reduce tension and the effects of stress are the nervines. These are milder in action than drugs and tend to have fewer side-effects. They are described on pages 465–76.

## **SURGERY**

### **Hysteroscopy**

A hysteroscope is a small pencil-sized instrument which is inserted into the cervix to view the inner cavity of the uterus. Most doctors recommend a general anaesthetic for this procedure because, unless the woman has given birth to at least one child, her cervix will be too small to pass the instrument through without considerable discomfort. Sometimes, however, a hysteroscopy is performed with a local anaesthetic in the specialist's rooms.

This procedure has the diagnostic advantage of being able to see which parts of the endometrium appear to be diseased. Prior to hysteroscopies, any procedures, such as a curette, were performed 'blind' which resulted in up to one quarter of pathologies being missed.

The diagnostic hysteroscopy has been somewhat replaced by the use of the vaginal ultrasound as a relatively non-invasive method of arriving at a provisional diagnosis for abnormal uterine bleeding. However, a hysteroscopy may then be performed in order to obtain a biopsy of tissue. The procedure is performed by inflating the uterine cavity with gas or saline so that a good view is possible. If hysteroscopic treatment is indicated, for example, for the removal of uterine polyps, sub-mucous fibroids or abnormal tissue changes in the endometrium, the uterine cavity is distended with a viscous fluid to facilitate the successful outcome of the operation.

The procedure is very short and only takes about half an hour. If a general anaesthetic has been used, a four-hour recovery time in hospital is necessary to observe for complications associated with the anaesthetic. Most women go home on the same day and feel completely well the next day following a hysteroscopy.

## Laparoscopy

A laparoscopy is performed, either as a diagnostic or therapeutic procedure, with a laparoscope. This thin, pencil-like instrument has fibre-optics through which the operator can view the inner organs. The procedure requires a general anaesthetic, and a number of small incisions are made, usually one under the navel and another just above the pubic bone, to insert the laparoscope, so that a good view of all of the pelvic organs is possible.

Frequently, the abdomen is filled with gas so that the abdominal wall does not interfere with the surgeon's view of the pelvic contents. After the procedure, the gas is allowed to escape, but some may remain in the abdominal cavity and cause pain until it eventually dissipates after a few days. (Gas which is trapped under the diaphragm causes irritation of nerves and referred shoulder-tip pain.)

Laparoscopy has a number of advantages. An accurate diagnosis can be made because the gynaecologist can view the entire pelvic cavity. Additionally, surgical procedures can be performed during a laparoscopy such as laser or diathermy to burn patches of endometriosis, and the removal of ovarian cysts or adhesions. These surgical procedures generally only involve a day in hospital; and pain and post-operative complications are minimal because major abdominal incisions are not required.

Recovery time is usually a few days, depending on the extent of the additional surgery and the type of complaint treated. Even though the external wounds can be quite small, the internal organs might take a while to recover. Pain is a good indicator of how much to do and when rest is needed.

## Laparotomy

A laparotomy involves an abdominal incision, usually just above the pubic bone and below the 'bikini line' and is indicated when extensive surgery is needed. This can include removal of extensive and inaccessible adhesions, removal of larger ovarian cysts (cysts larger than 5 mm may require removal at laparotomy), fibroid removal, diathermy or laser of extensive and difficult to reach endometriosis, or rarely for reconstruction and microsurgery to improve fertility.

A laparotomy can take from between half an hour to several hours, depending on the type of surgery to be performed. Recovery time is longer than after a laparoscopy because the abdominal wounds are larger and the surgery is usually more extensive. The advice on pre- and post-operative care will be useful to improve recovery.



## Uterine endometrial ablation

Uterine endometrial ablation is destruction of the endometrium, either with a laser, microwave or heat, to cause cauterisation. It is usually performed for women with menorrhagia as an alternative to hysterectomy. For many women this procedure means lighter periods since little or no endometrium remains after the procedure. In some women, menstruation stops entirely.

The cause of menorrhagia may have an impact on the eventual outcome of the endometrial ablation. Women with submucous fibroids or a large uterine cavity may experience problems with bleeding after the ablation. This type of treatment is less likely to be successful for women with endometriosis or adenomyosis and they will often require a secondary surgical procedure such as a hysterectomy.<sup>89</sup> Uterine size can greatly influence the length of the procedure and the success of the treatment. Increased surgical time increases the risks associated with the procedure, such as fluid overload secondary to the absorption of the distension media used during the surgery.<sup>90</sup>

When all other treatments have failed, this procedure offers a possible alternative to the conventional hysterectomy. However, like all surgical procedures, ablation therapy is not without risk and this needs to be assessed on an individual basis. Patients should be aware that pregnancy can occur and is associated with serious risk to the foetus because adhesions cause intra-uterine growth retardation. Endometrial pathology can also occur after endometrial ablation.

A new treatment being used in the United States for the management of menorrhagia is the endometrial thermal balloon ablation procedure. A deflated balloon is inserted into the uterine cavity through the cervix and then filled with a heated glucose solution which is retained *in situ* for 8 and 16 minutes. The procedure has been found to be less successful in destroying the endometrium when performed on younger women, when the endometrium was thicker, when the uterus was retroverted, or when dysmenorrhoea was present.<sup>91</sup>

## Myomectomy

A myomectomy is the surgical removal of a fibroid. It is usually performed through a laparotomy incision and can be a difficult operation to perform. A myomectomy is suggested when the woman wants to conserve her uterus, but the fibroid needs to be removed.

Fibroid size is not necessarily an indication for removal, and usually a gynaecologist will only recommend that a fibroid be removed in the following circumstances:

- The fibroid is large and causing pressure symptoms or discomfort.
- The fibroid is growing.
- Menorrhagia is associated with fibroids.
- The fibroid is pedunculated.
- The fibroid interferes with fertility.
- The fibroid is of sufficient size or in a position to cause bleeding following delivery or increase the risk of miscarriage.

There is an increased rate of caesarean section when a woman has fibroids because of the risk of uterine rupture in late pregnancy or during labour, but no change in fertility rate.<sup>92</sup> Women with fibroids have an increased risk of severe bleeding following childbirth caused by the fibroid interfering with uterine contractions. The risk associated with pregnancy when women have fibroids requires careful evaluation and the need for surgery should be discussed with all these points in mind.

## **Myomectomy or hysterectomy?**

For women past their childbearing years or those not wishing to become pregnant a hysterectomy is usually recommended, but for others a myomectomy (removal of the fibroid, but leaving the uterus in place) may be suggested or preferred. A myomectomy or hysterectomy may be performed as an abdominal operation or using laser surgery during a laparoscopy.

Some doctors are reluctant to perform a myomectomy, especially for women who do not want to have (more) children and may suggest a hysterectomy instead. It is difficult for even the most experienced gynaecologist to predict how easily a fibroid can be removed. Severe bleeding can occur and may mean that a hysterectomy will have to be performed anyway, and under less than optimum conditions. Sometimes the exact location of the fibroid will only be discovered during the surgery. It may be in a position where it is difficult to reach, or surrounded by delicate structures. It may be fed by more blood vessels than usual.

Other reasons for not wanting to perform a myomectomy are that the fibroids may grow back or the heavy menstrual bleeding associated with the fibroid prior to its removal may not stop. An unspoken reason for suggesting hysterectomy is the common medical opinion that women who do not intend to have a child have no need for a uterus. This, combined with the unpredictability of a myomectomy, means that a hysterectomy may be offered first and a myomectomy discussed only when the women requests the information.

This decision is often difficult for many women. When a hysterectomy has been advised, but is not a suitable option, a second opinion from a gynaecologist experienced in the technique of myomectomy is

advisable. Removal of fibroids using laser is reported to decrease adhesion formation, reduce bleeding at the time of surgery and improve the fertility rate of women wanting to conceive.<sup>93</sup> This technique is only for sub-mucosal or sub-serosal fibroids.

Sometimes a hysterectomy may be the only option. A myomectomy might just be too risky, complicated or unpredictable. There may be too many fibroids (although I do know of a 45-year-old woman whose gynaecologist removed 42 fibroids rather than perform a hysterectomy!) or there may be other gynaecological reasons why a hysterectomy is a better option.

Good pre-operative preparation is essential before major surgery and can greatly influence the recovery time (see pages 532–3). Both hysterectomy and myomectomy are elective procedures and so it is possible to arrange an auto-transfusion (where a woman gives her own blood some days before the operation and then is transfused with this blood during the procedure if bleeding occurs). A woman giving blood for an auto-transfusion should take iron supplements and increase her daily intake of iron-containing foods (see the information on iron on pages 248–50).

An alternative procedure to myomectomy or hysterectomy may become routinely available to women in the future. This procedure, arterial embolisation, can be performed by a radiologist and involves the artificial occlusion of the artery supplying the fibroid. It is a new procedure and long-term evaluation studies have not been performed. Side-effects are often considerable pain, caused by the ischaemic changes occurring in the fibroid while necrosis occurs. The procedure may not be suitable for those women wishing to retain their fertility because embolisation of the uterine artery has unknown effects on fertility and the capacity of the uterus to carry a pregnancy to term.

## Hysterectomy

A hysterectomy is the removal of the uterus and can be performed through an abdominal incision—an abdominal hysterectomy; or through the vagina—a vaginal hysterectomy. The decision to perform one over the other depends somewhat on the preference of the surgeon and on the type of condition present. A hysterectomy for endometriosis, for example, is often performed abdominally if there are multiple adhesions which make vaginal removal too difficult.

A hysterectomy is the removal of the uterus. When the uterus, tubes and ovaries are removed, the procedure is called a hysterectomy and bilateral salpingo-oophorectomy. A hysterectomy where the ovaries are left *in situ* is used for conditions like excessive menstrual loss, fibroids, prolapses, and when women have severe pain and bleeding associated with adenomyosis.

For conditions which are oestrogen-dependent, such as severe and non-responsive endometriosis and some types of cancer, a hysterectomy and uni/bilateral salpingo-oopherectomy is frequently recommended. Removing the ovaries can prevent or slow the growth of these oestrogen-sensitive tissues.

## PREPARING FOR AN OPERATION

Recovery from any abdominal surgery, including a hysterectomy, myomectomy, laser surgery, laparotomy or Caesarean section can be improved by following a few pre-operative strategies to improve wound healing and reduce wound infections; assist with early post-operative mobility; and reduce the discomfort caused by bowel problems.

Vitamin C promotes collagen formation and has been shown to improve wound-healing time.<sup>94</sup> Zinc supplements also have a beneficial effect on wound healing and zinc as a topical lotion is one of the oldest wound-healing agents known. It was used as far back as 100 BC by the Egyptians in the form of calamine lotion to promote the healing of wounds. More than half of all Australian women consume less than the recommended daily intake for zinc and many vegetarians are zinc deficient. Surgery increases zinc requirements because zinc is needed to enhance cell proliferation during wound healing.<sup>95</sup> Pre-operative zinc supplements can be recommended for most women. Information on zinc is included in Chapter 7 'Adolescence'.

Vitamin A plays an important role in wound healing by increasing cellular activity required for repair. A post-operative supplement of vitamin A can also increase collagen synthesis, and improve the bursting strength of the scar. Vitamin A applied topically improves healing and the appearance of scars. A vitamin A deficiency usually occurs without symptoms. Dietary sources of vitamin A are full-cream dairy products, egg yolk, yellow and green vegetables, and yellow or orange fruit.<sup>96</sup>

Vitamin E, which prevents internal scar tissue formation (adhesions), is very beneficial when fertility must be conserved following surgery. Small doses of around 100–250 IU should be taken pre-operatively because of the (very slight) risk of increased bleeding during surgery. Once food is commenced following surgery, doses of around 400–500 IU can be taken. Vitamin E can also be rubbed into the wound to hasten healing and reduce scarring. Oral vitamin E reduces the risk of post-operative blood clots.

*Echinacea*, a herb commonly used to improve resistance to infection, also seems to increase the formation of keloid scar tissue (thick, raised scars), and should be taken cautiously.

Poor muscle strength and agility can hamper recovery time post-operatively because getting out of bed and walking around is much more difficult. Weak leg and abdominal muscles can be improved pre-

operatively by specific exercises such as yoga exercises, squats, walking, sit-ups and gym work. Being physically active post-operatively improves recovery time and stamina, and reduces the risk of blood clots and respiratory infections. About a month is usually needed to dramatically improve muscle strength, but even a few days is better than nothing.

Post-operative recovery can be hampered by the abdominal discomfort caused by the handling of the bowel during surgery. Fortunately, a few dietary changes in the *weeks prior to surgery* can often help to prevent or reduce the symptoms.

- The seed breakfast (pages 296–7) should be started about one week before the operation and continued as soon as solid foods can be eaten after surgery.
- Daily salads of grated raw carrot and beetroot or a medium sized cooked beetroot to help prevent post-operative constipation.
- Yoghurt or cultured milk drinks colonise the bowel with healthy bacterial colonies and minimise flatulence. Drink or eat about one cup per day. Check that the yoghurt has live cultures and no sugar.
- Avoid refined sugars which tend to increase fermentation and flatulence.
- Avoid foods known to cause flatulence, constipation or diarrhoea.
- Pre- and post-operatively, three to six cups daily (two teaspoons of mixture per cup) of the herbal tea combination of equal parts of *Melissa officinalis*, *Matricaria recutita* and *Mentha piperita*. Make up a jar to take to hospital.
- Post-operative nausea is relieved by ginger root. Two studies which compared the degree of nausea experienced after a laparoscopy<sup>97</sup> and major gynaecological surgery,<sup>98</sup> with and without ginger root, found that the women who were given ginger root had much less nausea than those given a placebo. The usual dose is between 0.5–1 g every four hours in tablet form, or between 10–20 drops as a fluid extract, but check with the medical staff first.

## **CONVALESCENCE, OR MEETING THE DEMANDS OF STRESS**

People have forgotten how to convalesce. With the increase in laser surgery, and shorter hospital stays, many women start housework or return to work within days of surgical procedures and then wonder why they spend the rest of the year feeling dreadful. The financial strains on the average household also mean a shortened convalescent period for many people.

Many women recovering from operations are astonished by their doctors' predictions of 'you'll be back at the gym in a week' or 'you'll be up and walking by tomorrow' when they feel nothing like going to the gym (or anything else for that matter). It may be worth

pointing out that recovery times vary considerably and are influenced by factors such as smoking, lack of previous fitness, an inability to take it easy and let the body heal, or more surgery than was originally planned. It is better to be guided by pain and stamina and to do a little more every day than to resume former levels of work and exercise too quickly.

When the body is under stress or recovering from an illness, the nutrient requirements increase dramatically. Unfortunately, this often occurs at a time when the appetite is diminished and when there is little interest in food. Any stress, whether it be from surgery, burns, difficult times, a car accident, or overwork, has a similar effect on the body.

## Some general guidelines

- Requirements for all nutrients increase dramatically, but especially for protein, the B vitamins generally and particularly vitamin B<sub>5</sub> (pantothenic acid), vitamin C, and the minerals potassium, magnesium and zinc. A vitamin B complex tablet which has 50 mg of B<sub>5</sub> and B<sub>6</sub>, with a multi-mineral supplement and 1–2 g of vitamin C can be used to supplement the diet.
- Rapid energy fluctuations can be reduced by eating small, but frequent meals of complex carbohydrate (potato, rice, bread, oatmeal and pasta), combined with *small* amounts of protein such as yoghurt, cheese, tofu, hommous, tuna or egg.
- Any food which acts as a ‘body stressor’, such as the stimulant caffeine, and refined sugars should be avoided.
- Some exercise is vital. Exercise every second day allows for one day of recovery after energy expenditure. As strength improves, exercise every day will increase stamina and a sense of well-being.

Exercise should be taken at a much slower pace. People tend to over-estimate their capabilities so a good rule of thumb is to start at *half* the level you imagine you could comfortably manage *now*; if it is too little, no harm will be done. Long, slow, distance exercise is best (see page 225).

- Simple, easily digested soups and ‘energy drinks’ provide concentrated nutrients.
- Have one serve of a cooked green *leafy* vegetable every day while in the recovery period such as spinach, Chinese cabbage or silverbeet.
- Never skip breakfast and have a cooked breakfast (oatmeal, egg on toast, cooked rice cereal, vegetable soup) at least every second day.
- Use the ‘suggested menus’ given for the hypoglycaemic diet (pages 149–52) as a basis for the diet with the additional recipes provided.

## Suggested convalescent recipes

### Soups

Soups are useful recovery foods. The best types are those based on grains, especially barley and rice; beans, such as tofu, orange lentils, fresh soya beans and red kidney beans; or root vegetables like potato, carrot and sweet potato.

#### Chicken broth

Many societies use chicken broth as a convalescent food. Use free-range chicken. The broth can be prepared with a particular flavour—for example, Thai (lemongrass, lime leaves, galangal, chilli) or Western (celery, bay leaves, onion, carrot and peppercorns).

### High protein drinks

High protein drinks are useful meal substitutes or for between meals, particularly when digestion and appetite are poor.

#### Almond smoothie

- 1 tablespoon almond meal
- 1 teaspoon rice bran
- 1 teaspoon wheatgerm
- 1 cup soya milk (Bonsoy™, Aussie Soy™, Vitasoy™)
- 1 teaspoon malt extract

Blend all ingredients until smooth.

Variation:

Substitute  $\frac{1}{2}$  cup of yoghurt and  $\frac{1}{2}$  cup fruit juice for the soya milk and malt extract.

#### Berry drink

- $\frac{1}{2}$  punnet blueberries, strawberries, raspberries or other berry fruit in season
- $\frac{1}{2}$ – $\frac{3}{4}$  cup yoghurt or soya milk (yoghurt and berries tends to be fairly tangy and may not be to everyone's liking)
- 2 teaspoons almond meal, ground cashews, or seeds (the 'seed mix' for irritable bowel syndrome is suitable)

Blend all ingredients together until smooth.

### Tofu drink I

50 g soft tofu  
6 dried apricots soaked overnight in 1 cup water  
1 tablespoon almond meal  
1 teaspoon slippery elm powder

Blend all ingredients together until smooth.

### Tofu drink II

50 g soft tofu  
1 banana  
1 teaspoon slippery elm powder (or 1 teaspoon rice bran)  
2 teaspoons almond meal  
1 cup fruit juice

Blend all ingredients together until smooth.

### Tofu drink III

50 g soft tofu  
1 cup freshly squeezed orange juice  
2–4 teaspoons almond meal  
2–4 teaspoons ground cashew nuts or seed mix  
1 teaspoon slippery elm powder

Blend all ingredients together until smooth.



# Appendix

## Patterns of disharmony

### THE QUALITIES

#### Heat

Heat, like all of the qualities, is vital to life. In balanced degree, Heat is necessary for good health and the normal functioning of the organs.

#### Excess heat

The state of imbalance associated with excesses of Heat is caused by inappropriate diet, lack of fluids, constipation, exposure to the elements or extreme emotions. Heat which has been introduced into the body due to Hot foods, exposure to too much sun, or hot weather is common and easily recognised. Internal Heat, caused by pent-up emotions, failure to eliminate toxins (constipation) or excess activity, is a more complex presentation of disharmony often referred to as 'Hot blood' or 'Heat in the blood'. People with a temperament related to excess Heat are usually called 'hot-blooded', referring to their impulsiveness, to their sexual appetite or their bad temper.

Abnormal bleeding, pelvic inflammatory disease (PID), and some cervical and vaginal infections are examples of conditions women might experience that are associated with excess Heat. Other symptoms are described below.

#### Visible signs

- The body and face are hot to the touch, and the face is red
- Perspiration is increased
- A tendency to develop red and inflamed skin eruptions

- Respiratory tract infections are accompanied by fevers, inflamed mucous membranes and may either be Moist or Dry
- Discharges are likely to be thick and yellow, often with a foul odour
- The urine is dark, scant and strong smelling
- There is a tendency to Heat signs in the upper body (heat rises)
- Hot disorders may either be associated with Heat alone, Heat with Moistness, or Heat with Dryness
- The tongue is red and often dry, rough or coated with yellow fur
- The pulse is rapid. It may be full or thready depending on the strength of the individual

### Symptoms

- Sensation of being uncomfortably hot
- Symptoms aggravated by heat
- Fatigue similar to the tiredness felt on a very hot day, feeling drained, depleted and too tired to move about (physical activity generates more heat and aggravates the symptoms)
- Thirst, especially for cold drinks
- Burning and irritation which can affect any of the mucous membranes or organs. Examples might be burning stomach pain, burning and dry nose or eyes, burning and discomfort on passing urine, hot and burning passage of stool, hot and painful throat
- Coughs tend to be dry and irritating, perhaps with some expectoration of blood
- Constipation
- Headaches which are relieved by cool applications
- Increased libido
- Pain described as burning and/or throbbing
- Bitter taste in the mouth; bad breath

### Preferences

- A liking for cold foods or drink, cold applications, cool weather; dislike of spicy and hot (temperature) foods, drinks, applications
- Dislike of summer and hot weather

### Temperament

- Heat is an aspect of the Sanguine and the Choleric temperaments  
An abundance of Heat will tend to contribute to the enthusiasm, impulsiveness and ardour of the Sanguine individual, and make the Choleric type more irascible and quick-tempered
- A Hot person is likely to overreact to emotional experiences, have difficulty with relaxing and sleeping, or dream vividly

## In gynaecology

- Heat is frequently associated with abnormal bleeding or infections
- Menstrual bleeding is usually heavier, and brighter, and may contain many small clots
- Infections are associated with symptoms of burning, throbbing or itching
- Vaginal discharges are usually yellowish, irritating and may have an offensive odour

## Outcome

- Excess Heat will eventually cause Dryness as the body fluids dissipate
- An extreme form of Heat, caused by exposure to the elements or an external heat source, can cause high fever, red and dry skin, restlessness or lassitude, and eventually loss of consciousness. This is common in heat stroke
- In extreme and prolonged cases of Heat, the disharmony will eventually become Cold due to diminishing stores of vitality caused by the frantic activity of the Heat

## Common problems with diagnosis

Although it is common to associate infections with Heat, many people with quite severe infections will not have any of the symptoms outlined above. This is true of conditions like PID which, although caused by an infection, may not be accompanied by any of the signs or symptoms of Heat. PID of this type is likely to be associated with other types of disharmony and the treatment will need to reflect the rectification of the appropriate imbalance.

The symptoms of abnormal sweating and hot flushes encountered during times of debility, anxiety and at menopause, at first glance would appear to be caused by Heat. More often, however, they are the body's reaction to an abnormal situation, and cannot be seen to represent a condition in and of themselves. If all of the other symptoms point to other qualities predominating in the symptom picture—for example, when a woman with hot flushes talks of Cold symptoms—these are likely to represent the true picture for that individual. (Also discussed in the sections on adrenal exhaustion, neurasthenia and menopause.)

## Cold

Cold provides balance to Heat. Cold generally reduces activity of the organs and the mind, thereby allowing rest, recuperation and harmony in the body's activities.

## Excess Cold

Problems occur when Cold is either introduced into the body or develops as a result of lack of Heat and vitality. Introduced Cold is frequently associated with exposure to cold weather, sudden temperature changes from hot to cold, drinking too many iced drinks, or eating cold foods such as ice-cream, cucumber and watermelon. It is easier for a person to suffer from a disharmony associated with Cold if they are already depleted in vitality or Heat.

Introduced Cold will affect the part of the body which has been most exposed to its influence: the stomach and bowel if Cold foods have been eaten, the limbs and lungs if a person was exposed to cold weather. 'Internal' Cold conditions associated with a lack of vitality and Heat (in other words, those not introduced by an external factor) will tend to sink and cause disharmony in the lower body.

As one of the causes of disharmony in gynaecology, Cold can present in one of two ways. It can be seen as an indication of the lack of Heat, often associated with poor vitality; or as an externally introduced factor which has the potential to aggravate a condition, or in some cases cause one. Historically, the problem of Cold for women was acknowledged by recommending that menstruating women should not swim, get cold, sit on cold ground or eat cold food. Of course, many of these recommendations became confused with social mores, and many of them have been abandoned today as old wives' tales. However, for women who lack vital energy, and for whom the spectre of Cold as an externally introduced aggravating factor is real, these early prescriptions are still useful.

### Visible signs

- The face is blanched or pale
- There is evidence of poor circulation with cold limbs and extremities, purple nail-beds, diminished mental ability
- The skin is mottled, purplish or white, and cold to the touch
- Respiratory tract infections tend to become 'catarrhal'
- Chills are more frequent than fevers
- Discharges tend to be clear or white and copious
- There are frequent urges to pass urine, without pain or discomfort
- Large volumes of pale urine are passed
- Complaints associated with part of body exposed to cold, or predominantly to the lower portions of the body
- Disorders caused by Cold may either be associated with Cold alone, Cold and Moistness, or Cold and Dryness
- The tongue is pale and sometimes large, with a white coat
- The pulse tends to be slow, deep and thin

## Symptoms

- There is an unusual dislike of cold either in the form of food, drink, weather, draughts, or changes in weather from hot to cold
- The person tends to feel chilled, and wears more clothes than others. There is difficulty getting warm even with increased clothing
- All complaints are aggravated by cold
- There is a tendency to be fatigued, especially where the Cold is caused by a diminution of the vitality and Heat
- There is a diminished desire for fluids, or a desire only for warm drinks
- Pain is strong, and tends to remain in one position (fixed). It is either colicky or stabbing
- Digestion is poor and the appetite diminished. Bloating is common
- Poor libido
- Joints are stiff and painful to move, especially in cold weather

## Preferences

- A tendency to want hot or spicy foods, with an aversion to salads and cold foods generally
- Likes baths and hot applications
- Suffers more in winter

## Temperament

- Cold is an aspect of the Melancholic and Phlegmatic temperaments. Excess Cold will tend to cause the Phlegmatic individual to become fixed in their opinions and pragmatic; or even to become mentally dull and slow. The Melancholic is liable to slip into deep depression or to exhibit signs of catatonic and withdrawn behaviour
- There is the inclination to brood, withdraw, become pensive and to have a poor memory. Sleep is often taken in excess and there is difficulty waking or remaining alert

## In gynaecology

- Menstrual pain which tends to be intense and relieved by heat
- Bleeding which is characterised by dark or clotted blood which flows slowly and is accompanied by pain
- Periods are inclined to be late, or cycles too long
- Vaginal discharges are usually copious, white and non-irritating

## Outcome

- Response to illness tends to be slow, 'chronic' and is characterised by underactivity of the body
- Cold conditions may become Cold and Moist over time. The reduc-

tion in bodily functions, particularly the weakening of digestion and elimination, leads to an accumulation of 'toxins' in the gut and eventually, catarrhal complaints

- Similarly, Cold conditions may become Cold and Dry over time
- The cycle of transmutation may continue, and a Cold and Moist disorder might become eventually Moist and Hot; a Cold and Dry disorder might change to Dry and Hot

### Common problems with diagnosis

The most difficult interpretation of Cold disorders is whether they are predominantly introduced or related to an internal weakness of vitality and Heat. In reality, the two conditions intermingle, since introduced Cold will affect an individual who is already depleted much more easily. Cold associated with a lack of Heat and vitality will require tonics to improve vitality, restore Heat and replenish the Blood (which is Hot and Moist), as well as warming herbs and foods.

## Moist

Moistness is an essential quality to lubricate the tissues and organs and to facilitate elimination from the body.

### Excess Moistness

(‘Moist’ is the term favoured by Culpeper and other writers of the humoral theory, and will be used here instead of Damp which is used in traditional Chinese medicine. Related terms are ‘catarrh’ and ‘lymphatic congestion’ which are descriptions of conditions rather than qualities.)

Excesses of Moisture are associated with any condition which is characterised by too much fluid, with puffiness, fluid retention and deranged digestion with a tendency to diarrhoea. There is a tendency to discharges; poor resistance to infections; poor elimination accompanied by foul body odours; flatulence; bad breath and fluid retention.

Excessive Moistness causes swelling and heaviness, makes movement difficult and results in sluggishness of the mental faculties as well as the body. It can be caused by over-eating; eating rich, fatty or sweet food; humid weather; prolonged immersion in water; working or living in a damp environment; sedentary lifestyle; or emotional turmoil.

As with the other qualities, excess Moistness can be externally acquired or can result from disharmony within the body. The dietary excesses and environmental factors described above are examples of introduced Moisture; while physical underactivity, emotional lability,

poor vitality, lack of Heat and faulty elimination are both the causes and effects of 'internal' Moistness.

Women who suffer from an excess of the Moist quality will have vaginal discharges, obvious mucus in their menstrual blood, and will often suffer greatly if they develop PMT. Their fluid retention will be pronounced; they will become tired, muddled-headed, clumsy; and they will often suffer from thick, heavy headaches with nausea and vomiting (migraines).

Moistness is a passive quality and will usually combine with one of the active qualities, Heat or Cold. (The additional quality will be included, where relevant, in brackets.)

### Visible signs

- The complexion is greasy, oily and sallow
- Skin diseases are characterised by watery blisters, ulcers and abscesses with oozing discharge
- Complaints tend to be accompanied by thick, coloured mucus (Heat) or clear, or white mucus (Cold)
- Discharges and bodily excretions are often offensive (Heat)
- Moisture settles and is often found in the lower body (especially if associated with Cold)
- The urine is cloudy with mucus and a strong smell (Heat)
- The pulse is slippery and rapid (Heat) or slow and deep (Cold)
- The tongue is wet with a thick mucus-like white coat (Cold) or a greasy yellow coat (Heat)

### Symptoms

- The preference is for dry and hot weather and there is an unusual dislike of wet or cold places and weather (Cold)  
Or:
- There is an unusual aversion to hot and humid weather, hot baths and steam rooms, and an attraction to dry and cool environments (Heat)
- Fatigue and debility is accompanied by heaviness of the limbs. This is often described as a sensation of walking through glue or treacle
- The joints are sore and stiff
- Tiredness and stiffness worsens with rest, and gradually improves with movement (especially with Cold)
- The head is heavy and thick, sometimes with a sense of the head being tightly bound
- The appetite is diminished with nausea and indigestion, particularly from eating rich or fatty foods or alcohol (Heat)
- Any pain is dull, persistent and congestive. Moisture combined with Cold causes sharper and crampy pain; if mingled with Heat, the pain will tend to have the characteristics of burning and stabbing

- There is fullness and bloating in the chest, stomach and abdomen
- Diarrhoea will be either copious, possibly containing mucus (Cold); or burning and offensive (Heat)
- Resistance to, and recovery from infections tends to be poor
- Eliminative processes are often faulty resulting in constipation and fluid retention or oedema
- Diseases of the liver and gall bladder are often associated with Moist and Hot disorders
- Excessive amounts of sleep are needed but this does not refresh or improve fatigue
- The eyelids are puffy on waking

#### Preferences

- Wants sour, salty and hot foods (Cold and Moist)  
Or:
- Craves sour, cold and bitter foods (Hot and Moist)

#### Temperaments

- Moisture affects the Phlegmatic (Cold and Moist) and Sanguine (Hot and Moist) temperaments. Because an increase in Moisture slows and calms mental faculties, the Sanguine temperament will be less optimistic, ardent and courageous; while the Phlegmatic type will become more inclined to dullness of thought and more set in their ways

#### In gynaecology

- Vaginal discharges can be of the Hot and Moist type: thick, yellow, corrosive and offensive; or of the Cold and Moist type: bland, white or clear (leucorrhoea)
- Fungal infections, especially thrush or *Candida* will be very irritating if associated with Heat, and have a copious, less irritant discharge if associated with Cold
- PMT symptoms are associated with heaviness, clumsiness, fluid retention, bloating, headaches, skin eruptions and fatigue

#### Outcome

- Symptoms tend to linger and are difficult to eradicate
- Excess Moisture gives rise to conditions that are turbid and foul in nature. It arises from sluggish bodily functions, as well as making the bodily functions slow down



# Dry

Dryness is the counterbalance to Moisture in the body. It regulates the fluid balance and allows for dispersion and lightness.

## Excess Dryness

The quality of Dryness may be introduced into the body as a result of excessively Dry and often windy weather, Drying foods, inappropriate fasting or lack of nutritious food. In other circumstances, a lack of fluids brought about by excessive Heat, by excessive physical activity (causing a loss of body fluids) or extreme emotions, may cause Dryness to appear.

Gynaecological conditions associated with Dryness are usually associated with excesses of both the Cold and Dry qualities, brought about because of an absence of Heat and Moisture (Blood). This can cause late and scanty periods, while excessive menstrual loss may be one of the causes of a relative preponderance of Cold and Dry.

Dry is a passive quality and will combine with Heat or Cold. Where appropriate, these are indicated in brackets.

### Visible signs

- The skin is dry, rough and chapped, and readily absorbs oils, ointments or creams
- The mouth, mucus membranes, nose and lips are dry, cracked and chaffed
- The eyes are often dry and red (Heat)
- Inflamed, dry and itchy skin or mucus membranes; or tissues which crack and bleed, indicate Dryness with Heat
- If Cold is a factor, the skin is dry, pale, scaly and cold. This is particularly apparent on the lower extremities
- Respiratory tract infections are characterised by difficulty in breathing in dry environments, wheezing, shortness of breath, dry throat, dry cough with little phlegm. The presence of blood indicates Heat
- The tongue is dry and red (Heat) or pale (Cold)
- The pulse is indistinct and either rapid (Heat) or slow (Cold)

### Symptoms

- Dislikes dry, windy weather
- Conditions will tend to worsen in autumn
- There is a preference for humid and wet weather rather than hot and dry or cold and dry seasons
- The thirst cannot be easily satisfied
- Conditions may be accompanied by muscle wasting and weakness

- The bones are often weak and fragile, as is seen in osteoporosis
- Allergic conditions such as allergic rhinitis, conjunctivitis and dry eczema predominate, and the symptoms tend to worsen in autumn
- Insomnia associated with Heat is caused by a lack of the quietening and relaxing qualities of Cold and Moist
- The stools are dry
- There is poor resistance to infections of the skin, mucus membranes and respiratory tract due to breaches in the continuity of the tissues caused by Dryness

### Preferences

- Unusual dislike of dry foods
- Unusual and insatiable thirst
- Often takes baths, goes swimming
- Likes to be near water and in moist environments

### Temperaments

- Dryness is associated with the Choleric and Melancholic temperaments. Excess of Dryness will diminish the creativity of the Melancholic type and increase the irritability of the Choleric type.

### In gynaecology

- The Blood humour is both Hot and Moist, and excess loss of Blood will cause a relative excess of the Cold and Dry qualities. This is likely to mean that women will have fewer periods, lower libido and have a heavy and cold sensation in the lower abdomen
- Alternatively, excess of the Cold and Dry qualities from other causes outlined above can be a cause of infrequent or absent menstruation
- Excess of Hot and Dry qualities may be associated with small, sticky and dark clots in the menstrual blood, and with burning, smarting or stitch-like pains

### Outcome

- Dryness is most likely to transform into Heat because of the drying of the body fluids
- However, when the Dryness is associated with loss of the Blood humour, Coldness and Dryness will predominate and this may eventually transform into a Cold and Moist disharmony, particularly if the Blood loss is pronounced and the vitality is diminished.

## Rules governing the qualities

The qualities Hot, Cold, Dry and Moist are governed by a number of rules:

- One quality cannot form an element: elements consist of two qualities combined in various proportions
- Hot and Cold are the active qualities, while Dry and Moist are passive
- Hot and Cold are opposites, as are Dry and Moist
- An active quality will combine with a passive one, but not with its opposite quality. That is, Hot cannot combine directly with Cold; Dry cannot combine directly with Moist
- It is not possible for more than two qualities to combine in one element since opposites will come together and cancel each other out
- Adjacent qualities intermingle to create the elements: Hot and Dry produce Fire; Cold and Moist produce Water; Hot and Moist produce Air; Cold and Dry produce Earth

## THE ELEMENTS

Of the elements, Air and Fire are light and tend to move upwards. They are the positive and active elements. Earth and Water are heavy; they tend to move downwards and are the negative, passive elements. In a diagnostic sense, this means that Air and Fire tend to be related to conditions that are quick to develop, that affect the upper body and that are associated with overactivity, inflammation, fever and infection. Water and Earth tend to be related to conditions that are associated with slow-moving complaints of a more chronic nature, with constriction, slowing down and signs of underactivity.

### Fire

Fire is described as the most rarefied and lightest of the elements. It is composed of the Hot and Dry qualities and is always represented as being above the other elements. It prevails over Cold and permeates Air, with which it has much in common. Its active, positive and dispersive attributes lessen solidity and encourage the intermingling of the humours. Fire refines the mind and bestows drive, energy, passion and wakefulness. It is related to Yellow Bile and the Choleric temperament.

## **Air**

Air is seen to be Hot and Moist and is related to Blood and the Sanguine temperament. Its natural tendency is to float and to dissipate, ensuring lightness and ease of movement. The Moistness of Air dispels the Dryness of Fire, and it overcomes the Dry and Cold attributes of its opposite, Earth. With Water it shares the Moist quality, but its Heat counterbalances the tendency of Water to become Cold and stagnant. Air confers the characteristics of quickness, passion and courage to the temperament. It is depicted as being above Earth and Water, but below Fire.

## **Water**

Water is comprised of the Cold and Moist qualities and has the tendency to flow, change in shape and disperse. It is found between Air and Earth in nature and is related to the Phlegmatic temperament and the Phlegm humour. Its passive and Cold qualities impart an inclination to moderate bodily processes, to soothe and to reduce inflammation. Water adds Moistness to Earth and gives it form; dampens the Heat and Dryness of Fire; and calms the Heat of Air. Water imparts calm, peaceful and passive attributes to the character.

## **Earth**

Although Earth is said to be below all of the other elements, it is central to life. Earth gives the body form and solidity. It is passive, Cold and Dry; and by far the heaviest of the elements. Because of its solidity, it attracts all of the other elements to it: Earth modifies the Heat of the Fire element; the Moistness of the Water element; and counterbalances the light, floating and insubstantial qualities of the Air element. Although inclined to changeability, Earth imparts insight, vision and intellectual brilliance to the mental capacities.

## **Rules governing the elements**

Like the qualities, the elements Fire, Earth, Air and Water are governed by a number of rules:

- All earthly things consist of the four elements combined in various proportions
- Fire and Water are opposites, as are Earth and Air; and both pairs are mutually exclusive

- The elements adjacent to one another share one quality; Fire and Earth share Dry; Earth and Water share Cold; Water and Air share Moist; and Air and Fire share Hot
- Hot dominates dry in the Fire element; Moist dominates Heat in the Air element; Cold is dominant over Moist in the Water element; and Dry dominates over Cold in the Earth element
- Each of the elements endeavours to behave naturally: Fire tries to rise, Water wants to flow, Air to float, and Earth to fall
- The relative preponderance of one quality in relation to another may alter, allowing one element to transform into another and eventually even into its opposite element
- Irrespective of the transformation of one element into another, the worldwide quantity of any given element will remain the same. (This is similar to the first law of thermodynamics.)
- Elemental opposites are kept apart by the force of repulsion, which causes disease and degeneration; and are brought together by the force of attraction bringing health and regeneration
- Attraction and repulsion wax and wane over the seasons and the throughout the life cycle, creating an oscillation like that between Yin and Yang
- Elemental opposites are connected by the intermediate element and the qualities they share: Fire is connected to Air and Earth by the qualities of Heat and Dryness; Earth to Fire and Water because it shares Cold and Dry; Water is connected to Earth and Air because of the qualities Coldness and Moisture; and Air is connected to Water and Fire because of the qualities Moistness and Heat

## **THE HUMOURS**

The ‘body fluids’ known as the humours are Blood, Phlegm, Yellow Bile and Black Bile. They are believed to arise from the liver, and from the ingestion, digestion and evacuation of food and medicine. When any of the aspects of life become unbalanced—if, for example, there is not enough rest, the diet is inappropriate, or evacuation is impaired—there is a corresponding imbalance in the humours and disease occurs. The inherent strength of the body determines whether the person succumbs to the disease, and the relative strength of the organs determines its type and location.

Identifying and correcting humoral imbalance continues to be an important aspect of diagnosis and treatment in the Unani Tibb system of medicine.

## **Blood**

According to the humoral theory, Blood is made from the best quality, thoroughly digested foods (Culpeper says ‘blood is made of meat perfectly concocted’). It is then transmuted into flesh, and the normal bodily secretions, including sperm, menstrual blood and breastmilk (which was believed to be blood with the redness taken out). Blood humour improves the judgment and fortifies the digestion. It is carried by the blood vessels and, through them, is dispersed throughout the body. It is Hot and Moist.

## **Phlegm**

Phlegm humour is described as being made from the not so perfectly digested and next-best quality food. It makes the sweat, saliva, mucus and digestive juices and it is normally found in the lungs. Phlegm is believed to stabilise the emotions and the mind, and to prevent the irritability associated with Yellow Bile because of its Cooling and Moistening effect. Phlegm humour assists with elimination of wastes by allowing the bowels to function normally and mucus to be cleared from the respiratory passages. It is Cold and Moist.

## **Yellow Bile**

This humour is thought to be made from the coarser and less refined nutrients. It makes the bile, is stored in the gall bladder and strengthens the body’s ability to assimilate nutrients. Yellow Bile dispels apprehension and provides the necessary qualities for continued activity. Through these attributes, it is believed to give courage and passion. It warms the body and is Hot and Dry.

## **Black Bile**

Black Bile is composed of the least digestible and least nutritious part of food. It is stored in the spleen and strengthens the body’s ability to retain food until it can be properly digested. It is seen to affect the temperament by fortifying the memory and improving the ability to concentrate and study. It calms lust and conveys a solid and steady quality to the personality. It is Cold and Dry.

## THE TEMPERAMENTS

The temperament is the personality expressed according to the humoral prevalence and provides a theoretical basis for interpreting the intellect and the emotions. Much of the following is adapted from the twelfth-century writings of Hildegard of Bingen, who gave a detailed account of how the four temperaments specifically influence a woman's personality, her sexual behaviour and her reproductive capacity.

### Sanguine

The sanguine type is described as being optimistic, courageous, hopeful and amorous. This temperament is associated with Blood, the element Air, and comprised of the Hot and Moist qualities. Women of this temperament were often described as being well-mannered and serene. They were seen to have few gynaecological complaints, normal periods and few difficulties with fertility.

### Choleric

A choleric person is described as impatient, passionate, quick to anger, bilious and irritable. They are inclined to a sallow complexion, and are physically inclined to be well built but slender. Both Hildegard and the unknown author of the *Medieval Woman's Guide to Health* describe choleric women as being subject to heavy periods with hot, red and fiery blood.

### Phlegmatic

The phlegmatic temperament is represented in the even-tempered, serene individual. They are governed by the phlegmatic humour, the Water element and the Cold and Moist qualities. Their periods are not excessively troublesome, flowing neither too much or too lightly, and they are usually of an average build.

### Melancholic

Melancholic individuals are ruled by Black Bile, the element Earth and the Cold and Dry qualities. They are often described as being intellectually gifted, creative and inclined to be spiritual. Of all of the temperaments, the melancholic is inclined to have more difficulty with

heavy periods and infertility. They are physically weaker too, and often succumb to illness, especially when depressed.

## Physiology according to the humoral theory

The humoral theory, like other traditional medicines, describes a system of ‘forces’ which govern the overall functioning of the body and maintain a state of equilibrium. The three physiological forces—the vital spirit, the *anima* and the natural spirit—are known variously as ‘the forces of conservation’ (Culpepper), the ‘three natural faculties’ (Unani Tibb), or the Three Treasures, *san bao* (Chinese medicine). These three physiological forces are inseparable and interdependent; an absence of one or more is incompatible with life.

Pneuma is the primary generative energy, usually described as being of cosmic origin, which both creates and governs the physiological forces (see Figure A.1).

In the humoral theory, the vital spirit is housed in the heart, circulated throughout the body by the arteries, where it oversees the ‘administering qualities of attraction, digestion, retention and expulsion’. It gives rise to consciousness of self and the emotions.

The *anima* or soul spirit (called the animal spirit by Culpepper), resides in the brain and governs consciousness and the five senses. It is conveyed via the nervous system.

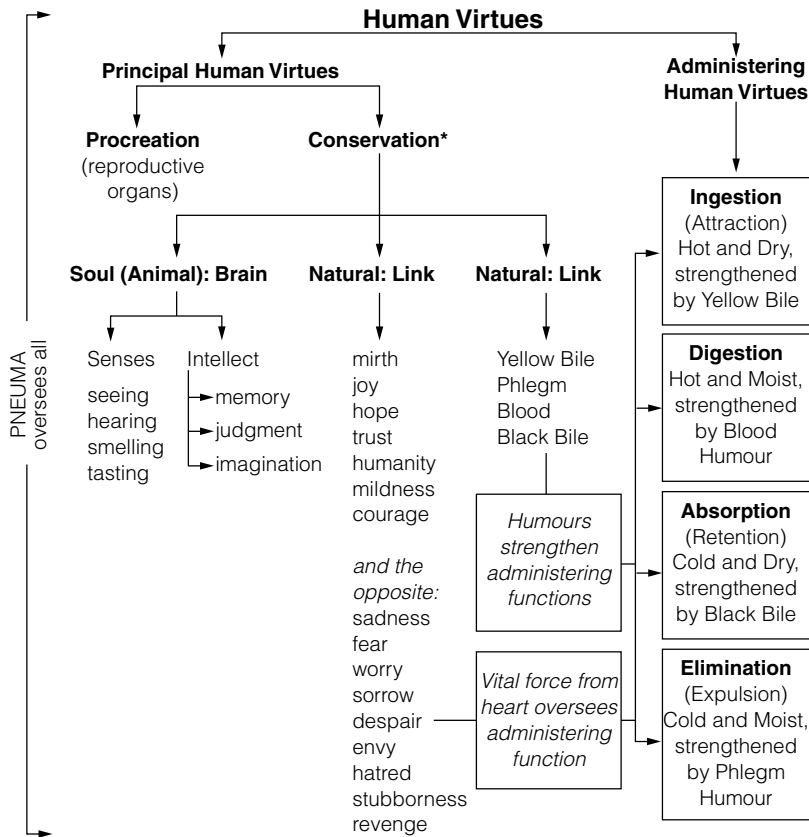
The natural spirit, housed in the liver, controls the production of the four humours and is the basis for vitality, growth and reproduction. The humours were believed to be conveyed throughout the body by the veins.

The concept of some form of vital force has informed the practice of natural medicine worldwide: in many traditions it has been associated with a deity, the sun or some other cosmic force. Whatever the origin of this energy, its very existence has stimulated spirited debate for centuries. The contemporary argument revolves around what has been referred to as the mechanistic theory and the vitalistic theory.

Mechanism dictates that life is dependent on the complexity of the arrangement of the organism: the more complex the organism the more complicated the arrangement of parts. Vitalism takes this theory one step further with the belief that a ‘vital force’ is necessary for this complex arrangement of parts to function.

At a fundamental level, the vitalism of an organism is seen to be that factor which defines the difference between life and death; the force that allows a particular collection of organs, cells and structures to continue to grow and organise itself in a coherent and coordinated manner. For natural therapists, it is the vital force, and not the complexity of the arrangement of the organs and cells, which governs an individual’s unique complexity. The vital force is also inherently





\* Conservation refers to the doctrine of preservation of energy such that the total energy of any system of bodies can neither be increased nor diminished.

**Figure A.1 Physiology according to the humoral theory**

corrective, and throughout life it seeks to achieve a state of homeostasis through repair and reorganisation. Its ability to do this is dependent upon its quality and strength, which are themselves reliant on a number of factors:

- the amount of vitality inherited from one’s forebears
- the amount generated from the digestion and assimilation of food
- the amount remaining after the demands of daily living, stress or disease processes.

The vital energy determines the way in which an individual reacts to disease: will they recover quickly and completely, as would a vital and healthy person, or will disease or vague ill-health linger interminably?

An individual with poor vitality might be easily fatigued, unusually weak or always unwell. Any or all of the body's recuperative, defensive, digestive or reproductive functions may be underactive. They may have complaints which come on after physical exertion or any expenditure of energy. Their mental capacity and memory is often diminished; their eyes are dull and lack the sparkle of the healthy person. They may have a large moist tongue. Their vitality, stamina and physical strength is poor and they usually feel the cold easily, since vitality generates heat.

Over the normal lifetime the vitality or *pneuma* is gradually whittled away. This process is accelerated by poor eating, an unhealthy lifestyle, illness and the normal wear and tear on the body; and slowed down by reducing stress, eating well, exercise and freedom from ill-health.

All traditional medicine, which is based on a belief in vitalistic concepts, strives to maintain and support the individual's inherent vital energy, *qi* or *prana*. Central to this theme is that medicines should do no harm, and that correctly administered, they will assist with the conservation of, or the return to, a state of health.

# Glossary

- abortifacient** an agent which is used to terminate a pregnancy.
- adaptogen** a non-toxic substance that increases resistance to physical, environmental, emotional or biological stressors; a substance which can help to re-establish normal physiological function.
- adenoma** a benign tumour in which the cells form recognisable glandular structures.
- adenomyoma** a well-defined and benign tumour-like mass which forms in the uterine muscle.
- adenomyosis** the growth of abnormally situated endometrium between the muscle fibres of the uterus.
- adhesions** scar tissue which forms internally after trauma, infection or blood loss.
- aldosterone** a hormone secreted by the adrenal gland which regulates water and electrolyte balance.
- alpha-linolenic acid** first omega-3 fatty acid found in linseeds, canola, walnut and soya bean oils.
- amenorrhoea** the absence of the period for six months during the menstrual years or the failure to commence menstruation.
- anabolic** constructive metabolism; growth-promoting.
- androgen** hormone produced by both men and women with masculinising effects when present in large quantities. Women secrete androgens from their ovaries and adrenal glands.
- androgenic alopecia** male-pattern baldness, usually an inherited trait.
- androgenising drug** a drug which produces masculinising effects such as hirsutism, deepening of the voice, clitoral enlargement, atrophy of the breasts, weight gain and acne.
- androstenedione** an androgen, weaker than testosterone, secreted by the ovary and adrenal gland (and testes in men).
- anodyne** an agent with pain-relieving properties.
- anorexia nervosa** an eating disorder characterised by extreme weight loss.
- anovulatory** not associated with the release of an ovum.
- anti-haemorrhagic** an agent which can stop bleeding.
- anti-oestrogen** an agent that blocks the action of oestrogen by competing for receptor binding sites, such as the phyto-oestrogens and the drug tamoxifen.
- anti-oxidant** food or herbal component which protects against oxidation and free-radical damage.
- antispasmodic** an agent that relieves or prevents smooth or skeletal muscle spasm.
- anxiety depression** a depressive state accompanied by anxiety.
- arachidonic acid** an omega-6 fatty acid found in cell membranes of animals.

**aromatase** an enzyme which converts androgens to oestrogens.

**aromatisation** an enzymatic process which occurs in adipose tissue, muscle and in the ovary, leading to the conversion of androgens to oestrogens.

**astringent** or **anti-haemorrhagic** (herbal medicine) a herb which stops bleeding or discharge from tissues via a tissue 'tightening' effect.

**atherosclerosis** a condition involving the deposition of cholesterol-containing plaques in the arteries.

**auto-immune disease** a condition characterised by the immune system reacting against the body's tissues.

**basal body temperature** the temperature of the body at complete rest; taken first thing in the morning after sleep.

**beta-carotene** a provitamin that is converted to vitamin A in the liver and intestines. Found in many green leafy and yellow vegetables.

**beta-glucuronidase** an enzyme produced by intestinal bacteria that converts oestrogen into the (deconjugated) form that can be absorbed from the bowel.

**beta-hydrogenase** an enzyme vital to the production of oestrogen in the ovary.

**beta-sitosterol** a steroid-like substance of plant origin.

**biochanin A** one of the isoflavone phyto-oestrogens found in soya products and a number of other plants.

**bioflavonoid** a group of compounds, widely distributed in plants, that maintain the health of small blood vessel walls.

**biopsy** a procedure where a small sample of tissue is taken for examination and identification.

**bitters** herbs or foods that have a bitter taste; Liver herbs.

**body mass index (BMI)** a value obtained by dividing the weight in kilograms by the height in metres squared. Used as a means of assessing the relative health risks of being above or below average weight for body height.

**bone density** ratio of bone mass to bone volume.

**bulimia nervosa** an eating disorder characterised by intermittent feasting, vomiting and fasting.

**caffeine** a stimulating and diuretic substance found in a number of plants, including tea and coffee.

**carcinogen** any cancer-producing substance.

**cardiovascular disease** a disease process affecting the heart and blood vessels.

**carminative** a medicine that relieves flatulence, and assuages gastric and abdominal discomfort.

**cellulose** a type of plant fibre.

**chloasma** well-defined, patchy area of increased pigmentation, usually distributed over the cheeks and forehead, and sometimes on the upper lip and neck. Frequently associated with pregnancy, menopause and the Pill. Also called the 'mask of pregnancy'.

**chromium** one of the trace minerals necessary for health.

**climacteric** medical term for the peri-menopause.

**Cold (humoral theory)** one of the four qualities.

**competitive inhibition** the process whereby one substance prevents another from occupying receptor binding sites and where the receptor is unable to respond in the same way, resulting in an inhibition of some process.

**congestive dysmenorrhoea** period pain described as aching, heavy and/or dragging.

**conjugated oestrogen** oestrogen excreted by pregnant mares in their urine. Administered orally as hormone replacement therapy, e.g. Premarin.

**corpus albicans** literally, the 'white body'; the scar left on the ovary after ovulation.

**corpus luteum** literally the 'yellow body'; the structure left after ovulation has occurred and which is responsible for the secretion of oestrogen and progesterone.

**cortisol** The major glucocorticoid hormone secreted by the adrenal cortex; the body's own cortisone. During periods of stress, cortisol levels increase dramatically, primarily affecting carbohydrate metabolism, muscle tone, circulation, reaction to injury and the immune response.

**coumestan** plant compounds, structurally similar to isoflavones, which possess oestrogenic activity. The important coumestan is coumesterol.

**coumesterol** a phyto-oestrogen found in legumes; the amount increases when the legume is sprouting.

**cystadenoma** a cystic tumour composed of glandular tissue that can occur in the ovary.

**D&C** a surgical procedure performed under a general anaesthetic where the lining of the uterus is removed and/or biopsied.

**daidzein** one of the isoflavone phyto-oestrogens which is converted by intestinal bacteria to equol.

**danazol (Danocrine)** a progestogen which can cause pronounced androgenic effects.

**deconjugated oestrogen** the form of oestrogen produced by the action of enzymes present in intestinal bacteria, which can be reabsorbed from the bowel.

**dehydroepiandrosterone** an androgen.

**diagnostic D&C** *see* D&C.

**diethylstilboestrol (DES)** a synthetic oestrogen.

**dihydrotestosterone** a powerful androgenic hormone.

**dihydroxytestosterone** an androgen.

**docosahexaenoic acid (DHA)** the fatty acid which is the last step in the omega-3 pathway; found in fish.

**dopamine** a central nervous system neurotransmitter, also known as prolactin-inhibiting factor.

**Dry** (humoral theory) one of the four qualities.

**dydrogesterone** a progestogen which has mild androgenic effects, e.g. Duphaston.

**dysmenorrhoea** painful menstruation, usually associated with colicky pain.

**eicosanoids** a class of biologically active hormone-like compounds which include the prostaglandins, leukotrienes and thromboxanes.

**eicosapentaenoic acid (EPA)** an omega-3 fatty acid found in fish, which has many therapeutic properties.

**elements** (humoral theory) the basic building blocks of the universe: Earth, Air, Fire and Water.

**embryo** a fertilised ovum is called an embryo between two weeks and seven or eight weeks.

**emmenagogue** a herb which increases the strength and frequency of uterine contractions.

**endogenous oestrogen** oestrogen which is produced within the body.

**endometrial hyperplasia** abnormal increase in the growth of the lining of the uterus.

**endometrioma** a non-cancerous collection of endometrium which often forms in scar tissue or on the ovaries. Associated with endometriosis.

**endometriosis** a collection of endometrial cells growing on the outside of the uterus, usually in the pelvic cavity.

**endometrium** the lining of the uterus which is shed at each period.

**endorphin** a morphine-like substance found in the brain.

**enterodiol** a mammalian lignan with oestrogenic activity, formed from the activity of intestinal bacteria on plant lignans.

**enterolactone** a mammalian lignan with oestrogenic activity, formed from the activity of intestinal bacteria on plant lignans.

**epinephrine** a hormone secreted by the adrenal gland. It increases both metabolic activities and blood pressure.

**equol** an oestrogenic substance formed by the activity of intestinal bacteria on the phyto-oestrogen, daidzein.

**essential fatty acids** alpha-linoleic acid, an omega-3 fatty acid, and linoleic acid, an omega-6 fatty acid. They are necessary for growth and development and cannot be made by the body.

**ethinyl oestradiol** a relatively potent synthetic oestrogen often used in the Pill, e.g. Estigyn.

**fatty acid** the basic unit found in fats and oils, made from chains of carbon atoms.

**feedback loop** the hormonal communication between the hypothalamus, the pituitary gland and the ovaries.

**fertilised ovum** an ovum which has been fertilised by sperm and which is less than two weeks old.

**fibroadenoma** an adenoma containing fibrous tissue.

**fibroma** a tumour consisting mainly of fibrous tissue; a fibroid.

**fimbria** a fringed border or edge; the finger-like end of the Fallopian tube which encircles the ovary.

**flavonoids** a group of compounds widely distributed in plants which have a number of actions including the strengthening of tissues and oestrogen-like effects.

**foetus** an embryo becomes a foetus from about seven to eight weeks until birth.

**follicle** the structure in the ovary which can contain the ovum if development proceeds to ovulation.

**follicle-stimulating hormone (FSH)** a pituitary gland hormone which stimulates the growth of follicles.

**follicular atresia** the degeneration and reabsorption of a secondary ovarian follicle before it reaches maturity and ruptures.

**follicular cyst** a closed cavity or sac produced by the enlargement of the developing follicle.

**follicular phase** the time in the menstrual cycle between the end of the period and ovulation when the follicle develops.

**formononetin** a phyto-oestrogen; one of the isoflavones converted to daidzein by the plant.

**fornix (vaginal)** the recess formed between the vaginal wall and the vaginal part of the cervix.

**functional hypoglycaemia** a syndrome characterised by fluctuating blood sugar levels, usually related to the over-consumption of refined carbohydrates and prolonged stress.

**galactorrhoea** an excessive or spontaneous flow of breastmilk.

**gamma-linolenic acid** the fatty acid found in some seed oils, including evening primrose oil and star flower oil.

**genistein** one of the phyto-oestrogenic isoflavones, produced by the conversion of biochanin A.

**genitalia** the external and internal organs concerned with reproduction.

**glucocorticoids** the corticosteroids produced by the adrenal gland.

**glucose tolerance test** a blood test to measure the rate of clearance of glucose from the blood following the ingestion of a standard dose of glucose.

**GnRH agonist** a drug which, when given continuously, inhibits ovulation and creates a menopausal state.

**gonadotrophin-releasing hormone (GnRH)** a hormone secreted by the hypothalamus which initiates the release of luteinising and follicle-stimulating hormones (the gonadotrophins) from the pituitary gland.

**haemostasis** cessation of blood flow.

**haemostatic** an agent which can arrest blood loss.

**HDL cholesterol** high density lipoprotein—the fat and protein carrier molecule that transports cholesterol to the liver for storage or conversion; known as ‘good cholesterol’.

**hirsutism** abnormal hairiness in women, especially with male-pattern distribution.

**hormone replacement therapy (HRT)** oestrogens and progestogens given after the menopause to treat effects of low oestrogen.

**Hot** (humoral theory) one of the four qualities.

**HRT** *see* hormone replacement therapy.

**humoral theory** an early system for understanding the workings of the body which proposed that all bodily processes are due to the actions of one or more of the four humours: Black Bile, Yellow Bile, Blood and Phlegm.

**humour** (humoral theory) one of the 'body fluids': Blood, Phlegm, Yellow Bile or Black Bile.

**hydrogenated fat** the process of adding hydrogen to an unsaturated fat. This can occur naturally, but is also a commercial process used to protect oils from rancidity, or to solidify oils when making margarine.

**2-hydroxyoestrone** a metabolite of oestradiol which is believed to protect against the development of breast cancer.

**16-hydroxyoestrone** a metabolite of oestradiol which is elevated when women have breast cancer.

**hyperplasia** an abnormal increase in the number of cells in an organ or structure.

**hyperprolactinaemia** increased levels of prolactin in the blood.

**hyperthecosis** a cystic condition of the ovaries associated with abnormal hormone levels, and sometimes with hirsutism and amenorrhoea.

**hypothalamic-pituitary-ovarian axis** the hormonal axis; the interplay between the major endocrine glands which regulates all the events of the menstrual cycle.

**hypothalamus** the gland situated in the base of the brain which secretes, amongst other hormones, gonadotrophin-releasing hormone (GnRH) and dopamine.

**hysterectomy** surgical removal of the uterus.

**hysteroscopy** examination of the interior of the uterus.

**IBS** *see* irritable bowel syndrome.

**imperforate hymen** complete closure of the vaginal orifice by the hymen.

**inco-ordinate uterine activity** frequent, irregular, ineffectual and very painful contractions which fail to dilate the cervix. A common cause of 'failure to progress' in a woman delivering her first child.

**insulin resistance** a syndrome where insulin levels and hepatic glucose output increase because insulin is incapable of transporting glucose into the cell. Commonly associated with obesity.

**in vitro fertilisation** union of ovum and sperm that takes place out of the body; *in vitro*—in glass.

**in vivo fertilisation** union of ovum and sperm that takes place in the body; *in vivo*—in life.

**irritable bowel syndrome** a syndrome characterised by abdominal discomfort, flatulence and alternating constipation and diarrhoea brought about by abnormal activity of the musculature of the bowel.

**ischaemia** lack of blood supply to an organ or part of the body.

**isoflavonoid** a group of substances, ubiquitous in the plant world, which has a variety of physiological effects.

**IVF** *see* in vitro fertilisation.

**lactose intolerance** an inability to digest the milk sugar, lactose.

**laparoscopy** examination of the interior of the abdomen or pelvic cavity using a laparoscope.

**laparotomy** a surgical excision into the abdomen to gain access to the abdominal or pelvic cavity.

**latent hyperprolactinaemia** a syndrome believed to be related to decreased progesterone which results in an increased sensitivity to normal or mildly elevated prolactin levels.

**LDL cholesterol** low density lipoprotein—the fat and protein carrier molecule that transports cholesterol into the blood vessel walls: known as 'bad cholesterol'.

**leucopenia** low white cell count

**leucorrhoea** a whitish vaginal discharge.

**leukotrienes** eicosanoids which regulate allergic and inflammatory responses.

**LH** *see* luteinising hormone.

**lignans** mammalian lignans are phyto-oestrogens which are formed in the body from forms of fibre called lignins.

**linoleic acid** an omega-6 fatty acid found in many seed and vegetable oils, nuts, organ meats and human milk.

**luteal cyst** a cyst occurring in the corpus luteum of the ovary.

**luteal phase** the time between ovulation and the commencement of the period.

**luteal phase defect** a hormonal defect that occurs after ovulation.

**luteinising hormone (LH)** the hormone produced by the pituitary gland which sustains the corpus luteum.

**lymphocytopenia** low lymphocyte levels

**mastalgia** breast pain.

**medroxyprogesterone** a progestogen that tends not to affect blood lipids or have strong androgenic effects.

**melasma** *see* chloasma.

**menarche** the time in a woman's life when she first starts to menstruate.

**menopause** the cessation of the period for more than a year.

**menorrhagia** excessively heavy menstrual flow at the time of the period.

**methionine** a naturally occurring amino acid.

**mittelschmerz** intermenstrual pain.

**Moist** (humoral theory) one of the four qualities.

**monounsaturated fat** a major component of olive and canola oil.

**myometrium** the uterine muscle.

**nervine** (herbal medicine) a herb that has an effect on the nervous system.

**neurotransmitter** a substance released from the ends of nerves which can transmit messages to a target cell or another nerve.

**norepinephrine** (noradrenaline) a neurohormone secreted by the adrenal gland in response to stress.

**norethisterone** a progesterone which has mild androgenic effects and adversely alters blood lipids with prolonged administration, e.g. Primolut N.

**oestradiol** the most potent endogenous oestrogen.

**oestriol** a weak endogenous oestrogen excreted in large amounts in the urine.

**oestrogen receptor** a structure in or on specific cells that responds to the stimulus of oestrogen.

**oestrone** an endogenous oestrogen formed from oestradiol and by peripheral conversion of androgens, with a potency between that of oestradiol and oestriol.

**oligomenorrhoea** infrequent or scanty menstrual flow.

**omega-3 fatty acids** the fatty acids in the omega-3 pathway, principally alpha-linolenic acid, eicosapentaenoic acid and docosahexaenoic acid.

**omega-6 fatty acids** the fatty acids in the omega-6 pathway, principally linoleic acid, gamma-linolenic acid and arachidonic acid.

**omega-3 pathway** metabolic process describing the conversion of alpha-linolenic acid to docosahexaenoic acid.

**omega-6 pathway** metabolic process describing the conversion of linoleic acid to arachidonic acid.

**ovum** the egg produced by the ovary each menstrual cycle; plural *ova*.

**partus praeparator** (herbal medicine) a plant or combination of plants given to improve labour.

**pathology** disease; evidence of localised tissue change indicating a disease process.

**pedicle** the stalk or stem which attaches a structure to the body.

**pedunculated** a structure growing on a short stalk, often a cyst or fibroid.



**pelvic inflammatory disease** inflammation of one or more of the pelvic organs usually in response to infection.

**peri-menopause** the years both before and after the menopause when a woman experiences symptoms associated with changing hormone levels.

**perineum** the muscular floor of the pelvis; the area between the vagina and anus.

**peripheral conversion** the conversion of androgens to oestrone, which largely occurs in the fat and muscle.

**peritoneal fluid** free fluid in the peritoneal (abdominal or pelvic) cavity.

**peritoneum** the membrane which lines the abdominal and pelvic cavities and the organs therein.

**phenomenology** the study of phenomena. Hence, a phenomenological approach seeks to explain the world on the basis of those events that are already understood. For example, heat dries wood, therefore dry skin must be caused by excess inner Heat.

**photosensitivity** the development of an abnormally high reactivity of the skin to sunlight.

**phyto-oestrogen** a substance produced by a plant which can exert oestrogen-like effects.

**phytosterol** steroid-like compounds found in plants; can have mild oestrogen-like effects.

**PID** *see* pelvic inflammatory disease.

**pilo-sebaceous unit** the hair follicle and its sebaceous gland.

**pituitary adenoma (micro/macro)** a tumour of the glandular tissue of the pituitary gland.  
A microadenoma is less than 10 mm in diameter—if larger it is classed as a macroadenoma.

**pituitary gland** the gland situated at the base of the brain, and in close communication with the hypothalamus, which secretes a number of hormones including LH and FSH.

**PMS and PMT** *see* premenstrual syndrome.

***pneuma*** (humoral theory) vital energy, life force.

**polycystic ovarian syndrome** a condition which is characterised by multiple ovarian cysts, an abnormal hormone profile and irregular cycles or amenorrhoea.

**polysaccharide** a carbohydrate containing many (poly) simple sugars.

**polyunsaturated fat** a fat found in oils and margarine, seeds, nuts, fish and some vegetables, which is less stable than saturated fat.

**post-menopause** all of the years following the last menstrual period.

**pouch of Douglas** a pocket-like space between the rectum and the uterus which is lined with peritoneum.

***prana*** (Ayurvedic medicine) vital energy, life force.

**pregnenolone** a precursor to endogenous progesterone.

**pre-menopause** technically, all of the years between the commencement of the period in the teens and the menopause, but often used specifically in reference to the decade between 40 and 50.

**premenstrual** the time before the onset of the period, usually the week before.

**premenstrual syndrome (PMS)** also known as premenstrual tension (PMT); the symptoms which recur each month before the beginning of the period, and which include irritability, headaches, bloating, breast soreness and tearfulness.

**primary amenorrhoea** failure of menstruation to become established at puberty by age seventeen.

**primary follicle** the follicle which will develop and produce the ovum.

**proanthocyanidins** flavonoids with strong anti-oxidant and collagen-stabilising abilities.

**progestogen** the term used to describe a synthetic progesterone.

**prolactin** one of the hormones secreted by the pituitary gland that stimulate lactation.

**prostacyclin** an eicosanoid which reduces blood clotting and dilates blood vessels.

**prostaglandin** a hormone-like substance involved in a variety of inflammatory, vascular and muscle-related activities throughout the body.

**pycnogenol** a compound found in various plants with powerful anti-oxidant and collagen-stabilising abilities.

**qi** vital energy, life force.

**qualities** (humoral theory) Dry, Hot, Moist and Cold.

**receptor site** the site on or in the cell where hormones and other substances can ‘dock’ and interact with cellular structures.

**relative hormone imbalance** when the absolute levels of a hormone are within ‘normal’ range, but when compared to another hormone, the ratio is sufficiently changed to cause symptoms.

**resorcylic acid lactone** a type of phyto-oestrogen.

**sapogenin** the compound absorbed into the blood stream after intestinal bacteria cleave a glucose molecule from a saponin.

**saponin** a soapy substance in plants which can have hormone-like effects.

**sarcoma** a tumour of connective tissue, often highly malignant.

**saturated fat** a fat abundant in animal products and tropical oils; often solid at room temperature.

**scoliosis** a lateral curvature of the spine.

**secondary amenorrhoea** absence of menstruation for more than six months after it has been established at puberty.

**secretory phase** the phase in the menstrual cycle between ovulation and menstruation when the breast and the endometrium undergo secretory changes because of progesterone.

**serum ferritin** the iron found in the serum.

**sex hormone-binding globulin (SHBG)** a protein that carries sex hormones (androgens and oestradiol) in the bloodstream.

**spasmodic dysmenorrhoea** period pain that is sharp and colicky due to uterine spasm.

**spasmolytic** a substance which can relax muscle; often used to describe herbs with this quality.

**spiral arterioles** vascular structures supplying the endometrium, which contract during the period to reduce blood loss.

**steroid hormone** any of the hormones which have a central structural component based on cholesterol, including the corticosteroids, androgens, oestrogens and progesterone.

**steroidal saponins** compounds found in plants with the ability to interact with steroid hormone regulation and metabolism.

**temperament** (humoral theory) character or personality, of which there are four types—Sanguine, Choleric, Phlegmatic and Melancholic.

**teratoma** a tumour that originates from germ cells in either the testis or the ovary and which may contain hair, teeth, bone, cartilage, nervous and endocrine tissue and epithelium.

**terminal phenolic group** relating to phyto-oestrogens; the chemical structure that imparts the oestrogen-like ability.

**testosterone** an androgen, produced in the testes of the male and also produced by females at low levels.

**theophylline** one of the xanthines found in tea leaves (and also produced synthetically) which has central nervous system-stimulating, smooth muscle-relaxing and diuretic effects.

**therapeutic diet** a diet given to achieve a therapeutic outcome.

**thromboembolism** a blood clot.

**thromboxanes** eicosanoids which are primarily involved with blood clotting and blood vessel activity.

**torsion** the twisting of a structure about an axis, as in the twisting of a pedunculated fibroid or cyst.

**trans-cortin** a carrier protein that binds to cortisol and progesterone; also called cortisol-binding globulin.

**trans-fatty acids** fatty acids which are produced by hydrogenation and which tend to behave like saturated fats.

**triglyceride** a compound consisting of three molecules of fatty acid joined to a glycerol molecule.

**trimester** a time period of three months.

**triterpenoid saponin** saponins found in plants with diverse physiological effects. Some have weak oestrogen-like actions.

**ultrasound** high frequency sound waves used for diagnostic or therapeutic purposes.

**uterine tone** the normal degree of tension in the uterine muscle.

**uterine tonic** a group of herbs that re-establish normal function of the uterine muscle.

**vaginal septum** a congenital malformation where a bridge of tissue divides the vagina.

**virilisation** the development of male secondary sexual characteristics due to the presence of excessive amounts of androgenic hormones, including the development of facial hair, male-pattern fat distribution, enlarged clitoris and deepening of the voice.

**vital force** that subtle force which permeates the universe and organises and animates all living things. The energy which makes growth, healing and repair possible in the face of entropy and disease.

**xanthine** compounds found in tea, coffee and cocoa: caffeine, theobromine and theophylline.

**xeno-oestrogen** any oestrogen-like substance, not of plant origin, which has been introduced into the body.

**zearalenone** a phyto-oestrogenic mould which contaminates cereal crops.

# Notes

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## Chapter 9 Menopause

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## Chapter 10 The usual suspects

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## Chapter 16 Ovarian cysts

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## Chapter 18 Oestrogen-like compounds in plants

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## Chapter 20 Drugs and surgery

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