108 Ways to Enhance your Health & Longevity

Articles Written and Compiled by Simon Borg-Olivier

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The YogaSynergy System is based on the synthesis of traditional exercise and meditation of the East and an understanding of the applied anatomy and physiology of posture, movement and breathing for the modern body. It has been developed by Simon Borg-Olivier MScBAppSc(Physiotherapy) APAM and Bianca Machliss BScBAppSc (Physiotherapy) APAM over the last 30 years and can be applied to any style of yoga or exercise.

School: Bondi Junction, Surrey Hills, Newtown; Postal Address: P.O. Box 9 Waverley, 2024, Australia; **Tel**: +61 2 9389 7399;
Email: yoga@yogasynergy.com **Websites**: http://fundamentals.yogasynergy.com , http://anatomy.yogasynergy.com , http://blog.yogasynergy.com
Directors: *Simon Borg-Olivier MSc BAppSc (Physiotherapy) APAM & Bianca Machliss BSc BAppSc (Physiotherapy) APAM*

Introduction

The YogaSynergy System is based on the synthesis of traditional forms of exercise and meditation from the East and understanding of Western applied anatomy and physiology of posture, movement and breathing for the modern body.

Simon Borg-Olivier MScBAppSc(Physiotherapy)APAM and Bianca Machliss BScBAppSc(Physiotherapy)APAM are both exercise-based physiotherapists with more than 30 years yoga teaching experience and 45 years yoga practice. The YogaSynergy System is essentially the practical application of the applied anatomy and physiology of the modern body. Bianca and Simon have used this system to develop 6 unique sequences that have more than 300 distinct variations from beginner to advanced level. There are many different ways of teaching the sequences to safely increase strength, flexibility, energy levels and internal health. Since this system is based on sound scientific principles, it can be (and has been) successfully adapted to use in enhancing the teaching and practice of almost all yoga and exercise systems. This is discussed at length here in Chapter 13 and also in our book '**Applied Anatomy and Physiology of Yoga**'

This book is a compendium of articles and writings that were initially published as blogs, magazine articles or from our other books. In this book there are many hyperlinks that allow you to find many of the original articles online and see the videos that are often associated with them. These articles give the essence of the YogaSynergy teaching as developed by Simon Borg-Olivier and Bianca Machliss. In these articles we discuss how this information can successfully be applied to any system of yoga and exercise.

You can learn much more about posture, movement and breathing and their relation to yoga, exercise and therapy by joining our **Teacher Training**

or our Online courses: **'Teacher Training Essentials: Yoga Fundamentals'** and **'Applied Anatomy and Physiology of Yoga'**

View and download many more articles with video links by going to

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Chapter 1: Basic Principles of Safe Effective Movements and Postures: Spinal Movements

1. Use your 'inner body' to move and enter postures rather than relying on gravity or momentum.

2. Flow smoothly between postures in curves rather than jagged edges in order to gather energy with each movement rather than just expend energy.

2. Move your spine (starting at the region around the navel) first, then move the rest of your body (suggested sequence for beginners is spine first, then the shoulders and arms, then the hips and legs)

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Basic Spinal Movements

In this section we will be examining a sequence of postures done from a simple standing posture that in its simplest form involves moving the trunk and spine into its 8 main 'pure' positions. This is one of the most effective and accessible practices for anyone and gives tremendous release of back and other pain as well as significantly increasing energy levels, improving functional core strength, reducing stress and improving the health of your internal organs.

The key to effective spinal movements and core stabilization is to always be able to breathe into the abdomen using the diaphragm and always initiate each spinal movement from the region of the navel and the 'navel spine' (L4-L5). Once you release the muscles of forced abdominal exhalation that many people habitually use to 'engage their core' using abdominal breathing or at least the feeling that you can breathe into the abdomen, then the spine is free to move from its base at the 'navel spine' (L4-L5) near the sacrum. Once you move your spine using the internal forces (trunk muscles) rather than external forces such as gravity or the use of another limb or momentum, then this will create tremendous core strength.

In summary: to move the spine, you must initiate movement from the core with a sense that the core feels relaxed enough to breathe there. At this point the abdomen may feel quite soft to touch. However, once the movement begins, the abdomen begins to firm because it is moving. This is an important key to functional mobile core strength and a pain free back.

A. Structure of the 'Spinal Movements Sequence' (*Meru danda tada vinyâsa*):

The eight main movements of the spine that are practiced in this sequence (*vinyâsa*) are actually 4 opposing pairs of movements. These are:

1a. 'Shortening' (Spinal compression) (standing with a 'neutral spine'),

1b. 'Lengthening' (Spinal traction) (standing with a straight spine),

2a. 'Forward bending' (Spinal flexion) (lengthening the back of the body),

2b. 'Backward bending' (Spinal extension) (lengthening the front of the body),

3a, 3b. 'Sideways bending' to right and left (Spinal lateral flexion) and

4a, 4b. 'Twisting' (Spinal axial rotation) to right and to left side

The purpose of this smooth flowing and dynamic linked sequence of postures (*vinyâsa*) is to enliven the spine by moving each vertebra.

This sequence acts directly on the spine by guiding it to move with its own volition. The shoulders and hips are used to assist the spine in order to utilize and enhance the connections within the body.

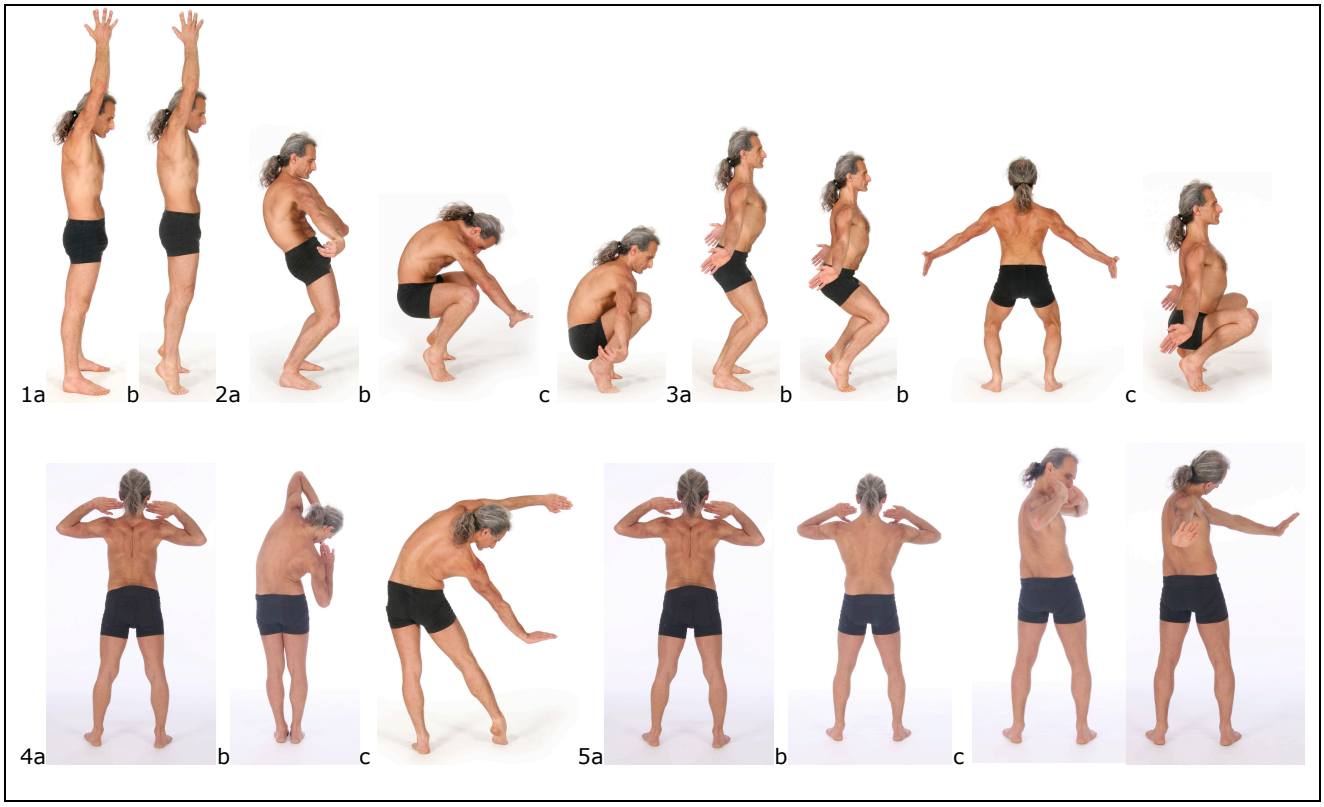

Figure 1.1: The list of main postures in the spinal movements sequence is as follows:

1. 'Complete spinal lengthening posture' (*Urdhva Hasta merudanda tadâsana*)
2. 'Back spinal lengthening posture' (*Pascima Merudanda Tadâsana*)
3. 'Front spinal lengthening posture' (*Purva MerudandaTadâsana*)
4. 'Side spinal lengthening posture' (*Parsva Merudanda Tadâsana*) (left and right side)
5. 'Twisted spinal lengthening posture (*Parivrtta Merudanda Tadâsana*) (left and right side)

B. Anatomical (physical) purpose of the 'Spinal Movements Sequence' (*Meru danda tada vinyâsa*):

On an anatomical or physical level if this sequence is applied correctly all of the inter-vertebral of the spine can become mobile and the muscles that move the spine (the true 'core' muscles) can become very strong.

C. Physiological (energetic) purpose of the 'Spinal Movements Sequence' (*Meru danda tada vinyâsa*):

On a physiological or energetic level, the spinal cord and the nerves of the spine are lengthened (tractioned), which enhances nerve conduction and the flow of energy and information via the nervous system. By learning to actively move the spine one vertebra at a time, from the base of the spine upwards, blood is effectively moved through the valve-less veins of the spine. Active spinal movements, in conjunction with natural diaphragmatic breathing, can stimulate the reciprocal spinal nerve reflex that allows the trunk to become strong, flexible and relaxed while increasing circulation of blood without needing to make the heart beat faster.

D. Context of the 'Spinal Movements Sequence' (*Meru danda tada vinyâsa*):

This sequence introduces the 'pure' active spinal movements i.e. pure flexion or extension, pure lateral flexion or pure axial rotation but no combined movements such as extension plus lateral flexion. Once these 'pure' spinal movements in this sequence can be safely and effectively mastered without the confounding influences of the arms and legs, they can then be then understood in more complex combinations such as spinal twisting combined with forward bending as seen in more complex postures.

E. Contraindications and modifications for the 'Spinal Movements Sequence' (*Meru danda tada vinyâsa*):

Contraindications for this sequence include the following cautions:

- **If you are prone to back or spinal problems** do not bend the spine in any way that causes pain. Be particularly careful to emphasize movement in the spinal joints more from where there is stiffness and less from where there is flexibility. A good rule for bending backwards (spinal extension) is to try to lengthen the front of the body rather than to shorten the back of the body. Similarly, avoid creasing the skin of your back if you can as this is usually associated with spinal compression. Also avoid excessive movement at the hip joints, as this is usually associated with excessive movement around the weakest most flexible parts of the lower back (lumbar spine). Try to lengthen (traction) the spine before you 'bend' it any direction. Also, try to move the spine one vertebra at time from the base upwards, i.e. move first from the 5th lumbar vertebra (L5), then move the 4th lumbar vertebra (L4), then the 3rd lumbar vertebra (L3) etc. Moving the spine one vertebra at a time helps develop core strength, increase spinal flexibility and improve blood flow through the spine and trunk.

- **If you are prone to knee problems** do not bend the knees more than half way if it is uncomfortable for the knees or if you can't come back up from a squat position slowly and with control.

- **If you are prone to shoulder problems** do not raise the arms above shoulder height if it causes pain or discomfort especially in the shoulders, but also in the lower back or anywhere else.

- **If you are prone to neck problems** ensure that when you lift your head you move the throat forward as you lift the chin up; but do not raise your head if it causes pain in the head, neck or back, or if it makes you lose your balance.

- **If you are prone to cardiovascular problems** do not raise the arms above shoulders if you have a cardiovascular problem that can be irritated by raising the arms.

F. Instructions and notes on how to execute the 'Spinal Movements Sequence' (*Meru danda tada vinyâsa*):

This sequence of postures (*vinyâsa*) actively mobilises (moves) the spine through the 4 main movements, lengthening and shorting, forward and backwards bending, sideways bending and twisting. Each movement should begin from navel and the 'navel spine' (L4-L5) by relaxing, moving and breathing from that part of the body first in order to enhance the connections within the body.

This sequence acts on the spine, arms and legs. The following postures (*âsanas*) and gestures (*mudrâs*) form the sequence (*vinyâsa*):

- **Figure 1.2: 'Complete spinal lengthening posture' (*Urdhva hasta meru danda tadâsana*)**
- Bring down the arms and lengthen the back of your wrists and fingers.
- Push your sitting bones down and forward, and move the top of your hips backwards to lengthen the lower back.
- Move your lower front ribs inwards, then lift and lengthen your upper back.
- Bend the elbows and bring the back of the hands together then take your arms forwards and upwards above your head as high as you can without pain.
- Lengthen your trunk from the navel and from the 'navel spine' (L4-L5) to lift your shoulders, elbows, wrists then hands.
- Lower your sitting bones further and then raise your heels.
- Lengthen your spine by relaxing your trunk muscles, then lifting your shoulders and arms higher and lowering your tailbone.
- Breathe naturally into your abdomen.

- **Figure 1.3: Back spinal lengthening posture' (*Pascima Meru Danda Tadâsana*)**

- Bend your knees and bring down your arms.
- Turn your shoulders inwards and lengthen the back of the body.
- Lengthen your wrists and fingers to create the 'Large intestine gesture' (*Atanu puritat mudrâ*).
- Bring your sitting bones under your shoulders.
- Push your sitting bones down and forward, and keep the top of your hips backwards.
- Move the navel (and the navel spine) forward and down and bend the spine into a smooth forward bend one vertebra at a time.
- Lengthen the back of your trunk without shortening the front.
- Breathe into the abdomen.
- Stay here, or raise the heels.
- Stay here, or bend the knees further.
- Ideally your abdomen should feel firm at the front but soft in the sides and in your back.
- It is important to check that you are relaxed enough that you can breathe naturally into the abdomen.
- Also check your neck is free and your fingers are lengthened but they are free enough to move.

- **Figure 1.4: 'Front spinal lengthening posture' (*Purva Meru Danda Tadâsana*)**

- Come back up by straightening your knees, then again bend your knees.
- Turn the shoulders outwards, open the palms to create the 'Lung gesture' (*Kloman mudrâ*).
- Push your sitting bones down and forward, and keep the top of your hips backwards.
- Move the navel (and the navel spine) forwards and upwards and bend the spine into a smooth backward bend one vertebra at a time.
- Lengthen the front of your trunk without shortening the back (try not to let any skin crease on your back when you bend backwards.)
- Breathe into the abdomen.
- Stay here, or raise the heels.
- Stay here, or bend the knees further.
- Ideally your abdomen should feel firm at the front but soft in the sides and in your back.

- **Figure 1.5: 'Side spinal lengthening posture' (*Parsva Meru Danda Tadâsana*) (left and right side)**
  - Move the hips back to the midline and lengthen the back of the body.
  -

- Come back up by straightening your knees and lowering your heels.
- Bend your elbows to create the 'Heart gesture' (*Buddhizuddhi mudrâ*) and once again lengthen the back of the body.
- Move your navel to the left side and upwards to lengthen the left side of the body.
- Move one vertebra at a time as you breathe into your right abdomen.
- Lengthen your left side of the trunk and lift your left shoulder and elbow without shortening the right side of your trunk.
- Stay, or take your left arm forwards and upwards and take your right arm down.
- Push the right sitting bone forward and up.
- Move the hips back to the midline and lengthen the back of the body.
- Move your navel to the right side and upwards to lengthen the right side of the body.
- Move one vertebra at a time as you breathe into your right abdomen.
- Lengthen your right side of the trunk and lift your right shoulder and elbow without shortening the left side of your trunk.
- Stay, or take your right arm forwards and upwards and take your left arm down.

- **Figure 1.6: Twisted spinal lengthening posture' (*Parivrtta Meru Danda Tadâsana*) (left and right side)**

- Turn your navel to the right side, then turn your ribs, then your chest, and then your shoulders and elbows.
- Breathe into the abdomen.
- Straighten the arms at the elbows.
- Look over the left shoulder with your left ear slightly lifted.
- Relax your throat, tongue, jaw, lips and eyes.
- Bend the elbows and come back to the middle with the navel first and the shoulders last.
- Turn your navel to the left side, then turn your ribs, then your chest, and then your shoulders and elbows.
- Breathe into the abdomen.
- Straighten the arms at the elbows.
- Look over the right shoulder with your right ear slightly lifted.
- Relax your throat, tongue, jaw, lips and eyes.
- Bend the elbows and come back to the middle with the navel first and the shoulders last.
- Bring down the arms and come to the front of your mat with your big toes touching and the heels apart. Relax.

SPINAL MOVEMENTS SEQUENCE – BEGINNER LEVEL

Figure 1.7: Active spinal traction (lengthening) with shoulder elevation (lengthen the back of the body first; then, keeping the back of the body lengthened, lengthen the front; lifting the chin is optional)

Figure 1.8: Large intestine meridian mudra, lengthening the back (spinal flexion)

Figure 1.9: Lung meridian mudra, lengthening the front (spinal extension)

Figure 1.10: Lengthening the side of the body (spinal lateral flexion)

Figure 1.11: Twisting the trunk and the hips (spinal axial rotation)

Figure 1.12: Lengthening the back of the body (spinal flexion) and the outer shoulders

Figure 1.13: Active spinal traction (lengthening) with shoulder elevation

ONE LEGGED SPINAL MOVEMENTS SEQUENCE – INTERMEDIATE LEVEL

Figure 1.14: Lengthening the back, actively flexing front of spine and lifting one hip

Figure 1.15: Lengthening the back, actively flexing front of spine and resisting against one leg

Figure 1.16: Lengthening the back, actively flexing front of spine and lifting one hip

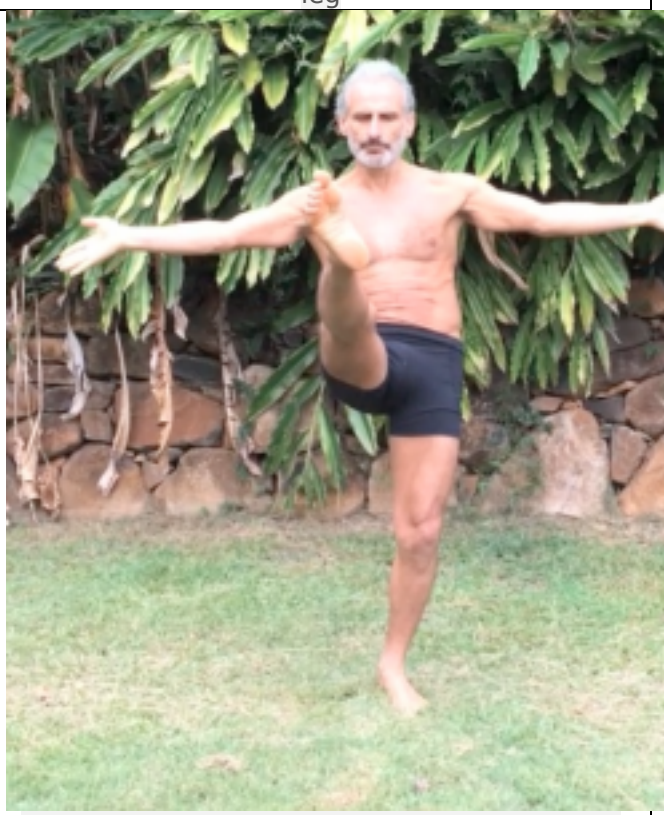

Figure 1.17: Active spinal traction with, hip flexion and knee extension

Figure 1.18: Active side spinal flexion with hip elevation

Figure 1.19: Active side spinal flexion with lower limb resistance

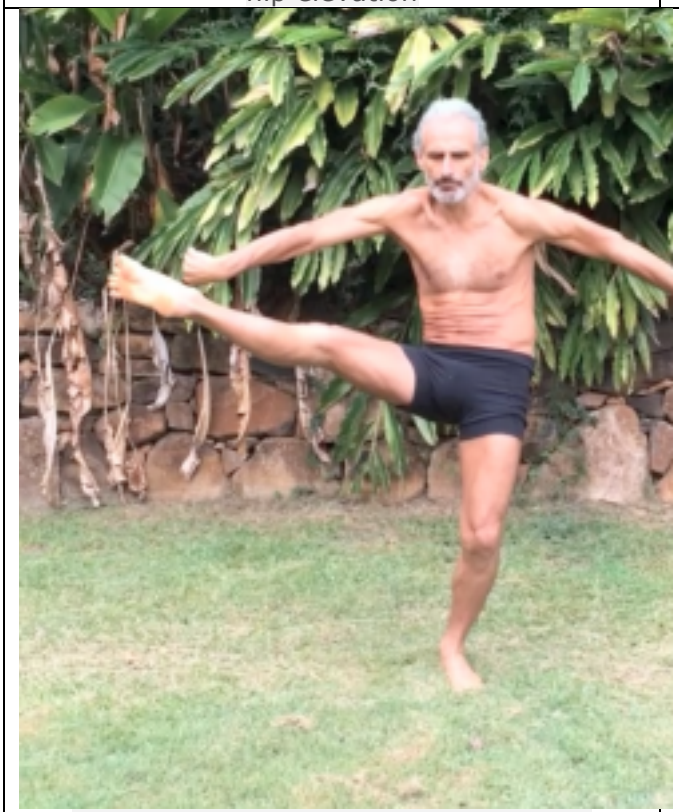

Figure 1.20: Active spinal flexion, hip external rotation and abduction, and knee extension

Figure 1.21: Active spinal extension, hip extension and knee flexion

Figure 1.22: Active spinal extension, with resistance against one lower limb

Figure 1.23: Active spinal traction, with hip extension and knee extension

Figure 1.24: Active spinal rotation (twisting), lifting one hip

Figure 1.25: Active spinal rotation (twisting), with resistance against one lower limb

Figure 1.26: Active spinal rotation (twisting), with resistance against one lower limb

Figure 1.27: Active spinal traction (lengthening) with shoulder elevation

Figure 1.28: Active spinal flexion (forward bending) plus hip flexion

Figure 1.29: Active spinal flexion (forward bending) plus hip flexion with weight-bearing on hands (*Lolasana*) (advanced)

Figure 1.30: Active spinal flexion (forward bending) plus hip flexion with weight-bearing on hands (splits handstand) (advanced)

Figure 1.31: Active spinal flexion (forward bending) plus hip flexion with weight-bearing on hands with legs in lotus posture (*padmasana*) (advanced)

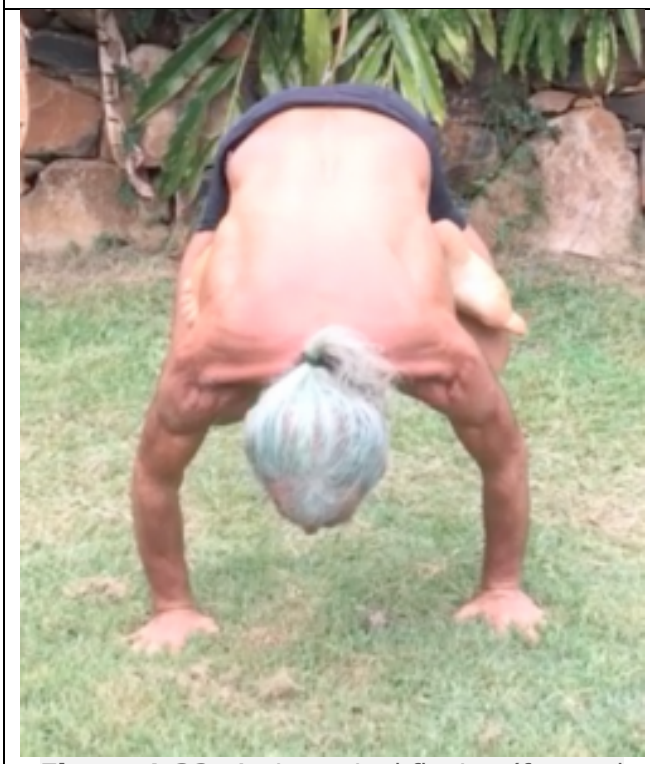

Figure 1.32: Active spinal flexion (forward bending) plus hip flexion with weight-bearing on hands with legs in lotus posture (*tolasana*) (advanced)

Figure 1.33: Active spinal traction (sitting with the sitting bones anchored down and the trunk and spine lengthening, plus hip flexion, external rotation and knee flexion (cross-legged or lotus posture)

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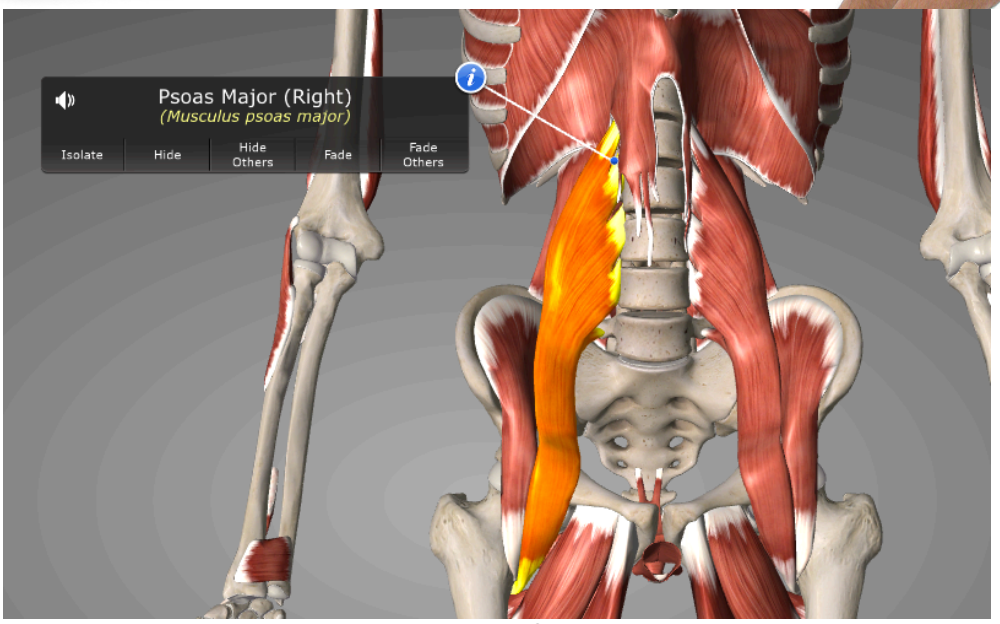
Chapter 2: How to Relieve Back-pain and Bend Backwards Without Hurting your Lower Back



How to 'open' your mid-spine in any 'backbend' & How to not squash your lower back:

* **Lengthen the psoas muscles at the hips** (hip extension) & immobilise L5-S1 (i.e. don't let your lower back compress)
* **Activate the rectus abdominis** (*tha-mula bandha*) as you would if you slowly lower down ('drop back') to *Urdhva Dhanurasana* ('Inverted bow posture') or slowly lower down to *Ustrasana* (the 'Camel posture')
* **Breathe in to your abdomen** (use your diaphragm)
* **Breathe out from your chest** (*ha-uddiyana bandha*)
* If you breathe into the abdomen (diaphragmatic breathing) when the psoas muscles are held in a lengthened state over the hip joint, then the psoas muscles can extend your spine (bend backward) from T12-L4, because the diaphragm attaches to, pulls on and gives 'stretch reflex activation' of the psoas muscles (which join to T12-L5)
* Here the psoas muscles can also flex the spine at L5-S1, relieving most lower back pain & encouraging flexibility in the stiffer regions of the spine

Figure 2.1: When you maintain length in the front of the hips and then breathe into the abdomen during a back arch this helps to 'open' your middle back without compressing your lower back

How to 'open' your mid-spine in back bends and not squash your lower back:

***** Lengthen your Psoas at the hips (hip extension) and immobilise L5-S1**
***** Breathe in to your abdomen (use your diaphragm)**
***** Breathe out from your chest (ha-uddiyana bandha)**
***** Psoas then extends your spine from T12-L5 (and not L5-S1) because the diaphragm attaches to the psoas, which joins to T12-L5**

Many modern adults tend to have very stiff middle backs (usually from about the tenth thoracic vertebra (T10) to the fourth lumbar vertebra (L4). This region (T10-L4) is stuck in a slight forward bend (spinal flexion) in many modern adults. These people usually do most of their bending backwards (spinal extension) from the very lowest part of the mobile spine at junction between the fifth lumbar vertebra and the first sacral vertebra (L5-S1). L5-S1 is usually located about 2 centimetres below the top of your hips (iliac crests). Since this part of your spine is below the top of the hips, it is actually very hard to relieve compression there by bending the spine forward because when most people bend forward, they primarily do so bending forward from the hips, which is something we are very good at doing due to our primarily seated lifestyle in which we are always bending forward from the hips. Once you have the ability to bend from the spine rather than the hips you have the key to relieving back pain and also the key to doing very safe and effective 'backbends' (spinal extension postures).

This 'info-graphic' put together quite loosely describe the steps you can do in a backward bending (spinal extension) posture. These steps will help you bend backwards where most people tend to be stiff – between T10 and L4 – and bend forward (spinal flexion) where most people tend to be compressed (and often stuck in a permanent backward-bending state (spinal extension) at L5-S1.

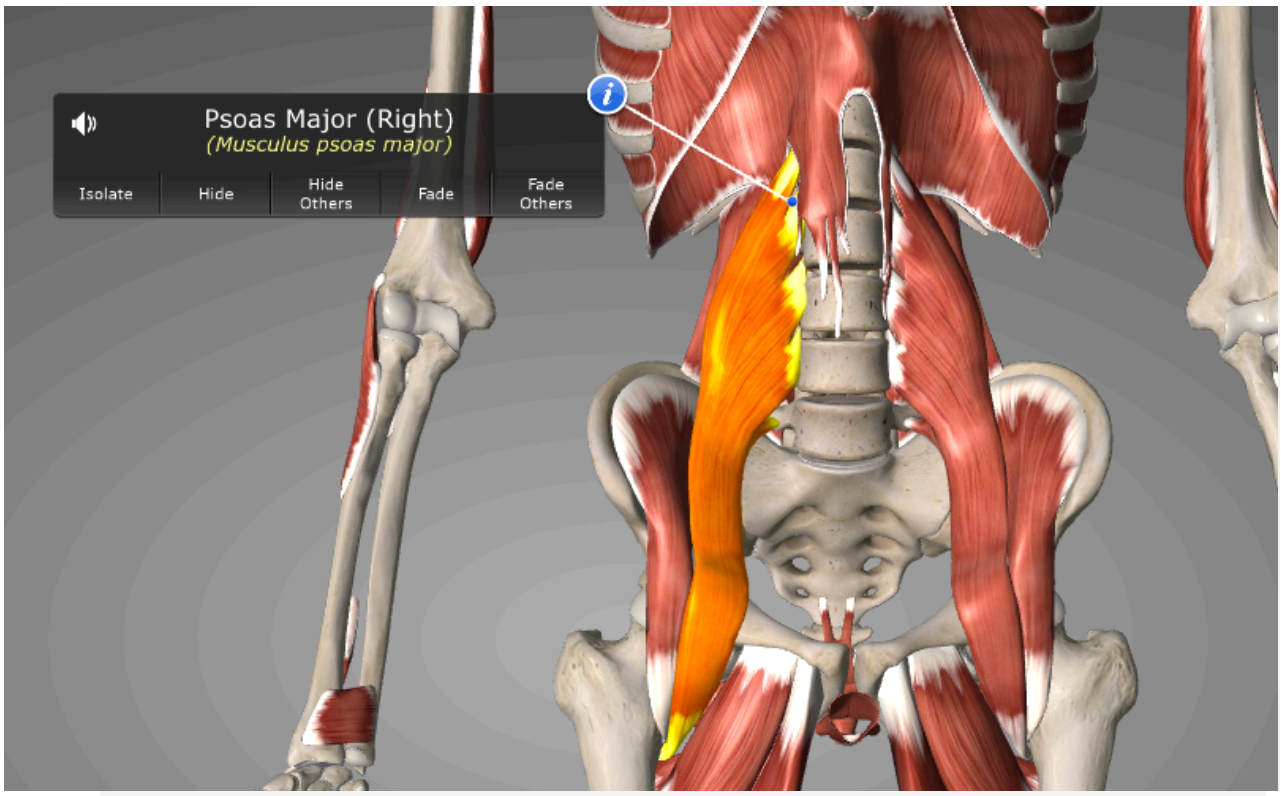


Figure 2.2: Psoas Major (orange); showing how the spinal attachments of the psoas also attach to the diaphragm. When you maintain length in the front of the hips and then breathe into the abdomen during a back arch this stimulates a 'stretch reflex' activation of the psoas muscles, which will help to further extend the spine at T12-L5 without hyperextending the L5-S1.

The solution to this problem relies on gaining control of and learning to use a combination of the following important muscles:

* **Psoas Major** (See Figure 2.2) – bends the hips forward (hip flexor activity) and also bends the spine backwards (spinal extensor activity). If the psoas is over-tense, or spasms, it can be the cause of lower back pain because it will pull the L5-S1 joint of the lower spine into a backbend (spinal extension).
* **Rectus Abdominis** (See Figure 2.3) – the abdominal 'six pack' muscle that can keep the front ribs inwards and is the main muscle of bending forward. This muscle, when active, can help reciprocally relax your back muscles, which are often too tense.
* **The Diaphragm** – the main muscle of breathing, which when being used makes you more relaxed and feel like you are breathing into the abdomen.
* **Hip Extensors** (See Figure 2.4)(such as the buttocks muscles and the hamstrings) – these muscles can help stop the hips from bending forwards and help to prevent the psoas muscle from squashing the lower back by causing hyper-extension at L5-S1, which can cause lower back pain.

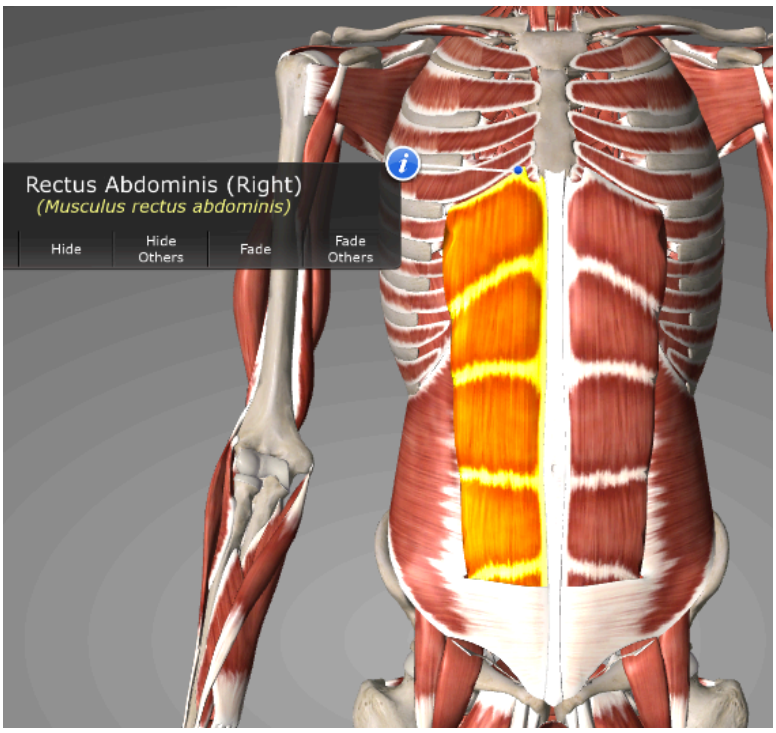


Figure 2.3: Rectus abdominis (orange); showing how this muscle attaches to the hips and when active during active spinal flexion (such as a 'sit up' exercise) or when eccentrically active while 'dropping back' to a 'back arch' (*Urdhva dhanurasana*).

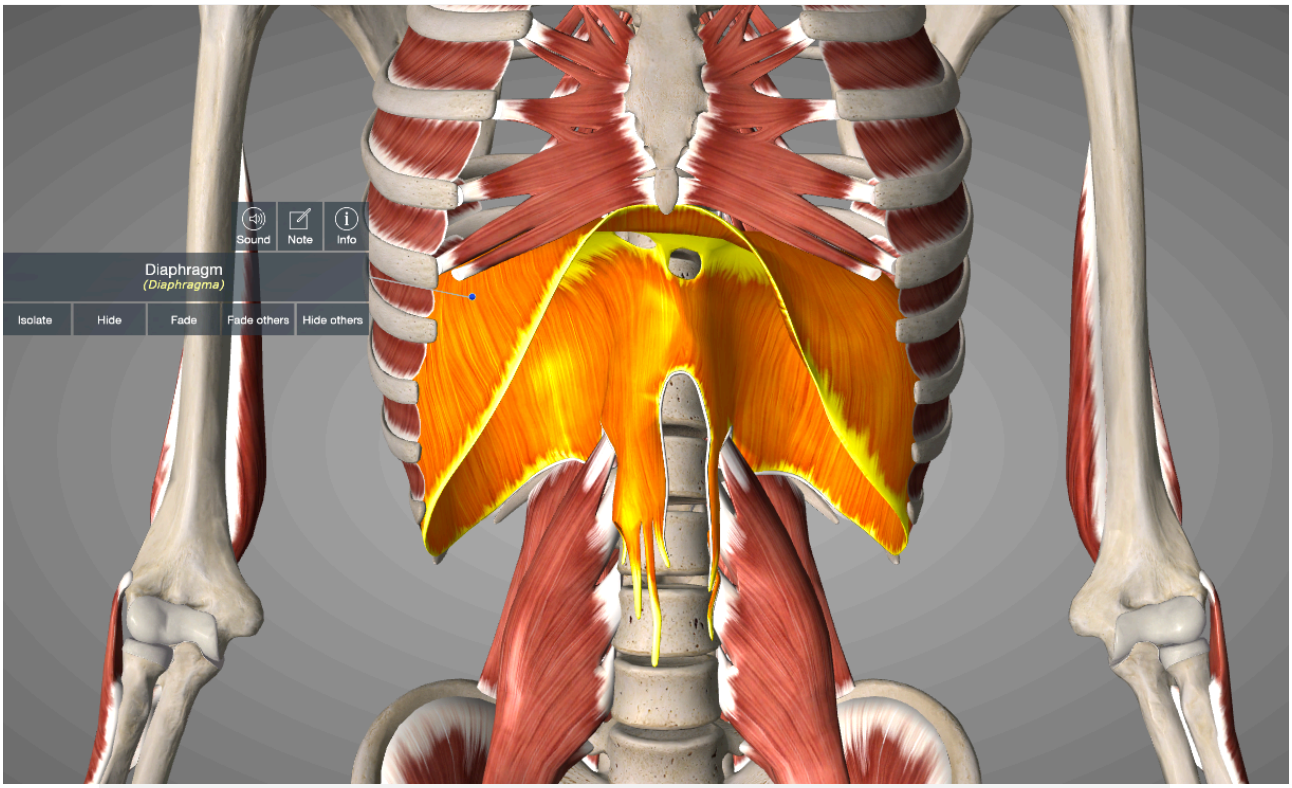


Figure 2.4: The diaphragm (orange); showing how this muscle attaches to the diaphragm, and so when you breathe into the abdomen (diaphragmatic breathing) this causes a 'stretch reflex activation of the psoas muscle, which provided is fixed at the hip to prevent hip flexion will help to assist in the extension of the upper lumber and lower thoracic vertebrae.

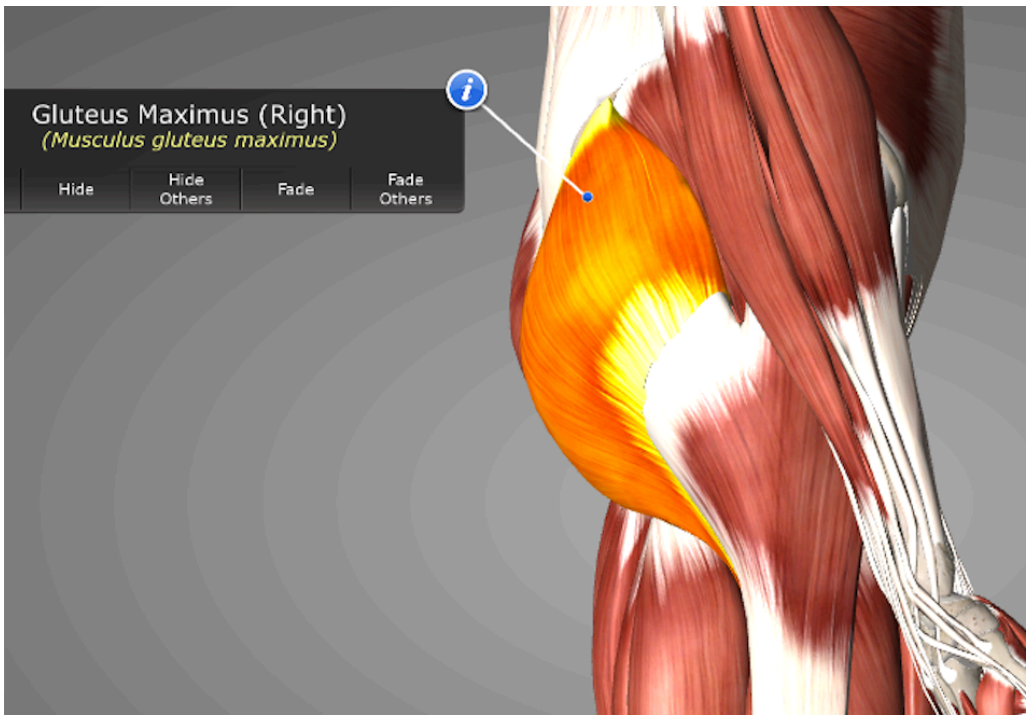


Figure 2.5: Gluteus Maximus (orange); showing how this muscle attaches to the hips and when active during active spinal flexion (such as a 'sit up' exercise) or when eccentrically active while 'dropping back' to a 'back arch' (*Urdhva dhanurasana*).

It is possible in any backward bending position to use a combination of muscles to prevent the hips from bending forward (i.e. encouraging hip extension). In backward-bending (spinal extension) postures this action prevents the L5-S1 from bending backwards. The simplest instructions to get this effect are to move sitting bones (ischial tuberosities) forward (towards the navel), move the top of the hips (iliac crests) backwards (away from the navel) and move the navel forward. The navel in the front of the waist corresponds to the region of 4th and 5th lumbar vertebrae (L4-L5), which are just above the sacrum. We can refer to the region of L4-L5 as the 'navel spine'. When you consciously move the navel forward, without moving the top of the hips forwards this also tends move the 'navel spine' forward and to move the L5-S1 joint into a more flexed (less bending backwards) and less compressed position, which can relieve most lower back pain.

Moving the navel (and 'navel spine') forward can be done using a combination of the diaphragm and/or the rectus abdominis. This action can be trained if you practice abdominal inhalation while doing a half sit up; or practicing abdominal inhalation while carefully dropping part of the way down toward the floor as if you are about to 'drop back' to *Urdhva Dhanurasana* (the 'Inverted bow posture'), or rather to *Ustrasana* (the 'Camel posture'), which is safer and simpler for most people.

To begin to open your spine to the possibilities of bending backwards (spinal extension) where it is mostly stiffer around the region of the middle back (especially from the middle thoracic spine to the fifth lumbar vertebrae), without over-bending backwards (hyperextending) at the L5-S1 junction, you

can do the following things. Immobilise the hips in an extended position (so there is length at the front of the groins) and breathe into the abdomen. This will give the best spinal extension especially if your rectus abdominis (the spinal flexor muscle we use while doing a half sit-up exercise) is active (as it is when dropping backwards), and holding your front ribs inwards. Once you breathe into your abdomen with your diaphragm you usually start to feel the middle of your back begin to bend backwards (sometimes for the first time since being a child), while actually relieving any compression around L5-S1. This is largely due to two main reasons:

1. The fact that the psoas muscles actually join onto the transverse processes of the vertebrae T12-L5 (see anatomy photo) and can therefore bend the spine backwards at these vertebrae if they are not allowed to make L5-S1 bend backwards.
2. The fact that the diaphragm is a dome-shaped muscle that actually joins onto the psoas (see anatomy photo), and so when the diaphragm becomes active (i.e. when it contracts as you inhale into the abdomen) it pulls on the psoas, and even causes the psoas to become active (via the 'stretch reflex'), which will cause the T12-L5 begin to bend backwards.

You can apply these principles in any backward-bending (spinal extension) posture – even while simply standing up 'straight' and trying to lift your chest...

Figure 2.6: Simon Borg-Olivier in *Baddha Hasta Janu Simhasana*; lengthening hip flexors and breathing diaphragmatically allows the body to smoothly bend backwards (spinal extension) along the complete length of the spine

Figure 2.7: Bianca Machliss in *Kapotasana*, breathing into the abdomen and out passively from the chest stimulate the diaphragm to activate the psoas muscle and bend the stiffest parts of the spine

Figure 2.8: Bianca Machliss lowering back into *Urdhva Dhanurasana*, which obligatorily actives spinal extensors (especially rectus abdominis) eccentrically (i.e. while they are lengthening) and reciprocally relaxes back muscles

In the photos attached you can see me using this method while doing *Baddha Hasta Janu Simhasana* (grabbing my knees in a 'lotus cobra') (Figure 2.6) and you can see in this posture how I am bending inwards (backwards) in my mid-spine quite fully (this feels incredible in fact – like an incredible self-massage). In another photo (Figure 2.8) you can see Bianca dropping backward into a backward arch, while slowly lowering down using the rectus abdominis so no ribs can stick out. Once you feel your ribs sticking out in a backwards arch (*Urdhva Dhanurasana*) you can be pretty sure your L5-S1 has been compromised due to compression. This is of course what happens to most people once they touch the floor in a backwards arch. In fact there is less risk of injury while lowering to a back arch from standing than there is once you touch the floor. This is of course hard to control and much easier to do in the camel pose. The real art is to keep the rectus abdominis on, while in the back arch, or while in camel pose or any backwards-bending posture.

Additional Information on Bending Backwards (spinal extension):

The information presented here mainly talks about how to do the 'Camel' pose (*Ustrasana*) and it's related postures (Figure 2.7) but it can also be applied all backward bending postures including the standing back-bending (spinal extension) posture *Utthita Virabhadrasana*, which is described in the **Spinal Movements (Part 22) sequence shown in a previous blog**.

Main points to consider when bending backwards:

- There are two ways to bend backwards (spinal extension).
- You can either lengthen the front of your trunk or you can shorten the back of your trunk.
- When you bend backwards it is generally better (for about 90% of adults) to do it by lengthening the front of your body and not by shortening the back.
- To bend backwards from a standing position to a backward arch posture (*Urdhva dhanurasana*), or to lower backwards from an easier posture such as the 'camel posture' (*Ustrasana*), it is good to think of moving your navel and your 'navel spine' (L4-L5) forward and upwards (which lengthens the front of your body), as opposed to moving your navel and your 'navel spine' (L4-L5) backwards and downwards (which shortens the back of your body).
- Lengthen the skin of your back with no creases in the skin if possible
- Move your collarbone away from the floor and tail bone closer to the floor.
- Breathe in to abdomen to reciprocally relax the muscles of forced abdominal exhalation that tend to harden the lower back
- Move your groins forwards to lengthen (extend) the front of your hips.
- If you lean backwards this can make the front of your trunk firm and the back of your trunk relaxed.

- Ideally you will have the middle front of the abdomen firm (rectus abdominis) and the sides of the abdomen (abdominal oblique muscles) relaxed.
- It is always good to check that your neck is relaxed, your fingers can move and that you can comfortably breathe into your abdomen.
- The real art will be to keep this feeling when your hands touch the floor or your ankles. It is easy to maintain the eccentric activation of your rectus abdominis.
- At any time you should be able to let go of the floor or your ankles and your trunk should feel the same.
- The purpose of holding the floor or your ankle is so you can enhance the activity of your abdominal muscles (spinal flexors), which can work more if you are holding onto the floor or you ankle. This is also going to increase the work of the knee extensors and hip flexors.
- The activation of your rectus abdominis causes reciprocal relaxation of your spinal extensors.

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Chapter 3: Regulate your breath to control body and mind

Figure 3.1: Simon Borg-Olivier doing Pranayama in *Kandasana*. (Photo courtesy Mads Becker Jorgensen)

The ultimate state of pranayama (yogic breath-control) and meditation is a state where breathing is reduced as much as possible without force.

This is a process that can for most people take a lifetime.

In order to work towards the mastery of yoga it is sometimes useful to breathe more than normal (hyperventilation) but eventually the aim is to be able to comfortably live and practice while breathing less than normal (hypoventilation).

With mastery over your breathing you can help to improve your cardiovascular health, respiratory muscle function, physical strength, mental control, emotional stability, levels of hunger, your ability to digest food, your energy levels, your reproductive health and well as your ability to regenerate body tissues at a cellular level.

Specific breathing can affect many body systems:

In yoga and life, breathing may be guided or controlled, for eight (8) main reasons. These are:

1. Physical
2. Neurological
3. Mental

4. Emotional
5. Cardiovascular
6. Digestive
7. Reproductive/Renal
8. Physiological

Pranayama (yogic breath-control) is the art of learning how to breathe less than normal (hypoventilation). Although sometimes fast, deep and/or complete breaths have benefits, the less you breathe overall, the better your mental capacity is and the greater the blood flow is to nourish the brain and the heart. The haemoglobin also transfers oxygen more efficiently to all the cells of the body (the Bohr Effect). Many studies on meditation have shown that focus and concentration are better when you breathe less! Additionally, the nervous system is much calmer when you breathe less and this is reflected in a reduced desire to eat.

Breath-control is also useful on a mental level. Any type of focus on your breathing can help you concentrate but the nervous system works best if you breathe less than normal.

Breath-control works on the cardiovascular and circulatory system. You can enhance the movement of energy and information through your subtle channels, and enhance the movement of blood and heat through your blood vessels, by breathing differentially from your abdomen (diaphragmatic breathing) or from your chest (thoracic breathing). You can also bring more blood and oxygen to the brain and heart and less blood and oxygen to the arms and legs by breathing less than normal (hypoventilation). Conversely, you can bring less blood and oxygen to brain and heart and more blood and oxygen to the arms and legs by breathing more than normal (hyperventilation).

Below is a summary of a selection of different possible effects, resulting from breathing, or not breathing, or simply using the muscles of breathing..

1. Physical effects of breathing

- Mobilising the spine
    - Deep inhalation or deep exhalation can enhance either spinal flexion (bending your spine more forward) or enhance spinal extension (bending your spine more backwards) depending on whether the breathing is focused on the posterior (rear) or the anterior (front) of the trunk
- Stabilising the spine
    - The muscles of breathing out (especially from the chest) can make your spine more stable and help relieve lower back pain
- Strengthening the spine and body
    - The diaphragm (the main muscle of inhalation) can be used as powerful strength muscle
- Inhalation retention with the use of trunk muscle co-activation (bandhas) can help to manipulate the spinal vertebra and relieve pain in the neck upper back and/or lower back

2. Neurological effects of breathing

- Control of the autonomic (automatic) nervous system via the diaphragm, which can be controlled either by the conscious mind (somatic) or unconscious mind (autonomic)
- Reciprocal relaxation of the muscles of abdominal exhalation (which include many of the muscles that can tend to over-tense and contribute to lower back pain) by the main muscle of inhalation (the diaphragm)

3. Mental effects of breathing

- Focus on any type of breathing can help with concentration
- Reduced breathing (hypoventilation) leaves the body slightly more acidic (with carbonic acid), which gives the physiological effect of calming the nervous system and the mind in general

4. Emotional effects of breathing

- Slow abdominal (diaphragmatic) breathing tends to enhance parasympathetic control of relaxation response with ahimsa (non-violence) and/or love and peace and happiness as dominant emotions
- Faster chest (thoracic) breathing tends to enhance sympathetic control of 'flight or fight' response with tapas (passion to do your best) and/or fear anger and aggression as dominant emotions

5. Cardiovascular effects of breathing

- Deep breathing with the abdomen relaxed (which can be diaphragmatic and/or thoracic provided the abdomen is relaxed) causes an increase in blood flow
- With this type of breathing heart rate increases on inhalation as does blood pressure
- Heart rate decreases and blood pressure decreases on exhalation
- This type of breathing causes increased pressure into the abdomen on inhalation and decreased pressure on exhalation that increases blood flow and nervous system stimulation to the abdominal organs

6. Digestive effects of breathing

- Diaphragmatic (abdominal) inhalations can help to reciprocally relax the muscles that cause forced abdominal exhalation and simultaneously immobilise the lower trunk and prevent the natural massaging of the digestive organs with spinal movements
- Diaphragmatic (abdominal) inhalations can help to bring flood to the digestive system that helps with the absorption of nutrients from your food
- Thoracic (chest) inhalations can (if done without needing to inhibit the diaphragm with the muscles of forced abdominal exhalation) relieve prolapse of internal organs that can prevent complete evacuation of the bowels
- Sequential abdominal exhalation using only the transverse abdominis fibres (not the oblique fibres) can help to promote peristalsis in in the intestines

7. Reproductive/Renal effects of breathing

- Diaphragmatic (abdominal) inhalations can help to reciprocally relax the muscles that cause forced abdominal exhalation and simultaneously immobilise the lower trunk and prevent the natural massaging of the reproductive organs with spinal movements

- Diaphragmatic (abdominal) inhalations can help to stimulate a better balance of the autonomic nervous system that can prevent proper fertility cycles (e.g. menstrual cycles in woman)
- Diaphragmatic (abdominal) inhalations can also can help to reciprocally relax the muscles that cause forced abdominal exhalation that can harder the abdominal region and prevent the menstrual flow
- Thoracic (chest) inhalations can (if done without needing to inhibit the diaphragm with the muscles of forced abdominal exhalation) relieve prolapse of internal organs that may be putting pressure on the bladder and the fallopian tubes that can prevent evacuation of the bladder and also prevent the release of eggs from the fallopian tubes that can result in extended periods of infertility
- Sequential abdominal exhalation using only the transverse abdominis fibres (not the oblique fibres) can help to promote massaging of both male and female reproductive glands

8. Physiological effects of breathing

- Reduced breathing (hypoventilation) for:
    - Calming the nervous system
    - Increased oxygenation and blood flow to brain and heart
    - Increased flow of air in the bronchial tubes to the lungs, which can help to relieve breathing difficulties and asthma
    - Reduced hunger, and decreasing appetite for people needed to eat less or reduce weight
    - Increased carbon dioxide causes increased stomach acid for better digestion of food
- Increased breathing (hyperventilation) for:
    - Stimulation of nervous system
    - Increased mobility of the synovial fluid that lubricates joints and also lies between layers of muscles and between nerves and their sheaths that can help improve the functioning of joints, muscles and nerves
    - Decreased oxygenation and blood flow to brain and heart
    - Increased hunger and promoting appetite, which may be good for people who need to eat more
- Inhalation retention (antara) with the use of trunk muscle co-activation (bandhas) can cause an increased partial pressure of oxygen in the body that can give the recorded benefits, which include increased immunity, of hyperbaric oxygen therapy
- Deep slow inhalations or inhalation retention (kumbhaka) with movements of the spine can also cause an increased partial pressure of oxygen in the body that can give the recorded benefits, which include increased immunity, of hyperbaric oxygen therapy
- Exhalation retention (bâhya kumbhaka) and prolonged inhalation retention (antara kumbhaka) and even very slow breathing or deep meditation can induce enough hypoventilation and a resultant drop in pH (increased acidity) that has been shown to induce the production of stem cells and other factors that can be paramount to the healing responses of the immune system and the process of tissue regeneration that is the long sought secret that some call 'the fountain of youth'

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Chapter 4: To Breathe or Not to Breathe!: Why Breathing Less than Normal is the Essence of Health and Longevity

Breathing less than normal can calm the nervous system, decrease appetite and cause more oxygen to be transported to the brain. Breathing more than normal can have some beneficial effects too, however it also can make you feel dizzy, jittery and hungry. It is also better to keep breathing exercises and physical exercices separate until one is firmly established in the physical exercises. Once one no longer needs to focus on alignment and can confidently and safely perform the postures, doing simple or more complex breathing exercises can further deepen the physical practice.

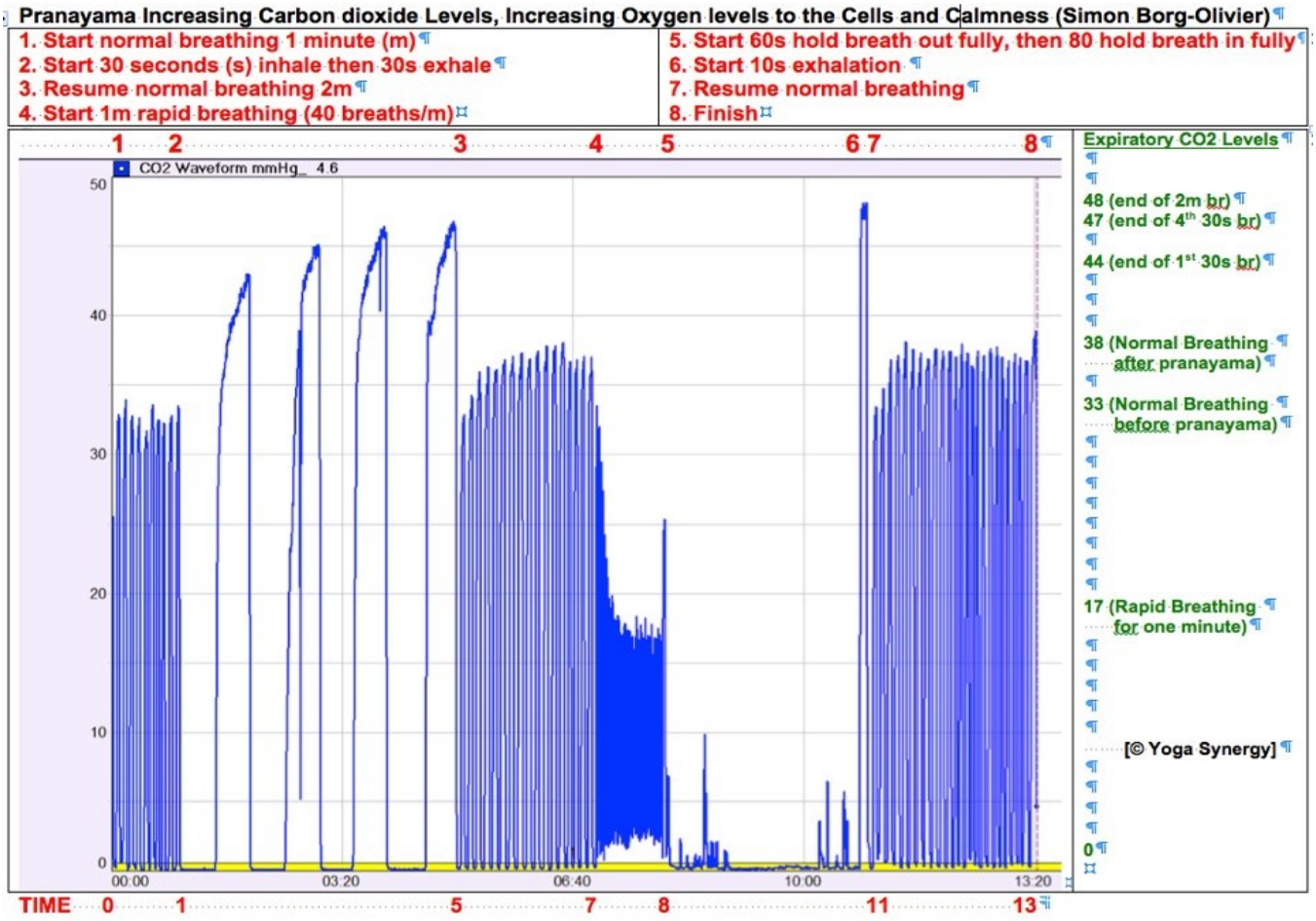

Figure 4.1: Capnometer (measuring carbon dioxide from exhaled air) Study by Simon Borg-Olivier: Hypoventilation increases CO2 levels in your breath and Hyperventilation decreases CO2

The western yogic world is divided in opinion in many areas, one of which is "**how to breathe**". Questions such as the following are often raised:

Should we separate breathing practice (pranayama) from physical practice (asana)?

Is it more beneficial to breathe more than normal or less than normal?

As with many things in life, there is no totally right or wrong answer. No way of breathing is in itself good or bad. It is matter of 'how' and 'when' to breathe in each way.

The facts that we know about breathing are quite compelling.

Medical science has shown for more than a century that the more you breathe (hyperventilate), the less blood goes to the brain and the heart, and the less oxygen can get absorbed in the lungs. Any fit person knows that their fitness is reflected in how little they breathe (or pant) after they do exercise. It is then no surprise that the ancient yogic texts state too that the art of pranayama is the art of learning how to breathe less than normal.
When you breathe less than normal (hypoventilate) you begin to accumulate more carbon dioxide. Every physiology textbook explains that carbon dioxide is a very powerful and important substance in the body. Carbon dioxide causes the expansion of the blood vessels to the brain and heart (vasodilation) improving blood flow. It opens the bronchial tubes in the lungs (bronchodilitation), thus improving breathing. It calms the nervous system reducing stress and many other nervous conditions. Carbon dioxide is also the main reason for the Bohr Effect, which causes more oxygen to be deposited in your body cells. When oxygen is used in your cells in the metabolism of sugar, you get nineteen times as much energy as compared to when you metabolise sugar in the absence of oxygen.

The Bohr Effect is a physiological phenomenon, known for more than 100 years, that says that a decrease in blood pH (more acidity, less alkalinity) or an increase in blood CO2 concentration will result in haemoglobin proteins (in red blood cells) releasing their loads of oxygen into the cells of the body. A decrease in carbon dioxide, which occurs during hyperventilation (or overbreathing), causes an increase in pH (less acidity, more alkalinity), which will result in hemoglobin picking up more oxygen and not allowing it to enter body cells. Carbon dioxide reacts with water to form carbonic acid, thus an increase in CO2 results in a decrease in blood pH.

Measuring CO2-levels using an expiratory capnometer

A capnometer is a medical device for measuring the **carbon dioxide** levels in the body. An expiratory capnometer is a non-invasive device that measures the concentrations carbon dioxide (CO2) during the exhalation. The graph in Figure 4.1 clearly shows the effect a personal experiment where I did two four-minute-breathing exercises (*prânâyâmas*) and measured my levels of carbon dioxide in the exhaled breath using an expiratory capnometer. Note that in the results below, with this device you can only measure CO2 when you are exhaling. Note also that CO2 mostly becomes carbonic acid in the body.

EFFECTS OF INCREASING CARBON DIOXIDE (CO2) AND CARBONIC ACID:

Increased levels of CO2 and carbonic acid in the body (up to a point) tend to promote the following effects:
* increased transfer of oxygen via the lungs to the blood (bronchodilation)
* increased blood flow to the brain and heart (vasodilation)
* increased transfer of oxygen from haemoglobin in the body cells (Bohr effect)
* increased calmness of the nervous system (pH effect on nerves)
* decreased hunger (pH effect on desire for acidic foods)

EXPERIMENT 1: BREATHING EXERCISE 1: 4 x one-minute breaths with 30 seconds inhalation followed by 30 seconds exhalation:

1. Start normal breathing 1 minute (m) [CO2=33]
2. Start 30 seconds (s) inhale then 30s exhale (x 4 breaths) [CO2=46]
3. Resume normal breathing 2m [CO2=36]

RESULTS OF EXPERIMENT 1: The results of this first breathing exercise (Experiment 1) are that CO2 levels increased significantly during the slow breathing and remained higher than at the starting level after natural breathing was resumed. This implies that pH decreased due to the increased levels of carbonic acid both during and after the experiment. As to be expected based on the reported effects of increased levels of CO2 and carbonic acid (see above), subjectively following the experiment I felt very warm, clear in and focused in my head, very relaxed and definitely not hungry.

EXPERIMENT 2: BREATHING EXERCISE 2: 40 short deep abdominal breath, followed by 60 seconds exhalation retention followed but 110 seconds inhalation retention followed by 10 seconds exhalation, then normal breathing:

3. Normal breathing after first exercise 2m [CO2=36]
4. Start 1m rapid breathing (40 breaths/m) [CO2=17]
5. Start 60s hold breath out fully, then 80 hold breath in fully
6. Start 10s exhalation [CO2=48]
7. Resume normal breathing [CO2=37]

RESULTS OF EXPERIMENT 2: In the second breathing exercise (Experiment 2) I did a period of hyperventilation followed by a period of hypoventilation (often called Bhastrika in many yoga traditions). During the period of hyperventilation (about 20 deep, full and quite fast breaths per minute) my CO2 levels fell very sharply to the lowest level in both experiments. My body became cold and tingly. I also became somewhat dizzy. These are typical symptoms of hyperventilation. After the period of hyperventilation I did one 3 minute breath which included nauli kriya (abdominal 'churning' using the rectus abdominis and the oblique abdominal muscles) during an exhalation retention of one minute. Holding my breath out this long seemed very easy since I was not getting the usually present signal to breathe from high levels of CO2 since I had 'blown off' my usual CO2 levels in the period of hyperventilation. I subsequently took an inhalation of 30 second, followed by inhalation retentions with bandhas (opposing muscle co-activation around the trunk) for a seemingly easily held period of about 110 seconds, followed by a 10 second

exhalation. During that final exhalation my CO2 levels increased to their highest level in both breathing exercises and remained higher than at the starting level after natural breathing was resumed. Therefore it is safe to conclude that my blood and intracellular pH decreased (became more acidic) due to the increased levels of carbonic acid both during and after the experiment. As to be expected based on the reported effects of increased levels of CO2 and carbonic acid (see above), subjectively following the experiment I felt even warmer, very clear and focused in my mind, very relaxed yet energised and completely satiated with no desire to eat for some time after.

In terms of diet, it is interesting to note that with regular practice of this, myself and others report much less desire for acidic foods (such as high protein foods, grains, animal products, processed foods etc.) in general and seem to be more easily satiated by simpler more alkaline foods such as fruits, salads and vegetables.

It is important to note that the graph alone does not show that blood flow to the brain increases with hypoventilation. It only shows that the two hypoventilation exercises I did increased CO2 levels both during and after the exercise. My experiment also showed that when I did a hyperventilation exercise it decreased CO2 levels. However, in the graphic below (Figure 3.2), based on an MRI study by Dr Peter Litchfield (see **www.physiomotion.nl**) a carbonic acid induced vasodilation (expansion) of the arteries to the brain and the Bohr effect has been shown to take place in most situations when there is an increase in CO2 and carbonic acid. From this graphic you can see that during normal breathing there is adequate blood flow and oxygenation of the brain, but after on a short period (one minute) of hyperventilation the blood flow and oxygenation of the brain is significantly reduced.

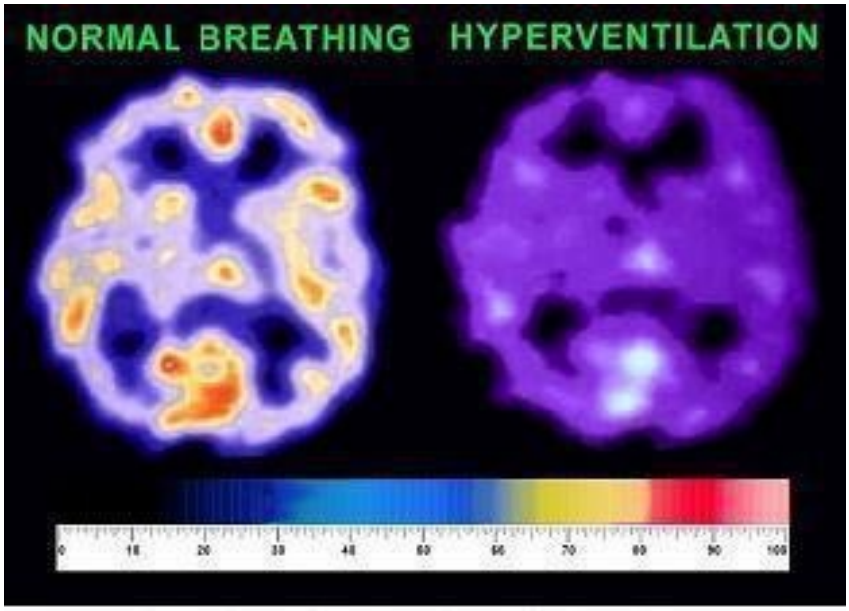

Figure 3.2: Image of brain before (left) and after (right) hyperventilation (breathing more than normal). Results strongly suggest that hyperventilation and presumably carbon dioxide cause vasoconstriction (thinning) of the arteries going the brain and hence giving less oxygen to the brain after hyperventilation.

For those interested a nice webpage that gives some simple explanations of the effect of CO2 on vasodilation and the Bohr Effect is available at http://www.normalbreathing.com/CO2-vasodilation.php. This page has some published references, that can help to give the link, and provide the evidence, that I didn't specifically give in this post, that an increase in CO2 levels can lead to increase oxygen levels in the brain and a general increase in health throughout the body.

Breathing more than normal can sometimes be good too

Controlled hyperventilation can have its benefits too, if balanced with a reduction of breathing for a period of time following. I do about three to five rounds of the following breathing exercise on a daily basis: one minute hyperventilation, followed by one breath for 3 minutes, then finish with about 20 minutes of meditation with minimal breathing. I also know powerful yogis in India who hyperventilate during an entire hour of physical exercise but then sit in meditation for several hours after with hypoventilation to balance the effects on the their bodies.

I only mention this because in my travels I see so many of the people in the yoga and in the exercise world today practicing hyperventilation throughout their entire practice yet they don't balance it afterwards. Often it is mistakenly thought that slow deep breathing is just 3 seconds in and 3 seconds out, for a

full lung of air whilst not doing too much physical activity. This would mean breathing about 50 litres of air per minute (10 X normal). Often these people report they are finishing their yoga practice feeling spaced out, dizzy, exhausted and hungry. This is often how yoga practitioners think they are supposed to be feeling and that the spaced out feeling is the essence of yoga, whereas of course it is much better (and healthier I think) to generally finish your exercise and/or yoga feeling clear, focused, calm energised and not desperate for food.

Keep it simple until you are established in your *asana* practice

However, nothing is ever completely right or wrong and definitely depends on individual needs. For example, my 6-year-old son often does not have an appetite, so I sometimes encourage him to hyperventilate (with breathing games such as 'from how far can you blow out this candle') and after that practice he is suddenly hungry again!

It is also better to practice breathing exercises and the physical exercise (posture and movement) separately until one is firmly established in the physical exercise you are doing. Once you no longer need to focus on alignment and can make sure you are not damaging your body, you can begin doing simple and then more complex breathing exercises during your physical exercise. However, when learning a new physical exercise the best way to breathe is with your own natural breathing.

Breathing exercises can also be of benefit to you

It is also important to note that it is good to exercise the muscles of breathing too, and point that although arguably the main purpose of breathing is to bring more oxygen to the cells, there are many other reasons we breathe and many things we can do with our breathing. These subjects will be discussed in further blogs and videos, but have already been mentioned in previous blogs including **this one.**

Thanks to Breath Therapist Roger Price for assistance with the capnometer

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Chapter 5: How to breathe to help your spine, internal organs and energy levels

In this chapter I will be discussing the physical and physiological effects of breathing. There are two main reasons we breathe. The main reason is the physiological reason of getting oxygen into our cells. Perhaps surprisingly to many people the best way to achieve this is to safely breathe as little as possible (hypoventilation) to stimulate the Bohr effect which says significant carbon dioxide must be present for oxygen to be able to enter the cells. The other reason we breathe could be called a physical reason and it includes the effects on joints, muscles, nerves, the mind, emotions, blood floor, digestion, reproduction and immunity. In this chapter on breathing I will be focusing on the physical effects of breathing. If you breathe, or use the muscles of breathing in certain ways you can radically improve and/alter strength, flexibility, nerve function, blood flow and internal organ health. Many people inadvertently only focus on this reason for breathing and in their enthusiasm and often lack of knowledge they over-breathe (hyperventilate) and thus miss the primary purpose of breathing. In other chapters on breathing I will be focusing on how to achieve the physiological effects of breathing. The advanced practitioner can control their breath in such a way the both the physical and physiological benefits of breathing are achieved at the same time.

Most people should do only natural breathing (simple breath-control) in posture and during movement:

It is best for most people (until they are very experienced) to practice posture and movement separate to specific breath-control. It is difficult for most people to do more than one thing at once while they are both still being learnt. What tends to happen when people try to learn posture and breathing at the same time is that either the posture or the breathing is compromised. Compromising the posture could lead to damaged muscles, ligaments or joints. Compromising breathing could lead to over-tension, over-stress and the problems of over-breathing (hyperventilation).

Natural breathing has three fundamental properties

1. Inhalation is diaphragmatic (abdominal)
2. Exhalation is passive
3. The amount of breathing is minimal

Only very experienced people should practice advanced breath-control exercises in complex posture and during movement:

Figure 5.1: In this photo I am moving my body and in a relatively difficult posture side-lengthening, twisting, backward bending lunging posture while doing a fairly advanced breath-control exercise. It is recommended that unless you are very experienced it is best to do natural breathing while movement.

In Figure 5.1 I am doing advanced spinal breathing during complex movement. I follow a path of inhalation that lasts up to 2 minutes on some breaths and a path of inhalation that last up to 2 minutes for exhalation on other breaths. As I 'breathe into' a part of the trunk I simultaneously expand that part, lengthen it, relax it and focus on it as I move it. When I 'breathe out of' part of the trunk I simultaneously expand that opposite part of the trunk, lengthen it, relax it and focus on it as I move it. This can create quite complex patterns for the mind to visualize but it also has very heating effect and does wonders to the strength, flexibility and wellbeing of the trunk, spine, internal organs and energy levels. In the simplest physical version of this exercise I twist my body to the left side while spiraling my breath around the trunk lengthening first the back of the body, then right side, then the front and then left side, and then I

repeat a similar breathing starting from the opposite side in the opposite direction. Before you attempt this it is best to practice long slow breathing in a seated posture (see Part 2 of this blog to come soon), and separately practice the movements with natural breathing.

Spinal movements with coordinated spinal breathing:

It is suggested in the yoga texts that most people (until very experienced) are best suited to focus on posture and movement with natural breathing and focus on specific breathing patterns in only simple postures like sitting up straight our lying supine.
However, if you have mastered both your breathing as well as posture and movement then the two can be very effective to combine.
Most people who combine special breathing with posture and movement tend to over-breathe (hyperventilate) and/or over tense their trunk, and block energy and movement with their muscles of forced abdominal exhalation (the co-activation of both sides of the internal and external abdominal oblique muscles that are ideally used mostly for actively twisting (axially rotating) the spine.

Breathing can control spinal movements:

In this section I am referring to simple spinal movement such as those shown in Figure 5.2. Although the spine can move into forward bending (spinal flexion) and backward bending (spinal extension) by itself, if you breathe in certain ways breathing can also cause the spine to move into forward bending (spinal flexion) and backward bending (spinal extension). Forward bending (spinal flexion) can be done in two main ways. You can either increase the length of the back of the trunk (lengthen the back) or you can decrease the length of the front of the trunk (shorten the front). Similarly for backward bending (spinal extension) there are two main ways of practicing. You can either lengthen the front of the trunk or you can shorten the back. All four possibilities are possible and none are wrong to do but most normal adults (~90%) find that there is discomfort that leads to back pain if you bend backwards (spinal extension) by shortening the back of the body, so it is generally not recommended for most people. Similarly, some people (~1-2%) find that there is discomfort that leads to back pain if you bend forwards (spinal flexion) by lengthening the back of the body. Additionally many people can only lengthen the back by hardening the abdominal oblique muscles in a way inhibits spinal movements and also inhibits the diaphragm, so it is generally not recommended for most people to bend forward by lengthening the back unless it can be done with no discomfort and while still being able to feel the breath start in a relaxed abdomen. Here are four possibilities that can arise once you know this information:

- If you inhale into the front of your trunk your front will expand and this causes your back to bend backwards (spinal extension) slightly.
- If you exhale from the front of your trunk your front will contract and this causes your back to bend forwards (spinal flexion) slightly.

- But if you inhale into the back of your trunk your back will expand and this causes your back to bend forwards (spinal flexion) slightly.
- And if you exhale into your back of your trunk your back will contract and this causes your back to bend backwards (spinal extension) slightly.

To get the best effect from 'spinal breathing' you need to be able to isolate the transversus abdominis muscle fibres independently of the internal and external abdominal oblique muscles. You also need full control of your diaphragm (abdominal breathing muscle control) and also your chest (thoracic breathing control). This is only possible for about one or two in every twenty untrained people

In much of my dynamic and static practice I inhale in at least two parts and exhale in at least two parts using a combination of four main methods depending on my purpose at the time:

METHOD 1: Ascending inhale and ascending exhale
Inhale up the back (spinal flexion) then inhale up the front (spinal extension)
Exhale up the back of the body (spinal extension) then exhale up the front (spinal flexion)
Effects on internal organs and energy: massages internal organs upwards and pushes energy upwards on inhale and exhale

METHOD 2: Ascending inhale descending exhale
Inhale up the back (spinal flexion) then inhale up the front (spinal extension)
Exhale up the back of the body (spinal extension) then exhale down the front (spinal flexion)
Effects on internal organs and energy: massages internal organs upwards and pushes energy upwards on inhale and massages in internal organs downwards and pushes energy downwards on exhale

METHOD 3: Descending inhale and descending exhale
Inhale up the back (spinal flexion) then inhale down the front (spinal extension)
Exhale up the back of the body (spinal extension) then exhale down the front (spinal flexion)
Effects on internal organs and energy: massages internal organs downwards and pushes energy downwards on inhale and exhale

METHOD 4: Descending inhale and ascending exhale
Inhale up the back (spinal flexion) then inhale down the front (spinal extension)
Exhale up the back of the body (spinal extension) then exhale up the front (spinal flexion)
Effects on internal organs and energy: relieves prolapse, as well as massages internal organs downwards and pushes energy downwards on inhale and massages internal organs upwards and pushes energy upwards on exhale.

Figure 5.2: **Spinal breathing**: In this series of photos I am demonstrating moving in synchrony with my breathing. In the more complex form of the exercise I am moving my body from a simple forward bending (back lengthening) posture while inhaling, to a simple backward bending (front lengthening) posture while continuing to inhale, then to a simple forward bending (back lengthening) posture and exhaling first from the chest then from the abdomen. It is recommended that unless you are very experienced it is best to do natural breathing with these movements and the breath works by itself in a similar fashion. (Please click on this photo to enlarge and see the detail).

In the attached photo montage (Figure 5.2) I am doing a dynamic exercise that moves between spinal flexion and spinal extension.
* The photo describes breathing related to Method 2 above.
* The first part of my inhalation begins in my pelvic floor and immediately fills the space between L5-S1, then the inhale moves up the back of my trunk and essentially lengthens my back without shortening my front. At this point my abdomen is completely relaxed and I begin with diaphragmatic breathing in which my navel moves backwards and upward.
* The second part of my inhalation goes up the front of my spine and this is synchronised with spinal extension in which I lengthen my front body without shortening my back body. This part of the inhalation is also initiated with an expansion of the pelvic floor and then expansion of the lower abdomen, upper abdomen, then the chest.
* The first part of my exhalation is passive and consists of deepening the spinal extension by lowering tailbone and then moving the L5 vertebra (and the navel) forwards and upwards to further lengthen the front.
* The next part of my exhalation goes down the front of the body and is initiated from the lower abdomen with a voluntary activation of the rectus

abdominis, which helps to move the L5 vertebra (and the navel) forwards and downwards into spinal flexion. This initiates an exhalation from my chest.
* Then I voluntarily release and relax the rectus abdominis and use first my upper then my lower transverse abdominis to move my navel downwards and backwards in preparation for the next inhalation from that position.
* This method can actually be used in any posture or movement. It is not only a very powerful way of training both breathing and spinal muscles but is also a really effective way to mobilse your spine, increase body heat and circulation, and massage the internal organs.

Once these method of inhaling and exhaling in two sections up and down the trunk with spinal flexion and extension is mastered then it is also possible to do the same with left and right sided spinal lateral flexion (i.e. in side bending postures)

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Figure 5.3: In this series of photos I am demonstrating moving my abdomen and chest using my breathing muscles with or without actually breathing. In the simplest form of the exercise I am expanding and contracting my chest, whole abdomen, upper abdomen and/or lower abdomen as I inhale and/or exhale. In the more complex form of the exercise I am using the same muscles but without actually breathing.

Rolling the abdomen up and down using the transverse abdominis muscles to 'massage' the internal organs while you breathe:

This looks strange I know, but it feels amazing and does wonders for the physical and physiological body! As the abdomen rolls upwards on inhale and exhale it 'pulls' the internal organs as well as blood flow (internal energy) downwards on inhalation and 'pushes' the internal organs as well as blood flow (internal energy) upwards on exhalation. The sequence for rolling in the abdomen from bottom to top on exhale, and then for rolling out the abdomen from bottom to top on inhale is as follows:

1. Relax then expand the pelvic floor
2. Inhale softly expanding the lower abdomen
3. Inhale softly expanding the upper abdomen
4. Contract the pelvic floor
5. Exhale by softly drawing in the lower abdomen
6. Exhale by softly drawing in the upper abdomen

As the abdomen rolls downwards on inhale and exhale it 'pulls' the internal organs as well as blood flow (internal energy) upwards on inhalation and 'pushes' the internal organs as well as blood flow (internal energy) downwards on exhalation. The sequence for rolling in the abdomen downwards on exhale and then rolling out the abdomen downwards on inhale is as follows:

1. Contract the pelvic floor first
2. Inhale softly into the upper abdomen (or inhale into the chest if the upper abdomen is too difficult)
3. Relax the pelvic floor, then inhale softly and expand the lower abdomen
4. Expand the pelvic floor
5. Exhale by softly drawing in the upper abdomen
6. Exhale by softly drawing in the lower abdomen

Breathing for improving internal organ health:

If you want your breathing to help your digestive system, you have to know how to control the muscles of inhalation and exhalation in a way that allows you to massage and manipulate the internal organs. If you can learn to breathe into your chest with your abdomen soft, you can help relieve prolapse of the internal organs. One of the ways to expand the chest in a way that the abdomen is not hard is by making the underarm muscles (pectoralis major and latissimus dorsi) firm. Another way of having the chest expand without having the abdomen hard is to lift the shoulders up past the ears, and then breathe into the chest. This can help to pull the chest up in a way that won't make the abdomen hard, and can cause the internal organs to be drawn upwards, which can relieve prolapse pressures in the intestines that can cause problems such as constipation and infertility. However, prolapse will not be relieved, and the digestive system will not be helped, if the only way you can breathe into the chest is by tightening the abdomen using the muscles of forced abdominal exhalation.

Another method you can use to relieve prolapse of the internal organs, as well as enhance the digestion and absorption of nutrients and elimination of waste,

is by rolling the abdomen up and down using inhalation and exhalation (as described above and in Figures 5.2 and 5.3). To achieve this you need to exhale in a way that the abdomen does not go hard. This can be done by simply using the transverse abdominal (TA) muscle fibres, which are belt-like muscle fibres going around the waist, in sequence. It is possible to isolate and activate the lower abdominal TA fibres and use them to draw in the lower abdomen softly, then to isolate and activate the upper abdominal TA fibres to draw in the upper abdomen softly as you complete your exhale. When you inhale, you can use your diaphragm to expand the lower abdomen first, while simultaneously releasing the lower TA fibres, and then inhale to the upper abdomen while simultaneously releasing the upper TA fibres. So it looks like a rolling effect. This massages the internal organs upwards. This method can push the internal organs upwards and can also relieve prolapse. Exhaling with the lower abdominal TA fibres is enhanced in most people if you precede your inhalation with a contraction of the pelvic floor. Inhaling to the lower abdomen first necessitates the release of the lower TA fibres and this is enhanced if you precede your inhalation with an expansion of the pelvic floor.

It is also possible to roll the abdomen the other way, exhaling from the upper abdomen, then the lower abdomen, and inhaling from the upper abdomen first, and then inhaling into the lower abdomen. This method can push the internal organs downwards.

The key to achieving these exercises is to isolate the pelvic floor as indicated in the lists above, the lower TA fibres and the upper TA fibres separately in a sequence.

In the photos of Figure 5.3, which were all taken in one breath cycle as part of *Tadagi mudra* I am using the same muscle control as described above but without breathing. I begin with and inhalation retention and finish in an exhalation retention:

(1) chest contraction and abdominal contraction (using oblique abdominal muscles) with inhalation retention;
(2) chest expansion with abdominal contraction (using oblique abdominal muscles) with inhalation retention;
(3) chest compression and lower abdominal TA (transverse abdominis muscle) compression (with upper and lower abdomen still soft) with inhalation retention;
(4) chest compression with abdomen relaxed with inhalation retention;
(5) chest expansion with abdomen relaxed with exhalation retention
(6) chest expansion with rectus abdominis with exhalation retention

The addition of the breath retentions in this way using compressive and expansive bandhas (as described below) gives benefits similar to those described by authors on hyperbaric oxygen therapy and intermittent hypoxic therapy.

Using *bandhas* to change intra-abdominal and intra-thoracic pressures:

In terms or structure, a *bandha* is the co-activation of opposing (antagonistic) muscle groups around a joint complex. This can always be done in two main

ways. In one way the joint becomes firm and compressed (*ha-bandha*) and in the other way the joint becomes firm and expanded (*tha-bandha*). On a physical level most of the *bandhas* give stability around the joint complexes. However, a physiological level *bandhas* (which are a type of *mudra* or energy-control system) act as gates (locks) that can either enhance (*tha-bandha*) or discourage (*ha-bandha*) the movement of blood and circulation of *prana* (energy) and *citta* (information) through the *nadis* (subtle channels of the body). Some people have asked for clarification about the *bandhas*, this is a photo montage with a different spiel below to clarify the points people have had questions about after reading my post:

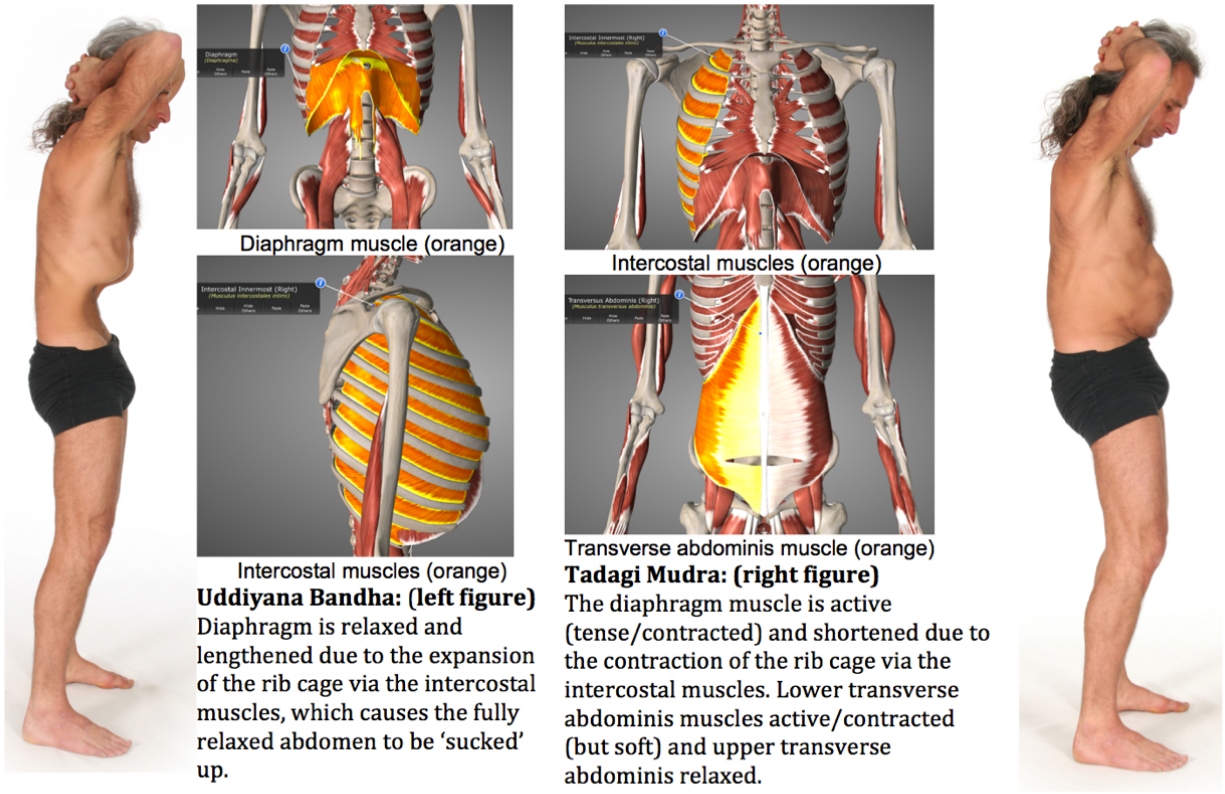

Figure 5.4: This montage shows the external form of Uddiyana bandha (left) and Tadagi Mudra (right) and the muscles used to create these mudras.

STRANGE but Useful Opposite Anatomy of *Uddiyana Bandha* and *Tadagi Mudra*:

UDDIYANA BANDHA: (left side of Figure 5.4) (on exhalation retention)
The diaphragm muscle is relaxed and lengthened partly due to the expansion of the rib cage via the intercostal muscles, which causes the fully relaxed abdomen to be 'sucked' up.

TADAGI MUDRA: (right side of Figure 5.4) (on inhalation retention)
The diaphragm muscle is active (tense/contracted) and shortened partly due to the contraction of the rib cage via the intercostal muscles, which causes the fully relaxed upper abdomen to be pushed out. The lower transverse abdominis

muscles are active/contracted (but soft) and upper transverse abdominis are totally relaxed.

These are both really useful *mudras* can be used effectively to move energy through the body in *pranayama* and *asana*.

Three common questions regarding *bandhas* can take the following form:
Question 1. *Mula bandha*: in many books it is described as the lift of the perineum, but in your anatomy course you define *bandha* as the co-activation of opposing muscle groups around a joint complex. So it looks like that from that point of view *mula bandha* is more like bringing the navel toward the spine like in *Lolasana*. Is that correct?

Question 2. *Uddiyana bandha*: people practicing *Ashtanga Vinyasa yoga* say, you should always hold your *bandhas*, but from this explanation it seems very hard for me to hold *uddiyana bandha* while you do backbend. Do I not understand this *bandha* correctly?

Question 3. Are *bandhas* used differently in *asana* and *pranayama*?

My answers:

1. Different types of *Mula bandha*:

There is much confusion about *bandhas* in the world of modern yoga. Part of the explanation to the question of *mula bandha* is that when you engage the lower abdominals (lower transverse abdominis but not the oblique muscles) then the perineum also comes on. Conversely, if you can activate the perineum but not the anus, then you also stimulate the lower abdominals in a way that does not inhibit the diaphragm. If the diaphragm is inhibited, which is what happens when you engage the anus and/or the abdominal obliques (as in when you forcefully exhale to bring the navel to the spine), then you will inhibit the diaphragm and instead of being 'firm but calm' (*sthira sukham asanam*) you will be tense and weak. I explain this much more in **our blog on what it really means to 'pull the navel towards the spine**, as it is a big topic and here I am only touching upon it here. What you are seeing me do in the photo of tadagi mudra (Figure 5.4) is using only my lower transverse abdominis muscles (the real lower abdominals) and not hardening my abdomen at all. This is a type of compressive (*ha*) *mula bandha* that does not cause tension, stress or inhibition of the diaphragm, as opposed to the more commonly seen *ha-mula bandha*, which is the co-activation of the opposing oblique muscles that does cause hardness in the abdomen, draw the navel closer to the spine, inhibit the movements of the spine and cause the inhibition of the diaphragm. However, this hardening *bandha* is still a useful as part of *pranayama* and part of **the Nauli Lauliki Kriya**.

2. Different types of *Uddiyana bandha*:

With respect to *uddiyana bandha* and its differing forms that regularly confuse many people there is harmony is opposition seen in Figure 5.4. In Figure 5.4 the *uddiyana bandha* on exhalation retention is a *tha-uddiyana bandha*, which is an expansive co-activation of the intercostal muscles of the chest, that is

most useful with pranayama but does not give much strength to the trunk of protection to the lower back. Conversely, the *tadagi mudra* is a compressive co-activation of the intercostal muscles of the chest (a *ha-uddiyana bandha* on inhalation retention), that is also used in pranayama but is most useful (in a slightly different form) in developing strength to lift up to handstands, and in postures like *Lolasana*, and is very protective of the lumbar spine in backward bending postures. However, the pulling in of the lower front ribs (*ha-uddiyana bandha*) that you see in my *tadagi mudra* in the above photo, which is done by me using my intercostal muscles, is done by most people using only the rectus abdominis (which will also pull the lower ribs in) and not the intercostals at all. Hence many modern yoga practitioners think that *uddiyana bandha* is to do with the tensing of the rectus abdominis and/or other abdominal muscles. In *Lolasana* and most backward bending postures, I also use the rectus abdominis, but for me this is engaged as part of one type of *tha-mula bandha* that increases trunk stability, protects my lower back but allows blood flow to the limbs and still allows my diaphragm to function. However, the ability to draw the ribs inwards (*ha-uddiyana bandha*) and lower abdomen inwards (*ha-mula bandha*) without using either the oblique muscles or the rectus abdominis (while keeping the upper abdomen soft as in the *tadagi mudra* shown in the photo) is what differentiates the two extreme types of *uddiyana* and *mula bandhas*, and this is primarily what confuses many people doing *Ashtanga Vinyasa yoga*. Studies by physiotherapists on real time ultrasound show that only about one in ten people can actually engage their lower abdominals (lower transverse abdominis) without engaging the oblique muscles and inhibiting the diaphragm. Similarly only about one in ten people have any real control over their chest muscles (internal and external intercostals) without having to first inhibit their diaphragm.

3. Differing uses of *bandha* in *asana* and *pranayama*:

Re the use of *bandha* varying: it is not so much that *bandhas* are used differently in *asana* and *pranayama*, but there are always two extreme forms of each of the three main *bandhas* that can be used in either *pranayama* or asana – one extreme *bandha* is a high pressure (*ha*) *bandha* that 'pushes' blood and energy (*prana*), and the other extreme *bandha* is a low pressure (*tha*) *bandha* that 'pulls' blood' and energy (*prana*). At some point I will publish the RMIT university research we did proving this to be the case on infra-red camera. These *bandhas* are the locked and unlocked doors (locks) that we can create in the body to move energy and information through the body as well as to create stability in the 9 main joint complexes. There are of course 6 more *bandhas* – this is all explained in detail in our online course and book **"Applied Anatomy and Physiology of Yoga'**.

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Chapter 6: Exhale for Pleasure, Strength and Freedom: 7 Ways to Exhale to Improve Breathing, Energy and Health

In this article (and the associated video on our blog site https://blog.yogasynergy.com/2014/02/exhale-for-pleasure-strength-and-freedom/) I discuss the seven main ways you can exhale and how by understanding and mastering these ways of exhalation you can stimulate the pleasure centres of your brain, improve core strength, save energy, reduce stress, make your spine more mobile and flexible, and massage your internal organs to improve the function of your digestive system, immune system and reproductive system.

The body can derive benefit from making passive minimal exhalations, which are seemingly effortless and help promote a calm restful state; and complete exhalations, which benefit the body by eliminating toxins from the body in the 'stale' air. The seven (7) main ways to exhale shown in this video and some of their applications are as follows:

1. Passive Abdominal Exhale
2. Passive Chest Exhale
3. Passive Postural Exhale
4. Active Postural Exhale
5. Forced Oblique Abdominal Exhale
6. Transverse Abdominis (TA) Exhale (rolling up or down)
7. Active Chest Exhale

1. Passive Abdominal Exhale:

Passive abdominal exhalation is the most natural type of exhalation but many adults don't do it due to poor lifestyle choices and other reasons. Prolonged passive abdominal exhalation can help induce relaxation and meditation. The deep state of rest produced by sitting with quiet minimal breathing with passive abdominal exhalations triggers your brain to release neurotransmitters that have been linked to different aspects of happiness. These include dopamine, serotonin, oxytocin, and endorphins.

2. Passive Chest Exhale:

The expanded chest is like a coiled spring that holds tremendous potential energy. Once the art of expanding the chest for inhalation has been mastered then passive chest exhalations can be used to really slow the exhalation in the same way you can use a brake to slow a bicycle from going too fast down a hill.

3. Passive Postural Exhale:

The passive postural exhalation allows you to make deeper than normal exhalations without using any muscular effort and with minimal energy expenditure. For example, your body will naturally exhale more if you simply let your trunk bend forward onto your thighs.

4. Active Postural Exhale:

The active postural exhalation uses trunk postural muscles to move the body. It is natural spinal movements and the activation of these muscles that give strength and freedom to the spine, while deepening the exhalation. Yet no additional effort to actually exhale more than normal is required because the deeper exhalations happen by themselves through active movements and posture.

5. Forced Oblique Abdominal Exhale:

Using a forced oblique abdominal exhalation is a good way to constrict and massage the internal organs provided these muscles are released on the next inhalation. However, many people never fully relax these muscles, which can cause stress and internal organ dysfunction. In fact many people erroneously use these muscles to stabilse the trunk and spine. The main purpose of these muscles is to twist (rotate) the spine to the left side (using right external obliques and left internal obliques) or to the right side (using left external obliques and right internal obliques). Hence if these muscles are activated together the body can neither twist to left or right and it becomes progressively more stiff and immobile. Hence, if you want to twist to one side it is best not to use this type of exhalation and instead use one of the previous four types of exhalation or will restrict your movement. Additionally these muscles are the opposing muscles (antagonists) of the diaphragm and so when active will inhibit the diaphragm via reflex reciprocal relaxation. This tends to stimulate a 'flight or fight response' (sympathetic nervous system) and switches off the activities of the 'relaxation response' (parasympathetic nervous system), which include the digestive system, immune system and reproductive system.

6. Transverse Abdominis (TA) Exhale:

The transverse abdominis (TA) exhalations are some of most difficult exhalations to master for most people, but a probably the most useful to learn. The TA is highly regarded by physiotherapists as being a muscle you need to really be in control of if you wish to have a healthy lower back and healthy reproductive system. The two most useful TA exhalations are the 'rolling' exhalations in which upper or lower abdominal TA muscle fibres engage at different times one after the other. For this to be effective you need be able to draw the lower abdomen inwards without moving or hardening the upper abdomen and without lifting the chest. Only about 5-10% of the average adult

population can do this without training, although it is quite natural for young children and standard practice in belly dancing. If the lower abdominal TA fibres become active first they will 'squeeze' the abdominal contents inwards and upwards, and move blood and intracellular fluids upwards. If the upper abdominal TA fibres become active first they will 'squeeze' the abdominal contents inwards and downwards and move blood and intracellular fluids downwards. These rolling TA exhalations (in conjunctions with chest breathing) are very important in moving blood through the valveless veins around the spine. If blood is not moved through these veins in some way it has been suggested as early as the 1930's to be the cause of spinal tumours. This is also why cats and dogs stretch their spine one vertebra at a time to promote the same rolling effect in the spine to move blood. These rolling TA exhalations are also what are being shown in Chapter 5, Figure 5.2.

7. Active Chest Exhale:

The active chest exhale is used to quickly and/or forcefully remove the air from your lungs. Once you learn how to voluntarily engage the intercostal muscles that do this you have mastered a compressive (ha) uddiyana bandha that can be used for tremendous strength and spinal protection. It was this type of uddiyana bandha that Sri K. Pattabhi Jois was asking his Ashtanga Vinyasa yoga students to maintain through most of their practice as it most easily facilities lifting the body into handstands and other arm balances and also protects the back during stressful postures.

Conclusion:

Once you understand and master these seven main types of exhalations you can practice using combinations of them to make very long slow relaxing exhalations or fast and powerful stimulating exhalations. Practicing long slow exhalations (especially with humming or very quiet ujjayi pranayama sounds) can really help to slow the heart, calm the nervous system and has been shown to increase levels of nitric oxide. Nitric oxide is powerful neurotransmitter that enhances blood flow and promotes healing in the body. You can make really long (greater than 60 seconds) exhalations if you systematically use as little energy as possibly with the methods I describe here. To achieve this it is best to use the passive exhalation methods before using the active exhalation methods and to avoid using the stimulating exhalations such as (5) forced oblique abdominal exhale and (7) active chest exhale. Once you learn how to effectively master exhalation as part of your breathing exercises you can potentially control your energy levels, your moods, your strength, your flexibility and the health of your internal organs.

EDITED VIDEO TRANSCRIPT: (please see the vídeo in our online blog at https://blog.yogasynergy.com/2014/02/exhale-for-pleasure-strength-and-freedom/)

Please Note that in this video I amplify the sound of my exhalation using a microphone up my nostril.

"Hi Everyone, In this short video I am going to talk about exhalation, and the seven (7) main different ways you can perhaps bring an exhalation into your exercise or practice. "

Passive Exhalation:

"The first way that exhalation can take place is 'elastic'. So elastic means the lungs just recoil the air out, and that can happen from the abdomen or the chest.

So if I breathe into my abdomen and I let the air out, the air goes out by itself.

If I let the air into the chest and then the air out, it goes out by itself.

It doesn't require any muscular effort.

I will use this microphone and you will hear the difference of a breath out.

You will hear the air come out via the microphone at my nose.

I will breathe into my 'tummy' and I will let the air out [passive exhale sound].

So there was no muscular force in that.

It was the passive recoil of the chest and the passive recoil of the diaphragm and the abdomen in letting the air out.

There was no muscular effort.

This is the easiest way to let the air out.

If I fill up both 'tummy' and chest, first the chest exhales, then the 'tummy', and they are both passive."

[Full inhalation into abdomen, then chest]

[1. Passive Chest Exhale sound; 2. Passive Abdominal Exhale sound].

Passive Postural Exhalation:

"Another way you can exhale is a (3) 'Passive Postural Exhale'.

So, if I just simply bend forward, for example, it doesn't't require any more than just falling with gravity.

See! My 'tummy' is soft.

When I passively exhale only part of my air comes out.

But if I make a postural passive exhale then more air comes out.

Watch!

[Full inhalation]

[1. Passive Chest Exhale sound; 2. Passive Abdominal Exhale sound; 3. Passive Postural Exhale].

So … What you saw and heard then was when I bent forward even though my 'tummy' was soft – I wasn't using any muscles – the act of bending forward made me exhale more. "

Active Postural Exhalation:

"Another type of exhale is (4) the 'Active Postural Exhale'.

My posture will change, but it's done using muscles.

I do that, for example, when I twist.

For example, you see my hand in my soft 'tummy' but as soon as I twist to the left side you see my tummy goes firm.

You see my fingers get pushed out (of my abdomen) by the muscles as I turn (rotate my trunk).

That action of pushing the tummy into a firm state relative to its soft relaxed state will actually make the air go out.

So watch!

First I will do a passive exhale from the chest, then the abdomen – the first two types of exhale – both passive.

Then I will do a postural active exhale.

So it's not consciously using exhale muscles, it's using active postural muscles.

Watch and listen!

[Full inhalation] [1. Passive Chest Exhale sound; 2. Passive Abdominal Exhale sound; 4. Active Postural Exhale].

So as soon as I started to turn my exhalation continued but only because I turned.

Watch again and I will do it more with delineation

[Full inhalation] [1. Passive Chest Exhale sound; 2. Passive Abdominal Exhale sound; 4. Active Postural Exhale].

So you heard then, further exhalation took place by the fact that I turned.

It didn't't require any active exhalation muscles as such."

***Active Exhalation with Abdominal Oblique Muscles**:*

"Now, the exhalation muscles of the abdomen are transverse abdominis – the 'belt muscle' – and/or the external oblique or internal oblique muscles acting as a group.

I can exhale in a forced way from the abdomen like this

[Full inhalation] [5. Forced Abdominal Exhale sound].

You see the navel draws closer to my spine and you see the line of my external oblique muscle just there.

If I do the same thing while holding expansive uddiyana bandha [chest expansion] *with my breath out you will see the muscles of forced exhalation and I will push my finger in to point when they come on* [exhales, expands chest without breathing and then shows with hands the abdomen to be completely relaxed] [points to abdomen while activating (tensing) the muscles of forced abdominal exhalation to define the external oblique muscles seen here as diagonal lines from the outer ribs to just below the navel].

So what you perhaps saw then was I exhaled fully, I held my breath out, and having held my breath out I expanded my chest like breathing into the chest, but not breathing, and then I activated my muscles of forced abdominal exhalation which included the external oblique, which you saw visualised, and the internal obliques, which were not visualised.

Now, I can use the internal and external oblique muscles in a different way.

I can use my right 'external', where my hand is, and left 'internal', where my hand is, and I can actually turn my spine with those two muscles.

So that combination of external and internal obliques will make me twist.

But, if I use both internal and both external obliques together it actually tries to make me twist to both sides at the same time. It means I can't move and the abdomen goes in. That's a 'Forced Abdominal Exhale' (and this is what really makes the 'navel move closer towards the spine').”

***Active Exhalation with Transverse Abdominis Muscles**:*

“Then, another type of exhale is just using the transverse abdominis. So, the transverse abdominis exhale can use just my lower abdomen like this [puts fingers into abdomen], but see my upper abdomen is soft.

Or, just my upper abdomen, like this [puts fingers into abdomen] but my lower abdomen is soft.

So I can exhale from the lower abdomen upwards like this [sound of sequential exhale using transverse abdominis from lower to upper abdomen].

Or I can exhale from the upper abdomen downwards using just transverse abdominis muscles like this [6a. Sound of sequential exhalation using transverse abdominis from upper to lower abdomen].

And I could include my chest muscles as well.

So I can breathe in and then breathe out from the bottom up like this [Full inhalation] [6b. sound of sequential exhale using transverse abdominis from lower to upper abdomen to chest].

That's using mainly my exhalation muscles from the transverse abdominis – lower to upper – and then the chest exhalation.

Exhalation from the chest is usually passive [Full inhalation][1. Passive Chest Exhale sound] – just due to the passive recoil of the chest.

Or you can do an active exhale from the chest, which uses the muscles of forced exhalation from the chest, which you often use to cough, like this …

[Full inhalation][7. Forced Chest Exhale sound] and that makes the rib cage quite firm. Rib cage firmness is another sort of uddiyana bandha.

That's what we often use in postures like Lolasana or handstand to keep the rib cage in. Although in that case [i.e. Lolasana or handstand] the rib cage is usually held in with the rectus abdominis [the 'six pack' muscle].

Let me now demonstrate 5 main types of exhale at once. I will do a passive chest exhale, passive abdomen, a postural passive – by bending slightly forward – and then an active postural exhale by twisting with my muscles of twisting to the left, and then an active exhale using my oblique muscles and transverse abdominis.

So, watch and listen! [Full inhalation][1. Passive Chest Exhale sound; 2. Passive Abdominal Exhale sound; 3. Passive Postural Exhale sound; 4. Active Postural Exhale sound; 5. Forced Abdominal Exhale sound].

Watch and listen again and I will make it a bit louder.

Full breath in to abdomen then chest [Full inhalation][1. Passive Chest Exhale sound; 2. Passive Abdominal Exhale sound; 3. Passive Postural Exhale sound; 4. Active Postural Exhale sound; 5. Forced Abdominal Exhale sound].

Watch and listen again and I will make it a bit louder.

Full breath in to abdomen then chest [Full inhalation][1. Passive Chest Exhale sound; 2. Passive Abdominal Exhale sound; 3. Passive Postural Exhale sound; 4. Active Postural Exhale sound; 5. Forced Abdominal Exhale sound].

Five different types of exhale!

I can also exhale from abdomen then chest, or chest then abdomen in sequence using transverse abdominis

[Full inhalation] [Sound of exhale from lower abdomen, upper abdomen then chest]

… or…

[Full inhalation] [Sound of exhale from chest, upper abdomen then lower abdomen].

Just for fun! Thank you."

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Chapter 7: Guidance in Postures: Making Triangle Pose (Trikonasana) the best posture ever

In this chapter we will examine the sort of instructions that can be given in postures. Postures can be approached in many ways. In this case we will use instructions that create bandhas around each of the 9 main joint complex. On a physical level a bandha is the co-activation of opposing muscles around a joint complex. Sri BKS Iyengar states in his book 'Light on Yoga' that there are three main bandhas, Jalandhar, uddiyana and mula, the fact that he says "three main bandhas" implies that there are in fact more than three. A bandha is a type of mudra (energy controlling system). Bandhas are applied in postures for two main reasons. On one level they give a structural stability to a joint and can assist in creating strength and flexibility. On another level they can control the flow of energy and information (especially blood flow) through the body.

In this chapter we will examine the 'Triangle posture' (*Utthita Trikonasana*). This posture is often taught as simple posture but it can be confusing to beginners and even teachers. If done incorrectly it can be at best ineffective and at worse dangerous for your knees and lower back. In this article we present instructions that make your body 'Firm but calm' (*sthira sukham asanam*) and while creating strength without tension and flexibility without painful stretching.

Instructions in *yoga* postures often need to be balanced by being paired instructions that create the opposing high pressure *(ha)* and lower pressure *(tha)* forces that make *hatha* (force) *yoga* actually work to move energy and information through the body).

Four pairs of useful instructions for *Trikonasana* (with right leg forward as shown in photo):

1. Right knee (this instruction strengthens and stabilises the right knee and prevents it from hyperextending:

- **'Pull up' up right knee cap'** (activates knee extensors) **and**
- **'Press on the front of your right foot'** (activates right plantar flexors, and right knee flexors)

2. Right thigh and ankle (these instructions lengthen the right lower back around the lumbo-sacral joint, relieves lower back pain, helps create core stabilisation, 'opens' your hips by turning them out, stabilises your right knee, strengthens your ankles and lifts the outer arch of your right foot):

- **Try to turn your right thigh outwards** (activates hip external rotators)
- OR squeeze the right heel inwards (activates hip adductors) and push the right front foot outwards (activates hip abductors) **and**
- **Lift the outer arch of your right foot**(activates ankle evertors)

(NOTE: most people need to start with their right foot slightly turned inwards

in order to 'try' to turn the right thigh outwards

3. Left thigh and ankle: (these instructions lengthen the left lower back around the left sacro-iliac joint, relieves lower back pain, helps create core stabilisation, 'opens' your hips by turning them inwards, stabilises your left knee, strengthens your ankles and lifts the inner arch of your left foot):

- **Try to turn your left thigh inwards** (activates hip internal rotators)

OR push the left heel backwards (activates hip abductors) and push the left front foot inwards (activates hip adductors) **and**

- **Lift the inner arch of your left foot**(activates ankle evertors)

(NOTE: most people need to start with their right foot slightly turned inwards in order to 'try' to turn the right thigh outwards)

4. Left thigh and spine (these instructions lengthen the left lower back around the left sacro-iliac joint, relieves lower back pain, helps create core stabilisation, 'opens' your hips by turning them inwards, stabilises your left knee, strengthens your ankles and lifts the inner arch of your left foot):

- **Try to turn (rotate) your left thigh inwards** (towards the floor) **and**
- **Turn (rotate) your spine outwards** (upwards away from the floor)

(i.e. rotate the trunk away from the floor starting from the navel and ending at the neck and head. This should activate right external abdominal oblique muscles and left internal abdominal oblique muscles)

MORE INSTRUCTIONS:

Following are further more detailed instructions on how to improve your *Trikonasana,* and develop greater strength, greater flexibility and improve your circulation.

These notes are adapted from our book comprehensive textbook **'Applied Anatomy and Physiology of Yoga'** (AP). This work is also elaborated and enhanced in our two award winning fully online courses **'Essentials of Teacher Training: Yoga Fundamentals Online Course'**, and **'Anatomy and Physiology of Yoga Online Course'**.

Definitions and Introduction (APCh 1, 2,4, 7 Appendix C)

Bandha is defined as co-activation (simultaneous tensing) of antagonistic (opposing) muscle groups around a joint complex; Bandhas require multi-joint muscles and multi-joint complexes; Bandhas strengthen and stabilise joint-complexes; Bandhas help to move prana (energy) citta and (consciousness) through the nadis (subtle channels including nerves, blood vessels, lymph vessels and acupuncture meridians)

- ***Ha-bandhas*** are compressive, create heat and increase local pressure. They push energy and blood away from their region and reduce local blood flow
- ***Tha-bandhas*** are expansive, decrease temperature and local

pressure. They pull energy and blood away from their region and increase local blood flow

There are many ways to generate *bandhas* at each of the nine main joint complexes. The main ways in *Trikonasana* are listed below with simple instructions to guide you in this posture as a follows:

Below are listed some of the instructions you can give to others as a teacher or things you can do in your own practice in the posture *Utthita Trikonasana* (with right leg forward)

Kulpha* (ankle) *bandha (APpp 178-186, 395-396)

Use *ha-kulpha bandha* on both feet (This *bandha* pushes the blood away from the feet and should mainly be used when the foot is on the floor)

- Grip (flex) the toes (like trying to make a closed fist)
  Lift the arches of the feet – (once kati (hip) *bandhas* are applied then emphasize the lift of the arch of the outer right foot and the arch of the inner left foot), i.e. turn the right thigh out and lift the arch of the outer right foot, and turn the left thigh inwards and lift the inner arch of the left foot
- Bring the weight of the body to the front of your feet

Janu* (knee) *bandha (APpp 158-163, 396-397)

Use *tha-janu bandha* on both knees (This *bandha* enhances blood flow through the knee and should mainly be used with the knee extended in a weight-bearing posture)

- Pull up the knee caps (in order to activate muscles in front of the thighs or knee extensors)
- Try to bend the knee with knee caps still pulled up and/or press into the front of the foot (in order to activate muscles in the rear of the thighs or knee flexors)

Kati* (hip) *bandha (APpp 134-142, 398-399)

RIGHT LEG (flexed hip)

Use *ha-kati bandha* (This *bandha* restricts blood flow through the hip and should mainly be used with the hip flexed, i.e. in poses with the thigh moving towards the front of the body, in standing or in the air)

- Try to turn the right thigh outwards
- Start with the right foot slightly turned inwards (outer foot parallel to the long side of your mat, and your inner foot slightly turning inwards (although the exact position can differ from person to person) then:
    - press your right heel inwards and
    - press your right front foot outwards
    - (this is like trying to turn the thigh outwards, but effectively co-activates hip abductors and adductors to create a compressive hip *bandha)*

LEFT LEG (extended hip)

Use *tha-kati bandha* (This *bandha* enhances blood flow through the hip and should mainly be used with hip extended, i.e. in poses with the thigh moving towards the back of the body, in standing or in the air)

- Try to turn the thigh inwards
- Start with the LEFT foot turned 45-60 degrees outwards, then:
    - press your left heel outwards and
    - press your front foot inwards
    - (this is like trying to turn the thigh inwards, but effectively co-activates hip abductors and adductors to create an expansive hip *bandha)*

- ***Mula* (lower trunk) *bandha*** (APpp 207-209, 400-401)

Tha-mula bandha:

For most people it is generally best to only use *tha-mula bandha* in this posture. This *bandha* enhances blood flow through the lower trunk while stabilising and firming the lower trunk. It is best maintained with natural diaphragmatic breathing where it should feel like you are keeping your abdomen relaxed and comfortably able to breathe into the abdomen (using your diaphragm) but if you were to touch your abdomen it would feel firm to touch because of the way you are doing the posture and using your postural muscles.

- Lengthen the spine (especially by pushing the tail bone and sitting bones in the opposite direction from the first thoracic vertebrae and the collar bone)
- Narrow and compress the waist (using the postural abdominal muscles and not the muscles of abdominal exhalation)
- Initiate your inhale using the diaphragm (pull the diaphragm down) while not letting the abdomen puff out and this will increase intra-abdominal pressure and add to the stability of the lumbar spine
- Keep the abdomen very firm but calm with three spinal movements:
    - Bend your spine and trunk forward (spinal flexion) to un-crease the back of your body, by moving your navel and your navel spine (L4-L5) forwards and downwards (activating spinal flexors, especially rectus abdominis)
    - Rotate your spine and trunk upwards (to the left side), by rotating your navel and your navel spine (L4-L5) to the left side
    - Lengthen the front of your body (spinal extension) by moving your navel and your navel spine (L4-L5) forwards and upwards
        - AND/OR Try to push the sitting bones down and forward and while trying to pull the middle back in and up, without actually shortening the spine
        - AND/OR Stretch the mat with the feet (specifically try to stretch the mat apart from the ball of the RIGHT foot to the heel of the LEFT foot)
        - AND/OR Perform *nauli* (activate the rectus abdominis by pushing the pubis and your navel spine (L4-L5) forwards and downwards while generating *tha-uddiyana bandha* (see below) on exhalation retention)

Ha-mula bandha:

Only use *ha-mula bandha* (the compressional form of *mula bandha* which restricts blood flow through the lower trunk and is best used and learnt during forced abdominal exhalation) when both this posture *(asana)* and basic breath-control *(pranayama)* have been mastered separately and can now be applied at the same time. Note that most practitioners with less than 10 years of rigorous yoga are not ready for this stage and will over-tax both their physiology and anatomy by inappropriately applying this type of positive

pressure core stabilisation or *ha-mula bandha* prematurely trying to apply it in postures.

- Narrow and compress the waist and especially the lower abdomen (using the abdominal muscles of exhalation), but generally only hold for a few moments
- Most people can only use a combination of the external and internal abdominal oblique muscles to do a forced abdominal exhale, but this will restrict the ability to rotate the spine and prevent a diaphragmatic inhalation. Ideally the exhalation and *tha-mula bandha* should be done only with the transversus abdominis muscles, and they should be able to isolated so that the lower abdominals can be constricted separately from the upper abdominals (most people can't do this
- Activate the perineum (not the anus) by learning how to draw in the lower abdomen and not the upper abdomen using the lower transverse abdominis fibres and not the external oblique muscles
- This will cause a co-activation of the lumbar multifidus muscles and the perineum not the anus and yet still allow diaphragmatic breathing, but this is not possible for 90% of people without special training using devices such as 'Real Time Ultrasound'
- AND/OR contract the diaphragm with or without an inhalation

Uddiyana* (chest and upper back) *bandha (APpp 208, 211, 402-403)

In *Utthita Trikonasana* the chest can have a *bandha* that is intermediate between *ha-uddiyana bandha* and *tha-uddiyana bandha* (see below), or it can fully oscillate between the two opposing *bandhas* with or without using complete breathing (i.e. using diaphragm then chest muscles)

Ha-uddiyana bandha (This *bandha* restricts blood flow through the upper trunk and is good to use when the spine is being compressed or under a potentially damaging load, or when strength is required such as when lifting into a handstand, *Lolasana* or any arm strengthening activity)

- Contract the front lower rib cage and the rear lower rib cage (near the kidney region) inwards towards each
- Activate the muscles that you would use to exhale fully from the chest (*ha-uddiyana bandha* is easiest to feel on a safely performed forced chest exhalation)
- Equally round out the upper back then lift the collar bones so the front and the back of the chest are equally stretched
- *Tha-uddiyana bandha* (This *bandha* enhances blood flow through the upper trunk and is safest to use in postures such as *Utthita Trikonasana* where the spine is not compressed or under a load
- Expand the lower rib cage
- Inhale to the chest or expand the chest as if you are inhaling (this can be done at any time of the breath cycle)
- Equally round out the upper back then lift the collar bones so the front

and the back of the chest are equally expanded

Jalandhara (neck & head) bandha (APpp 209-211, 404)

Ha-jalandhara bandha (This *bandha* restricts blood flow through the neck)

- Move the head down and move the neck back
- If and when you rotate the head to the left (i.e. upwards) then move your left ear away from your left shoulder
- Note that when you turn your head upwards you should turn your whole spine from the region of the naval and the 'navel spine' (L4-L5)

***Amsa* (shoulder) *bandha* (APpp 87-92, 405-406)**

Generally to create *amsa* (shoulder) *bandha,* move or push the armpits in the direction they are facing and move the elbows in the opposite direction.

In *Trikonasana* the shoulders can have a *bandha* that is intermediate between *ha-amsa bandha* and *tha-amsa bandha* (see below)

Ha-amsa bandha (This *bandha* restricts blood flow through the shoulder and is best used when the shoulders are extended by the side of the body or abducted out to the side)

- Push your shoulders towards your hips and push your elbows away from your hips
- *Tha-amsa bandha* (This *bandha* enhances blood flow through the shoulder and is best used when the shoulders are flexed, i.e. arms above the head)
- Push the shoulders forward towards the chest and push the elbows backwards away from the chest

***Kurpara* (elbow) *bandha* (APpp 112-113, 407)**

RIGHT ARM

Tha-kurpara bandha (This *bandha* enhances blood flow through the elbow and is best used when the elbow is extended)

- Gently and simultaneously tighten (bulge) the biceps brachii and triceps brachii
- Here the arm is pulling upwards against the ankle (or the big toe or the floor), as if trying to fly up into the air
- Try to bend (flex) your elbow, activates the elbow flexors and elbow supinators (e.g. biceps brachii), and try to rotate your forearm inwards (elbow pronation), which activates the elbow pronators, and thus creates co-activation of opposing muscles groups (*bandha*) around the elbow

LEFT ARM

Tha-kurpara bandha

- Gently and simultaneously tighten (bulge) the biceps and triceps brachii
- Here the arm is pushing to try and straighten (extend) the elbow

so try to rotate the forearm outwards (elbow supination)

***Mani* (wrist) *bandha* (APpp 113-120, 408-409)**

RIGHT ARM

Ha-mani bandha (This pushes the blood away from the hand and should mainly be used when the hand is weight-bearing or grabbing something)

- Grip (flex) with your fingers and
- Pull the back of the hand towards the wrist (extend the wrist), as if trying to make a closed fist with the hand
- OR in an open handed position in case the hand is on the floor then try to 'grab the floor' with your fingers, or if your hand is resting by the side of the ankle in the air then make a tight closed fist with your hand

LEFT ARM

Tha-mani bandha (This pulls the blood towards the hands and should mainly be used when the hand is in the air and is not weight-bearing or grabbing something)

- Spread (extend) your fingers and
- Pull back (flex) your wrist slightly

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Chapter 8: How your yoga practice can make you fat and weak

Bad diet, unfocused mind, stressful practice, not using your diaphragm, holding postures too long, over-tensing muscles, not being able to properly activate muscles and abdominal over-breathing can all make your yoga practice ineffective and impede your progress for a lifetime.

After we initially published our blog about the basic tenets of the Yoga Synergy Method, which is summarised in Chapter 13,, which can make any style of yoga effective and beneficial. Some days after that we received a letter from one of our readers saying that despite her 1-2 hour yoga practice, four times a week, she is still gaining weight and is not getting stronger.

Dietary issues, when combined with ineffective yoga practice can be depleting and cause one of the two possibilities: weight gain or the inability to put on weight.

Factors affecting weight gain or loss include how much you breathe, in what manner you breathe, how stressful your practice is, how many calories your practice burns, how effective your digestive system is and how well you can activate and relax your muscles.

'Remaining light in your body allows you to have lots of fun'
Photo by courtesy of Eva Kincsei

Over-breathing makes you stressed and over-eat

The body regulates blood pH to stay within the narrow range of 7.35 to 7.45 and one of the ways it does this is by choosing foods that leave a particular pH in the blood

If you breathe more than normal in your practice (hyperventilate), it will tend to raise the pH level of your blood slightly towards alkalinity. To balance that alkalinity you are more likely to crave processed, high protein and/or acidic foods after your practice, which may result in weight increase. Conversely, if you tend to breathe less than normal in your practice (hypoventilate), you will probably not be hungry after your practice. Carbonic Acid levels in your blood increase as a result of breathing less, lowering your blood pH, making it more acidic. If the blood is slightly acidic then you will feel less like eating, be attracted to more alkaline foods such as fresh fruit, salad and vegetables, and therefore lose weight. (Please see the short video below to explain this further)

How you breathe

If you tend to breathe naturally into your abdomen using your diaphragm as opposed to breathing more into your chest, your digestive system tends to work more effectively to digest food, absorb nutrients and eliminate waste. However, if you inhibit the diaphragm by always 'holding in your abdomen', your digestive system may become dysfunctional. **Often people (especially women) tend to hold in their abdomen** using muscles of forced abdominal exhalation to try to look slimmer or perhaps to try to stabilize the spine and manage lower back pain. If the abdominal exhalation muscles are always in use (to stabilize the back or hold the tummy in) then the abdominal inhalation muscle (the diaphragm) is inhibited and by default chest breathing occurs. In this scenario the autonomic ('automatic') nervous system is disturbed and could result in either incorrect absorption of food, which may cause weight loss or incorrect metabolism of food, which may lead to weight gain.

Over-breathing should be followed by breath-retention

Sometimes people think that breathing into the abdomen will automatically mean that they do not over-breathe, however this is not the case. If you do a full abdominal breath every 2 or 3 seconds, the amount of air breathed per minute can be as much as 50 litre per minute, which will mean that you are definitely over-breathing compared to the 5 litres per minute that is considered to be normal breathing for a healthy person at rest. Rapid abdominal breaths can be the result of an unfocused mind or stress, which result in a stressful practice that depletes your immune system instead of strengthening it. Sometimes people consciously do rapid abdominal breathing as part of the kriya (yogic cleansing process) referred to as kapalabhati. This would be appropriate as an occasional practice, but for most people it is best to follow any period of breathing more than normal with a significant period of breathing less than normal. This is what is done in the traditional pranayama practice of bhastrika, which often is done as a period of some type of rapid breathing such

as kapalabhati followed by holding the in and/or out for as long as possible. If the breath is not held long enough after kapalabhati, then this usually results in excessive hunger after the practice.

An always relaxed muscles is just as bad as an always tensed one

Another reason you may not lose weight when practicing yoga is because your practice may not be intense enough and you are not using your muscles in an effective way to move your blood. Although advanced yoga practitioners can move their blood (without needing to increase heart rate) in stationary postures, most people can only really increase their circulation with moving exercises. For newer practitioners, therefore, it is better to either move through the postures smoothly and/or to hold some postures for between 10 – 30 seconds. The easiest way for the average person to do this is by having a brisk 30-minute walking meditation every day.

If you feel totally unfocused and emotionally disturbed while practicing, it is good to stop for 5-10 minutes and do a hypoventilation session in a comfortable posture. To do this, simply hold your breath in for 20-30 seconds and/or hold your breath out for 20-30 seconds to calm your mind. If you are unable to comfortably hold your breath at all, then simply return to your most natural minimal breathing.

The art of yoga

Finding the balance between having a relaxed but intense practice is the art of the yoga. You need good self-knowledge (svadhyaya) and honesty (satya) to realize the thin line between doing your best (tapas) and gently pushing your limits to challenge yourself while not over-doing your practice out of greediness. If it is hard to find a balance within one yoga practice, then do different types of yoga practices: one day a gentle and quick flow of vinyasa practice to enhance blood flow, then perhaps the next day hold the postures longer and try to do some resistance stretching in each posture to gain more strength in a slow flowing practice. You can alternate between these kinds of practice on a regular basis.

For stressed and/or unfocused people, doing a ten-minute long meditation with natural breathing every day first thing in the morning, then slowly increasing the amount of time in meditation can lead up in the long run to a calmer state of mind with which it is easier to find that delicate balance.

Too much eating

There is one other big reason that you may be not losing weight with your practice. You may be eating too much food. As an adult you simply do not have to eat so much. It is important to keep your bowels moving, and so appropriate amounts of fibre containing food are useful to eat, but once you get your bowels moving and take in a sustainable number of calories you simply don’t need to eat any more in that day. If you do eat more that the body can use immediately for energy needs (as an adult who does not need to grow or rebuild any parts) excess food will end up in one of three ways:

1. Creation of excess fat in your body

2. Act as a mechanical blocking agent in your body
3. Become fermented or putrefied by microorganisms inside you

All diets have problems: The only proven diet is the 'Eat less and you live longer' diet

All diets have been shown to be faulty. Some people believe an 'eat only grains' diet is very good, or the 'eat only high protein food including meat' diet is good, but there's scientific evidence both for and against both these views. In fact all diets have pros and cons, and the scientific evidence for almost every diet in the world is not conclusive. The only diet that does have some scientific backing is the 'eat less diet'. Technically it is called the 'calorific reduction diet'. It has been shown repeatedly in studies over more than one hundred years that if you eat less you live longer. In animal studies this is true whether using very small animals or large ones. For example, in one experiment a group of mice were allowed to eat as much as they wanted to. A basket of food was left open and they helped themselves, and then the amount of food they consumed was measured. A second group of mice were fed just a quarter of this amount, and the second group lived two or three times longer than the first. This increased longevity is probably due to reduction of free radical production, decreased production of highly damaging forms of oxygen and less stress on the cells metabolism due to 'overuse'. Overuse wears anything out, so when you put less food inside yourself (provided your body functions ok), it results in less stress on the system.

The most effective way to learn to comfortably eat less to increase health is as follows. Increase the proportion of alkalising food in your diet (such as fresh fruit and vegetables). At the same time compensate for the increased alkalinity by breathing less to increase the levels of carbon dioxide and carbonic acid in the body. In short if you breathe less while still being able to exercise and practice your yoga etc. (i.e. get physically fit – e.g. be able to exercise harder without panting and/or be able to do good pranayama – e.g. work towards being able to breathe less than one full breath per minute at rest). Then you will generally find you are just not that hungry, yet you are energised and so your desire and need to eat will be less and this is the ultimate way to lose weight.

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Chapter 9: Holding your breath for increased strength, flexibility, healthier digestion and to eat less food

Figure 9.1: Simon Borg-Olivier doing *Viparita Cakrasana* (backward flipover) with *antara kumbhaka* (inhalation retention)

Although there are many benefits to learning how to use all the muscles of breathing, and to learn to breathe in many ways, in the more advanced stages of yoga it is the art of breathing less than normal (hypoventilation) that gives the most physiological benefits. The less you breathe in and out the more you will build up carbon dioxide inside your body. Contrary to popular belief, carbonic dioxide and the carbonic acid it becomes in your blood, has many benefits inside the body.

THE EFFECTS OF INCREASING CARBON DIOXIDE IN THE BODY: Carbon dioxide and carbonic acid build up inside you from breathing less than normal (mild hypoventilation):

- Brings more blood to your brain and heart (vasodilation)
- Allows more air to enter your lungs (bronchdilitation)
- Calms your nervous system
- Reduces your need and craving for heavy, processed and acid food

SIMPLE VERSION: For a beginner the best way to do get the benefits of a build up of carbon dioxide is to try to maintain relaxed abdominal breathing as much as possible and in as many activities as you can. A great activity is to go for a brisk walk and try to keep your breath as natural and relaxed as possible. You will find this easier to do if allow your abdomen to relax more than you may normally do and allow your hips and spine to move more freely like an Olympic walker. For more advanced practitioners there are several other things

you can do with your breath that can increase carbon dioxide once your body is adequately prepared.

ADVANCED VERSION (HOLDING THE BREATH IN):

In the 5 minute video clip (on our related blog at https://blog.yogasynergy.com/2014/01/holding-your-breath-for-increased-strength-flexibility-healthier-digestion-and-to-eat-less-food/), which is an extract from the **Yoga Synergy Yogic Nutrition DVD** the benefits of holding your breath both in and out as an advanced yoga practitioner are elaborated and demonstrated.

In the first part of this video physiotherapist and research scientist Simon Borg-Olivier demonstrates how to use the Valsalva Manoeuvre to lift into a handstand and do a backward flip (without warming up). Simon explains that the Valsalva Manoeuvre is essentially the act of breathing in almost fully then holding your breath in and performing a moderately forceful attempt at exhalation (without actually exhaling) against your closed airway. Although this is a relatively commonly used technique for increasing strength via increasing intra-abdominal and intra-thoracic pressure in sports such a weightlifting, it is not recommended for most people as it can dangerously increase blood pressure and if done incorrectly can cause stroke in some people. Here Simon demonstrates how to use the Valsalva Manoeuvre and what is essentially a chest lock (a compressive *Uddiyana bandha*) and an abdominal lock (expansive *mula bandha*) (**see our previous blog**) to slowly lift his body into the air into a handstand. This method then also protects his lower back enough to drop into a full backward arch posture and then complete a backward flip to standing (*Viparita Chakrasana*). Here the Valsalva Manoeuvre helps improve both strength and flexibility while protecting the lower back as well as other joints in the body. The added benefit of course is the build up of carbon dioxide in the body. Also, because of increased partial pressure of oxygen in the body this method also can give some of the benefits of hyperbaric oxygen therapy, which has been shown to have many healing effects by 'pushing' more oxygen into the tissues of the body.

WARNING: The Valsalva Manoeuvre is potentially dangerous done in normal positions, but it is especially potentially dangerous when done in the exercise and movements shown in this video unless your body is highly trained in physical yoga and pranayama or at least similar Western exercise techniques. Many people (intentionally or unintentionally) use this method to do the 'jump-back' (lifting into *Lolasana*) to the 'push-up' posture in *Ashtanga Vinyasa yoga* but this is not that safe and it is not what Sri Pattabhi Jois intended (please see below for the correct method). DO NOT use the Valsalva Manoeuvre at all if you are prone to irregular blood pressure (high or low), headaches, nausea and/or circulatory system problem. If you do you use the Valsalva Manoeuvre you must not let any pressure come to your head during the lifting movements of handstand and the backward flip. Pressing and keeping the tip of your tongue to the roof of the mouth can help to prevent excessive pressure going to the brain and helps to replace the standard chin-lock (*ha-jalandhara bandha* in *pranayama*), which is hard to do while lifting into handstands.

SAFE ALTERNATIVE (best for *Ashtanga Vinyasa yoga*): There is a far safer, more relaxing and in many ways more effective way to increase strength using increased intra-abdominal and intra-thoracic pressure. This is done by using your diaphragm to slowly breathe into your abdomen while you are lifting up your body into the air. In this case your abdomen should be firmed by correct pressure application in your posture. To lift slowly into a handstand (or *Lolasana*) simply push the sitting bones and your navel down toward the floor instead of trying to push them upwards as many people do. This helps you to firm the abdomen using a combination of the same muscles you would use to do a sit up (rectus abdominis) and the muscles you would use for actively twisting the spine (internal and external abdominal oblique muscles). Breathing into the abdomen then increases the intra-abdominal pressure and intra-thoracic pressure making the handstand lift much easier, more stable for your back, more relaxing and without risking increased blood pressure.
This method of inhaling while you lift into the air is the one that Sri Pattabhi Jois recommends in his *Ashtanga Vinyasa yoga*, during the lift (*Lolasana* or 'jump back') to the 'push-up' position (*Chataranga dandasana*) and which we have described in detail in **another blog** and also in our **online courses**.

ADVANCED VERSION (HOLDING THE BREATH OUT): In the second part of the video Simon talks about the benefits of holding your breath out. Here he demonstrates holding his breath completely out and practicing *Nauli* (rectus abdominis isolation) and *Lauliki* (abdominal churning using rectus abdominis as well as the oblique muscles) while expanding the chest as if inhaling to the chest but not actually inhaling. This practice, which is sometimes likened to the Mueller Manoeuvre in Western medical science, builds up carbon dioxide even more rapidly than the Valsalva Manoeuvre and is less dangerous to attempt. It is really great for improving digestion by massaging the internal organs. You can read more about this technique in our **earlier blog**.

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Chapter 10: Ashtanga Vinyasa Yoga and Core Stabilisation

In the blog associated with this chapter at (https://blog.yogasynergy.com/2011/05/ashtanga-vinyasa-yoga-and-core-stabilisation/) there is a beautiful video of Derek Ireland, who was an advanced Ashtanga Vinyasa yoga practitioner and a very noble man. Derek inspired many people in this world. When I went for my first trip to Mysore in the 1980's to meet with Pattabhi Jois, Derek was the first person I saw practice in the old Shala. He had a magnificent practice that so beautifully represented the brilliant teachings of Sri K. Pattabhi Jois. Sadly Derek died not so long after this video was made. In the video you see the beauty of *Ashtanga Vinyasa yoga* as it was intended… firm but calm' ('*Sthira Sukham Asanam*'). It is the balance between the firmness of correct bandha work that allows freedom for the spine to move and the breath to travel up the spine, plus the calmness that comes through the controlled art of complete breathing while maintaining correct bandha yet without over-breathing (hyperventilation).

In the extract from our book below, we discuss the difference between different interpretation of *bandha* and explain how when *bandha* and core stabilisation is done correctly in posture (*asana*) as practiced by Derek, the movements are light but generate tremendous internal energy, while maintaining a calmness in the nervous system. Although many *yoga* styles try to mimic this it is usually only the senior practitioners of *Ashtanga Vinyasa yoga* who actually succeed in this. In its highest form *Ashtanga Vinyasa yoga* has much that can be compared with the internal martial arts of China and India.

Core stabilisation in *Yoga*

Core stabilisation is a physiotherapy term that has been used in many different ways to describe how the spine can be stabilised and protected by muscle activation. The general consensus is that the main muscles involved in core stabilisation are deep muscles such as the transverse abdominus, the lumbar multifidus and the muscles of the pelvic floor, as well as the diaphragm. Other muscles, closer to the surface, that help with core stabilisation include the more superficial abdominal and back muscles, as well as muscles around the pelvis, hips and shoulders. Recent research, using real-time ultrasound (RTU) imaging devices, has shown that a major problem in low back pain is due to over-activity of the superficial core muscles and reduced activity of the deep core muscles. For some time this problem has been made worse because it was assumed that pulling the navel to the spine is the best way to activate deep core muscles such as transverse abdominis. Informal surveys show that about two-thirds of people will pull their navel to the spine when asked to 'tighten their abdomen'. RTU has shown that pulling the navel to the spine, actually causes an over-tightening of more superficial and gross abdominal muscles such as the obliques externus, which can be seen to push the pelvic floor downwards in a negative fashion as well as inhibit the natural function of the diaphragm. In traditional hatha yoga 'drawing the navel to the spine' is a

type of compressive ha-mula bandha that is used to complete an exhalation in advanced pranayama (breath-control exercises) but it is not generally maintained throughout postures as it usually inhibits the diaphragm.
Although there is a relationship between breathing, Mula and Uddiyana bandhas, and core stabilisation, it is not as simple as one may imagine. As described in detail throughout our book and course on Applied Anatomy and Physiology of Yoga*** a **bandha is the co-activation (simultaneous tensing) of opposing muscles around a joint complex.** From this definition there are always at least two opposing ways to create a bandha, one causing an increased local pressure (which can be called a ha-bandha) and one causing a decreased local pressure (a tha-bandha) in the body.
The existence of two types of bandha with opposing effects explains why in modern yoga texts mula bandha and uddiyana bandha are described in several ways that often seem in opposition. This is an ongoing source of confusion for many yoga practitioners and teachers especially if they are familiar with the concept of core stabilisation but not up to date with the latest research on the subject. For example, Sri B.K.S. Iyengar and Sri K. Pattabhi Jois, two of the most important hatha yoga teachers of the modern era, both use *mula bandha* and *uddiyana bandha* differently depending on whether the focus is on *pranayama* (breath-control exercises) or *asana* (physical exercise). In *asana*, it is the compressive *ha-uddiyana bandha* and the expansive *tha-mula bandha* that are mainly used to stabilise the spine and to generate internal power in a relaxed way.

Figure 10.1: Simon Borg-Olivier in *Lolasana*

This is typified by the posture *Lolasana* , which is the most common posture that is used in the Ashtanga Vinyasa yoga of Sri Pattabhi Jois and is also taught by Sri BKS Iyengar. *Lolasana* obliges the average practitioner to compress the chest (*ha-uddiyana bandha*) and firm the abdomen without

drawing the navel to the spine (*tha-mula bandha*). This action stabilises the spine, while allowing the diaphragm to be used to enhance both relaxation and strength especially during inhalation. In pranayama, the compressive *ha-uddiyana bandha* and the expansive *tha-mula bandha* are still used. However, there is more emphasis on the expansive *tha-uddiyana bandha*, which draws energy and information into the chest and upper spine (and completes the inhalation) and the compressive *ha-mula bandha*, which pushes energy and information away from the abdomen and lower spine and completes the exhalation.

WHY IT IS IMPORTANT TO BEND YOUR SPINE FORWARD AND TO DO SO WITH THE FRONT OF YOUR TRUNK FIRM AND YOUR SIDES RELAXED WHIILE GENTLY BREATHING INTO THE ABDOMEN USING THE DIAPHRAGM:

Many Yoga Teacher Training courses teach that it is dangerous to bend the spine forward. However, the specification, which all physiotherapists understand as do senior yoga teachers such as Sri K Pattabhi Jois, Sri BKS Iyengar and TVK Desikachar, is that if you are bending the spine forward (spinal flexion) you should not be feeling a stretch in the hamstrings or the back of the hips (note that feeling a stretch is different to simply lengthening the knee extensor muscles and hip flexor muscles such as hamstrings without feeling a stretch). Unfortunately not all Teacher Training Instructors are experienced enough in yoga or anatomy and physiology to actually understand the reasons behind why they give instructions and so instructions are often given inappropriately and/or at the wrong time. It is perfectly fine to bend the spine forward as long as you are not feeling a stretch or taking a load without the appropriate core stabilisation.

When you bend forward, you do of course bend your hips forward (hip flexion), but if you never bend your spine forward you risk damaging your hamstrings. What's worse is that you can actually cause long-term problems in your back. Your spine naturally bends forward in every yogic forward bend but most people emphasize too much hip flexion and not enough spinal flexion. Also when many people bend their spines backwards (spinal extension) they are often bending their hips too far forward (hip flexion) as well and this puts even more tension and compression strain at the lumbosacral joint of the lower spine. In fact, simply bending the spine backwards causes much more problems in most normal people than bending the spine forward, as shown in Figure 1.3 or as you do in *Lolasana* (Figure 10.1). You can often relieve lower back pain with a really simple standing version of *Lolasana* (Figure 1.3).

Lolasana is the spinal forward bend that is exactly this movement that is the most common posture in the teachings of Sri K Pattabhi Jois. The third posture Guruji wanted us to learn (before doing *Chataranga dandasana* or *Urdhva mukha svanasana*), and the posture that is done twice as many times as any other posture in all of the *Ashtanga Vinyasa* series is *Lolasana* (Figure 10.1).

Unfortunately *Lolasana* is a pose that is done naturally by little kids and eventually learnt by dedicated and experienced practitioners but it is happily

ignored or not appreciated by most teacher training courses and as being too hard. In fact, as anyone can easily see by looking at any good photos of *Lolasana* on the internet or in books. *Lolasana* is essentially an arm-balancing version of a spinal forward bend with the front of the abdomen firmed with the Rectus abdominis (you can see in John Scott's books photos of his abdomen moving outwards in *Lolasana*). Guruji (Sri K. Pattabhi Jois) told us to inhale into *Lolasana*, but this will only be powerful if you breathe into the abdomen using the diaphragm, which reciprocally relaxes the muscles of abdominal exhalation, relaxes the spine and causes an increased intra-abdominal pressure that helps you lift up. If forward bending of the spine is not a good idea then every sit up done in every gym and even the yoga posture *Ardha navasana* as well as every leg behind the head pose has to be considered wrong because they all bend their spines forward. They are by no means wrong of course. Spinal forward-bends are not only safe as you long as you are not stretching the back of the legs, they are actually beneficial and necessary for good yoga. Often people think that *Lolasana* is too hard so they either don't teach or practice it. However, the principle of bending the spine forward using the spinal flexor muscles, while breathing diaphragmatically is the essence of all vinyasa yoga.

Doing what I am suggesting also helps with handstand. If you emphasize bending the spine forward (by pushing your tail bone and navel downwards) before lifting to a handstand (which could be done from the *Lolasana* shown in Figure 10.1), and especially if you breathe into your abdomen without letting the abdomen or the chest expand then that very relaxing abdominal breath itself can actually lift you up to handstand. I think of this as the internal relaxation power that Guruji was teaching. It is of course also possible to lean on your hands and lift to a handstand either with brute strength or with extreme hip flexibility by lifting your tailbone up high and trying to bend the spine less forward (i.e. extend the spine more), and also by pulling in your abdomen and breathing deeply into the chest but it is much harder for most people and more stressful too.

It is for this reason Guruji asked us to gaze at the navel in *Adho mukha svanasana* (if you pull the navel inwards or bend the spine backwards as many people do in downward dog you cannot see the navel and it is very hard generate internal power without creating stress). Many practitioners today do a stressful practice and then relax at the end. What I learnt from Sri Pattabhi Jois, Iyengar and Desikachar was '*Sthira sukham asanam'* (i.e. to be firm but calm) and to do stressful exercise in a powerful but relaxing way.

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Chapter 11: Using your diaphragm to simultaneously enhance power, core stabilisation, relaxation, digestion, immunity and sexual function

The diaphragm is a major muscle that is the key to internal power, as well as an often forgotten, but very important contributor to core stabilisation. In addition, the diaphragm has important neurological control over the autonomic nervous system (ANS), which is sometimes called the automatic nervous system because we usually think that we have no conscious control over it. Diaphragmatic breathing allows us to have some conscious control over the ANS and is the simplest way to stimulate activity of the parasympathetic nervous system (PNS). The PNS tends to have a calming effect on the body-mind and leaves you feeling peaceful, and content. It usually has an opposite effect to the sympathetic nervous system (SNS), often called the 'flight or fight response', which in its primitive form has fear and anger as its dominant emotions. The PNS also enhances the functioning of the digestive, reproductive and immune systems.

Core stabilisation is a nebulous term referring to the activation of various muscles in and around the trunk that can stabilise and strengthen the spine under load. The often-used instruction 'tighten your abdomen' is not a clear instruction. It can be, and is, interpreted in many ways by different people. In other words people tighten their abdomens using many different combinations of muscles, and each of these ways can have very different effects. Core stabilisation is also described to be a type of co-activation (or simultaneous tensing) of muscles around the trunk. This can be done by simultaneously tensing the circumferential muscles of the trunk (such as the transverse and oblique abdominal muscles), which usually causes the trunk to narrow, the navel to move towards the spine, and breathing to become less abdominal (diaphragmatic breathing) and more thoracic (chest breathing). Alternatively, core stabilisation can be achieved by co-activating (or simultaneously tensing) muscles at the front and back of the trunk (such as the main spinal flexor rectus abdominis and the spinal extensors or back muscles). This flexor-extensor co-activation usually causes the trunk to firm without the navel moving towards the spine, while still allowing abdominal (diaphragmatic) breathing in preference to chest (thoracic) breathing.

When the abdomen is relaxed the diaphragm descends on inhalation and causes an increase in the intra-abdominal pressure that makes the abdomen expand outward like a balloon being blown up. If the abdomen is held firm by pulling the navel to the spine using a combination of transverse and oblique abdominal muscles then the diaphragm is usually inhibited and cannot move and so breathing becomes more thoracic. If the abdomen is held firm using other muscular combinations such as those including the rectus abdominis then the diaphragm and the PNS are not inhibited and a diaphragmatic inhalation causes an increase in intra-abdominal pressure that can increase trunk strength and stability as well as power to the arms and legs. In addition, because the waist is not constricted with this type of core stabilisation,

circulation can be seen to significantly increase, while heart and breathing rates do not significantly increase.

Core stabilisation, if practiced as many people do it, by tightening the abdomen by pulling the navel closer to the spine, creates tension that can restrict the diaphragm, reduce trunk strength and stability, reduce power to the limbs, stimulate the SNS and inhibit the PNS. Inhibition of PNS due to decreased diaphragmatic breathing leads to deficiencies in the digestive, reproductive and immune systems. If the SNS is predominant and 'flight or fight' is the main aim, then the body-mind sees no need to waste energy on digesting food, fighting a flu or reproducing so it simply turns these systems off and diverts this energy elsewhere. If the digestive system is depleted then food is often poorly absorbed or eliminated, and fermentation, bloating, autotoxemia and overeating tend to occur. If the immune system is inhibited then the ability to deal with simple pathogens and/or heal from simple injuries is impaired. Inhibition of the reproductive system can lead to menstrual irregularity, prostate problems, sexual dysfunction and infertility. Problems in these three body systems are very common in the world today and are often present in people of all ages who appear fit and healthy from doing regular exercise.

It is possible to use intelligent posture and movement to create abdominal firmness that allows the diaphragm to be used for the generation of increased power and superior core stabilisation, while allowing activity of the parasympathetic nervous system to enhance relaxation, digestion, immunity and sexual function. Postures and movements that allow the body to be firm but calm can be learned by observing the natural movement of the trunk and limbs that occur during brisk relaxed walking with diaphragmatic breathing. These natural movements are often lost in activities such as jogging. Learning how to use the diaphragm to breathe into an abdomen that has been firmed by natural movements or postures improves, power, strength, flexibility, internal organ function as well as circulation, while keeping the nervous system calm and breathing and heart rates relatively low.

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Chapter 12: Core Stabilisation: Is it Correct to 'Pull the Navel towards the Spine'? Answer: Yes and No!

Many people in the world of yoga, Pilates and fitness tell their clients and students to do something like 'pull the navel to the spine'. If you google this expression you find articles that give a flurry of controversy on whether or not it is a good idea to 'pull the navel to the spine'.

In the video associated with this article (located at https://blog.yogasynergy.com/2013/06/is-it-correct-to-pull-the-navel-towards-the-spine-answer-yes-and-no/), exercise-based physiotherapist and yoga teacher Simon-Borg Olivier, discusses core stability and different ways to interpret the instruction "pull the navel to the spine". This can be a confusing instruction and is often misunderstood, depending on the experience and the body of the practitioner.

However, just what exactly does it mean to 'pull the navel to the spine'. It turns out that when people are given this instruction they actually appear to move the navel towards the spine in 3 main ways. Neither of these ways can be said to be wrong or right as such, but they do have different effects.

Figure 12.1: Simon Borg-Olivier in *Yoga danda urdhva san calasana*. In this posture it is the postural muscles that support the spine and help to achieve the posture.

The three ways for your trunk muscles to 'pull the navel to the spine' can be labelled as follows:

*** 1. 'FORCED EXHALATION MUSCLES' METHOD:

This method uses the muscles of forced abdominal exhalation. This is a great way to empty the lungs and massage the internal organs, but tends to immobilise the spine, and usually causes inhibition of the diaphragm and

resultant increases in stress level. It also does not actually protect or strengthen the spine much and it does cause an increase in heartbeat because it actually inhibits blood flow through the trunk.

*** 2. 'POSTURAL MUSCLES' METHOD:

This method uses postural muscles of the trunk that enable spinal movements such as flexion and extension, lateral flexion and rotation. This is a great way to strengthen the trunk, still allow you move freely and breathe naturally with your diaphragm but does not give the most complete exhalation and does not massage the internal organs that much.

*** 3. 'COMBINED TRUNK MUSCLES' METHOD:

This method uses a combination of the 'forced exhalation and the postural methods. It uses both the muscles of forced abdominal exhalation as well as postural muscles of the trunk to move the navel closer to the spine. This method has some of the pros and cons of both of the previous methods.

Surveys have revealed generally about one third of people use each of these three methods to successfully interpret the instruction 'pull the navel to the spine'. In each case if one starts with a relaxed abdomen (as soft as a relaxed baby's belly) each method will show that navel moving closer to the spine than it was relative to its resting state, but on closer examination the muscles used and the results are very different.

*** 1. 'FORCED EXHALATION MUSCLES' METHOD:

If you place your fingers deep into the relaxed abdomen then use the 'forced exhalation muscles' method of pulling the navel to the spine the abdomen does actually harden and move away from the fingers closer to the spine.

*** 2. 'POSTURAL MUSCLES' METHOD:

However, if you place your fingers deep into a relaxed abdomen and uses the 'postural' method of pulling the navel to the spine the abdomen hardens but actually pushes into the fingers and actually appears to move away from the spine.

It is important to state that none of these methods is wrong or right as such, it is just that they have different effects and can be used for different purposes. The 'forced exhalation muscles' method is great if you want to exhale fully or massage the internal organs, but the 'postural muscles' method engages your trunk muscles in a way that gives you much more physical power and also the ability to remain calm, while allowing natural diaphragmatic breathing.

*** 1. 'FORCED EXHALATION MUSCLES' METHOD:

In the 'forced exhalation' method the muscles used to exhale fully and draw the navel towards the spine relative to the position of navel in a relaxed belly may include the transverse abdominis, external oblique abdominis, and internal oblique abdominis.

*** 2. 'POSTURAL MUSCLES' METHOD:

In the 'postural' method the muscles used to exhale fully and draw the navel towards the spine relative to the position of navel in a relaxed belly may include external oblique abdominis, internal oblique abdominis and rectus abdominis. When the spine moves into a posture with its own volition (as opposed to moving due to an external force such a gravity), the trunk muscles can firm in the following manner:

* When flexing or extending the spine the rectus abdomens can be active.

* When rotating (twisting) the spine to the left, the left internal oblique and the right external oblique become active, while when rotating (twisting) the spine to the right, the right internal oblique and the left external oblique become active.

The apparent paradox is that in both these sets of movements an initially relaxed abdomen as well as the navel will appear to draw inward toward the spine as a twisting or bending movement take place but if you use your fingers to palpate deep into the abdomen during such a movement then the abdominal muscles appear to push the abdomen and the navel outwards away from the spine.

In Ashtanga Vinyasa Yoga (and all physical yoga) and any sort of physical postures or exercises both of these methods can and are used, but for most people the best effect if the 'postural muscles' method is used as the primary way of creating firmness in the trunk and the 'forced exhalation muscles' method is used purely for exhaling fully (and massaging the internal organs) and not for trying to firm the trunk.

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Chapter 13: How to Practice Any Yoga Style and What Makes a Good Teacher

by Simon Borg-Olivier MScBAppSc(Physiotherapy)

I am constantly being asked during workshops and after classes what my opinion is about different yoga styles. I do not want to speak against any style of yoga because, with the right principles, all yoga can be performed in a safe and effective way that will help you both physiologically and anatomically. A yoga practiced with the following fundamental principles of the **Yoga Synergy System** will enhance blood flow in the body and will help develop strength and flexibility without feeling over-tense or over-stretched.

Figure 13.1: Simon Borg-Olivier in *Eka hasta mayurasana* (photo courtesy Eva Kincsei)

1. Begin each exercise with active movements:

Active movements, when done slowly (at least at first), are the most important feature of a yoga practice that makes your practice closer to traditional yoga. By initiating all your practice (both in exercise and yoga) with active movements you elicit the reciprocal relaxation spinal reflex that allows you to develop strength without becoming tense, develop flexibility without feeling like you're stretching, increase blood flow without needing to make your heart beat faster and staying relaxed and stress free while still doing something.

2. Before learning any complex breathing learn to breathe naturally into your abdomen:

Abdominal breathing stimulates the parasympathetic nervous system (the 'relaxation response'), which is responsible for the unconscious regulation of organs and glands of the digestive system, the immune system and the reproductive system. Breathing into the chest, however, tends to activate the

sympathetic nervous system (the 'flight-or-fight response'), which tends to increase stress levels while decreasing immunity, digestion and the functional activity of the reproductive system.

3. Focus on spinal movements:

As a result of modern sedentary life our spines tend to be very stiff. The less the spine is able to move, the less blood and energy can flow through the body as the spine is the main energy channel in the body. Thus, it is of utmost importance to move your spine in all its pure planes of movement (spinal traction and compression, flexion and extension, left and right axial rotation and left and right lateral flexion) and keep it as agile and flexible with regular exercise as possible.

4. Graded use of breath:

It is always good to begin each version of an exercise or posture with simple natural breathing. Then, once that version of the exercise or posture has been mastered (in a relaxed stress-free manner), progress from simple natural breathing to enhanced abdominal breathing, enhanced chest breathing, complete breathing, breath retention and finally breathing into different parts of the body including the limbs. For the modern western body – in which energy is blocked and is usually over-tensed and over-stretched – the most important task is to learn natural abdominal breathing. Natural abdominal breathing – moving the diaphragm actively down on inhalation and passively up on exhalation – will send out a message to all the internal organs that they are safe and protected. Thus, natural abdominal breathing will sooth the nerves and calm the mind. The progressive development of breathing can also help to massage the internal organs, give relief from prolapsed organs, traction the spine, improve circulation, relax muscular tension (especially with the trunk) and boost the immune system. In addition, if your breathing progresses to the point that you can actually breathe less than normal (mild hypoventilation) you can trigger a slight increase in the acidity levels of the blood that can calm the nervous system, bring relief from asthma, reduce appetite and significantly increase energy levels.

5. Gradation of postures.

Always remember that you have a choice when it comes to performing a moving exercise (*vinyasa*) or static posture (*asana*) ranging from simple (easy) versions to complex (difficult) versions of each posture or sequence. Therefore, every person should find the level of difficulty that his or her body is comfortable with. To a make a posture easier simply apply the rules …'stretch less', 'tense less', 'breathe less', 'think less' and 'move slower'.

Fundamental principles of the Yoga Synergy System and how to respond to a teacher:

These 5 points listed above are some of the fundamental principles of the **Yoga Synergy System** that are accessible to everyone. These principles and the Yoga Synergy method can be applied to any physical practice. If you follow these principles with any style of yoga you can be fine. If a teacher does not let you apply these formulas during your yoga class, then it may be better not

to carry on with those classes. Be careful not to be pushed into doing anything that does not feel good or that you do not wish to do. Good teachers try to encourage but not impose. They should know that, but if they have forgotten, maybe you can remind them that you are trying to be 'firm and steady, but also calm, relaxed and peaceful' ('*sthira sukham asanam*'). Remind them that you are trying to exercise in a stress-free way for your body and mind. Tell your teacher what you and your body and mind needs and also what it wants. Generally you know your body-mind better than most teachers or therapists do. If a teacher will not listen to you in these matters then I think maybe you should think twice about attending their class.

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Chapter 14: Principles of Yoga Therapy: Practical Therapeutic Applications of Yoga

How does the practical application of some physiology and anatomy theory can make a difference in your yoga practice? Below we have presented some 'quickies' on how to make not just your yoga practice but your daily exercises more intelligent, more effective and safer. Then we have some of the basic principles of Yoga Therapy that have been adapted from our book **'Applied Anatomy and Physiology of Yoga'** . If you'd like to know more about how to use your yoga practice as a healing therapy for yourself, join the **Yoga Anatomy and Physiology Online Course** or the **Essential Teacher Training Online Course** .

Figure 14.1: Simon Borg-Olivier in *Mayurasana* (photo courtesy Eva Kincsei)

1; Basic practice of hatha *yoga asanas* (static postures) use isometric activations when the body is kept still in postures and no movement about a particular joint is occurring. Basic practise of *hatha yoga vinyasa* (dynamic exercises) uses isotonic activations when the body is moving from one posture to the next and there is movement about a particular joint.

Figure 14.2: Simon Borg-Olivier in *Utthita vatayanasana* (photo courtesy Eva Kincsei)

2; One-legged poses, such as the one shown in the photo above, are very effective in strengthening the standing leg and hip. They usually oblige the hip abductors of the weight-bearing leg to generate powerful forces through the hip joint complex.

3; In postures such as the Triangle posture (see photo below) beginners should keep the neck in line with the spine in order to minimise the risk of vertebral artery occlusion. To reduce the risk of vertebral artery occlusion in sideways bending postures such as 'Triangle Posture' (*Trikonasana*) and 'Extended side angle posture' (*Parsvakonasana*) for beginners, these postures can be simplified to have the head facing the floor. If a beginner attempts to rotate the head upwards in order to complete what they believe to be the final posture, there is a high probability they will collapse into their neck which will fall with gravity into side flexion and extension which leaves them at risk of vertebral artery occlusion. In the photo below the alignment of the neck has been enhanced slightly by moving the right ear away from the right shoulder to increase the length on. This is not the same as simply letting the neck fall, which is what can cause problems such as vertebral artery occlusion or neck pain.

Figure 14.3: Simon Borg-Olivier in *Trikonasana* (photo courtesy Eva Kincsei)

4; Use your diaphragm to breathe into the abdomen to help you relax and balance your nervous system and to help your reproductive health. The diaphragm (and breathing in general) is often thought of as the bridge between body and mind because it can be controlled by the conscious mind (which relates to the somatic nervous system) and the unconscious mind (which relates more to the autonomic nervous system). Breathing diaphragmatically (abdominal breathing) can reestablish the natural balance between your parasympathetic nervous system (the 'relaxation response') and your sympathetic nervous system (the 'flight or fight response'). Natural breathing or controlled diaphragmatic breathing can calm nerves, balance emotions, and enhance the functioning of the body systems that are under autonomic (automatic) control such as those to do with digestion, reproductive health, immunity and healing.

It is good to note that in the 'arm-balancing' posture, *Mayurasana*, that is shown in Figure 13.1, my abdomen is completely relaxed and I am breathing diaphragmatically. This not only gives me strength and relaxation here but also allows a tremendous massage of the internal organs.

BASIC PRINCIPLES OF YOGA THERAPY:

Here are some general principles that may be applied when there are physical problems. This is an overview of what not to do in certain situations and what may help the healing process in other situations.

In dealing with any injury or illness, the most important thing is to not make things worse. If there is any uncertainty as to the nature of the problem, it is safest to rest the injured part, and if necessary, rest the entire body, and then refer the person to a health professional. Never assume that, as the teacher of a yoga class, you have to know how to cure someone.

First, it is important to learn the general principles of injury and healing. When there is some understanding of what is happening in a particular person's body, it becomes relatively safe to work with the holistic principle of improving the health of the body as a whole without really interfering with an injured part. As the overall health improves then the injured part often improves also. Therefore, improving a body's overall level of strength, Flexibility, musculoskeletal control and cardiovascular Fitness is the first step in the process of more specific yoga therapy.

Generally, when dealing with someone who has a musculoskeletal injury or problem one needs consider the following factors:

- Is the injury acute or chronic?
- Is the injury irritable or non-irritable?

Irritable conditions are easily stirred up and must be treated very carefully or else they can become very sore after exercise or after a treatment.

Non-irritable conditions, on the other hand can be treated or exercised quite firmly. While they may have a sense of discomfort while exercising or while being treated, the discomfort settles down quickly after the treatment.

Treating Acute Injuries with Hatha Yoga:

An acute problem usually shows the cardinal signs of inflammation, and is often quite recent.

The 5 cardinal signs of inflammation usually seen in acute conditions are:

- Redness
- Pain
- Heat
- Swelling and sometimes
- Loss of function

Acute conditions are usually treated in medical circles with the R.I.C.E. principle (Rest, Ice, Compression and Elevation).

If a musculoskeletal problem is acute in nature, it is usually best to rest the injured part, or if necessary, rest the entire body.

Hatha yoga can still be practised in this situation if the problem area can be suitably bypassed and allowed to rest. Postures need to be suitably modified and a greater emphasis made towards a gentle more relaxed practice that does not generate too much excess heat.

MEDICAL TREATMENT OF ACUTE INJURIES (R.I.C.E.)	TREATMENT OF ACUTE INJURIES WITH *HATHA YOGA* [Section 1.8.1]
Rest	Rest injured part & keep working with the rest of the body (Or rest the whole body if necessary)
Ice	Do not generate excess heat with practice (Do a gentle *hatha yoga asana* & *vinyasa* practice)
Compression	Gentle isometric co-activations (*bandhas*) around a joint (Activate joint *bandhas* if possible and if appropriate)
Elevation	Inverted or semi inverted postures (*Viparita Karani*)

Table 14.1: Treatment of acute injures with hatha yoga

Treating Chronic Injuries with Hatha Yoga [Table 14.2]

Chronic injuries are usually long-standing injuries where the inflammation has subsided.

• Chronic musculoskeletal injuries or conditions may be cautiously approached with the following general methodology, when there are no signs of inflammation.

• When there are no contraindications, one can use hatha yoga postures and exercises, breathing exercises, and relaxation to give general and specific improvements in circulation, strength, flexibility, and musculoskeletal alignment.

To improve circulation use:

• Breathing techniques (*Pranayama*) to utilise the respiratory pump of circulation.

• Dynamic exercises (*Vinyasa*), activating and relaxing muscles during movement to utilise the musculoskeletal pump of circulation and varying the speed of movements to utilise the centripetal pump of circulation.

• Inverted and semi-inverted postures (*Viparita karani*) to utilise the Gravitational pump of circulation

• Static postures (*Asanas*), creating regions of relative high pressure (compression and/or isometric muscle activation) and relative low pressure (stretching and/or muscle relaxation) to utilise the postural pump of circulation.

• Co-activation of opposing muscles around joints (*Bandhas*) to utilise the muscle co-activation pump of circulation.

To improve strength develop:

• Muscle control: develop the ability to fully relax or turn off a muscle and then smoothly activate or turn on a muscle to its maximum level of muscle activation in any of its states.

• Muscle balance: develop muscle symmetry and learn how to co-activate muscles for increased joint stability

• Symmetry: restore and/or develop balance between:

- Left side and right side of the body

- Agonist and antagonist muscle groups

- Anterior and posterior, medial and lateral, and superior and inferior musculature.

- Muscle co-activation: develop the ability to co-activate (simultaneously tense) agonist and antagonist muscle groups for increased joint stability (*bandhas*).

• Muscle specificity: To develop functional task specificity:

- Use isometric, isotonic and isokinetic exercises

- Use varied velocities of joint movement

- Move joints through their full range of motion (ROM)

- Use weight-bearing (WB) exercises and non-weight-bearing (NWB) exercises

- Use open-chain (OC) exercises and closed-chain (CC) exercises

To improve flexibility Develop:

• Joint mobility: i.e. develop ease of joint movement not just the ability to stretch further.

• Symmetry of flexibility: both inter-joint, i.e. between right and left sides of the body; and intra-joint (i.e. superior and inferior, medial and lateral, and anterior and posterior).

To improve musculoskeletal alignment:

Work towards restoring and or developing normal:

• Joint structure

• Joint space

• Joint symmetry: both inter-joint, i.e. between right and left sides of the body; and intra-joint (i.e. superior and inferior, medial and lateral, and anterior and posterior).

For Chronic Injuries	Method	
Improve Circulation	By using	
	1. *Pranayama*	= Breathing exercises [Section 1.0.4] **Respiratory pump**
	2. *Vinyasa*	= Dynamic exercises **Musculoskeletal pump & Centripetal pump** [Section 1.0.4]
	3. *Viparita karani*	= Inverted postures **Gravitational pump** [Section 1.0.4]
	4. *Asanas*	= Static postures **Postural pump** [Section 1.0.4]
	5. *Bandhas*	= co-activation of antagonistic (opposing) muscle groups around a joint complex **Muscle co-activation pump** [Section 1.0.4]
Improve Strength	By focusing on	
	1. Control	to be able to voluntarily activate or relax any muscle to a desired amount
	2. Balance	symmetry & co-activation
	3. Specificity	functional task specificity
Improve Flexibility	By focusing on	
	1. Mobility	of joints, muscles, nerves etc.
	2. Symmetry	equal flexibility on both sides of the body
Improve Alignment	By focusing on	
	1. Structure	of each joint
	2. Space	within each joint
	3. Symmetry	between both sides of a joint & both sides of the body

Table 15.2: Treatment of chronic injures with hatha yoga

Appendix: Further Training: Live and Online Courses From Therapy, Beginners to Advanced and Teacher Training:

If you have enjoyed the information we have presented here or found it useful then you may be interested in other training that we offer. Our main website is www.yogasynergy.com . Although we have our main schools in Sydney Australia, we regularly teach workshops courses and teacher training all over the world. In Upcoming events you will see what is coming and we usually run 2 intensives each year in Sydney based on Anatomy & Physiology and Yoga Therapy.
If you are interested in hosting us to do a workshop for you please contact us at yoga@yogasynergy.com or via our website.
From our website you can also buy DVDs available in hard copy or as digital downloads and we also have Online courses with streaming video and lots of practical in-depth information. We also run 200 YogaSynergy Teacher Training Courses annually in India, Australia and elsewhere.

'Essentials of Teacher Training: Yoga Fundamentals': Yoga Synergy 120 hour Online Course

This course is the culmination of 30 years of teaching experience and 45 years of yoga practice. The course is useful on many levels. It gives 28 versions of an accessible but challenging yoga sequence that is designed for the modern body. Almost everyone can do the simplest form of this sequence, yet the full version is quite demanding on all levels. On a deeper level the course gives a lot of information that will really assist you to develop your own practice and be your own teacher, as well as help you to teach others.
This course is based on the very popular and award winning course of the same name that we wrote some time ago for RMIT University's Master of Wellness Degree. The Yoga Synergy version of this course has been developed, adapted and modified for use by the general public.

For full course details and to enrol please visit http://fundamentals.yogasynergy.com/

ABOUT THE COURSE:

Our new online course *Yoga Fundamentals* is a must do for anyone who is a serious practitioner or teacher of yoga or any of the similar related exercise forms. The course is explained simply and practically by the teachers (Simon Borg-Olivier and Bianca Machliss) who have decades of experience teaching yoga, practicing as physiotherapists and lecturing at Universities. Each of the 12 Topics is subdivided into several sections that each have learning objectives that once achieved can be practically applied to your yoga, exercise or therapy. Below are listed the main teaching topics and some of the learning objectives.

This online course provides an overview of yoga as it was originally taught in the pre-industrial East and how yoga can be adapted to a Western context.

Topic areas include:

- A very practical introduction to the history and philosophy of yoga that really helps you practice yoga in the modern world
- Basic functional anatomy and physiology from both Eastern and Western medical perspectives
- The essence of the main types of yoga (traditional and modern styles)
- Theory and practice of traditional yoga techniques
- A simple hour long yoga sequence practice that is taught and demonstrated in more than 30 different ways by two senior yoga teachers who are also experienced physiotherapists
- The principles, theory and practice of being your own yoga teacher that are the prelude to learning to teach other people

TOPIC TITLES & LEARNING OBJECTIVES (WHAT YOU WILL LEARN)

- **Topic 1: The History and Philosophy of Yoga**
    - **Session 1.1: The Purpose of Yoga**
        - Definition of *yoga*
        - The purpose or goal of *yoga*
        - *Hatha yoga*, Buddhist *yoga* and Taoist *yoga*
        - The purpose of physical *yoga* on a physiological level
        - Understanding the Indian *hatha yoga*/*ayurveda* term *prâna*, and the Taoist *yoga*/Chinese medicine term *chi*
        - Different types of *prâna* or *chi* (energy) on a physical level
        - The *yoga*/ayurveda term *citta*
        - Different types of *citta* (information/consciousness) on a physical level
    - **Session 1.2: The History of Yoga**
        - Why the modern (chair-based sedentary) body has to modify the yoga practiced by the traditional (floor-based active) body
        - Main historical events of the:
            - Vedic *yoga* period
            - Pre-classical *yoga* period
            - Classical *yoga* period
            - Post-classical *yoga* period
- Modern *yoga* period
    - **Session 1.3: The Philosophy of Yoga**
        - How to approach your yoga practice for the best results
        - Eight fundamental truths in all traditions of *yoga*
        - Eight stages of *astanga yoga*
        - Five main *yamas* (ethical principles of what you shouldn't do)
        - Five main *niyamas* (ethical principles of what you should do)
        - Principles of dualism and non-dualism in yogic philosophy
        - Main principles of *tantric yoga*
        - Seven *main* stages of *hatha yoga*

- **Topic 2: Basic Applied Anatomy and Physiology of Yoga**
    - **Session 2.1: Bones, Joints and Muscles**
        - Main components of the musculoskeletal system
        - Nine main joint complexes of the body
        - Main joint movements at each of the 9 main joint complexes
        - Muscle groups and the principle of opposing (antagonistic) muscle group pairs
        - Muscle activation states: isometric, isotonic, concentric, eccentric and isokinetic

        - 'Associated joint movements'
        - Main associated joint movements to know when practicing physical *yoga* or exercise
    - **Session 2.2: Regulation and Control of the Body**
        - The nervous system and its main components
        - Nerve tensioning (neural mobilisation)
        - How the *yoga* term *mudrâ* relates to nerve tensioning
        - Using the stretch (myotatic) reflex to facilitate muscle training and control
        - Using the reciprocal reflex to facilitate muscle training and control in active stretching
        - Using the relaxation (inverse myotatic) reflex to facilitate muscle training and control
        - Co-activation (simultaneous tensing) of antagonistic (opposing) muscle group pairs is equivalent to the *yoga* term *bandha*
        - Four main states that a pair of antagonistic (opposing) muscle groups may be in, around a joint complex
        - Nine main *bandhas* in anatomical (musculoskeletal) terms
        - Two main functions of *bandhas*
        - Two opposing forms of *bandha*, the *ha-bandha* (a compressive co-activation) and the *tha-bandha* (an expansive co-activation)
    - **Session 2.3: Circulation and Breathing**
        - Physical mechanism that *hatha yoga* uses to move *prâna* (energy) and *citta* (information/consciousness) through the *nadis* (channels) of the body
        - Moving energy and information through the body with seven circulatory pumps
        - Effects of hypertension (high blood pressure)
        - Effects of hypotension (low blood pressure)
    - **Session 2.4: What You Need to Know in Order to Safely and Effectively Execute a Physical Yoga Exercise**
        - Safe and effective execution of a physical *yoga* exercise (*vinyâsa*)
        - Elements (essential components) of the final (complex) version of a static posture (*âsana*)
        - Safely moving from simple (easier) through to complex (harder) versions of a posture (*âsana*)
        - Order of movement (*vinyâsa*) required to safely move in and out of a posture (*âsana*)
        - Devising alternative variations for performing a posture (*âsana*)

- **Topic 3: Physical Yoga Practice: Introductory and Finishing Sequences**
    - **Session 3.1: The 'Nerve-lengthening Sequence'**
        - Safe and effective execution of the 'Nerve lengthening sequence' (Hasta nadi meru danda vinyâsa), which includes:
            - 'Mountain posture' (*Tadâsana*)
            - Large intestine gesture' (*Atanu puritat mudrâ*)
            - 'Lung gesture' (*Kloman mudrâ*)
            - 'Pericardium gesture' (*Bukha puritat mudrâ*)
            - 'Heart gesture' (*Buddhizuddhi mudrâ*)
            - 'Upward facing arms-up posture' (*Urdhva hastâsana*)
            - 'Heels raised arms-up posture' (*Padanghustha Urdhva Hastâsana*)
            - 'Heels raised squat posture' (*Padanghustha Utkatâsana*)
            - 'Upward-facing squat posture' (*Utkatâsana*)
    - **Session 3.2: The 'Spinal Movements Sequence'**
        - Safe and effective execution of the 'Pure spinal movement sequence' (*Meru danda tada vinyâsa*), which includes:
            - 'Complete spinal lengthening posture' (*Urdhva hasta meru danda tadâsana*)
            - 'Back-spinal lengthening posture' (*Pascima meru danda tadâsana*)
            - 'Front-spinal lengthening posture' (*Purva meru danda tadâsana*)
            - 'Side-spinal lengthening posture (*Parsva meru danda tadâsana*)
            - 'Twisted-spinal lengthening posture (*Parivrtta meru danda tadâsana*)
    - **Session 3.3: The 'Salute-to-the-sun Sequence'**
        - Safe and effective execution of the 'Salute-to-the sun sequence' (*Surya namaskara vinyâsa*), which includes:
        - 'Standing hands-to-floor posture' (*Hasta Uttanâsana*)
        - 'Pendulum posture' (*Lolâsana*)
        - 'Push-up posture' (*Cataranga dandâsana*)
        - 'Upward-facing dog posture' (*Urdhva mukha svanâsana*)
        - 'Plank posture' (*San tolanâsana*)
        - 'Downward-facing dog posture' (*Adho mukha svanâsana*)
        - 'Upward-facing hands-to-floor posture' (*Urdhva mukha uttanâsana*)

2. **'Salute to the sun sequence' (*Surya Namaskar*)**

- **Session 3.4: The 'Salute-to-the-moon Sequence'**
  - Safe and effective execution of the 'Salute-to-the moon sequence' (*Candra namaskara vinyâsa*), which includes:
    - 'Standing fingers-next-to-heels posture' (*Agguli Parsni Uttanâsana*)
    - 'Upward-facing floor lunge posture' (*Urdhva mukha san calanâsana*)
    - 'Downward-facing floor lunge posture' (*Adho mukha san calanâsana*)
    - 'Standing lunge posture (*Utthita san calanâsana*)

1. **'Salute to the moon sequence' (*Candra Namaskar*)**

- **Session 3.5: The 'Seated Finishing Floor Sequence'**
  - Safe and effective execution of the 'Seated finishing floor sequence' (*Padma vinyâsa*), which includes:
    - 'Lotus posture' (*Padmâsana*)
    - 'Unsupported twisting (revolving) lotus posture' (*Niralamba parivrtta padmâsana*)
    - 'Supported twisting (revolving) lotus posture' (*Parivrtta padmâsana*)
    - 'Supported neck-twisting (revolving) lotus posture' (*Gala parivrtta padmâsana*)
    - 'Upward facing bound lotus posture' (*Urdhva mukha baddha padmasana*)
    - 'Downward facing bound lotus seal posture (*Adho mukha baddha padma mudrâsana*)
    - 'Upward facing bound lotus seal posture (*Urdhva mukha baddha padma mudrâsana*)
    - 'Scales posture' (*Tolâsana*)
    - 'Seated lotus salute sequence' (*Padma namaskara vinyâsa*)

4. Twisting Spine and Neck 'Releasing' Sequence, 'Lotus finishing sequence' (*Padma vinyâsa*)

4

- **Topic 4: Physical Yoga Practice: Standing Sequence Part A**
  - **Session 4.1: The 'Triangle Sequence'**
    - Safe and effective execution of the 'Triangle sequence' (*Trikona vinyâsa*), which includes:
      - 'Triangle posture' (*Utthita Trikonasana*)
      - 'Unsupported half-moon posture' (*Niralamba Ardha Candrâsana*)
      - 'Unsupported warrior posture' (*Niralamba Virabhadrâsana*)
      - 'Unsupported standing knee-to-chest posture' (*Niralamba Eka Pada Pavan Muktâsana*)

1. 'Triangle Sequence' (*Trikona vinyâsa*)

1.

  - **Session 4.2: The 'Side-spine Lengthening Sequence'**
    - Safe and effective execution of the 'Side-spine lengthening sequence' (*Parsvakona vinyâsa*), which includes:
      - 'Side-spine lengthening posture' (*Utthita Parsvakonâsana*)
      - 'Twisted side-spine lengthening posture' (*Parivrtta Parsvakonâsana*)

2. 'Side angle sequence' (*Parsvakona vinyâsa*)

2. 

Topic 5: Physical Yoga Practice: Standing Sequence Part B

- **Session 5.1: The 'Elephant Sequence'**
  - Safe and effective execution of the 'Elephant sequence' (*Gadja vinyâsa*), which includes:
    - 'Tall elephant posture' (*Urdhva Danda Gadjasthana*)
    - 'Forward-bending elephant posture' (*Pascima Danda Gadjasthana*)
    - 'Backward-bending elephant posture (*Purva Danda Gadjasthana*)
    - 'Side-bending elephant posture' (*Parsva Danda Gadjasthana*)
    - 'Twisting elephant posture' (*Parivrtta Danda Gadjasthana*)
    - 'Pushing wide-legged forward-bending posture' (*Hasta Prasarita Paddotonâsana*)
    - 'Pushing-twisting wide-legged posture' (*Parivrtta hasta Prasarita Paddotonâsana*)
    - 'Pulling wide-legged forward-bending posture' (*Hasta Kulpha Prasarita Paddotonâsana*)
    - 'Wide-legged hand-balance posture' (*Samokona Adho Mukha Vrksâsana*)

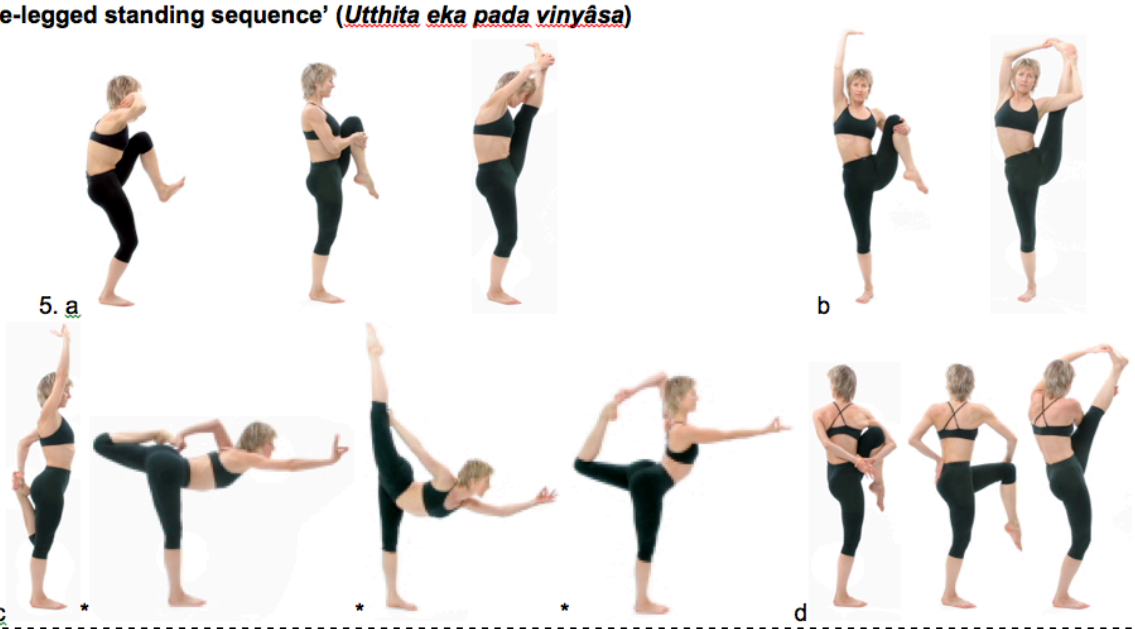
- **Session 5.2: The 'Standing One-sided Forward-bending Sequence'**
  - Safe and effective execution of the 'Standing one-sided forward-bending sequence' (*Parsvotona vinyâsa*), which includes:
    - 'Standing one-sided hamstring-lengthening posture' (*Ardha Parsvotonâsana*)

- ‘Standing one-sided forward-bending posture’ (*Paripurna Parsvotonâsana*)

4. ‘Standing one-sided forward-bending sequence’ (*Parsvotona vinyâsa*)

- **Topic 6: Physical Yoga Practice: Standing Sequence Part C**
  - **Session 6.1: The ‘One-legged Standing Sequence’**
    - Safe and effective execution of the ‘One-legged standing sequence’ (*Utthita Eka Pada vinyâsa*), which includes:
      - ‘Unsupported forward-bending one-legged posture’ (*Niralamba Pascima Eka Pada Padanghusthâsana*)
      - ‘Forward-bending one-legged posture’ (*Pascima Eka Pada Padanghusthâsana*)
      - ‘Unsupported side-bending one-legged posture’ (*Niralamba Parsva Eka Pada Padanghusthâsana*)
      - ’Side-bending one-legged posture’ (*Parsva Eka Pada Padanghusthâsana*)
      - ‘Unsupported backward-bending one-legged posture’
      - ’Backward-bending one-legged posture’ (*Purva Eka Pada Padanghusthâsana*)
      - ‘Unsupported twisting one-legged posture’ (*Niralamba Parivrtta Eka Pada Padanghusthâsana*)
      - ‘Twisting one-legged posture’ (*Parivrtta Eka Pada Padanghusthâsana*)

5. ‘One-legged standing sequence’ (*Utthita eka pada vinyâsa*)



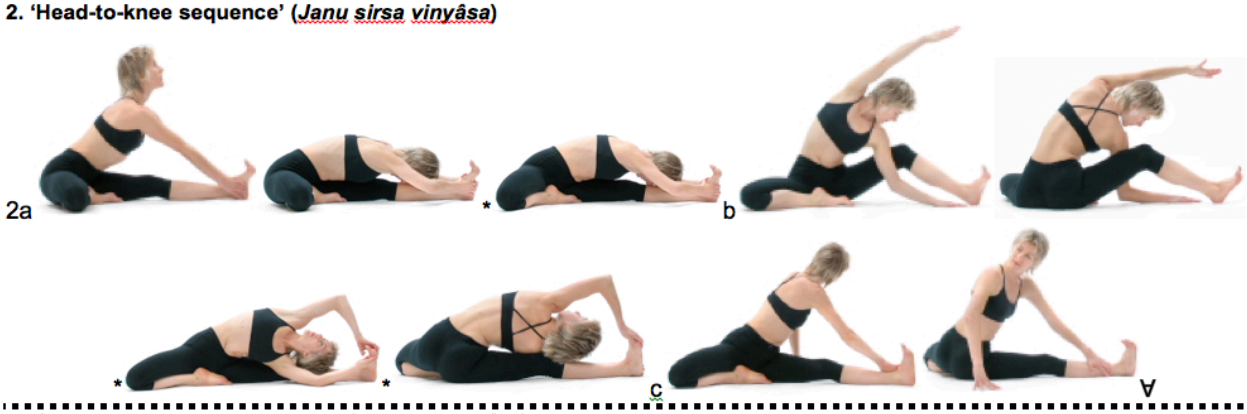
- **Session 6.2: The 'Warrior Sequence'**
  - Safe and effective execution of the 'Warrior sequence' (*Virabhadra vinyâsa*), which includes:
    - 'Extended warrior posture' (*Utthita Virabhadrâsana*)

6. 'Warrior sequence' (*Virabhadra vinyâsa*) & 'Forearm balance headstand sequence' (*Pinca mayura sirsa vinyâsa*)

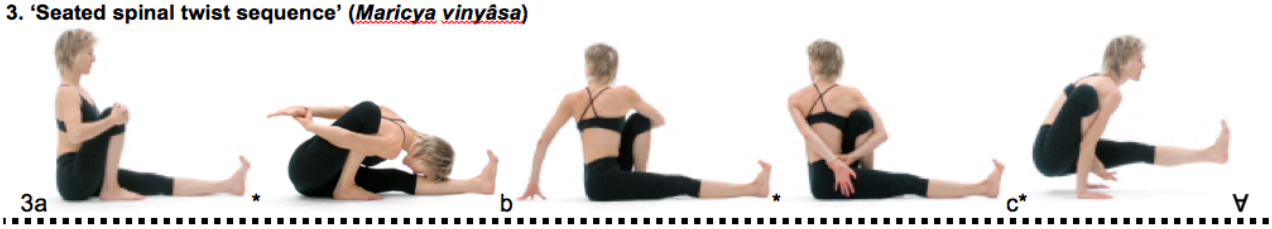
- **Topic 7: Physical Yoga Practice: Floor Sequence Part A**
  - **Session 7.1: The 'East-west Spinal-lengthening Sequence'**
    - Safe and effective execution of the 'East-west spinal-lengthening sequence' (*Pascima Purva vinyâsa*), which contains:
      - 'Spinal-lengthening seated posture' (*Dandâsana*)
      - 'Back spinal-lengthening forward-bending posture' (*Pascimotanâsana*)
      - 'Front spinal-lengthening backward-bending posture' (*Purvotanâsana*)
  - **Session 7.2: The 'Head-to-knee Sequence'**
    - Safe and effective execution of the 'Head-to-knee sequence' (*Janu Sirsa vinyâsa*), which includes:
      - 'Simple head-to-knee posture' (*Sukha Janu Sirsâsana*)
      - 'Sideways head-to-knee posture' (*Parvsa Janu Sirsâsana*)
      - 'Twisting head-to-knee posture' (*Parivrtta Janu Sirsâsana*)
  - **Session 7.3: The 'Seated Spinal Twist Sequence'**
    - Safe and effective execution of the 'Seated spinal twist sequence' (*Maricya vinyâsa*), which includes:
      - 'Seated spinal twist posture' (*Maricyâsana*)

1. 'East-west spinal-lengthening sequence' (*Pascima purva vinyâsa*)

2. 'Head-to-knee sequence' (*Janu sirsa vinyâsa*)



3. 'Seated spinal twist sequence' (*Maricya vinyâsa*)



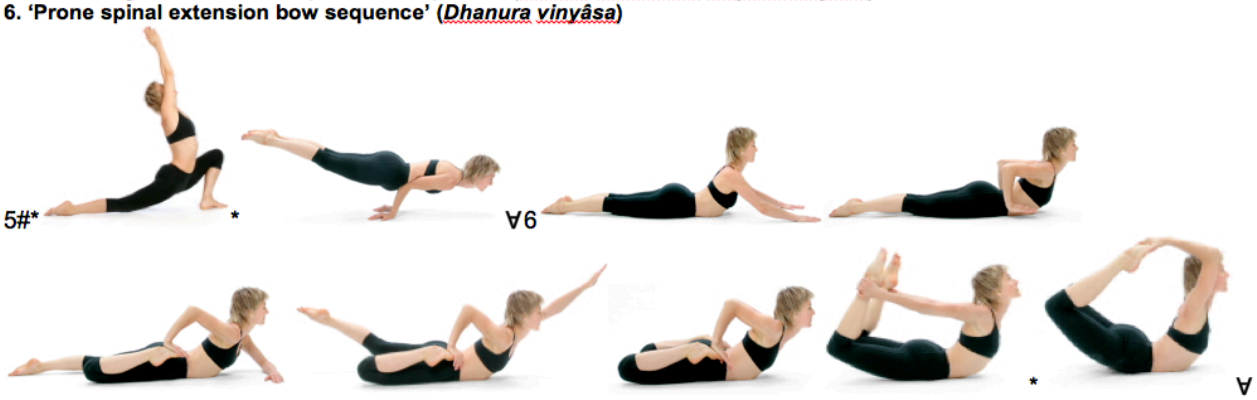
- **Topic 8: Physical Yoga Practice: Floor Sequence Part B**
  - **Session 8.1: The 'Cobblers Sequence'**
    - Safe and effective execution of the 'Cobblers sequence' '(*Baddha Kona vinyâsa*), which includes:
      - 'Upward facing cobblers posture' (*Urdvha Mukha Baddha Konâsana*)
      - 'Downward facing cobblers posture' (*Adho Mukha Baddha Konâsana*)
  - **Session 8.2 The 'Cow Sequence'**
    - Safe and effective execution of the 'Cow sequence' (*Gomukha vinyâsa*), which includes:
      - 'Upward facing cow posture' (*Urdvha Mukha Gomukhâsana*)
      - 'Downward facing cow posture' (*Adho Mukha Gomukhâsana*)
      - 'Twisting cow posture' (*Parivrtta Gomukhâsana*)
      - 'Side-lengthening cow posture' (*Parvsa Gomukhâsana*)

4. 'Cobblers sequence' (*Baddha kona vinyâsa*)

5. 'Cow's head sequence' (*Gomukha vinyâsa*)

- **Topic 9: Physical Yoga Practice: Floor Sequence Part C**
  - **Session 9.1: The 'Prone Backward-bending Sequence'**
    - Safe and effective execution of the 'Prone backward-bending (spinal extension) sequence' (*Dhanura vinyâsa*), which includes:
      - 'Unsupported prone one-foot-to-buttock posture' (*Niralamba Eka Pada Supta Bhekâsana*)
      - 'Prone one-foot-to-buttock posture' (*Eka Pada Supta Bhekâsana*)
      - 'Unsupported bow posture' (*Niralamba Dhanurasana*)
      - 'Bow posture' (*Dhanurâsana*)

5# 'Side lunge to one handed peacock sequence' (*Parsva sancalana mayura vinyâsa*) &
6. 'Prone spinal extension bow sequence' (*Dhanura vinyâsa*)



  - **Session 9.2: The 'Supine Backward-bending Sequence'**
    - Safe and effective execution of the 'Supine backward-bending (spinal extension) sequence' (*Urdhva Dhanura vinyâsa*), which includes:

- 'Unsupported arms-up bridge posture' (*Niralamba Urdhva Hasta Setu Bandhâsana*)
- 'Unsupported interlocked-hands bridge posture' (*Niralamba Baddha Hasta Setu Bandhâsana*)
- 'Supported bridge posture' (*Salamba Setu Bandhâsana*)
- 'Half backward-arch posture' (*Ardha Urdhva Dhanurâsana*)
- 'Backward-arch posture' (*Urdhva Dhanurâsana*)

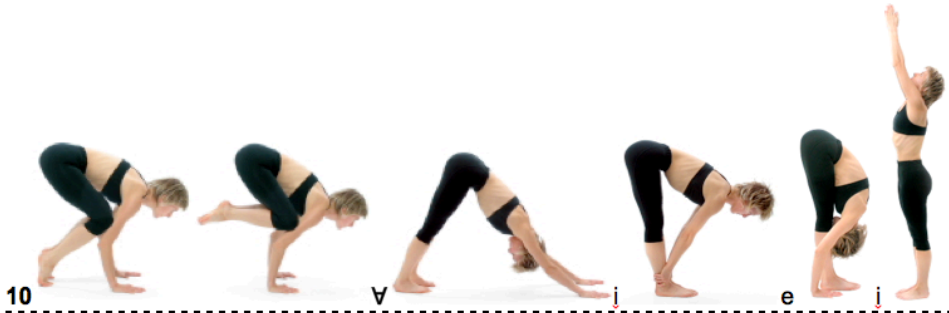
7. 'Supine spinal extension bow sequence' (*Urdhva dhanura vinyâsa*)

- **Session 9.3: The 'Supine Knees-to-chest Spinal-releasing Sequence'**
  - Safe and effective execution of the 'Supine knees to-chest spinal-releasing (spinal flexion) sequence' (*Supta Pavan Mukta vinyâsa*), which includes:
    - 'Unsupported two-knees-to-chest posture' (*Niralamba Supta Pavan Muktâsana*)
    - 'Supported two-knees-to-chest posture' (*Salamba Supta Pavan Muktâsana*)
    - 'Half sit-up supported two-knees-to-chest posture' (*Salamba Uttana Supta Pavan Muktâsana*)
    - 'Unsupported half sit-up two-knees-to-chest posture' (*Niralamba Uttana Supta Pavan Muktâsana*)
    - 'Unsupported half sit-up one-knee-to-chest posture' (*Eka Pada Niralamba Uttana Supta Pavan Muktâsana*)
    - 'Supported half sit-up one-knee-to-chest posture' (*Eka Pada Salamba Uttana Supta Pavan Muktâsana*)
    - 'Toes-to-floor supported half sit-up one-knee to-chest posture' (*Padangustha Eka Pada Salamba Supta Pavan Muktâsana*)
    - 'Toes-to-floor unsupported half sit-up one-knee-to-chest posture' (*Padangustha Eka Pada Niralamba Uttana Supta Pavan Muktâsana*)

- 'Toes-to-floor supported half sit-up two-knees to-chest posture' (*Padangustha Salamba Uttana Supta Pavan Muktâsana*)
- 'Toes-to-floor unsupported half sit-up two knees-to-chest posture' (*Padangustha Niralamba Uttana Supta Pavan Muktâsana*)

8. 'Supine spinal flexion knees to chest sequence' (*Supta pavan mukta vinyâsa*)

10. 'Garland, crow, half squat sequence' (*Mala baka utkata vinyâsa*)



- **Topic 10: Physical Yoga Practice: Inverted Sequence**
  - **Session 10.1: The Inverted Postures**
    - The purpose of 'inverted postures' (*Viparita Karani Mudrâ*)
    - Main inverted postures in *hatha yoga*
    - Contraindications for shoulderstand
    - Prerequisite postures and movements that need to be established before shoulderstand can be safely attempted alone, and/or with the help of an experienced teacher
  - **Session 10.2: The 'Shoulderstand Sequence'**
    - Simple through complex stages of shoulderstand (*Sarvangâsana*) in the 'Shoulderstand sequence' (*Sarvanga vinyâsa*) of the 'inverted postures' (*Viparita Karani mudrâ*), which include:
      - 'Legs up the wall posture' (*Salamba Urdhva Prasarita Padâsana*)
      - 'Half Shoulderstand posture' (*Ardha Salamba Sarvangâsana*)
      - Full Shoulderstand posture' (*Salamba Sarvangâsana*)
- 'One-legged Shoulderstand posture' (*Eka Pada Salamba Sarvangâsana*)

- 'Unsupported plough posture' (*Niralamba Halâsana*)
- 'Simple supine intense neck-extending-releasing posture' (*Sukha Uttana Padâsana*)
- 'Seated neck-extending-releasing posture' (*Urdhva Mukha Pascimotanâsana*)

- **Topic 11: 'Breath Control' (*Prânâyâma*)**
  - **Session 11.1: Factors that can affect Breathing**
    - Components of breathing and their features, which include:
    - Shallow tidal (natural relaxed) breathing
      - Long slow breathing,
      - Forced complete exhalation,
      - Full inhalation,
    - Inhalation retention
    - Exhalation retention
    - The effects of hyperventilation and hypoventilation on the body
    - The main features of natural breathing, enhanced abdominal (diaphragmatic) breathing, chest (thoracic) breathing, and complete breathing
    - Different factors that can modify the type of breathing
  - **Session 11.2: Simple to Complex Breath-control Exercises**
    - The effects of various simple breathing patterns and the effects of their practice, including:
      - Supine natural breathing
      - Seated natural breathing
      - Supine abdominal breathing
      - Seated abdominal breathing
      - Supine thoracic breathing
      - Seated thoracic breathing
      - Supine complete yogic breathing (abdominal then thoracic breathing)
      - Seated complete yogic breathing (abdominal then thoracic breathing)
    - Types of breath retention (*kumbhaka*)
    - Simple to complex forms of breath control practice known as *Ujjayi Prânâyâma*

- **Topic 12: Meditation and Relaxation**
  - **Session 12.1: Concentration and Meditation**
    - The purpose of meditation
    - Physiological changes associated with the meditative state

- Simple to complex seated static meditative postures
- Essential qualities that a seated static meditative posture has to have to allow meditation to be possible
- Technique of meditation on sounds
- Technique of meditation on images
- Technique of meditation on breathing
- Technique of meditation on physical posture
- Dynamic (moving) exercises that can induce a dynamic meditative state
- Advantages and disadvantages of static meditation versus dynamic meditation

- **Session 12.2: Supine Relaxation**
  - Physiology of 'Supine Relaxation' (*Yoga Nidra*)
  - Essential components of corpse posture (*Savâsana*) in supine relaxation
  - Alternative variations for performing the corpse posture (Savâsana)
  - Technique of 'systematic whole body supine relaxation' and how it works
  - Technique of 'chakra-focused supine relaxation' and how it works
  - Technique of 'twelve bridge-focused supine relaxation' and how it works

Topic 13: Revision and Exam (Optional)

Course Assessment and Certification

The most important thing you can achieve from this course is information. However, if you wish to receive a certificate of successful completion then you need to pass two online multiple-choice exams (in weeks 7 and 13) and submit an assignment. You do not have to do any of these assessment criteria, if you wish to just do the course and learn what you do on the way, but we have repeatedly found that it is studying for the exams and attempting the assignment, which provides maximum benefit.

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If you want to learn more of this type of information you can join one of our live or online courses –

Live Courses:

1. YOGA THERAPY & VINYASA INTENSIVE Sydney 29 August – 7 September 2014 (http://yogasynergy.com/main/yoga-therapy-vinyasa-intensive-29-aug-7-sep-2014)

2. YogaSynergy (200 Hour) TEACHER TRAINING COURSE, Goa, India, 21 March – 19 April 2015 (http://yogasynergy.com/training)

Online courses:

1. **'Applied Anatomy and Physiology of Yoga'**

2. **'Essentials for Teacher Training: Yoga Fundamentals'**

These courses are the public versions of the award-winning RMIT university courses that were written by physiotherapists and co-directors of Yoga Synergy, Bianca Machliss and Simon Borg-Olivier. They are the culmination of 50 years of combined teaching experience.

ONLINE COURSE 1: ANATOMY AND PHYSIOLOGY OF YOGA: (**http://anatomy.yogasynergy.com**)

This is a 'must do' course for anyone who wants to practice/teach safe and effective yoga. You will learn how to use 9 main joint complexes, 20 muscle group pairs, muscles, 3 main nerve reflexes, 10 circulatory pumps, 18 *bandhas*, 9 *mudras* and 8 main *pranayamas*.

ONLINE COURSE 2: 'ESSENTIALS OF TEACHER TRAINING: YOGA FUNDAMENTALS':

(**http://fundamentals.yogasynergy.com**)

"It is very important, but not enough; to know where your muscles and bones are … You have to know what to do with them!"

This course is the public version of the award winning RMIT university course written and presented by physiotherapists and yoga teachers Simon Borg-Olivier and Bianca Machliss'. It is the culmination of the 30 years of teaching experience and the practical application of the 'Yoga Anatomy and Physiology' course.

Each course is 120 hours fully online and is CEP points credited.

Join the Yoga Synergy Affiliate Program

If you have enjoyed our work we would love you to help us share it with others. You can also earn money by joining our affiliate program and promote our online courses and products.
If you've done our courses or used our DVD's or books, and have the ability to promote them via your website or email newsletter then this is the perfect way for you to earn passive income.

For each person that comes through to our website via your promotion (even a simple link on your website or newsletter), and makes a purchase from us, you will get a minimum of 10% commission.

For example if you refer 20 people to purchase any of our online courses you will earn more than A$1000.

All you have to do is fill in the **Affiliate Registration Form** at **https://anatomy.yogasynergy.com/affiliate-program**