cells. For this reason, Recomposition starts with high-glycemic liquid carbohydrates and progresses to solid low-glycemic foods as the hours tick by.

Traditional carb-ups last 3 days. For some reason, most bodybuilders look fuller after 4 days of high carbohydrate consumption. However, by forcing you to eat extra carbohydrate meals, BODYOPUS condenses the supercompensation period to roughly 2 days.

Recomposition requires you to eat every 2-1/2 hours, even while you are usually sleeping. Is this annoying precision really necessary? Not if you have one of those truly gifted metabolisms — but then you probably wouldn't be reading this book. You could be a dedicated weight-lifter, follow the best nutritional advice and even use anabolic steroids, but unless you have superior insulin sensitivity and well-modulated insulin secretion, you will probably look like the typical soft, bloated gym rat who always looks big in clothing and struts around in the lobby of bodybuilding contests, but never gets into shape.

I always suggest that you push the limits of *slackness*. If you can get a perfect carb-up without waking up at night for extra meals, or eat any sweet thing that strikes your fancy, I am actually fucking envious. Your hour of reckoning is Monday morning. Filled, lean, no bloat? Or are you something slightly less? Just as long as you are satisfied. If not ...

CHAPTER 42

# RECOMPOSITION ABRACADABRA

RECOMPOSITION is not the common term for traditional athlete carb-ups. This is because the BODYOPUS carb-up is not a typical glycogen supercompensation. In the endurance sports, where carbohydrate depletions and carb-ups were first invented, the goal was to increase anaerobic energy stores. However, electrolytes, amino acids and fluids are transported across the cell membrane with the glucose and increase cell *volume*. For the strength athlete, this is more important than simple energy supercompensation. The goal of Recomposition is to cause kinetic anabolic expansion. Unlike endurance athletes, we must consider which amino acids and electrolytes to consume with the carbohydrates.

BODYOPUS' 48-hour carb-up has other novel aspects. Researchers have discovered that fructose helps you carb up because the liver will shunt over virtually all of the glucose to general circulation to replenish the cells. Glucose will only start to be stored in the liver once the cells have enough. In a depleted state, the body always replenishes the muscle first and the liver second.

Fructose is, as mentioned in the carbohydrate chapter, not

directed into the blood. Fructose is converted to liver glycogen until the enzyme runs out, and then the rest is converted into triglycerides. Later, when blood glucose is too low, liver glycogen is converted back to glucose.

Since the BODYOPUS cycle is repeated every 7 days, the initial state of stored liver glycogen influences the rate of the descent into ketosis. A traditional infrequent carb-up would rightly include fructose, but for Recomposition we don't want a reglycogenated liver and we don't want a sugar that converts into fat; we only have 48 hours. In Recomposition, you should do your best to avoid fructose and sucrose. This is not an absolute rule, as I've seen many nice carb-ups that used fructose and sucrose. However, to better prepare for the upcoming cycle we will concentrate on glucose, glucose polymers and starches. Unfortunately this means that you should avoid fruit in the 48-hour period.

The old Ultimate Diet carb-up relied on fruit and sucrose, but it was a 10-day cycle and more time was allotted for carbohydrate depletion. BODYOPUS *does make* some sacrifices to fit into 7 days. A glycogen-filled liver will require more time to achieve ketosis, and the longer you can stay in ketosis, the more fat you will burn. Ketosis usually occurs 72 hours after carbohydrate restriction when you start with a glycogen-filled liver and don't use any glucose disposal agents. BODYOPUS gets it done in record time: 36 hours.

CHAPTER 43

# RECOMPOSITION NUMBERS

Research on glycogen supercompensation has studied the effect of the type, amount and timing of food. A few adventurous scientists have experimented with intravenous glucose infusions, but most of the research has concerned food.

Logically, we should choose foods that cause maximum insulin secretion and are easily digestible; that is, high-glycemic liquid carbohydrates. If BODYOPUS was a static system, not a cycle, we wouldn't have to be as picky. For simple carb-ups, any combination of glucose, sucrose, fructose and glucose polymers will do.

We'd like to avoid fructose and sucrose in our Recomposition drink, which limits us to glucose (hard to find) and glucose polymers. We also want to include very soluble proteins and moderate amounts of sodium, potassium and magnesium.

If high-glycemic liquid foods are ideal, why don't we just use them throughout the carb-up period? Some people have done that. Fast sugars cause high insulin secretion, which causes maximum glucose disposal into muscle when ideal conditions are met: high insulin sensitivity and really jumping enzyme activity. Unfortunately, this blessed insulin sensitivity

steadily descends back to normal or sub-standard. Under regular conditions, high-glycemic liquids will cause glucose to be deposited into fat cells.

There is plenty of research on glycogen deposition in the first 24 hours after a depletion workout. Little is known about how much and when to eat after the first day to achieve supercompensation. With enough food, rest and time we should eventually be able to stuff in supra-normal amounts of nutrients. However, the latest tricks (especially glucose disposal agents) have not been used in formal research.

Before we go over the carbohydrate schedule, let's discuss muscle glycogen. Unlike blood glucose, glycogen is not measured in milligrams (mg), but in millimoles (mmol). Glycogen is extracted from the muscle with a biopsy needle. Ouch! Average glycogen levels in a trained but not overtrained athlete are between 130 and 150 mmol/kg of muscle. After carbohydrate depletion and exhaustive workouts, muscle glycogen can be as low as 25 mmol/kg. Our goal is to achieve maximal glycogen supercompensation (195 mmol/kg). Experiments on glycogen supercompensation were done on runners, not bodybuilders, so we don't know what the upper limit is for competition bodybuilders using anabolic steroids, glucose disposal agents and injectable insulin.

Unfortunately, we have no practical way to measure when we pass the 150 mmol/kg threshold into supercompensation. Your muscles will just *feel* full. I can't adequately describe this feeling, but you will know that you are supercompensated when you lift a 45-pound plate onto an Olympic bar and say to yourself, "Man, this feels *light* today."

Research has indicated that the maximum rate of muscle glycogen replenishment after high-glycemic drinks is 10 mmol



of glycogen per kilogram of muscle during the first hour. The average, however, is only 5.5 mmol/kg/hr. Really hapless individuals replenish glycogen even more slowly. In addition, these rates diminish rapidly over time.

The researchers did not use chromium, vanadyl sulfate or phenformin, which would have improved these figures. Let's play with some numbers to give you an idea of the relationship between calories, glycogen storage and time.

With good to excellent insulin sensitivity and enzyme potential, sport scientists estimate that 9 to 16 grams of carbohydrates per kilogram of lean body weight can be converted to muscle glycogen. Carbohydrate intake above 16 g/kg/day will be converted to fat. Since we will be exercising the entire body, let's give ourselves the benefit of the doubt and use 16 g/kg/day. What does this mean? In the first 24 hours of carbing-up we should consume carbohydrates according to this formula:

16 g carbohydrates X (your lean body weight in kg) →
(One kg equals 2.2 pounds;
a gram of carbohydrate is 4 calories.) →

Let's illustrate this formula with an example:

A 100-kg bodybuilder (220 pounds) has restricted his carbohydrate intake and exercised to exhaustion, and now he has 25 mmol/kg of muscle glycogen. He wants to supercompensate to at least 175 mmol/kg. What can he expect?

The average rate of supercompensation is about 5.5 mmol/kg/hr, and could be lower if he chooses low-glycemic solid carbohydrates or doesn't eat enough.

The best result, without insulin or glucose disposal agents,

is 10 mmol/kg/hr. In controlled hospital environments, scientists have achieved 25 mmol/kg/hr with intravenous infusion of glucose and insulin.

With basic arithmetic, you can see that at 5.5 mmol/kg/hr, supercompensation of 175 mmol/kg should be achieved in 30 hours. As any athlete will tell you, carb-ups take at least 3 days, and are at their best after 4 to 5 days. With Recomposition, we will carb-up within 48 to 54 hours. Why is there a discrepancy?

Two obstacles can thwart a rapid and predictable carb-up. The most obvious one is not eating consistently every 2 hours. Remember, insulin sensitivity and enzyme potential decline rapidly after the last exhaustive workout. If you sleep from 10:00 p.m. to 6:00 a.m., you should eat at 10:00 p.m., 12:00 p.m., 2:00 a.m., 4:00 a.m., and, of course, 6:00 a.m. Your heightened ability to divert glucose from fat to muscle is not on hold while you sleep.

Second, you want to avoid microtrauma (muscle soreness caused by exhaustive exercise). Microtrauma causes glucose to be used for energy for ATP repair, not glycogen storage.

Now that you're ready to chow down, how much should you eat? Wouldn't eating every carbohydrate between your mouth and the horizon be a wonderful plan? Unfortunately, eating more than 16 g of carbohydrates per kg of lean body weight over a 24-hour period does not deposit any more glycogen in the muscles. That's 16 g of carbohydrates per kg of *lean* body weight, doughboy. Eating more than that will cause glucose to deposit in — (gasp!) — *fat cells!*

CHAPTER 44

# RECOMPOSITION RULES

FRIDAY'S EXHAUSTIVE WORKOUT will deplete glycogen stores to between 8 and 25 mmol/kg while avoiding muscle microtrauma. Although you can't measure the glycogen directly, you should be able to feel your strength diminish as glycogen is used up.

Recomposition consists of two stages. Each stage consists of substages of 4 meals each. Plan on eating every 2 hours, even while you would normally be sleeping.

## STAGE 1: INITIAL 24 HOURS

| | |
|---|---|
| **Feedings** | 12 |
| **Carbohydrates** | 16 g X lean body weight in kg |
| **Type** | glucose, glucose polymers and starches |
| **Meals 1 – 4** | Drink 2 g of carbohydrate per kg of lean body weight of liquid simple sugars or glucose polymers per meal. Soluble proteins like whey should be added to the liquid drinks. |

| | |
|---|---|
| Meals 5 – 8 | These meals should be liquid carbohydrates and solid high-glycemic carbohydrates, such as corn flakes. Eat 1.5 g of carbohydrate per kg of lean body weight at each meal. |
| Meals 9 – 12 | Finally, you get to eat some real food! Eat .5 g of solid starches and some liquid carbohydrates per kg of lean body weight at each meal. |

## STAGE 2: FROM 25 HOURS TO 48 HOURS

| | |
|---|---|
| Feedings | 12 |
| Type | Mixed, primarily starches |
| Meals 1 – 4 | At each meal, eat 1 g of carbohydrate per kg of lean body weight. Since insulin sensitivity is declining, you should eat more solid carbohydrates and proteins. |
| Meals 5 – 8 | Eat .75 g of carbohydrate per kg of lean body weight of relatively normal food, such as rice, potatoes and pasta. |
| Meals 9 – 12 | At these meals, you should eat only .5 g of carbohydrate per kg of lean body weight. Since you want to begin lowering blood glucose before you begin another week of carbohydrate depletion, you should eat just the opposite of what you'd expect. Go back to simple liquid carbohydrates and proteins. Basically, you want a sugar crash to get into low blood sugar. This is the final topping off of the tank. Yes, insulin is higher, but the actual amount of carbohydrates per meal is quite low. |



## STAGE 2+

If you begin Stage 1 on Friday afternoon, you should be done with Stage 2 on Sunday evening between 6:00 and 8:00 p.m. You have a decision to make at this point. We want to resume the BODYOPUS cycle on Monday and start depleting again. The glucose reading on Monday morning should be about 80 mg/dl, but we'd like to extend the 48-hour Recomposition phase to achieve the best possible supercompensation. Should you eliminate carbohydrates from that time on to better prepare for low blood sugar on Monday morning or keep eating carbohydrates until right before bed? To decide, you will need to take three factors into account. If your muscles are still sore from Friday, or if you have *not* prudently eaten every 2 hours (especially if you've skipped feedings during sleep time), or have consumed even moderate amounts of fructose, your supercompensation will not be optimal.

If you are sore or skipped meals, keep eating carbohydrates until bedtime. If you have eaten fructose or sucrose, do *not* keep eating carbohydrates. The extra meals will increase liver glycogen, which we don't want.

Also, if for some reason you weren't using glucose disposal agents, that's a double screw-up. Without these agents, glucose stays in the bloodstream longer and you won't achieve ideal

glycogen deposition. Practice!

In addition to the carbohydrates, always consume 15 percent of your pre-diet maintenance calories of essential fatty acids (walnuts are ideal) in each 24-hour period.

CHAPTER 45

# BODYOPUS VARIATIONS

BODYOPUS' 7-DAY CYCLE requires more attention to detail than the 10-day Ultimate Diet did. The condensed cycle requires achievement of ketosis within 36 hours instead of 72 hours, and glycogen supercompensation within 48 to 54 hours. BODYOPUS has two phases: a ketogenic quasi-catabolic state that accelerates fat loss, and a Recomposition phase that potentiates cellular anabolic expansion. To achieve optimal results in both phases, you need to keep track of urine ketone levels, blood glucose, carbohydrate types, feeding frequency, and more. Basically, the 7-day BODYOPUS plan doesn't allow any slack.

In working with bodybuilders to fine-tune BODYOPUS, I've seen two recurring problems that interfered with perfect execution. First, some people eat so much fat, and therefore make so many ketones, that their body fat is not being burned fast enough. One bodybuilder was eating 3 pounds of ground beef and over 10 tablespoons of mayonnaise each day, totaling over 5000 calories of fat. I wasn't surprised that he didn't lose much fat; it was amazing that he lost any fat at all.

Second, some dieters don't carb-up correctly. They skip meals, especially during sleep time, and then try to make up for

it with bigger meals later on. Remember, neither your insulin sensitivities nor enzyme levels are on hold while you sleep. In some cases, athletes who won't wake up and eat and won't use glucose disposal agents, don't achieve glycogen supercompensation in 48 or even 54 hours.

The practical solution may be to make BODYOPUS an *8 day* plan, with a 3-day Recomposition phase. Each BODYOPUS cycle would then start one day later in the week.

Remember, I'm a clever person but I'm no body prophet, nor is BODYOPUS any kind of 10 commandments. Experiment with it. Use it. But don't let it run your life.

CHAPTER 46

# THE BODYOPUS WORKOUT SCHEDULE

BODYOPUS IS AN INTEGRATED DIET and exercise system. Weightlifting is *not* optional. The kinetic anabolic expansion which results from glycogen supercompensation is synergistic with weight training. Dividing the training into two distinct parts is part of the metabolic trickery. The first workouts in BODYOPUS are *tension* training sessions. These workouts should be done with heavy poundages that allow a complementary anabolic response. The final whole body workout is a *fatigue* training session, designed to deplete glycogen stores.

To bodybuilders or powerlifters who train regularly, the preceding paragraph is easy to understand. For my other readers, who feel I am speaking in some secret language, let me explain a few concepts about exercise in general.

An active body is a happy body. Although we don't yet know if exercise actually extends life span, we know that regular exercise keeps old people feeling young. Most tissues and organs benefit from exercise.

In our present culture, a lean, firm, "in shape" body is the aesthetic ideal for men. The aesthetic ideal for women is somewhat looser (although too much influenced by men, in my opin-

ion), but becomes more like the male ideal as women get older.

Although any type of exercise will increase calorie expenditure, exercises can be grouped into two types: exercise that stresses the cardiovascular system, in which the musculature is second in importance; and resistance training, weight-lifting for short. Weight-lifting has 3 branches. Powerlifting is a pursuit wholly dedicated to physical strength. Olympic lifting is a combination of strength and great skill. Last is bodybuilding, which is what most resistance trainers do. These "bodybuilders" may not look like competition bodybuilders and may not associate the name "bodybuilding" with what they are doing in the gym.

How do we define bodybuilding and include all of the weight-lifters who "don't want a lot of muscles?" Bodybuilding is weight-lifting exercise to maintain or alter the ratio of muscle to fat to arrive at a higher cosmetic self-standard.

If bodybuilding were just a cosmetic endeavor it would be like applying make-up or arranging one's hair. However, bodybuilding, unlike other cosmetic activities, influences the metabolism in a profound and positive manner. Done correctly, bodybuilding is an anabolic and anti-catabolic activity. All other exercise is either neutral or covertly catabolic. I know of no other form of exercise that maintains muscle and bone mass while stimulating continual secretion of growth hormone, testosterone and thyroid hormones.

If you visit any gym, you will discover that most "bodybuilders" look closer to normal than not. Although training techniques vary tremendously, almost any system will maintain muscle mass. Every system will have an anabolic effect for some amount of time. However, *all* systems eventually stop working. After a while, the weight-training system's anabolic effects no longer cancel out the catabolic forces on the body.



We can extend the anabolic period with unusual nutrition or anabolic drugs (steroids have been favorites in the past), and eventually reach equilibrium at a higher plateau, but it will be a plateau nevertheless.

The BODYOPUS training system is tailored to the metabolic states induced in the body during the 7-day cycle. These recommendations are particular to the BODYOPUS system and would not have much meaning outside the dieting routine. I feel that these are the best recommendations *for now*. I have some reservations about many of the current so-called scientific theories for muscular growth, and I have some very unusual training methods in development. The working title for this new system is *BODY CONTRACT*.

Champion bodybuilder workout routines are eventually an anabolic cul-de-sac. If you wish to emulate the exercise routines of world-class bodybuilders, you should also consider the thousands of also-rans and near-normals who duplicated the exact antics of the professionals and made no progress.

### FRIDAY'S WORKOUT

I haven't been able to finish Friday's whole body depletion workout in less than two hours, especially when working with a training partner. There is no need to arrange body parts or exercises in any particular order in this workout. Actually, what has worked best is a giant circuit, performing one exercise for each body part in a big loop. For example, select one exercise for each body part sequentially: Calves, chest, shoulders, triceps, back, biceps, forearms, hamstrings and thighs (pant, pant, pant). Rest 5 minutes or so and do another circuit.

You have two goals in setting the amount of weight and repetitions. First, you do *not* want to inflict too much micro-

trauma. Soreness signifies that your muscle cells are using glucose for repair and regeneration and not primarily for glycogen compensation. You should avoid high weights, forced repetitions and negatives.

Most weight-lifters have a close approximation of their personal one-repetition maximum weight for each exercise. Even if you never lift your one-rep maximum, you can estimate it. In the depletion workout, start with 50 percent of your one-rep max. At this weight, most of the muscle fibers will be engaged. You should be able to lift this weight for 10 to 20 repetitions, depending on the state of your muscle glycogen. Should you decrease the weight after failure to be able to do more repetitions? It doesn't matter. After enough sets, muscle glycogen will be exhausted anyway. However, adding repetitions by decreasing the weight will shorten your workout.

In the following list, lever movements are exercises that arc the weight over a non-linear path, like leg extensions. Presses are exercises that push directly against the load. This list is in no particular order.

| | | |
|---|---|---|
| **Calves** | 2 | |
| **Thighs** | 2 | 2 presses or 1 press and 1 lever |
| **Hamstrings** | 2 | 1 press and 1 lever |
| **Back** | 3 | Pull down, free weight row and overall pulley row |
| **Chest** | 3 | Lower, middle and upper |
| **Biceps** | 1 | Curl |
| **Shoulders** | 3 | Press, side lateral and rear lateral |
| **Triceps** | 1 | Press or lever |
| **Forearms** | 1 | |
| **Abdominals** | 2 | Upper and lower |



Pick exercises that target the muscle fibers by area. Many bodybuilders mistakenly duplicate areas out of boredom or tradition.

How many sets should you do to achieve exhaustion? I haven't arrived at any conclusions. How low does muscle glycogen have to drop to get supercompensation? Long distance runners have been measured at 8 mmol/kg after exhaustive exercise. Is this beneficial? The traditional answer for bodybuilding depletion workouts has been 15 to 20 repetitions, 5 sets per exercise and 4 exercises per body part, the classic 20 sets. As you have seen, I differ from the classic routine.

The goal is to deplete glycogen in the muscles down to 25 mmol/kg. With enough time, discipline and pain killers, a bodybuilder could probably get down further. The problem is that trying to achieve total glycogen depletion results in something called "body shock." The whole body is so stressed from general overtraining, compounded by the depletion workout, that the bodybuilder becomes a zombie. Although the body is depleted, lack of appetite and sustained trauma inhibit glycogen supercompensation.

All that I can recommend is *balance*. Somewhere between 2 and 20 sets is the magic amount that will exhaust glycogen stores. Of course, a large area like the back or thighs will require more sets than biceps or forearms. Don't expect to hit everything right on the money with the first depletion workout. Unlike other dieting systems, BODYOPUS gets better with practice.

### MONDAY'S AND TUESDAY'S WORKOUTS

Although most people will work out once per day for 2 days, you can adjust these workouts to your schedule. One bodybuilder did all of the body parts in one early Monday

workout because that's when he felt strongest. Another did a split routine, with 2 workouts on each day, totaling 4 workouts over 2 days. Of course with your imagination you can conjure up some other arrangements. A very late *Sunday* whole body workout? It's been done.

With the completion of the *BODY CONTRACT* training system, I will have new, startling recommendations on training. For now, fit your non-depletion workouts into Monday and Tuesday. Use a weight heavy enough that you can only do between 5 and 8 repetitions. This is usually about 85 percent of your one-rep max.

How many exercises? How many sets? These questions are both open to "debate," which nobody wins because there are too many bodybuilders making progress with the goofiest routines. It seems hard to believe that only 1 or 2 sets for each exercise will be sufficient, but this will work, especially if you are not using anabolic steroids. As to the number of exercises, I feel that there are many exercises with no valid purpose. Thinking man's bodybuilders like Mentzer and Yates only use between 1 and 4 exercises. Large complex muscles in the back and legs need up to 4 exercises; smaller muscles like biceps and forearms need only 1 exercise each.

How intensely should you train? A set of 3 heavy repetitions with 2 assisted forced repetitions is more of an overload than a set of 8 reps to failure with no help. Since we don't have the luxury of daily blood tests, the best indicator is muscle soreness. Muscle soreness is usually most apparent at 24 hours after training. Whatever scheme you settle on for Monday and Tuesday, most of your muscle soreness should be *gone* by late Thursday evening.

There are two ways to adjust this recuperation time. You



can modify the intensity of your workouts on Monday and Tuesday. For example, the most intense workout is 3 positive reps and 2 assists, which is a cross between a power workout and the Mentzer/Jones heavy-duty workout set. The least intense "heavy weight" workout is 8 reps to failure with no assistance. Don't categorize these as either stud or wimp workouts. A middle-aged woman with virtually no testosterone or growth hormone secretion may recuperate best with 8 reps. Conversely, the same individual might do well working the whole body late on Sunday evening with sets of 3-plus-2. This will cause more trauma, but the extra recuperation time may allow sufficient recovery by Friday.

Most dieters will not train the whole body on Sunday night or Monday morning. The following schedule assumes that you work a regular job and don't have a training partner. It will work even if you are not using steroids and have poor recuperative abilities.

| | |
|---|---|
| **Monday** | Chest, shoulders, arms, abdominals |
| **Tuesday** | Back, legs, calves |
| **Rep range** | 8 reps to failure |

You will find that muscle soreness lasts longer without dietary carbohydrates. Usually, incoming glucose is used for ATP for repair, but in its absence, ATP is generated from glycogen, ketones and fatty acids.

The other way to adjust recuperation time is to lower the intensity of the aerobic activity. Classic aerobics is exercise that causes a heart rate at about 70 percent of maximum. Aerobics burn fat best at only 60 percent of maximum. Benefits to the cardiovascular system only start at 70 percent. What do you want,

to burn fat or have a strong heart? Aerobics at 70 percent of maximum heart rate will also cause muscle catabolism. Try to adjust your aerobic activity so that you can still continue to lift the same amount of weight.

Perhaps this paradox is the reason I have such ennui about aerobics: Either the intensity is so low that it's aerobically worthless or the intensity is so high that the dieter has noticeable muscle catabolism. Aerobics and dieting have an intrinsic conflict. Reaching ideal aerobic target heart rates for long sessions is too damaging to the body.

I suggest that you do your aerobic exercise after the last tension workout on Tuesday. Make sure to spread the muscle trauma over the whole body. Choose the Versa Climber or a rower, not a stepping machine. Do no more than 20 minutes per day at the 70+ percent target heart rate. If you want to do longer aerobic sessions, lower the heart rate to 60 percent of maximum. By the way, doing aerobics without carbohydrates is not fun.

CHAPTER 47

# BODYOPUS CODA

I TOOK A 12-MONTH BREAK before writing this chapter. I wanted to come back and read what I have written with a fresher eye.

I hope that I have explored all of the minutiae of fat loss that hardly anyone else mentions. If you have read other diet books, you have probably noticed that such mainstream weight loss books usually have very little hard, factual text and contain generous amounts of recipes and calorie numbers. BODYOPUS is, of course, a very long book. Perhaps I have put in too much information, making it somewhat unwieldy — although I'm sure some readers will write in and ask for the recipe for whey custard or those low-carb whey pancakes that I mentioned a few pages back.

After re-reading this book, I see many areas that could be expanded. Certainly performance nutrients such as pyruvate and lactate and some new performance fats (that have just recently become available at the commercial level) need further study, not in the laboratory but with real human athletes.

To be completely candid, not every dieter needs a radical plan which restricts carbohydrates completely. It is my belief that most bodybuilding failures are caused by insulin sensitiv-

ity and resistance. BODYOPUS works best with individuals with terrible insulin sensitivity and high insulin resistance, because it avoids these problems for about 5 days. This carbohydrate restriction results in a temporary rebound in which the usual substandard uptake of glucose into the muscle cells is elevated to at least normal and sometimes extraordinary.

Of course, this is only a transient trick. None of these nutritional sleights of hand are permanent solutions to the real problems at the cellular level. Many hapless individuals have hyperinsulinemia (too much insulin), which is the result of problems at both the insulin receptor level (insulin resistance) and past the receptor inside the muscle cell.

Although BODYOPUS works well with such individuals, it is, in all probability, a sledgehammer approach. In the future, scientists should develop very specific testing to pinpoint these Repartitioning problems. Although I have not delved deeply into the phenomenon of Repartitioning (how well you store calories in muscle versus fat), it is intimately connected to BODYOPUS. Obviously, the ideal solution would be to make accumulating body fat so difficult that BODYOPUS would not be needed.

Such ideal situations, however, seem to involve non-FDA-approved drugs (phenformin and metformin), or very expensive drugs like IGF-1. In the interim, BODYOPUS happens to be the quick and dirty solution. Granted, BODYOPUS is not a walk in the park. It requires above-average discipline.

This book is so long because I just couldn't ignore any of the tantalizing tricks that help you lose fat. I will be updating BODYOPUS regularly, including even perhaps a recipe or two. I envision a quarterly newsletter and journal, tentatively called BODY# ETC ("Body#" is used in medical databases to mean "pertaining to all words that begin with the word 'body'").



In closing, I'd like to add in some very personal comments about how this book was written. BODYOPUS happens to be the hardest project I've ever done in my life. It was started when I was incarcerated in Federal prison and has taken 2 full years to write. Right before I went to prison, I suffered a stroke that damaged the parts of my brain that controlled my speech and writing skills. For many months I could scarcely talk, and my writing was very fragmented. Over the next 24 months I slowly retrained both my speech and writing skills, which are virtually back to pre-stroke normal.

So this book was an unusually laborious project. In prison, there are no computers, modems or on-line databases. For the first 18 months, I had no typewriter, so the first draft was written longhand with a 25-cent Bic pen while sitting on a folding metal chair in a 6-by-9 foot room. I was transferred to 3 different prisons, one of which was a leper colony. All of the research papers that I needed had to be photocopied by assistants on the outside and mailed in. The only typed draft of this manuscript was "lost" for 2 months during one of the transfers. It finally arrived, piecemeal and out of order, because the prison authorities had read the manuscript. All my mail, both incoming and outgoing, was read by prison officials. Many times the mailrooms would not allow me to receive my mail.

This whole project has taken too long, but the adversity I've faced has earned BODYOPUS a very dear place in my heart. Certainly, in other circumstances, BODYOPUS could have been a more ordinary book, with more details and technical "correctness" — but it would not have been as heartfelt. BODYOPUS gave me my life back. I envision more interesting projects in the future, but I will never be as passionate about them as I am about BODYOPUS.

CHAPTER 48

# SPECIAL SECTION: DIURETICS FOR BODYBUILDING COMPETITIONS

## INTRODUCTION

IN MANY SPORTS, athletes use diuretics to lower their body weight in order to qualify for a lower weight division. Powerlifters, high school wrestlers and horse racing jockeys, to name a just few, lose tremendous amounts of body fluids (gallons), and almost crawl onto the weigh-in scale. Their aim is to step onto the scale, be assigned to a more advantageous weight class, and then discreetly step off and rehydrate so their performance doesn't suffer.

It has not been an exact science. There is no listing in the Yellow Pages for physicians who specialize in athletic dehydration, nor any articles in sports magazines. Doctors, sports officials and many laypeople would advise that you just don't use diuretics at all.

Powerlifters have been the most adept at manipulating body weight through diuretics. This is largely because they have more weight to manipulate. Because they use anabolic steroids and eat a lot of calories, they have more water in (and

between) their muscle cells. In addition, powerlifters have traditionally had better access to black market prescription drugs, including diuretics.

Bodybuilders use diuretics for a very different reason: cosmetics. Until the late 1980s, bodybuilders did everything they could to avoid using diuretics. Everyone knew that using them meant that you had botched the pre-contest preparation. Now, things have changed.

For decades, AAU bodybuilding contests had height classes instead of weight divisions. As the IFBB/NPC became the dominant bodybuilding organization, they created weight divisions in their quest for Olympic recognition of bodybuilding.

I became involved in bodybuilding in after college graduation in 1976. At that time, contest preparation was not very scientific. Whatever quasi-scientific tricks bodybuilders had were few and guarded.

Back then, bodybuilders frowned upon diuretics because they were thought to damage the overall look. The water was lost from the muscles, causing muscular size, shape and vascularity to suffer. In addition, diuretics caused cramps.

We also knew that some anabolic steroids "held water" and others didn't. The most obvious sign of pre-contest preparation was the switch from bulk-up steroids to dieting steroids, from the "androgenic" ones to the "anabolic ones," from testosterone to Deca Durabolin. European injectables and the Primabolans were the hot secret back then. Dianabol and Anadrol were swapped for Anavar and Winstrol. As the contest got closer, these were in turn swapped for fast-acting injectables — Deca Durabolin for Durabolin, Primabolan Depot for Primabolan Acetate. The Stanozolol injectable from Europe was the real prize because it was water-based. Water-based injectables held



very little water and somehow burned fat off more quickly. Aside from steroids, our only hope back then was to lower dietary sodium.

About week before the show, we all heard that we had to eat "no carbs" to get shredded. The no-carbohydrate part of the diet, which usually consisted of fish and water, was so successful for some bodybuilders that they competed without carbing-up.

In the last few days before the show, we would eliminate all salt and drink only small sips of water. The last resort, after switching steroids and eliminating salt and water, was to sweat it out in saunas or plastic sweat suits. Sometimes we would wear the sweat suit in the sauna! That was the state-of-the-art until the early 1980s.

If a bodybuilder did use a diuretic, we all thought that he just didn't try hard enough. He didn't diet hard or long enough, or had the wrong drugs (because he was stupid) or just didn't have the guts to do without carbohydrates, salt and water. For a time, diuretics were for fuck-ups.

I can't remember when popular opinion changed. Slowly, through gossip, innuendo and vacation stories from California or Europe, we all learned about Dyazide, the potassium-sparing diuretic. We thought: potassium is the good mineral in muscles. Sodium is the bad mineral in skin (sweat is salty, right?). If we used a diuretic that got rid of the salt and left the potassium, that was good, wasn't it?

From that point onward, anyone using Dyazide for pre-contest was not a fuck-up; he was in the inner circle. We started to use other diuretic-like drugs. We used Aldactone for a week before taking Dyazide. We bought Thiomucase from France, both creams and suppositories. The least squeamish of us did numerous tiny injections of Thiomucase or Wydase with insulin

needles directly into the fat areas to lose water. By 1985, the state-of-the-art had been redefined.

Bodybuilders went even further. We took non-aromatizing androgens like Finajet and Parabolan, along with Drolban, Masteron and Permastril. These highly androgenic steroids made the skin look thinner and the muscles denser. Instead of just changing steroids during contest preparation, we added new ones. I haven't even mentioned the thyroid medication, tanning accelerators and anti-estrogens that we used to achieve the perfect stretched-parchment look of the skin. Do you still wonder how the term "chemical warfare" got associated with bodybuilding? I know. I was there, in the trenches.

In 1986, the US Government broke the underground steroid black market network. Most doctors who had freely prescribed steroids and accessory drugs to bodybuilders wouldn't prescribe them any longer. The range of available contest preparation drugs has narrowed. Many of the non-androgenic steroids are either not sold in America or not sold at all. Most drugs available now would not have been my first choice then. Anything that is not counterfeit is desirable.

As anabolic steroids became less available, bodybuilders experimented with other techniques to enhance performance. Growth hormone (GH), which had been employed on and off since the early 1980s, was used extensively in the early 1990s. Many bodybuilding contests were drug-tested, and GH was undetectable. Professional bodybuilders, who were making more money, were willing to spend it on an undetectable performance enhancer. Through trial and error, growth hormone use became more sophisticated, with anabolic effects that sometimes surpassed steroids.

Thermogenic agents, notably clenbuterol and ephedrine,



were "discovered" in the bodybuilding world and were used for both pre-contest and off-season training. The strength sports, which had previously fixated on protein consumption, finally discovered performance nutrition.

At the local levels, the reduced availability of steroids was apparent. Competitors were smaller and less in-shape. However, on the national amateur and professional levels, competitors were bigger and leaner than ever. Paradoxically, the previous state-of-the-art pre-contest drugs were hardly being used at all. How did this happen?

Many of the newly banned steroids were replaced with whatever was available — usually harsh, highly androgenic steroids. Although the more "refined" steroids were desirable because they had fewer side effects, they were not as anabolic as the highly androgenic ones. Remember, none of the modern anabolic steroids ever had a greater anabolic effect than plain testosterone, synthesized in the mid-1930s.

In addition, the triple combination of growth hormone, thermogenic agents (especially clenbuterol) and meticulous nutrition resulted in a leaner off-season physique. Top bodybuilders now rarely exceed 10 percent body fat off-season. By applying these new pre-contest strategies, dieting time has been shortened. With a shorter dieting period, less muscle was lost.

Contest preparation had devolved. Pre-contest steroids, thyroid medication and mild, safe diuretics (like Aldactone and Dyazide) were thrown out the window.

At the amateur level, NPC weight divisions caused "weight diving" to become more common, especially in the light-heavyweight class (limit 198-1/2 pounds). Bodybuilders had greater muscle mass from the more androgenic steroids, but they also retained more water. Because the national weight divisions were

hotly contested, and less osmotic (water-holding) steroids were unavailable, competitors were willing to use powerful drugs to drop to a lower weight category. Bodybuilders at the low end of the heavyweight division would try to plunge down to 198-1/2 pounds, rather than face the 250+ pound behemoths.

In the past, such extreme water loss usually resulted in muscle catabolism. However, the new pre-contest conditioning techniques, which caused competitors to begin with leaner, bigger physiques, offset the problems of diuretic use.

This is the big problem with current diuretic use: Many top competitors have made it work. Many, however, who try the same trick, end up screwing up royally. Muscle loss is the least of their problems. Dizziness, cramping and nausea are common. Competitors don't make it to the contest, or drop out during the contest. Some bodybuilders come close to death. The diuretic trick really can't be practiced. The winners, obviously, are able to stay vertical long enough to perform and win.

Picture this: a top competitor uses so much diuretic that he's dropped up to 20 pounds of water weight. He's weak, sick and he feels that he's too small. He can't pump nor flex his muscles. And he wins! The spectators and judges all say he's awesome, totally ripped, freakish, in perfect shape. They don't care that the bodybuilder was dangerously ill and on the verge of passing out (or worse). In proclaiming him the winner, the judges have set a new, higher standard of physique conditioning. His extreme look is now the de facto standard. Suddenly, the contest-day "look" can only be achieved with heavy-duty diuretics. And this is a dangerous, dangerous thing.

It's really sick. The competitor, who had to live through the diuretics, can get so scared that he uses less diuretic at the next contest. He feels better this time, and thinks that his muscles are



bigger and rounder. Then, he places lower than before. The reason? He's not as sharp and defined as he was at the previous contest.

There are lots of diuretic horror stories. Cramp-ups on and off stage are increasingly common. A few bodybuilders were rushed to the hospital for rehydration. One bodybuilder died. What's the problem? Powerlifters do this scary stuff all of the time. They don't seem to fuck up.

Powerlifters are trying to make a weight class. It's a dangerous, weak and sick time for them. However, after the brief weigh-in, a powerlifter will immediately rehydrate, sometimes with the help of intravenous infusions of glucose, water and electrolytes. Bodybuilders try to stay dehydrated for almost 24 hours.

For the longest time, I have been reluctant to assist bodybuilders with diuretics. As a coach, I feel responsible for the health of my athletes, and diuretics are distinctly unhealthy. On the other hand, an athlete with the right physique can achieve a near-perfect, winning look — with the help of diuretics. If the bodybuilder doesn't have sufficient leanness, muscle mass and shape, then heavy diuretics won't help. Either vascularity, size or symmetry will suffer.

After Momo died and a few other competitors were carted off in ambulances, I thought that the diuretic problem would sort itself out. I figured that the judging standard would be modified so that people wouldn't need diuretics to win. I was a little surprised that it didn't happen. Then I began hearing about "water gurus," coaches who specialized in diuretics for pre-contest preparation. If their coaching was adequate, the rate of no-shows and drop-outs should be falling, not increasing. In addition, diuretic methods are kept secret. If there really is a better

method of using diuretics for bodybuilding contests, it should be shared with other bodybuilders so that techniques can be refined by the community. Frankly, I have a gut feeling that there is no particular diuretic technique for achieving the required look of upper echelon bodybuilding. The whole contest hinges on whether the winning bodybuilders can still be ambulatory at low water levels.

In this section, I will propose a potentially perfect way of achieving the bodybuilding contest "look," which resolves the previous problems with diuretics.

First, let's look more closely at how diuretics are currently perceived in bodybuilding. There is a lot of false information, gym talk and oral arcana. Many problems with diuretics are really caused by making do with what is readily available. The ideal choices are often obscure and hard to come by. Most of my recommendations are unusual. Does that bother you? Well, that's too bad.

Bodybuilders too often leave diuretic decisions to the last minute before the contest. Predictably, the correct choices are now unavailable, and they grasp at any diuretic that will work. You can't make an appointment with a physician and present a shopping list of diuretics, the purpose of which is to dehydrate a healthy athlete to the point of near death. Yes, all diuretics work. Given enough time and a high enough dosage, most of them will eliminate as much water as the competitor wants (which is usually too much). However, the side effects cannot be controlled when you just "make do." To perfect diuretic use (although you will eventually see that traditional diuretics must be abandoned), we need, above all else, three things: predictability, controllability and repeatability.

I'll start by debunking some common assumptions about



diuretics. Many bodybuilders think that diuretics only need to remove water and salt from the skin. Unfortunately, paper-thin skin is not enough. Separation and granularity come from the muscles themselves.

You can see this for yourself in your own kitchen. Go to the supermarket and pick out a nice lean piece of beef, perhaps an eye round steak. Trim off all of the fat and cut it into 2 pieces that have a few square inches of pure muscle. Now, take some plastic wrap and place it across the surface of one of the pieces of meat. What do you have? Muscle, dieted down with fat removed and ideal Saran-wrap skin, just like you are striving for. Put some tension on the plastic wrap, and you'll notice the difference in the appearance of the meat.

Now, remove the plastic wrap. Put one of the pieces of steak, naked and uncovered, into the refrigerator for a few hours. Marinate the other piece in a bowl of warm salty water for a few hours. Do the plastic film trick with both pieces. The plastic film is just as thin as before, but look at the difference in the steaks! The same steak, same meat, same muscle, looks entirely different. The refrigerated piece is slightly dehydrated. The marinated piece is retaining water between the cells.

What have you learned? Skin thinness is not the only criteria for cosmetic leanness. Skin tension and muscle dehydration are important also. Dehydrated muscle looks grainy, while excess water blurs the details of the muscle fibers.

The water between the cells contains potassium and magnesium in addition to sodium. You might think that diuretics remove the salt and water between the cells. They don't. Most diuretics work immediately at the kidney. Water is eliminated first from the blood, then between the cells (from both skin and muscle), and finally from inside the cells.

## NON-OSMOTIC STEROIDS

Let's discuss the tricks bodybuilders have used to exorcise the "water devil" in the past. The first trick I encountered, as I discussed earlier, was to change to less osmotic steroids. With current regulations, this is no longer possible. However, there are some advantages to using very osmotic heavy androgens during dieting.

First, you don't lose as much muscle because there is more water in the muscle cell. In addition, you will have less injuries because the excess fluid acts as a lubricant for the muscle fibers. Osmotic steroids will make you look bloated, but looks only count on contest day. Later on, diuretics can drain most of the water around the muscle cells. Water inside the cells, though, is a more difficult problem. The fluids inside the cell are maintained with an active sodium pump.

The chief problem (water-wise) with these steroids is that they increase the water inside the fat cells. A very lean person has more water in their fat cells than a fat person (whose cells are filled with triglycerides). Unfortunately, no diuretics preferentially dry out the fat cells. As the fat cells are being dehydrated, the muscle cells are also losing water, causing muscle loss and potassium excretion.

Water inside the fat cells is the most difficult (and dangerous) to eliminate. Attempts to remove it can cause cramps and blood pressure so low that you can't stand up.

The only non-diuretic trick when using highly androgenic steroids is to switch to non-aromatizing ones in combination with anti-estrogens. Masteron, Permastril, Dihydrotestosterone (DHT), Halotestin and the Trenbolones, somehow (and we don't know exactly how) reduce water in both fat and muscle cells. This switchover is a time gamble. You try to guess how long it will take for the new steroids to work their androgen magic on the recalcitrant fat cells — usually between 2 and 3 weeks. The best way to tell is by visual assessment and records from previous pre-contest strategies.



This advice does not apply to female bodybuilders. Although oral Proviron is the least androgenic, all of the nifty unusual water-reducing steroids will produce severe masculinizing effects on women.

Some people prefer Winstrol for water reduction because it is listed in the *Physicians' Desk Reference* as an approved therapy for hereditary angioedema. However, aside from being non-osmotic, Winstrol doesn't do much. Of course, a low potency steroid will appear to be extraordinary when compared to B-12 and foo-foo dust. It's only good by comparison. Winstrol doesn't cause water retention like the big sloppy androgens, and you will lose water by replacing them with Winstrol. But because the androgen receptors on fat cells have the highest affinity to DHT variants, more water is sometimes expelled with androgens than with Winstrol.

## SODIUM INTAKE

The second trick is to decrease sodium intake. In general, this is not a good idea for several reasons. First, sodium balance is well-regulated by the adrenal hormone aldosterone. After a few days on a low-sodium diet, you will produce more aldosterone. Bodybuilders want to have low levels of aldosterone. Also, as I mentioned earlier, it is desirable (except on contest day) to retain water in the muscle cells.

My recommendation, for people who do not have hypertension, is not to reduce sodium intake. On a low-calorie diet, blood pressure goes down. Normal sodium levels will allow a

better fluid balance throughout the body, a reduced aldosterone level, and more strength.

In addition, dietary sodium speeds the absorption of carbohydrates. Your carb-up won't take as long if salt is available in the small intestine during digestion. Although it is possible to get full supercompensation without salt, it takes significantly longer. The 3-day carb-up schedule is already tight, and without sodium it may take days more.

In my experience, most competitors carb-up too slow. Their muscles look fullest a day or two after the contest. Sodium is necessary to achieving three-quarter glycogen replenishment in 24 hours.

For a natural competitor entering a drug-tested show, normal sodium intake would be a liability because they would test for diuretics. If you have access to proper diuretics, then eliminating the sodium and excess water that helped with glycogen supercompensation can be done within 12 hours.

### ALDOSTERONE ANTAGONISTS

Aldosterone antagonists, the mildest of the diuretics, are the third trick. Many bodybuilders are familiar with Searle's Aldactone, the trade name for spironolactone, which comes in either 25, 50 or 100 mg tablets.

On paper, Aldactone seems like a perfect candidate for water reduction. Aldactone blocks the aldosterone receptors at the kidney so that more sodium is excreted, taking water with it along the way. Aldactone is a "passive" diuretic — it doesn't pull as much sodium and water out of the body as other (real) diuretics do. Bodybuilders like Aldactone because, unlike active diuretics, it does not cause potassium excretion. (By the way, active diuretics do not directly cause potassium excretion. They just cause chloride excretion. Because potassium can be bound to chloride just like sodium, it is hitched out by the same mechanism.)



Some years ago when the judging standards for physique shows were less stringent, Aldactone was a nice choice because it's relatively safe. Even today, it can be used in women's competitions, which don't require the extreme leanness of the men's. For male competitors, it just doesn't move enough water out of the body, no matter how you take it. Bodybuilders usually take either the dose recommended by Searle (2 milligrams per kilogram of body weight) for the 5 days before the show or double the recommended dose the day before the show. The worst possible way to take it is every day for 12 weeks before the show.

The main hazard of Aldactone is your impatience. In many cases, Aldactone is not good enough, and you may end up combining it in a dangerous way with other drugs. Not all diuretic combinations are bad, but there has to be good science behind it. Instead of using Aldactone, and possibly combining it dangerously at the last minute, you could choose a more powerful diuretic in the first place.

As you have learned, Aldactone doesn't cause much potassium excretion. If you "fool around" with other water-dropping methods that raise the blood potassium level, such as severe water and salt restriction, another potassium-sparing diuretic or prescription potassium, things could get nasty, dangerous or at worst DOA.

You must understand the concept of potassium concentration. Even if the total amount of potassium in the body stays the same, by decreasing the amount of sodium and water, potassium *concentration* increases.

Potassium levels can only be measured by a blood test, either in the hospital after you've collapsed from severe dehydration, or in a clinic before you take the diuretics. Needless to say, you'll probably want to take the blood test beforehand.

Electrolytes in the blood (potassium, sodium, chloride and magnesium), are measured in milliequivalents (mEQ), because they are in a soluble state in the blood. The conversion of mEQs to mg varies by electrolyte. For example, 1 mEQ of potassium is equal to approximately 39 mg.

Blood test parameters for potassium are:

| | |
|---|---|
| **Normal** | .5 – 5 mEQ/l |
| **Slightly high** | 6.5 – 8 mEQ/l |
| **High** | 9.0 – 12 mEQ/l |

Blood potassium in the "slightly high" range can cause irregular heart rate. Blood potassium in the "high" range can cause paralysis and cardiac arrest. Remember, Aldactone itself doesn't increase potassium, only its relative concentration. On its own, this increase will not be a problem. However, restricting water, excessive sweating (remember the sauna and the sweat suit?), and popping Slo-Ks like candy will all influence Aldactone's effects.

Aldactone is actually an androgen antagonist. Few people notice this, probably because it is typically used for such a short time, or the barrage of androgens from external steroids simply overwhelms the Aldactone antagonism.

Aldactone is a better choice for female competitors with low to moderate muscle mass than it is for men. Female competitors have the same problems with diuretics, but to a greater degree. Women tend to have lower blood pressure even before



diuretics are used. Also, women have nausea and cramps more quickly than men do. In many instances, 300 to 400 mg of Aldactone for one day before the contest is plenty.

### DYAZIDE AND OTHER POTASSIUM-SPARING DIURETICS

Dyazide is the most popular diuretic because of its supposed potassium-sparing action. I say "supposed" because this claim is not 100 percent true. There are only two wholly potassium-sparing diuretics in America: Dyrenium (triamterene) and Midamor (amiloride). Dyazide is a combination of triamterene (50 mg) along with a plain-jane thiazide diuretic, hydrochlorothiazide (25 mg). The thiazide component causes potassium excretion.

If there are other diuretics that spare potassium better, why is Dyazide so popular while Dyrenium and Midamor are virtually unknown? Unfortunately, Dyrenium and Midamor are not very potent diuretics. Because they don't work very well, bodybuilders are tempted to radically increase the dosage. The warnings of both Dyrenium and Midamor specify that they are not to be used with like diuretics, including each other and Aldactone.

Dyazide, because it has a small amount of thiazide, causes more water excretion and better controls potassium concentration in the blood. Dyazide has been a popular diuretic for many medical conditions, including mild hypertension. Many doctors are familiar with it, which makes it easier to "find." A few capsules can easily be pilfered from someone's medicine cabinet. In the range of diuretics from mild to potent, Dyazide is one step up from the extremely mild class that starts with Aldactone. In years past, Dyazide was a wholly adequate choice for the major-

ity of male bodybuilders.

The most disappointing thing about Dyazide is that it no different from any other diuretic. In trying to chase away the last of the water trapped in the fat cells, some bodybuilders increase the dosage arbitrarily, which causes the usual side effects: dizziness, nausea, cramps and blackouts.

I abandoned Dyazide as a pre-contest diuretic for males a few years ago. Present judging standards require far more diuresis than Dyazide was designed to do. Given enough days and a high enough dosage, Dyazide will work, but it is faster and safer to pick a diuretic that will work better in the first place.

## LASIX

Even non-competitive bodybuilders have heard of Lasix (furomeside). Diuretics in general are deemed dangerous (even more than anabolic steroids) and Lasix has been the worst of the lot. Lasix horror stories are pretty common. However, it's not the most potent diuretic. On a milligram for milligram basis, the powerlifters' current favorite, Bumex, causes greater diuresis.

So why is Lasix so often bad-mouthed? Lasix pulls a lot of water out of the body and does it faster than other diuretics. It also causes the excretion of significant amounts of chloride and potassium. This potassium depletion is generally blamed for severe cramping, which is not entirely correct. Cramping can occur when using Dyazide, Aldactone or even clenbuterol (which has no diuretic action). None of these drugs cause extreme potassium depletion. The crampee would like to blame one electrolyte for the agony, and potassium is mostly held in the muscles, so Lasix's potassium excretion gets blamed. No one likes to point out that replacement potassium does not alleviate the cramping, but the damage has been done. Lasix, is reality, is



not the mother of all diuretic villains. Remember, under the wrong circumstances a bodybuilder could drop dead with a handful of Aldactone and a bunch of bananas.

Lasix, properly used, is the best diuretic for male competitors. It is only when used haphazardly that it is dangerous. Most competitors don't bother to read the instructions on the label, and if there is no label, they won't read the warnings in the *Physicians' Desk Reference*. You *must* take blood tests one week before the contest. The two most important ones are potassium (no surprise here) and hematocrit. Obviously, to fit into my "having your act together" category, you should monitor your blood pressure. You would be shocked at how often such a simple thing is not done. Blood pressure is a fairly good predictor of when you are about to go horizontal.

Before I tell you what I've done, it's important to explain what I don't do. I don't recommend sodium or water restriction. I don't recommend taking Aldactone or Dyazide beforehand. I don't recommend gimmicky no-drug tricks like sodium loading. These methods will interfere with the carbing-up period which should be done, by the way, by Friday morning. I try to achieve total diuresis within one day of the contest. Since most contests are held on Saturday, the dehydration begins around noon on Friday, with most of the work done by Friday evening to be ready for the next morning's pre-judging.

## BLOOD CONDITIONERS

Actually, the preparation for the one-day diuresis starts 2 weeks out from the show with two drugs that I call "blood conditioners". To help you understand how they work, I'll explain what hematocrit is.

Blood is made of many substances, but we can broadly cat-

egorize it into two parts. A certain amount is a liquid, the plasma. The rest, the blood cells (both red and white) and platelets, is solid.

If you were to take a whole blood sample and spin it fast enough (please, don't try this at home) like some miniature out-of-control merry-go-round, the two parts would separate. The parts can be measured with a fine ruler. The ratio of the solids to the whole is the hematocrit number. For men, the average is 40 to 50 percent solids. Women — who have virtually no testosterone — don't produce as many red blood cells, and their blood is only 30 to 40 percent solids. Classic anemia is signified by hematocrit below 30.

Weight loss and overtraining will lower hematocrit, especially in women. Steroids will increase hematocrit to the low 50s for both men and women. However, if hematocrit reaches 60, things can turn serious.

A person with hematocrit of 60 or above is in a dangerous state. The thickened blood is more difficult to pump through arteries and capillaries. The solids in the blood are less slippery, and can clot, causing a stroke. If a doctor found an ordinary, well-hydrated person with a hematocrit of 60 or above, he would recommend drawing off a pint or so of blood.

When using diuretics, the solid portion of the blood is the same, but the amount of plasma is reduced. Severely dehydrated bodybuilders will sustain a 24-hour hematocrit of over 70! Obviously, this is not healthy. However, this (dangerous) state is currently necessary to achieve a winning physique.

Blood conditioners help offset the effects of a high hematocrit ratio. Two weeks before the competition, you should start taking Ticlid and Trental. You should read about them in Chapter 30 and in the *Physicians' Desk Reference*. Ticlid prevents



clumping and Trental makes the blood cells more slippery and flexible. Neither imparts any cosmetic benefit. I recommend them for protection against an accident. Of course, there's no guarantee, but it's just common sense to reduce the risks. Also, be sure to read about the side effects. You will bruise easier, and minor cuts will take a long time to stop bleeding.

### THE DAY BEFORE THE SHOW

Let's imagine that we've convinced a doctor to prescribe the blood conditioners. Let's say we've also had your blood tests done on the last day of dieting (about 8 to 9 days before the show). Ideally, you will have a very high potassium level, about 5 mEQ/l, and low hematocrit, perhaps in the low 40s.

What is this "we" stuff? Well, you won't want to do this alone. Of course, a physician would be an ideal assistant. Your second choice is an emergency room nurse. However, the assistant will usually be a friend, spouse, coach, water guru — none of whom are qualified to be messing up this healthy athlete with dangerous drugs. Let's face the unfortunate truth: Most competitors will be using the damn diuretics. To make the best of a going-to-be-bad situation, get the most informed assistant you can. You and your assistant have me as a guide, and I've been "messing around with diuretics" for about 12 years. I have only had one competitor go horizontal and that was over a decade ago.

This next section covers some unusual, even creepy, territory. The array of diuretics I'll describe is unique to me and my competitors, probably because these drugs are not common, in-the-bathroom-medicine-cabinet diuretics left over from when granny went into the freezer. Each of these drugs is the best for its purpose.

One last comment: I have never recommended that a competitor use diuretics. I really wish that the judging standard for top bodybuilding contests could be relaxed a bit. But it has not happened. It will not happen. In my mind, recommending the use of diuretics is both dangerous and immoral. However, once you've made the decision, I feel it's immoral not to help keep you functioning — or at least be on hand to call the paramedics.

On the day before the contest pre-judging, the work begins at 8:00 a.m. Administer 250 mg of Diamox intravenously.

Diamox is available as tablets, capsules and as an intravenous injection. All three work the same, and since it's used a day before the show, absolute speed is not essential. However, I prefer injectable diuretics whenever possible. Injectables always work fast, and more importantly, they are predictable, controllable and repeatable.

It's hard to duplicate the effects of oral diuretics exactly and with consistency. Absorption time varies. Once you swallow a tablet or capsule (sometimes a handful of them), we have no idea when the drug reaches the bloodstream, nor can we consistently replicate peak diuresis or length of duration. When using injectable diuretics I can predict down to the minute when the bladder is filling. For example, I know that within 5 minutes of administering Lasix, the competitor will want to urinate and will continue going back and forth to the toilet for 30 minutes.

If a bodybuilder swallows 400 mg (8 capsules) of Lasix all at once, I can tell that he's headed for trouble, but I won't know how bad the trouble is for a while. Obviously, this does not fulfill the requirement of predictability. By the way, that particular real-world example ended up in the emergency room in the middle of pre-judging (not one of my clients). I know using



intravenous diuretics looks creepy. But from a practical standpoint, it is a safer, less dangerous (notice I didn't say "healthier") way to go.

Why Diamox? Does it have some special magic? Not really. I use it because it is not as troublesome as other diuretics. It seems to eliminate the water without dropping blood pressure as much as equally-effective diuretics. Also, it is hard to overdose with Diamox. Doing something stupid with it will not get a competitor into the hospital. We usually do the whole 500 mg vial, half at 8:00 a.m. and the other half at noon.

Ideally, by about 4:00 p.m., the competitor will look perfect. That would be very nice, as his blood pressure is reasonable and he will feel pretty good for the pre-judging. Usually, though, Diamox alone is not enough. It has removed some interstitial water without plummeting the blood pressure downward, but there is still more to do.

Before we discuss the next diuretic, we should discuss blood pressure. The "big number over the little number" that the doctor gives you are called systolic and diastolic pressure. Normal blood pressure is around 120/80, and should not be higher than 140/90. Even small changes in blood pressure will affect the mood of the athlete. Small drops cause lethargy and depression — definitely unfun. If your blood pressure drops to 80/60, you are not going to be a happy camper. Some people normally have a blood pressure of 80/60, but any quick descent will make you dizzy if you sit up or stand. Usually, though, 80/60 is workable; you are at least ambulatory. You will be able to make it through the pre-judging without cramping up or doing a header into the judges' table.

At 60/40, you will not be conscious, but still alive. Between 80/60 and 60/40 is the phantom zone. Really hapless competi-

tors will be doubled over with cramps even above 80/60. Others have the knack for staying vertical, and even maintaining vascularity. Some bodybuilders have such high hypertension to begin with that the diuretics just make the blood pressure readings normal. The whole point of a very regimented diuretic procedure is finding the limits and being able to repeat them. It's a little more precise than, "Gee, I really fucked up this time around. I'll never do that again."

### THE NIGHT BEFORE THE SHOW

By 4:00 p.m. we should know if we need more aggressive drugs. If you do, you should now swallow one tablet only (500 mg) of Mydox (metolazone). Unfortunately, Mydox is only available in pill form. Zaroxolyn, which is slightly longer lasting, is also acceptable. Because Zaroxolyn is over-the-counter in Mexico, it is easier to get than Mydox. To speed up the action of Zaroxolyn, crush the tablet(s).

Neither of these would merit any attention at first glance. They are garden-variety thiazide diuretics. You'll find a number of them in the *Physicians' Desk Reference*. They're ordinary, oral only, not potassium-sparing, not very fast-acting, and not nearly as potent as Lasix or Bumex. What's the deal?

I call them synergizers. All alone, Mydox is nothing special. But when coupled with Lasix (furosemide), it is quite remarkable. Using Mydox allows you to use 1/4 (or less) of the usual Lasix amount. Conversely, Lasix multiplies Mydox's effect 4 times. Why not use more Lasix? It's all going to end up with a dehydrated athlete and piss in the toilet anyway.

Using Mydox is a matter of aesthetics. There is elegance in forcing a drug to perform at its best at a minimal dosage. It's like adding caffeine and aspirin and grapefruit juice with ephedrine,



when you could have just used more ephedrine.

The timetable so far:

| | |
|---|---|
| 8:00 a.m. | Diamox |
| 12:00 p.m. | Diamox |
| 4:00 p.m. | Mydox |

By 8:00 p.m. Friday night, most of the water should be gone. For the next 10 hours, the Mydox will only cause a small amount of diuresis. When the morning pre-judging begins, your bladder won't be constantly filling.

At this time, you must decide whether or not the diuresis is "good enough." The decision should be based on three things. First, obviously, is how you look. Next, check your blood pressure. The reading at 8:00 p.m. will be the highest. Any further diuresis will cause a drop in blood pressure. Careful records from prior diuretic experiences will help us gauge how well you can handle low blood pressure. The last factor is how you feel. Can you stand up rapidly without swaying? Are you lethargic? Do you cramp when posing?

Between the Diamox and the Mydox, most male bodybuilders will be in winning condition. Their blood pressure and electrolytes are lowered, but not alarmingly so.

If the diuresis is not good enough, you will need a course in Practical Lasix.

### PRACTICAL LASIX

Most competitors use the 40 mg tablets. I do not. Actually, I prefer the big whopper, the 50 ml, 50 mg/cc veterinarian industrial strength bottle used on horses. It's unusually cheap, and since we will be using only 10 mg at a time, we can use a

nice, small 30 IU, 29-gauge insulin needle. You will be injecting less than 1/4 of a milliliter.

I have hypertension (runs in the family) so I've had the luxury of personal experimentation with intravenous Lasix in varying amounts. I think I'm an expert on Lasix. Top on my list of "don'ts" is: "Don't do Lasix on no-carb days and when blood sugar is less than 50."

The *Physicians' Desk Reference* recommends using Lasix in a controlled drip infusion of no more than 4 mg per minute. We have not done this, ever. The advantage of intravenous injections over intramuscular injections is the speed and predictability. The Lasix starts working in 5 minutes and stops working in 30 minutes. Because Mydox is still in the system, we will be giving only 25 IU with an insulin syringe, which is 12 mg of Lasix.

With intravenous administration, we can check the basics — blood pressure, appearance, ambulatory status, dizziness, nausea and cramping — every 30 minutes. With controlled diuresis, there should be no surprises, no "better call 911" mishaps.

After a few administrations of Lasix, you should hit the "look" right on the money. After that, all you need to do is relax, eat normally, and hold this cosmetic zenith until pre-judging.

## ELECTROLYTES, CRAMPING AND DRINKING WATER

All three major diuretics — Diamox, Mydox and Lasix — eliminate both sodium and potassium from the body. How should we deal with potassium? Too much is just as dangerous as too little. We don't have access to rapid blood test results like a hospital emergency room has. This lack of precision is maddening. Since you can't look at urine and tell how much potassium is in it, the best you can do is make an educated estimate of how much potassium was lost.



Normally, about 20 mEQ/l of potassium is lost in urine. You will need to urinate into a cup and measure the amount before you flush it down the toilet. You can buy a 500 ml (half-liter) glass measuring cup at a gourmet kitchen supply shop or a chemical supply house (although it's probably best not to tell them what it will be used for). From the Diamox onward, every urination has to be measured and written down.

You should be eating and consuming liquids in the usual carb-up manner all day Friday. Don't be fanatical about restricting sodium to zilch; just try to avoid adding salt to your meals. Some bodybuilders even avoid toothpaste because it contains a small amount of sodium. Being concerned with sodium in toothpaste is more of a psychological problem than a physical one.

In average people, dietary potassium averages between 40 and 80 mEQ per day. Bodybuilders are bigger and eat more, so they eat more potassium than the average person. The number of liters of urine is multiplied by 20 mEQ to determine a low estimate of how much potassium was lost in the urine. A lab test would show a higher amount of potassium in the urine than this estimate, but this is all we have. By the way, potassium is expelled with respiration and sweating, too.

Many pre-contest bodybuilders try to replace potassium with bananas or 99 mg over-the-counter tablets from a health food store. Others use Slo-K (prescription potassium). The trouble with bodybuilders before a contest is that most get a little gonzo near the end and do panicky, drastic things, always out of sight of the coach or assistant. Then they lie about it. Typically, they sneak Slo-K or Aldactone before Friday and don't tell me about it. More diuretic horror stories are from too-high potas-

sium than the reverse. Competitors don't realize that what they think is cramping is actually close to paralysis, which is close to cardiac arrest. Did you know that potassium chloride injection is a common method of execution?

I prefer Polycitra-K, available by prescription, for potassium replacement. It comes in either in an oral solution or crystals, which need to be dissolved in water. The crystal packets are compact. Each contains 30 mEQ of potassium which should be dissolved in 6 ounces of liquid. To be conservative, you should replace half of the estimated amount lost (20 mEQ multiplied by the amount of urine excreted in liters).

For example, after excreting 3 liters, you have lost at least (and probably more than) 60 mEQ of potassium. I would recommend just 1 packet of Polycitra-K for really sneaky competitors, and perhaps 1 1/2 packets with bodybuilders I have worked with before.

You will also lose some magnesium, and I recommend a few antacid Maalox tablets throughout the day to replace the small amount lost.

Even after you have stopped taking diuretics and you are happy with your look, it's still important to continue to measure urine excretion. Although most of the effects of the Lasix stop after 30 minutes, there will be some residual action throughout the rest of the night. It's prudent to replace all further fluid loss. Actually, you should replace a bit more than the urine volume because the body loses water from perspiration and respiration.

None of these cautions will guarantee that cramping won't occur. I wish I had a cure for cramping. It is not caused by something as simple as "too low potassium," but by an imbalance between sodium, potassium, magnesium and calcium. Some bodybuilders are just prone to cramping whenever they



are dehydrated past a certain point.

The only way to avoid cramping is, of course, by avoiding diuretics and clenbuterol. It's easy to stop clenbuterol a few days before the contest. The only medication I know of that prevents cramps is prescription Quinamm (quinine sulfate). Dosage is 1 tablet at bedtime and then another in the morning.

## CONCLUSION

As cautious and sophisticated my diuretic methods are, I am not particularly happy with them. The problems at the root of diuretic use cannot be eliminated. All diuretics thicken blood, lower blood pressure and imbalance electrolytes.

I've recently learned about a better solution. It has so much promise that traditional diuretic use for competitions may become obsolete.

Diuretics are frustrating. Usually, the competitor can only get oral diuretics, which he uses for a few days before the contest with no supervision. Often, he takes too much, and bad things happen.

In complete candor, even when you have easy access to the ideal choices — Ticlid, Trental, Diamox, Mydox and Lasix — and follow my recommendations, the end result is virtually the same. The reward for being specific and methodical is better control. It's somewhat more precise, predictable and (I hope) repeatable — and at least it recognizes the inherent danger of diuretics.

Drug testing is on hiatus in professional bodybuilding. IFBB contests now have physicians to help competitors who are already in trouble. I would love to see every competitor get a quick electrocardiogram and blood pressure check before the pre-judging. These two non-intrusive tests would help deter-

mine if the competitor is fit to compete.

Using diuretics to "harden up" the physique is a backwards way of doing it. Our goal is to get water out of the skin and the space between the muscle cells, but since diuretics work at the kidney, dehydration of the blood will always occur first.

Ideally, we'd like to get the water out of the skin and the interstitial spaces without disrupting blood pressure, potassium or hematocrit.

I'm currently refining a new way of eliminating water from specific areas. Unfortunately, to the layperson the whole procedure looks dangerous, creepy and just too wild.

In some situations, hospital patients need to reduce edema (swelling) in certain tissues without lowering blood pressure (such as cardiac patients, burn victims and people with brain injuries). In these instances, doctors don't use diuretics, but a curious class of substances called plasma expanders. The primary purpose of plasma expanders is to replace lost blood volume. Plasma expanders are mixtures of water and unusually long-chain starches similar to glycogen.

Why starches in the blood? Here's how they work. Soluble starches can't be transported into the cells like glucose. The liver doesn't have the proper enzymes to break them down into simple sugars. Their large size makes them hard to excrete from the kidneys.

These starches cause a lower osmotic gradient in the blood. Do you remember that for each gram of glycogen roughly 3 grams of water is stored? The glycogen causes intracellular water retention by creating a low osmotic gradient that forces electrolytes and water in to balance it.

To put it simply, long starches attract electrolytes and water. The water and electrolytes flow from the extracellular spaces of



the tissues and into the bloodstream. In terms of blood pressure, this has an effect exactly opposite to diuretics. Blood pressure will increase from the water and electrolytes flowing into the blood from the skin and interstitial spaces. The result is exactly what we'd like — low water in the skin and spaces between the muscle cells, with decent blood pressure and hematocrit.

However, high blood pressure is dangerous too. We'd need to use a diuretic along with the plasma extenders to keep blood pressure from rising too high. We also need to investigate their effect on the central nervous system.

Here's the creepy part. Plasma extenders have to be administered intravenously over a few hours, usually in 500 ml dosages. This means a butterfly needle, tubing and an elevated bag on a movable stand. To most people this is not the picture of a healthy, vigorous athlete. But I think it is the way of the future. It will be less dangerous and give a much better look.

### MANNITOL

Mannitol is not a true plasma expander, but a simple sugar that is used as an odd intravenous diuretic. It has a relatively small molecular weight of 182.17, which causes it to be excreted rapidly out of the blood. It is not easily transported and creates a low osmotic gradient. It may be a good choice for pulling water out of the tissues and eliminating it from the body swiftly. It is not tested for.

### DEXTRANS

Dextrans are long-chain starches created from sucrose by bacteria. Dextran 40 has a molecular weight of 40,000, and stays in the bloodstream for 12 hours or less. Dextran 70 has a molecular weight of 70,000. Dextrans with a molecular weight over

50,000 stay in the blood for 24 hours, pulling water in the whole time.

**HESPAN**

This is the mother of all plasma expanders, with a molecular weight between 400,000 and 500,000! Hespan is the trade name for hetastarch, which is made from amylopectin, one of the component starches in waxy corn. Hespan will pull water into the blood for a few days. Because it would be difficult to maintain normal blood pressure for this long, Hespan is probably unworkable.

Unfortunately, all this is conjecture. I don't know of anyone who has experimented with plasma expanders for bodybuilding contests. However, I predict that within a few years these seemingly bizarre methods will be standard with some competitors. There is too much money to be made. In many contests the difference between being in the money and being in sixth place (or finishing) is a matter of slight water retention.

In years past, bodybuilders used anabolic steroids, thyroid hormones and anti-estrogens, which had been used for decades with an astonishingly low incidence of harm. They are not benign, but also not unduly hazardous. However, because of diuretics, the medicine cabinet is no longer a toy box.

As sports go, bodybuilding doesn't seem dangerous. It is certainly less hazardous than scuba diving, mountain climbing or auto racing. There's been only one death over the last few years. But using the word "only" belittles its significance. Even one death is one too many. Officials, judges and contest promoters should have changed the rules, but didn't. I wish that I didn't have to write this section, and I invite other, perhaps more qualified, people to fix this problem.