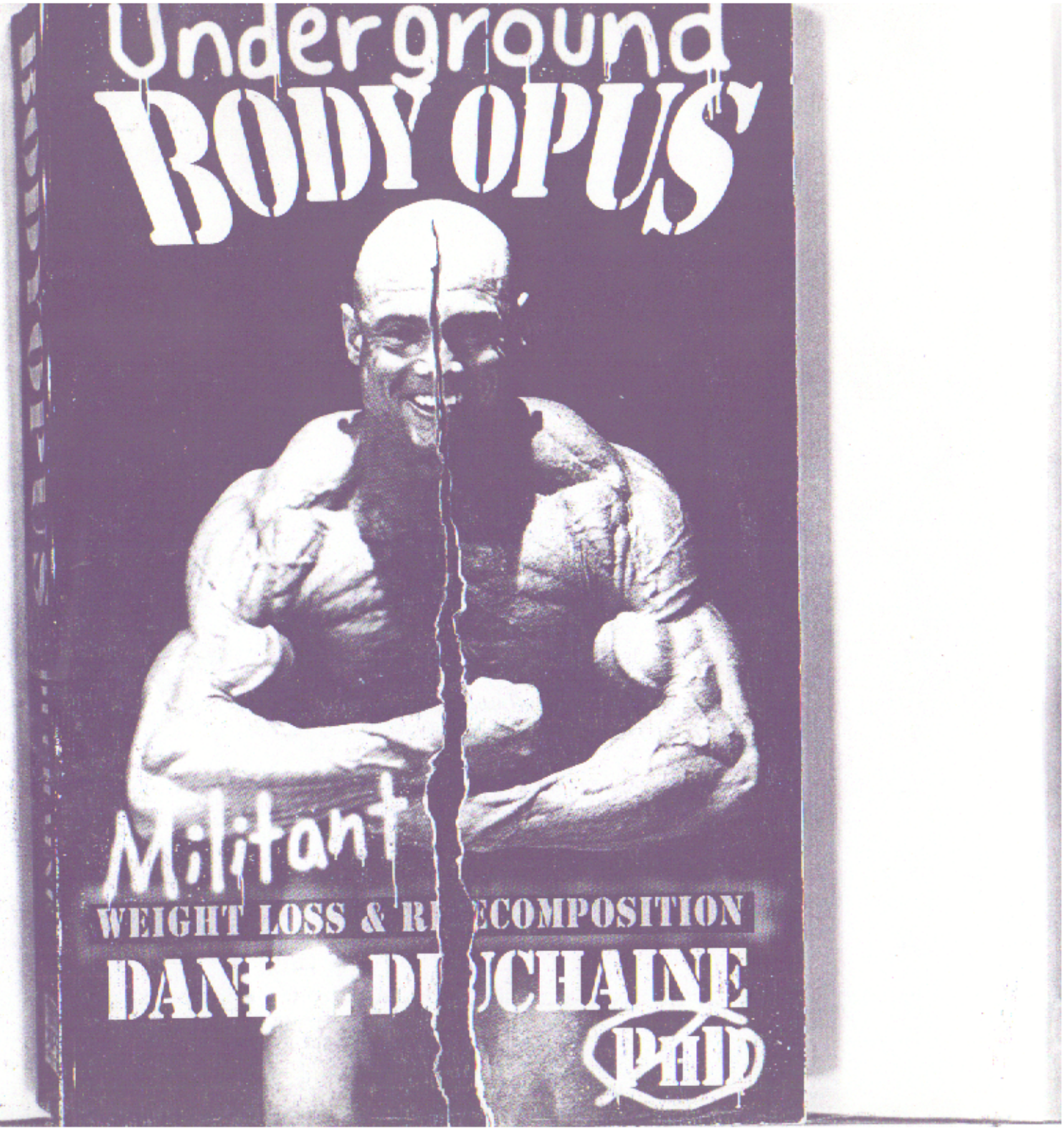
Underground
BODY OPUS
Militant
WEIGHT LOSS & RECOMPOSITION
DANIEL DUCHAINE
PHD

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UNDERGROUND BODYOPUS MILITANT WEIGHT LOSS & RECOMPOSITION

CHAPTER 1

INTRODUCTION: A DIET BOOK FOR PEOPLE WHO AREN'T FAT

YOU'RE NOT OVERWEIGHT; you're normal. But there's an itsy-bitsy secret, a painful part you keep to yourself because nobody will believe you. Well, I'm onto you. I won't blab, but *I* know, because I'm a professional body confidante. The hush-hush is this — you're *still fat*! Now relax. That was the worst news. The good news is that you're not crazy.

You and I both know that you've been the good diet soldier — graduated from Weight Watchers, rotated your diet and embraced fit over fat. Perhaps you've even dabbled in *Life Extension's* powders and pills. Your doctor, looking over your weight, cholesterol and various blood tests, proclaims you marvelously healthy. Your nutritionist is upbeat; you're on course. All those food labels at the supermarket are now memorized. (Alas, poor yogurt, I knew him well.)

And finally, your clothes. Your trousers or your dress size — they're the same sizes that the models wear (But Floyd, *lose* the Jockey shorts. They spoil the lines of the dress.)

Victory! You're not obese, not overweight — you've finally arrived. You're — ah, well — normal. Happy at last? No? Of

course not. Deep down in your heart of hearts, you know that normal is just ... normal. But let me gently remind you, you're still not fat. You're trim, toned, fit and in shape.

I'm here to present you with ways of *realizing your dreams*, the so-called physically impossible ones, by using a revolutionary new way of coordinating your diet and exercise to achieve an optimal metabolism. It doesn't require much time, just 3 days of exercise, a total of 5 hours per week. You need a moderate amount of eating discipline, but you can "let loose" on the weekends. Interested? Read on, and I'll show you a *wild* new diet system and a host of secret, insider body(building) tricks. This system will allow you to become exceptional — beyond normal — with the ability to ascend to a higher standard, perhaps to the highest standard: an optimized metabolism. If your ideal is to be a Wonderman or Wonderwoman comic book hero from your childhood, or a body model, triathlete or bodybuilder, you can set your own standard. And you can finally attain it.

It's important for you to understand the entire title of this most unusual book: *[UNDERGROUND] BODYOPUS [militant] Weight Loss and Recomposition*. Each word is significant. *[UNDERGROUND]* means not generally known, hidden. Many techniques and shortcuts that you will learn in BODYOPUS are secrets that even doctors don't know yet. Although they're not buried like pirate treasure, these powerful metabolic adjusters are not known to ordinary dieters and GPs. The secrets? I happen to know *all of them*. I discovered many of them while solving bodybuilding problems (which I do for a living). All of these "dirty tricks" are scientifically valid and researched — no body voodoo here. The result? Supra-healthy, long-lasting, vigorous, athletic and, in my mind, *beautiful* bodies.

Next word: *BODYOPUS*. Flat out, I made this word up. An "opus" is a numbered musical composition. Changing your body is more than just diet and exercise, biology and physiology. It is also body art and aesthetic decisions. What good is an ultra-lean athletic body if your face looks like death sucking on a cracker? Your hair, skin, face and even (yes) toenails, are all part of your body sculpture. Let's be realistic. Most people will be looking at those areas first, not immediately at your keester (shame on you). BODYOPUS is shape, art balanced with metabolism, optimized chemistry reactions. I hope you'll accrue enough body wisdom to understand that leaner or bigger or more impressive is not necessarily better. BODYOPUS is optimized aesthetic body *balance*.

Militant is a word people are touchy about, but it is particularly applicable to this book. Diet and exercise should be rooted in science and biology, but they are often swayed by trends, fads and public charisma. Diets, exercise programs and even nutrients are often victims of fashion. I hope that all of the products that are touted as metabolic miracles will fulfill their claims. Unfortunately, the creation of most diet books, health foods and sports paraphernalia is not inspired by the desire for optimal health. It's naked (and sexy) consumerism. Buy my book, my vitamin, my exercise gear. Subtext: I want your money. Oh, by the way, some of this stuff might help you out.

In BODYOPUS, I'll present techniques and chemicals (over-the-counter, prescription and non-FDA-approved) that may go against accepted public opinion, but you won't have to break any laws. Remember, the medical profession in the United States is designed to maintain your normalcy. Optimizing your body, metabolism and health is considered quackery to the FDA-AMA status quo.

However, lean wanna-be's, there's a complex and diverse world out there. There are exciting studies, medications and nutrients from Europe, the Orient and the Third World. You can't totally dismiss their medical contributions as backward or ignorant. The people who live and work in these countries have the same desires and problems that we do. To disregard their scientists' work, considering it invalid, ineffective or dangerous just because it doesn't have an FDA blessing, is a socially repugnant attitude on a global scale.

We have to be somewhat militant about our nutrients, drugs and dieting techniques. In order to ascend past the AMA-FDA-approved normalcy, we need the whole world as our supermarket, health food store and drug store. Many worthwhile (but not mandatory) shortcuts in BODYOPUS involve personal importation, gray market buyers' clubs and research chemicals — not mainstream nutrition. You won't break any laws; BODYOPUS doesn't require guerrilla medicine. But you might be considered ... ***militant***.

The phrase ***weight loss*** is deceiving. BODYOPUS goes beyond the usual diets, which are concerned with only one thing: losing weight by lowering your food intake. BODYOPUS, on the other hand, is a complete system. Of course, some calorie restriction is necessary. Beyond that, BODYOPUS' efficient system of fat loss coordinates with other things. Gee, is it ... *exercise*?

BODYOPUS' training program is complemented by the *type* and *amount* of food you eat. BODYOPUS will also teach you to trick your metabolism into burning more calories than you can with the "calories in/calories out" dogma that you read in mainstream periodicals and the latest self-help books. I've raided the obesity, diabetic, life extension and geriatric research. I've pulled

tricks out of the professional bodybuilders' grab bag of dieting goodies. I've also included most of my personal body secrets, perfected over 15 years of solving body problems. Some solutions are from cutting edge research. Others are techniques that have been forgotten or have fallen out of favor. The really special ones, which I call "Guru's booty," are gems beyond accepted science. Until we figure out how the trick works, it will look like *magic*.

The last word in the title is ***Recomposition***. The dirty little aspect of weight loss that diets have to address is muscle loss. Whenever you reduce calories to lose body fat, you also sacrifice muscle. Sometimes it's a significant amount; other times, it can be measured in mere ounces or grams. However, the status of your lean body mass directly affects both your metabolism and your ultimate shape. Replace, maintain and increase muscle — Recomposition accomplishes all three.

Sure, most diet books or exercise programs will stoke your hopes and dreams. The whole self-help genre is a wish-fulfillment-instant-gratification-come-on. Certainly, I seem to be promising something unattainable.

Why use BODYOPUS? Because it works spectacularly well. I won't lie — it's not an easy, walk-in-the-park program — but it is effective.

Why me? I have the reputation of being the best at what I do.

Why now? Well, after 12 years, BODYOPUS is finally ready. So let's go! It will be the adventure of your life!

CHAPTER 2

WHAT WE'LL ACCOMPLISH IN BODYOPUS

LOTS ACTUALLY, probably too much. Although this book has a bodybuilder on the cover, BODYOPUS is intended for *any* healthy person who is not classically obese. You will be expected to diet for 5 days out of 7, and you must commit to 3 days of working out (a total of about 5 hours a week) with a weight-training program.

Who am I looking for? Who is the ideal BODYOPUS candidate, and why? If you are a man, your body fat percentage should be no more than 15 percent. For women, it should be no more than 20 percent. I don't want to deal with the typical, *normal* fatty. Is that so wrong? No. I expect higher quality material. These figures are average for young, healthy, semi-active adults. Although researchers and doctors adjust their range of ideal body fat percentages upward as people age, this is unnecessary. They are forgiving their patients' slack habits, lack of discipline and inactivity. Well, you'll find no sympathy here. Your body doesn't automatically get fatter as you age. Some metabolic processes change (always for the worse), but the usual culprits are sloth, gluttony and comfort. Am I a pain in the ass, or

what? Of course I am. It's part of my job. Besides, I never promised to be nice.

Men and women with 15 and 20 percent body fat, respectively, are considered by medical professionals to be normal, non-overweight and healthy. This is because most doctors are not very healthy, lean or active themselves. Most athletes consider 15 or 20 percent body fat to be out of shape. Zealot dieters consider 15 or 20 percent body fat obese. In a few sports — swimming, football, sumo wrestling — athletes tend to be heftier. Usually, however, extra body fat is unnecessary and aesthetically unappealing (fetishists excepted). Fat is not healthy, and will probably be shown to be an impediment to long life. The averageness around you has made you too complacent. You accept "pretty good" as normal. I'd like to show you *great!*

The BODYOPUS goals are: men, 6 percent body fat; women, 10 to 12 percent. Below 10 to 12 percent body fat, many women have problems producing estrogen, which is necessary to maintain ovulation and bone density. Many women can maintain estrogen production at 12 percent body fat, but only a few can achieve 10 percent body fat year-round with no ill effects.

These figures, 6 percent for men and 10 to 12 percent for women, were not chosen arbitrarily. I arrived at these ideals while working with hundreds of athletes over the last 15 years. At these percentages, there is a balance between leanness, vigor, energy and a socially acceptable non-gaunt face. You will banish the jiggle in your backside and love handles, while retaining a happy, non-suffering face.

You may wonder why I don't use BODYOPUS for the obese. If it works, wouldn't it work for all fat people? Fat is fat, right?

There are lots of diets in America — in books, at weight-loss centers, even in the magazines at the supermarket checkout

line. It doesn't take a Rhodes Scholar to know that all of these diets work. They will all help you lose weight. They push all of the buttons: low fat, high carbohydrate, high fiber and moderate exercise. As long as you have a decent amount of discipline and actually follow the diet, you will lose fat. For most overweight or obese people, these safe and sane diet plans are the logical way to go. Why fight it? Big business dieting is backed up with group support and individual counseling; the food is trendy and palatable.

Most overweight people should follow a sensible, easy-to-follow, medically approved diet that includes some kind of pleasant calorie-burning activity. Overweight and obese dieters need to lose a tremendous amount of weight, which can take months, perhaps even years. Until your body fat is 15 or 20 percent, find a diet plan that you can live with. You'll have access to a zillion diet foods and snappy pep-talk magazines to get you through the deprivation.

All of the popular diet and exercise programs (we don't need to name names) are designed to get you back to normal, to ordinary. But what if you want to become *extra*ordinary? What do you do then? Let me point out a few problems that most post-graduate dieters encounter.

The biggest impediment to your ascent beyond normalcy will be psychological pressure from friends, peers and the medical profession. Most athletes *do* understand a quest for leanness. But everybody else will say, "You're fine," or "You're too thin," or "Why? You look great as you are." Doctors can really quash your spirit with the testy response of "totally unnecessary and probably unhealthy."

Is the doctor wrong? Well, I think so. Excessive body fat, even at so-called normal levels, is not always caused by eating

too damn much. Many "normal" individuals have undiscovered metabolic problems. To maintain a lean body, especially as you age, you must make adjustments to your nutritional habits and exercise routines. Too much body fat is a symptom of a problem in one of these areas. The goal of idealizing your metabolism is not just pure cosmetic vanity; optimal health and vigor go along with that flashy exterior. As we age, our bodies don't just take care of themselves. However, most people continue to ignore their bodies for far too long. Don't take their platitudes too seriously. Look beyond the words and judge *their* bodies.

What's wrong continuing to use traditional diets? I've tried them all, and even the most medically and athletically correct diets allow much too much muscle loss. On your typical low-fat, high-carbohydrate, lose-a-pound-a-week diet, you will *lose one pound of muscle for every three pounds of fat!* No lie!

I find this unacceptable. BODYOPUS, of course, minimizes the dreaded muscle disappearing act. The safe and sane diets just can't keep up. BODYOPUS is elegant; it doesn't just "minimize." *It puts the muscle back on.* Think of it as an anabolic diet.

The quest for leanness turns maddening when your body won't respond the way you'd like it to. It's frustrating to try to chase down *stubborn fat*. Some truly gifted individuals have fat evenly distributed over their bodies. Their fat is really sneaky: no love handles, stomach rolls, saddlebags, droopy backsides or piano legs. On these homogenous fatties, the damned fat looks like it's defying gravity! Stubborn fat is not the same as regular fat. Sure, it's uglier and there's more of it, but this is because these fat cells have different types and amounts of hormone receptors. Stubborn fat is the last of the fat. It usually stops diets dead in their tracks. When you try to eliminate it, your muscles shrink and your face collapses into gauntness. Most diet damage (and

make no mistake, it is body *damage*) happens when chasing down the stubborn fat. Creams and injections don't work. Should you throw in the diet towel and use liposuction? I'll warn you: Liposuction leaves some funky honeycomb ridges under the skin that never smooth out.

BODYOPUS aims directly at stubborn fat from the beginning. BODYOPUS tricks your metabolism into releasing fatty acids more quickly and completely. It's not hocus-pocus, just metabolic sleight-of-hand. It's not primarily a drug trick, but I've included information on drugs and herbs too. (I couldn't resist.) Remember, I'll keep no secrets from you.

Are you having trouble believing that BODYOPUS is both fantastically effective and terribly different from all other diets? Is it unsafe and insane? No. Instead of just restricting calories, BODYOPUS manipulates nutrition and exercise to trick the body into burning fat in a very unusual way. BODYOPUS was not originally a weight-loss diet, but an anabolic system that (as a happy coincidence) happened to reduce body fat. Now, years later, I've refined it into the best diet I've ever used.

CHAPTER 3

WHO AM I?

PERHAPS YOU ARE FAMILIAR with my name and what I do. Notice that I'm not an MD, and I don't have any PhDs, either. Many athletes and news reporters call me the "Steroid Guru." It's a part I've played (and quite brazenly) on many talk shows and interviews. Stories on drugs in athletics in the American news media usually follow a good guy/bad guy/victim dramatic formula. There's no shortage of good guys and victims. As an authority on steroid use, I take the bad guy part. I happen to be the *only one* who will tell the truth and play the villain. It seems that there are no grey hats, just black and white.

Steroids are now, in my mind, passé. Does that make me, the "Steroid Guru," some pathetic throwback? I think not. I've created my own job description. Under "occupation," let's put: Human Performance Theorist.

I solve body problems, problems beyond maintenance of simple health. I work with athletes to increase muscle mass, decrease body fat, improve strength and speed recuperation. You might be surprised to know that I am apathetic toward most sports. I don't participate or view any of them. Athletes just happen to have some interesting body problems. Bodybuilders

have been especially interesting to work with because they are both technical-minded and fearless. I also work with actors and models who have a financial incentive to lose fat without destroying their salable camera-perfect face. I'm a body doctor, but it's not life or death, so I don't have to do house calls. I'm a specialist and theorist, tackling situations that most MDs and medical researchers don't even consider.

What I do, I do well. Some say that I'm the best at getting results. It helps that I have no sport scruples. I delve into areas that others are too sensitive to pursue — like beating drug tests. Sports ethics are up to the athlete and his particular sport. I just fix the body problem. As you can imagine, the solution is often against the rules or philosophy of a particular sports organization. They call it immoral or unfair. So? As I said, I don't read the sports pages in the morning newspaper. My job is to solve interesting body problems that other (sometimes more qualified) people can't or won't tackle.

As a result, I'm an obvious target for sport authorities. I also butt heads with the FDA, and now that steroids are Scheduled drugs, the DEA. Crotchety MDs, the AMA and mainstream PhD researchers don't like me either. It sure would be easier for all of them if I was just plumb crazy. Unfortunately for them, I happen to be, according to some people, brilliant and charismatic. Most of the time it's been impossible to dismiss me as "that Duchaine crackpot," because I'm usually right. I've broken a few laws; I've never been shy in pointing that out. I've been in Federal prison twice so far. Am I a criminal? That depends on whom you ask. However, I've never lied to athletes or the public. Even the Government always got a straight answer out of me. I'll never try to damage your health or shorten your life span. You will always get the brutal, honest truth, as I know it.

Am I believable? Sure. I have demonstrated my dedication, honesty and proficiency over the past 15 years. Like many coaches, I sometimes had to spring for groceries or hotel rooms for my athletes. I've helped thousands who have sent me letters. I have their trust, I think.

BODYOPUS makes extraordinary demands of you. To follow it, you will need more than just perceptible results or provable science. You need trust. Accept this, and welcome to BODYOPUS.

CHAPTER 5

BODY FAT AND FAT PERCENTAGES

HOW FAT ARE YOU? To classify how fat a person is (or isn't), we call them: obese, overweight, normal, trim, skinny, underweight and anorectic, in order of fatness to *un*fatness. Many doctors and insurance companies use height and weight charts to classify body types. However, for BODYOPUS, more precision is needed.

From our exercise-conscious American culture, you've probably learned that "muscle weighs more than fat." Scientifically, it's a matter of densities. Muscle, bone and blood are more dense than fat. Your mother skimmed the fat off the top of the chicken soup for the same reason that the grouchy next-door neighbor drained the water out of his gasoline tank after the Halloween prank — oil and water don't mix. Body fat is just a very thick oil.

To express how much of your body is composed of this oil, we use body fat percentages. Your body weight, divided into the weight of all of the fat in the body will result in a decimal number; the figure agreed on is in hundredths or percentages. Let's say your total body weight is 200 pounds. Next, we magically or scientifically weigh *just* the fat and all this yellow lumpiness is 20 pounds. We divide 200 pounds into 20 pounds and we get

.10, or 10 percent. This ratio is a much better way to show the difference between 200-pound Joe Bodybuilder and 200-pound Joe Couch Potato.

The whole point of body fat percentages is, other than morbid curiosity, to have a general idea of how *healthy* the person is. High fat percentages often correlate to disease. Overweight and obese people have heart disease, diabetes and ambulatory problems. These ailments either arise from or exacerbate the staggering burden that the live (but not lively) fat cells place on their metabolism. Yes, fat is a necessary and efficient fuel. In some parts of the body, mostly around the internal organs, fat is an essential shock absorber. Socially, some degree of fat is considered attractive; extra flesh is justified as a sign of glowing health.

This book focuses on an unusually narrow range of fat percentages. Somewhere between skinny and normal, there is an *ideal* body fat percentage. There is no consensus on it; this ideal (like all ideals) is constantly being debated and changed, dictated by both science and fashion. I've thrown out some figures; 15 or 20 percent get you inside the BODYOPUS clubhouse. I've suggested ideals of 6 percent for men and 10 to 12 percent for women. These are the ideals I arrived at after working with healthy bodies for 15 years. To remind you, I have not worked exclusively with bodybuilders; I have also helped other athletes, actors, models and dancers who wish to keep their body fat low, for cosmetic or performance purposes. Superior health, for them, is a happy coincidence.

For the longest time, scientists and doctors advocated normal fat levels, maintaining that less than normal fat percentages were unnecessary and probably unhealthy. Over the last decade, the life extensionists have accrued some credible research showing increased life spans, or at least more vigorous and active life spans, from reduced body fat levels — at least with easily measured laboratory rats and the like.

If you're looking for a written-in-stone ideal body fat percentage, you'll never find it. A regular physician who sees a broad spectrum of patients will probably recommend the traditional ratios. Sports medicine specialists are used to much lower body fat levels. Life extensionists will advocate one level, while geriatricians will quote another set of ideals for the aging body. Gynecologists are particularly adamant about the minimum body fat allowed for women. Take your pick. MDs and specialists aren't complete idiots. Each recommendation has some kind of scientific research and clinical studies to bolster it.

Let's integrate all this conjecture and apply it to healthy, athletic people. In working with the real zealots of body fat, bodybuilders, I have experienced the advantages and disadvantages of maintaining very low body fat numbers. Modern bodybuilding competitions are ultimately judged on the "nth" degree of leanness, usually well below 6 percent for both men and women. As I've mentioned, beyond a certain point, extreme leanness is not healthy.

Below 10 to 12 percent body fat, women have problems with estrogen production, ovulation and osteoporosis. Fat is intimately connected with estrogen storage, and it has the ability to convert other hormones into estrogen. The 10 to 12 percent ideal is not an unalterable rule. Some women have problems at slightly higher body fat levels. Others can maintain normal "female health" at even lower levels. Young endurance-type female athletes can have the same kinds of problems that middle-aged post-menopausal women encounter.

Of course, some women *do* drop below the 10 percent

threshold. Female bodybuilders can't usually compete (and place) unless their body fat percentage is between 6 to 8 percent at contest time. Marathoners also measure that low, although they don't look as lean as bodybuilders. Below 10 percent body fat, the body changes in ways that are considered unattractive by most. Breast tissue, bereft of estrogen and fat, shrinks — make that *collapses*. The face loses its fat sacs, becoming angular and bony. This "hard" look is viewed by most of society as "masculine." After losing even more weight, the face goes from angular to gaunt. The jaw muscles develop into a sinewy, otherworldly mask that will flex and pose with the simplest facial expressions. It's not necessarily unhealthy, but it's certainly not very calming to most of our well-fed populace. It's considered unattractive except to the odd fetishist.

At 3 to 4 percent bodyfat, the organ, marrow and spinal cord fat are all that's left. Healthy, active people rarely reach this level, although male bodybuilders will dip down this low for a few weeks during the year. Damage does happen at this level: easy bruising, blood in the urine or feces from what used to be everyday jarring and heel pounding. You certainly wouldn't drive an automobile with bad shocks for very long! You experience lethargy, anemia, hypotension and depression. Testosterone and other hormones will be suppressed. Serum cholesterol raises briefly, then plummets. Of course, if the bodybuilder is supplementing with exogenous hormones like anabolic steroids, growth hormone, thyroid, insulin (do I need to continue?), almost all of the damage is forestalled. However, it is probably dangerous to take drugs intended to improve metabolism solely to mask symptoms of poor health.

The BODYOPUS ideal is this: to maintain good health without props at the lowest possible body fat percentages year-

round. As a body techno-tweaker, I will discuss drug-like substances that I think will enhance or extend your vigorous life. However, even the most benign drugs can be used to mask a health problem. From bodybuilders to bicycle racers, all athletes have health problems that can be fixed with methods other than the politically correct proper training, nutrition and rest. Remember, BODYOPUS includes chemical additions intended to enhance your body, not just make it normal.

Over the years I haven't kept written records, files or statistics, but I've looked at an array of bodies and read numerous blood tests. I've pinched skin (in sometimes sensitive areas), dunked clients under water, painted vast expanses of skin with oils, dyes and cosmetics, shaved hairy backs (on both men and women) and even popped a pimple or two — actually, too many of those. I've read thermometers and dipped urine sticks. My clients lifted weights, ran ultra-marathons, climbed rocks or slammed violently into other bodies. From these experiences, I've arrived at my ideal figures — 6 percent for men and 10 to 12 percent for women. These percentages are healthy to maintain year round — make that *supra-healthy*. These are *not* bodybuilder competition-ready numbers, but they are damn close, and you can certainly attain a winning body fat percentage with a month of two of additional BODYOPUSizing. Most athletes will find that the 6 percent or 10 to 12 percent figures are ideal.

Keep in mind that these are my ideals, not yours. If you are modifying your life to get *my* approval, then there's something terribly wrong with your life that has nothing to do with your body or metabolism. Find an ideal that meets your *own* approval. BODYOPUS is not a raison d'être, nor a Zen-like body state. It's a collection of methods, processes, shortcuts and fast and dirty tricks — no miracles, just solutions to body problems.

Some of you might ask: "What's the point?" Why spend the time and energy to pursue an absurdly low body fat percentage? Most people won't see it; you'll be covered up with clothes in public. Friends, family and spouses may not understand or even care. For this reason, I'm going to briefly discuss the reasons why you would want to lower your body fat to BODYOPUS levels. I'm not trying to convert you to my way of viewing bodies, but to arm you with an arsenal of plausible excuses that you can use to defuse a tense social situation over your peculiar new hobby.

A prosaic one is: it's nice to know how the professionals do it. Most of the information in this book is arcane and technical. Much of the esoterica of fat loss used and guarded by the bodybuilding community has been called chemical warfare, and that's not exactly false. This book contains secrets that even coaches, nutritionists and doctors aren't privy to. Even if you never use BODYOPUS, you'll know the really cool stuff. And knowledge allows you greater possibilities ...

Of course, lowering body fat increases performance. Fat cells are beyond deadbeat cells; they're dead weight, too. Yes, fat is an efficient and necessary fuel source for aerobic muscular activity. Rudimentary arithmetic will tell you that the 3500 calories in a pound of fat is about a whole day's energy requirement. Even an ultra-marathoner who "burns up" 10,000 calories over twenty-four hours would need less than three pounds of body fat as fuel. Most athletes need much less fat fuel than this. In the modern Western world, we don't have to wait out a monsoon or drought. Extra baggage should be left at the airline counter; leave it behind (especially big behinds) or get charged for it. Bodybuilders don't even try to think of arguments — a single-digit fat percentage is part of the pursuit.

In addition, low body fat percentages are probably healthier. Scientists believe that you will live longer with less body fat. A fact is still a fact, even if it's not proven yet. You could call it "faith," acceptance without proof. Beyond normal health, we're into a new non-fat faith.

Leanness is a cosmetic necessity in many professions. Actors, models, dancers, and diet and exercise gurus are expected to be lean for the jobs that they do.

Low body fat levels allow your body to grow old more gracefully. Fat is connected to skin and neither can be toned by exercise. The only thing that holds all that fat up against gravity is the elasticity of young skin. Youth's soft and cherubic fat seems to defy gravity. Eventually, though, fat and skin sag. You *can* tone muscle all of the way into old age. Fat, however, will droop and drop. Beyond a precious jiggle, it becomes pendulous. As you age, your skin doesn't tighten. Keeping body fat low is prudent cosmetic insurance.

Personally, I like the shape of lean bodies. I'm "conditioned" to them. I find them aesthetically pleasing, and it's a longer lasting shape over the long run. Since childhood, my body type ideal, for both men and women, has been athletic and lean. I argue for health, but I admit that deep down the supreme motivation for me is plain personal vanity.

I renounce "normal" and "just good enough." Aging bodies lose muscle and gradually accumulate fat. Your overall body weight may not change from high school to middle and old age, but the quality will.

You'll have less muscle, bone and hair (with men, it will migrate, too), and more fat. Aging fleshiness is more than too much food and a more sedentary life. It's a hormonal disappearing act. BODYOPUS creates positive metabolically induced

changes through both nutritional sleights-of-hand *and* drugs. The goal is an optimized metabolism, period. This is not just good enough for à middle-aged person, or optimal for the elderly. Left to its own devices, the aging metabolism is not an efficient or vigorous or pretty thing. Without outside help, the best one can do with just good nutrition and exercise is a nice, normal, natural old body. Instead, let's flip back the metabolic calendar to an earlier time.

These are my personal motivations. I've spent a good part of my life chasing down the most inconsequential problems — balancing the bloom on the face with the tautness of 5 centimeters of skin over the navel. Foolish things, perhaps. I've failed many times. When inventing the light bulb, Edison took many years to find the brightest and longest lasting filament. During his quest, he is claimed to have said, "I don't have the right material yet, but I do know about ten thousand materials that *won't* work."

CHAPTER 6

MEASURING BODY FAT PERCENTAGES: THE AWFUL, AWFUL TRUTH

NOW THAT YOU HAVE an understanding of body fat percentages and (I hope) the urge to pursue the BODYOPUS ideal, the practical question is: How do you actually measure body fat? How close are you to the ideal now? And when will you have achieved it?

Good bodybuilding coaches don't need hard numbers. A trained eye and a smart mouth will say, "You're too far out. You're behind schedule. You're not going to make it because you're not lean enough, and you're losing too much muscle." Coaches don't need devices because they have an astute awareness of size, shape, and leanness. Ultimately, a bodybuilding contest is judged visually, not with body fat percentages. In fact, competitors sometimes mistakenly trust body fat percentages, when the mirror reflects a more accurate picture.

Eventually, I hope that by correlating what you are feeling with what you see (and understanding chemically and hormonally why), body fat percentages will become irrelevant.

As you become more in tune with your energy levels and strength, you will notice muscle loss without having to measure

or weigh anything. Until then, I suggest you use body fat percentages as a starting, ending and in-between gauge for muscle loss.

Be forewarned: once you understand how body fat percentages work, I'll do my best to bury them. When you grind downward to the last few pounds of visible fat, percentages become inaccurate. Most stubborn fat is not considered in the body fat percentage formulas.

Many methods of measuring body fat have been invented since the unpleasant Danish studies in which scientists dissected, weighed and tape-measured cadavers. Modern estimating systems range from crude to amazingly complicated, high-tech and expensive. As we discuss the methods used to measure body fat, you'll find that the more modern and precise the apparatus seems, the less accurate it really is.

Circumference measurement is the most commonly used method. It's fast, simple, and cheap — and *wrong*. It is used most often for overweight and obese people, to get a general idea of how much fat they are carrying around. It's simply the old height and weight charts, with the addition of taped circumferences (with an extra-jumbo sized tape) at various points at the body — w-a-i-s-t, lower arm, sometimes wrist. Add the weight and height and look up in the magic chart to find the body fat percentage. The circumference method is a kinder way to break the bad news to the obloid. Instead of brutally saying, "You're *too damn fat!*" they simply say, "You're 77 percent fat," and get the same effect — sinking panic and increased motivation. It's not an accurate way of doing it, but that's not the point. Circumference measurement is just a way of sounding the alarm. The only advantage is that the measurements are done — thankfully, oh thankfully — clothed.

If a person is in the 40 percent body fat panic range, hydrostatic weighing is more accurate. It's also a fair (but not simple nor compact) way for normals (15 percent and up) to measure their fat. Underwater weighing involves an unwieldy apparatus that fills a small room: a tank filled with tepid water, a swing-like scale, a regular land scale, a computer and software to extrapolate the data, and (finally) another device to measure the amount of air in the lungs. Punch all of these different values into the computer — dry weight, dunked weight, vestigial air; the result is an estimate of body density, which is then converted to a fat percentage.

Yes, it's awkward, uncomfortable, kind of embarrassing and relatively expensive. And lately, hydrostatic weigh stations have been hard to find. When I first found a tank back in 1980, I had to drive 45 miles in rush hour traffic in Los Angeles to get to it. Tanks became more plentiful during the 1980s; some companies would actually truck out the equipment to gyms and offices. These enterprises turned out to be money-losing endeavors; most went (ha-ha) under. It's a moot point, though, because if you look past the gee-whiz techno-glitter, there are simpler, more convenient and more accurate ways to measure body fat.

In a moment, we'll discuss my preferred method of body fat measurement, but before we do, haven't you ever wondered where all of the fat is? I don't mean the fat in the food — where is it in your body? The fat attached just beneath the skin, called subcutaneous fat, is the most obvious. If you think about it, you'll notice that this fat is not uniformly thick. Women store their fat in different areas than men do. Different races have different fat distribution. And, of course, your fat will migrate south as you age.

Interorgan fat, which cushions the internal organs, is usu-

ally about 3 percent of your body weight, although fatter people will have more of it. Oddly enough, some men with steroid receptors in their abdominal fat develop a pot-bellied look from the fat *under* the muscle, in the peritoneal cavity. Recent research has concluded that the existence of excessive fat in this area correlates to cardiovascular disease. It's sneaky, too. Many male bodybuilders who don't accumulate much subcutaneous fat, *do* build up abdominal fat until they almost look pregnant.

Most people don't develop significant amounts of intramuscular fat. Only the truly obese have muscles marbled with fat like the expensive beefsteaks at the supermarket. Research has pointed out that middle-aged and older men store more fat intramuscularly than subcutaneously. This fat is not visible, and it is hard to determine with hydrostatic weighing, which is not very accurate below 15 percent body fat.

We've discussed subcutaneous, interorgan and intramuscular fat. Is there any fat left? Some organs, notably the brain, are partially fat. And don't forget the fat traveling in the blood, lymph, bone marrow and spinal column. In most dieting situations, however, we are concerned with subcutaneous fat.

Subcutaneous fat is easy to measure with calipers, handheld mechanical devices that are used to pinch certain areas. The measurements of skin and fat thickness are plugged into one of several mathematical formulas that take total body weight, sex, age and estimated organ fat into account. Voilà! Out pops a nifty and damn close body fat percentage.

Calipers are much more convenient and inexpensive than hydrostatic weighing. I've seen calipers advertised as inexpensively as $7, although these were cheesy, plastic and inaccurate. Professional, medical quality models vary between $150 and $450. The top Skyndex caliper has a cool built-in computer to

do all of the math for you.

I don't know why calipers are so accurate. Although you can find more glamorous contraptions, a skilled "pincher" can get a better estimate than with any other method except dissection. After testing caliper measurements against extremely accurate and expensive techniques like Nuclear Magnetic Resonance scans, they were found to be more accurate than hydrostatic weighing, infrared and electronic inductance. In addition, hydrostatic weighing doesn't measure black people very accurately, because the density assumptions are wrong. All electronic devices assume that 73 percent of lean body weight is water, which is not always true. The only drawback to calipers is the possibility for operator error; practice does make perfect.

Most chiropractors, nutritionists and weight-loss specialists can take caliper measurements. Eventually, you will not need to measure your body fat percentage. Until then, I'd advise those who are serious about BODYOPUS to buy medical-quality calipers. They don't have to be computerized, because eventually we won't be using the formulas. As for the bargain basement plastic ones, well, *a* caliper is better than *no* caliper. The difference between junk and precision is only about a hundred dollars. The body fat percentage equations themselves were created with data from a $139 Lange caliper.

Let's discuss a few delusions that many people keep believing, even though deep down they know the truth. First, there's no such thing as thick skin. Skin thickness is usually the same in both sexes and all races. Of course, the soles of your feet and palms of your hands have thicker skin (and thicker fat, too). However, what looks like thick or loose skin, or water in the skin, is usually just plain, ugly fat unless you have an odd disease.

Women, who have more body fat, have slightly thinner skin than men. Orientals, who are generally less fat, have slightly thicker skin. Growth hormone increases the size of skin cells, and some minerals and hormones allow more water into the skin. However, these factors cause only a millimeter or so of difference. Please, let's banish the "I just have thick skin" excuse.

When dieting, fat cells shrink, but they are *still there*. Genetically gifted people who are born with fewer fat cells will usually win the thinnest-skin contest.

The appearance of thin skin, which bodybuilders call the "shredded" look, is caused by the elasticity, tautness and age of the skin, in addition to the fullness of the muscles underneath. Among athletes, only contest bodybuilders desire thin skin. Skin tautness is a two-edged sword: such tightness is always accompanied by stretch marks. Do you really want drum-tight skin?

Liposuction would seem to be an attractive alternative. It completely removes fat cells. It is condoned by society, the AMA and the business-doctors. However, the few instances of liposuction on lean individuals that I've seen have an unusual look. After the swelling dissipates, the area looks ripply, like a dip potato chip. Liposuction *does not* tighten up the loose skin where the fat used to be. BODYOPUS should work well enough on stubborn fat areas that you won't need to consider liposuction.

Eventually, we will stop using fat percentages because they can blind you to the persistence of stubborn fat. Liposuction is popular because it is used to vacuum out the fat from areas that are resistant to dieting. Most of the stubborn fat areas — the lower glutes, hamstrings, inner thighs, lower thighs or that

really stubborn place between the calf and the ankle — are not used in the body fat percentage formulas. These kicking-and-screaming, I'm-not-moving, fat cells from hell are the first to get fat and the last to reduce, if they ever do.

Although most doctors don't think it's worthwhile to try to eradicate stubborn fat because it doesn't correlate to specific health risks, our problem is that fixating on body fat percentages can obscure metabolic damage. Calipers will not measure your gaunt face, stick-like upper body or loss of muscle.

Individuals with a compulsion to move their body fat percentage downward whatever the cost forget that calipers cannot measure everything. The last-of-the-fat will still hang on (well, down). Overall aesthetic shape should be a priority over "in shape." You should try to balance aesthetics and biology. I've often said to bodybuilding competitors: "Yes, we could get your body leaner, but it won't be better."

Later, calipers will still be useful, but not for figuring your body fat percentage. We can pinch areas that aren't used in the formula. At the end of a diet, a loss of 2 pounds of body weight results in a small decrease in body fat percentage, but a great decrease in energy and strength. Of course, the stubborn fat will not shrink at all. After the initial measurements, you will never quote percentages, but "millimeters of thickness."

CHAPTER 7

THE EASY STUFF: DIETING BY THE (POPULAR) NUMBERS

MOST OF THE DIETING ADVICE in popular books, magazines, television shows and videos has the same ideology. If discoveries in obesity, diabetes, geriatrics, heart disease, longevity, and sports medicine research generate advice that is palatable (psychologically speaking) it will be incorporated into the public's current diet personae.

Dieting has trends and fashions, just like clothing, hairstyles and political opinions. As long as people become bored or unhappy, change — even just to have something new to do — will always be in the forecast. However, fashions in dieting are unique because virtually all diets work. If you follow *any* plan, you will lose weight. Even a cursory glance at the people you meet will reveal many overweight, unhealthy and (if you look closer) unhappy people. Many of them have attempted to lose weight. They often succeed temporarily, but ultimately fail to make a major change. Dieting becomes an ongoing hobby.

Most weight loss failures have nothing to do with glands, large bones, genetics or bad diets. When trying to change their eating habits, most people have trouble developing the disci-

pline to overcome two key problems: hunger and anxiety.

I'm not going to discuss hunger and anxiety in BODYOPUS. I'm assuming that you have this under control. I'm not interested in being a parent, psychologist or baby-sitter. I'm a body problem-solver, not a head fix-it man.

Although all diets "work," people jump from diet to diet for the most whimsical of reasons. The weak-willed ones switch because of failure, guilt or denial. Semi-successful dieters usually change their plans to match some idea of correctness, either scientific or philosophical.

Because of these factors, there are a great number of diets. There's the Rotation Diet, the non-fat diet, the (pick one or all) oat, rice or pectin fiber diet, the (see above) olive, canola or nut oil healthy heart diet. Diet fashions are championed by the segments of the dieting population that find them most acceptable. Athletes embrace high-complex-carbohydrate diets; the elderly pursue the healthy heart ones. It does have some sense to it, doesn't it?

Aside from specific diets, there are two primitive ways that people reduce the amount of food they eat. The least complex is to remove one or more items: dessert, bread, soda pop, alcohol or dairy. It works extremely well because most people have a lurking suspicion that some foods they eat are *bad* for them, and that those foods are the culprit behind the fat accumulation. Scientists would debate against this simplistic prescription, but it often works. Even a dog can understand the word "NO!" With people and food, "BAD! NO!" works too.

The extension of this "BAD! NO!" plan is just as simple — eat less food. If you make a semi-conscious effort to eat fewer meals or smaller portions, you will lose weight without counting, balancing or ratios. It's just plain rationing.

This is primitive dieting, but it does have its charms. It doesn't cause much angst or intrude into your thinking. Eat less and presto, you will lose weight. Many primitive dieters don't own a bathroom scale, nor want one.

This is fine as long as you don't have any concern over the quality of the weight loss. When you want to lose only fat, not muscle, or are concerned with energy levels and physical performance, you will need to abandon simple diets and move into mainstream Modern Dieting. Modern Dieting involves counting calories, weighing foods and considering nutritional ratios. Virtually all popular diets that you read about consist of calorie restriction with a few embellishments.

The biggest advantage of calorie restriction diets over the "just eating less" strategy is *control*. By tracking calories and nutrient ratios, you can predict the amount and quality of the weight lost.

This book is not a typical diet book. I expect that most of you have progressed past elementary and secondary school dieting. There's already a plethora of A-B-C diet textbooks and primers on basic nutrition. I am not a traditional nutritionist. I don't fill in all of the blanks. For most people, choosing a nutrition plan is like choosing a religion. After watching the bickering of MDs, PhDs, the FDA, the life extensionists, athletes and vegetarians (have I left some group out?), many nutrition-shoppers just pick the least irksome one, or surrender to the comfort of the FDA's views.

I have nothing against nutritionists. I simply find them uninteresting and docile. Many of them are wanna-be MDs pining for membership in the Good Old Boy Medical Club. Since I'm not a nutritionist, don't think I've missed something and say: "Aha! What about *zinc*?" or "You haven't addressed my colon

and pectin!" I'm telling you now that I'm leaving the minor (easily solvable) problems for the traditional nutritional hoi polloi.

BODYOPUS is far, far removed from mainstream dieting, but it's not just a capricious exercise. BODYOPUS is a pick-up diet; use it to solve problems that other diets can't address.

Believe it or not, I *do* endorse regular diets. I have even advised clients to start out with the rudimentary "BAD! NO!" diet. The tried and true calorie restriction diet is a valuable tool much of the time. It's easy to follow and most people can stick to it for a long time. Why don't we pursue this diet initially? Actually, we will. In the next chapters, I will present a typical Modern Diet that will work fine until problems arise that it can't fix.

I've met a few genetically gifted people who don't get fat. They are usually born with fewer fat cells and have naturally optimized metabolism. It looks like a sideshow trick, as they eat an enormous amount of food and never get fat. If they do gain any fat, it's evenly distributed over their body, not in paunches, love handles, or saddlebags. Some bodybuilders who have put 50 pounds of fat or more on their frames at worst have chipmunk cheeks. *I* know they're fat, but to other people they only look bulky.

For the gifted, dieting is effortless. They don't count calories, weigh foods, or balance portions; they tell me: "Oh yeah, I cut down on my ice cream, butter and soda pop." They don't even have to cut these foods out — just down. Damn, the fat seems to melt away almost overnight. It's freaky.

These ideal people are both blessed and cursed. Of course, they always look lean and can eat whatever they want. Their easy success entices others into fantasizing that they are the same way. Who wants to think about or suffer over food? The curse of the gifted, of course, is that they usually don't develop

any diet discipline. They're used to eating a lot of food, and not used to hunger or anxiety.

There are many such perfect people in bodybuilding because body fat levels of near 3 percent are required for men to win major competitions. In sports which don't require low body fat percentages, these gifted, undisciplined folks do fine. However, to get caliper measurements between 2 and 4 millimeters at any visible point on the body, you need discipline in addition to genetics.

These genetically gifted bodybuilders expect me to come up with some slick, effortless trick to thin their skin out. They want to be dazzled with suggestions for a secret fat burning trick, thyroid hormone, growth hormone or a water rebalancer. (Hey, they ask for that one a lot.) They're sending me a covert message, which is: Don't ask me about my food.

At some point, disaster strikes, and they encounter *the obstacle*. I start by asking an innocuous question: How many calories do you eat every day? Most people, myself included, don't count calories when they're not dieting. However, if you want to lose fat and make sure you don't lose muscle, you need to look at the amount of food you're eating. Before you start manipulating calories and nutrient ratios, you must know how much you are eating (and yes, that's in calories).

My perfect clients usually eat too much and have no idea how much they're eating. Although counting calories is an alien concept for them (and may be for you), it must be done. It is necessary to know what you are currently doing to make any use of the help of a coach, trainer or nutritionist. In this chapter, we'll discuss the first step of Modern Dieting.

Step One: Establish maintenance calories. Before you make any changes, you need to know how much you are consuming

each day. Do not tolerate a "round figure" or an impromptu estimate; the amount should be as exact as possible. At maintenance calories, your weight will be pretty stable over a week's time. Although there will be day-to-day fluctuations, each once-a-week weigh-in should be within a couple of pounds.

Don't make adjustments to your eating patterns at first. Just buy a food scale, some measuring cups and spoons and a calorie counter book. Then chart out a typical day of eating. List how many meals (and snacks) you ingest over 24 hours. Don't forget things like the refrigerator raid at 3:00 a.m., the pastry with the mid-morning coffee or the banana before your workout. What about the Gatorade you drink during your workout, or the cream and sugar in your coffee or tea? I am no longer amazed at the amount of food that clients forget about during a day. Sometimes the only way to remember it all is to keep and a pad and pencil with you and write down everything you eat or drink. Eventually, you should not need this much precision, but by being careful in the beginning, you are establishing good nutritional habits. Is this routine a real pain in the ass? Probably so, but I've learned from my clients not to trust an estimate without questioning the veracity of the "claim." Most people's estimates are off, especially if their eating habits vary from day to day.

The wild card is restaurant food, which is usually uncountable and unweighable. Of course, I usually advise my clients not to eat out often. However, if you must do it, pick places that have calorie charts of the foods they serve. It's not that difficult these days, as even fast food restaurants have them available on request. As for gourmets — AARRGHH!

Constantly remind yourself to weigh or measure everything that is not pre-portioned. It's a common mistake to misjudge

maintenance calories by forgetting whole meals or snacks, or by "eyeballing" the amount of food you are eating. Even really smart clients do the damnedest things, such as misjudging how big a cup is or what looks like 4 ounces. Food will trick you; the stuff we like to eat doesn't have to take up much room to add up to a lot of calories. Sure, there are a lot of foods that look large but have virtually no calories, like lettuce and celery. But lettuce and celery are *not* the problems, are they?

Is it really important to get an exact (exact, exact) calorie count for the day? Of course not. People usually eat enough to maintain their weight. Even without tracking every calorie, a normal non-compulsive person will maintain their weight with moderate exercise and a varied non-fetish diet.

The point of learning your daily maintenance calorie count, besides being a starting point for an outside observer to make adjustments from, is to develop food awareness. People usually track calories in the specific areas they're concerned with. Endurance athletes are carb-conscious. Bodybuilders who may not know how many calories they're eating can tell you how many grams of protein they consume at each meal. Even sedentary people will carefully watch how many milligrams of sodium and cholesterol they are eating. Quite a number of people fixate on certain aspects of daily nutrition, but few measure it all. I hope that as you weigh, count and measure, and flip like a madman through the calorie counter book, you will start to judge the quality of the food, in addition to the quantity.

What have you accomplished with ***Step One***? Digits, four of them: the number of calories you consume over a 24-hour period. You should also be more conscious of the quality of the food you eat by knowing the number and frequency of your meals, when you eat solids versus liquids, what supplements

you take and rough ratios of the macronutrients in your diet. This is not a surprise quiz or passing in your homework — this is important information for real life.

It's no fun to count calories. Some people feel that it involves too much thinking and looking things up. Why bother? Lots of popular diets just start out with a pre-determined calorie amount. Why don't we just skip over all this busywork and start reducing calories? If you don't create a reference point now, you'll wish you had one later. Before we diet for fat loss, we'll start a pre-diet diet, an optimal maintenance diet. You're now ready for *Step Two:* Manipulate your maintenance food intake for best possible performance.

CHAPTER 8

MAINTENANCE MANIPULATION: THE PRE-DIET DIET

MANY OF THE IDEAS I'll present in this chapter are taken for granted by bodybuilders, the athletes most obsessed with the whats, hows and how muches of nutrition. To other athletes who don't understand their nutritional precision, this preoccupation with food seems obnoxious. Bodybuilders will, in the least likely place, in the middle of the most spirited conversation, interrupt with an abrupt, "I have to eat some protein and carbs *now!*" A pet cat is better mannered.

For the others, let me ease you into the pre-diet diet. The three macronutrients — protein, carbohydrates and fats — should be adjusted. Bodybuilders usually eat a diet that is 30 percent protein, 60 percent carbohydrates and 10 percent fat. Most mainstream health professionals say that 30 percent protein is excessive, and 20 percent is fine. Well, it isn't. I'll put it simply: 20 percent is too little protein for athletes. Although my ideal figure is 25 percent, I recommend 30 percent because most athletes don't eat the correct *types* of protein. Although quantity can compensate for quality in the pre-diet, the quality of protein becomes very important when you are trying to main-

tain muscle on reduced calories. This is true about many other aspects of nutrition; increasing performance and fine-tuning metabolism takes much more than just the RDAs. Quality bodies need quality nutrients.

The FDA has redefined its position on protein. The "gold" standard in protein has been abolished and "just good enough" (a nice phrase for fair) has peter-principled up: soybean protein is now considered a quality protein. This political, back-office decision involved hidden agendas, trade-tradeoffs and special interest pressures. Any scientist familiar with nutritional research could have recommended a better protein. The FDA has no concern for athletes or life extensionists. In fact, most of the expected changes in regulations for protein, vitamins, minerals, herbs and amino acids are to the detriment of the goals of performance and supra-health.

Succinctly put, if you don't consume quality proteins, 30 percent should allow you to maintain athletic performance. A ratio of 25 percent is correct only if the proteins are of the highest quality. I'll describe exactly which proteins to choose further on in this book.

There are three distinct metabolic phases: maintenance, fat loss and muscle acquisition. Each phase is nutritionally distinct, and causes different psychological states. Savvy coaches realize that athletes need a mental break, some time to stop thinking about food. I created the pre-diet diet for this reason. I hope that the nutritional discipline of the other phases would subliminally influence you to make correct nutritional choices during this "vacation" time.

You would think that scientists would at least agree on the ratio of fat calories. Most mainstream nutrition authorities suggest a maximum fat intake of 30 percent for normal, non-athletic people. Most sports nutritionists recommend only 10 percent. Because I haven't made my final decision yet, I tend to go along with the 10 percent figure just to shut everybody up.

I am concerned that the intake of fat required to avoid health problems may be different than the amount required for performance. Most athletes *have* reduced the amount of fat they eat over the last few years. Weight training athletes used to eat (and some still do) copious amounts of whole eggs, whole milk and fatty red meat. It wasn't unusual to see a diet with 40 percent or even 50 percent fat. Times have changed. Now, most athletes are primarily concerned with carbohydrates (endurance athletes), and protein and carbohydrates (weight-lifters). Both camps have lowered dietary fats to 10 percent of total intake, and sometimes even less. There are many good arguments for eliminating meat and dairy fat, so if the 10 percent consists of essential oils, most nutritionists would say that it should be enough.

What's my problem with this persuasive advice? First, most of the big bodybuilders and powerlifters I've met have built most of their initial muscle mass while eating a diet that was about 30 percent fat. Bulgarian Olympic weight-lifters, who are rather avant-garde, explicitly abandoned 10 percent, and chose 30 percent because it increased their strength! What to do?

Mainstream nutritionists are happy with 30 percent. Athletic and life extensionist nutritionists have been hammering away with 10 percent for so long now that it's become a de facto standard. The Bulgarians, along with some fringe endurance coaches, recommend the "normal" 30 percent. I've yo-yoed myself. At times I've suggested 10 percent, and in other circumstances, 30 percent. (I believe that the new term for such vacillating is called "waffling.") And many of you might go bal-

listic to learn that the *core* of the BODYOPUS Diet requires a 70 percent dietary fat ratio!

What to do? In the pre-diet diet, somewhere between 10 and 30 percent is an ideal balance between supra-health and optimal performance. As with protein, the best fat ratio depends on what quality of fat you are eating. Some fats are essential for health.

At this time, I feel that 10 percent fat is too low, and 30 percent is probably used to overcompensate for lack of quality fats. Personally, I have trained myself to dislike even moderate amounts of any dietary fat, so 30 percent seems especially repugnant. BODYOPUS' 70 percent fat is acceptable to me only because I know what is happening to all that fat.

The nice thing about extra protein consumption is that the conversion to glucose or fat is not very efficient. I've never seen an athlete get fat from eating too much protein, and I've never had a protein binge myself.

So why do I still recommend 10 percent? Human nature. A 10 percent fat to calorie ratio is virtually a no-fat diet. Even if you try to eat a fat-free diet, the tag-along fats in meat, fish, and even oatmeal will add up to 10 percent. When I recommend a 10 percent dietary fat ratio, I specify that it is 10 percent *essential* fats (polyunsaturated and monounsaturated vegetable oils and fish oils). After adding the essential fats to the tag-along fats, the real total is usually more than 10 percent.

How about 30 percent? Well, many athletes are mentally conditioned to avoid fat. It's hard to sell them on a diet with more fat. Although some athletes would perform better with more fat in their diet, good advice not followed is no advice. For now, the pre-diet diet is 10 percent essential fat, for a total of about 18 percent fat.

If protein is 30 percent and fats are about 10 percent, about 60 percent of your calories should come from carbohydrates. Carbohydrates are the most important part of the pre-diet diet. Carbohydrates are important for energy, strength, endurance, recuperation and alertness. Bodybuilders usually reduce carbohydrates for fat loss, and add them for muscle growth. Even small alterations in quality and quantity will affect your mood. You will learn more about using carbohydrates scientifically in the Recomposition phase of the BODYOPUS Diet.

The sports nutrition media have attempted to educate the general public about eating "right" with two key words: fiber and complex. This isn't wrong, just incomplete. Humans can digest two forms of carbohydrates: starches and sugars. After digestion, all carbohydrates are turned into glucose, a simple sugar found in the blood, and glycogen, a starch found in the muscle and liver.

Many nutritionists would like to tell you that starchy, fibrous carbohydrates are preferable to simple sugars. In reality, all carbohydrates are fair game. Starch with or without fiber, and sugars such as sucrose, fructose, maltose and even lactose can be used by the body. Even evil white table sugar can be useful in some circumstances, such as glycogen replenishment. There are no bad (digestible) sugars, just mistimed applications.

In the pre-diet diet, we won't discuss carbohydrates at much length. When discussing the Modern Diet I'll go into more carbo-detail, but you'll learn the real tricks in the BODYOPUS Diet.

The pre-diet diet should be almost carefree. Too much thinking about eating leads to nutritional burnout and sugar and fat binges that last for weeks. In the pre-diet diet, use common sense. Eat a variety of carbohydrates — vegetables, grains,

fruit, even (gasp!) some nasty processed refined sugar things. The pre-diet is not sophisticated, but it should satiate any lurking potential binge fetishes. In the pre-diet diet, don't worry about carbohydrates too much.

Step Three: Set your feeding frequency. During the pre-diet, you won't need to wake up in the middle of the night and eat. You're probably comfortable with three meals per day. We both know that you also snack — between, after, whatever — but you don't really count snacks as meals, nor do you really plan them. However, smart athletes *do* count snacks.

I strongly recommend that you start eating 6 meals per day, especially when 60 percent of your calories come from carbohydrates. Six meals a day work out to a "feeding" every 2-1/2 waking hours. Dedicated bodybuilders have been eating 6 meals a day for years, and it should be the standard for everyone. Banish the 3 squares into a deep, round hole. Of course, I won't be calling anyone up to check, but you may want to set the alarm on your wristwatch to chime every 2-1/2 hours.

Eating 6 meals per day helps to modulate blood glucose and insulin levels. Insulin, the most anabolic hormone in the body, controls glucose and some amino acids. Too little insulin, too few carbohydrates or too much time between meals will make most people feel tired. Too much insulin will transport glucose into fat cells. Sedentary people need steady insulin levels. Athletes benefit from coordinating their carbohydrate intake with their physical activity. The more carbohydrates you eat, the more meals are needed to spread them out.

Muscles need the most carbohydrates within the first hour after exercise, even if you train late at night. Post-workout meals should be liquids containing glucose, fructose, sucrose and maltodextrins. Dietary fats and fibrous carbohydrates

should be eaten in other meals. The proteins in the post-workout meal should be easily assimilable, like egg, whey and milk. You should eat more calories in the post-exercise feedings. Your other meals can be more traditional: vegetable, starch or fiber with an animal protein (if you wish) and some essential fats.

Let's review the steps so far:

STEP ONE

Establish maintenance calories over a 24-hour period. Count, weigh and measure; look up the calorie amounts and write them down. Include everything: snacks, sleepwalk eating and coffee condiments. Within 3 or 4 days you'll find your personal maintenance calorie level. The total is often surprisingly different than an uncounted estimate.

STEP TWO

Divide your maintenance calories according to these macronutrient ratios:

Protein	30%
Fat	10%
Carbohydrate	60%

Be flexible with these ratios. Don't bother counting the extra fat in so called non-fat foods like grains and whitefish. Even if you don't get 30 percent of your calories from protein each day, you will probably achieve 25 percent.

STEP THREE

Arrange the frequency and number of your meals. Yes, that's 6 meals per day. Snacks are considered meals now, so plan

them. Plan for more calories and easy-to-digest foods in the meal after your workout. The post-workout meal is the most important for your performance, even if it is not very sociable.

With this plan, you will be a happy, carb-chomping athlete. Don't congratulate yourself yet; it's only a humble beginning. We do have higher aspirations, don't we? The pre-diet diet is a prelude to more precise things to come.

CHAPTER 9

REAL DIETING

THIS BOOK contains three distinct diets: Modern, Isocaloric and BODYOPUS. Although I recommend starting with the Modern Diet, it must ultimately be abandoned, because a low-fat, high-carbohydrate diet will not achieve your final goals. However, you should try it first because it's the easiest of the diets.

In past chapters, I've suggested ways to adjust food ratios for better performance. Most athletes will not have to change their routine very much to go on the pre-diet diet. However, people who are used to eating 3 meals a day, with low protein and 30 percent saturated fat, will be surprised when they switch to the pre-diet diet. When you adjust your diet to 30 percent protein, 10 percent essential fats, and 60 percent carbohydrates, spread out over 6 meals, you will notice a big change. Your energy will be better, you will be stronger, and you may lose body fat at the same calorie level. No applause, please, it's really a simple trick.

Explain the trick? Sure. Your body's thermostat adjusts itself to the amount of carbohydrates and proteins that you eat. By replacing dietary fats with these "thermogenic" foods, your body temperature will raise slightly, enabling you to burn fat

more quickly. Later in this book, I'll describe how to modify your body temperature more directly, but you can make minor changes now just by eating smarter.

Although the pre-diet diet will help you transform, you will notice only subtle improvements. You're not ready to snap the "after" picture yet, are you? I expect the best of you — there's still a lot of work to do.

Next, we will reduce calories and perhaps increase your activity level to burn more calories. Modern dieting (a real diet) includes both increased exercise and lowered food intake. The usual fat math applies. Each gram of fat has an energy value of 9 calories. A pound of body fat is about 3500 calories. Technically, 455 grams of fat (one pound) multiplied by 9 calories per gram is 4095 calories. However, fat cells contain some water and some of the calories are lost as you burn the fat. Now you know.

If losing fat was just a math problem, it would be elementary school arithmetic. Class, how many pounds of fat does Johnny want to lose in how many days? You could just fill in the values to determine a daily calorie debit, and then cut the calories by eating less or exercising more.

Unfortunately, there are other factors to take into account. How do most dieters determine how much fat to lose each week? Most of them wish they could get it over with as quickly as possible. Overnight, while sleeping, would be nice.

Let's explore the obstacles. First, there is your ability to tolerate hunger and anxiety. Calorie restriction is a test of emotional discipline. Although there are ways to lose fat without hunger or anxiety, they have side effects and dangers. I'll discuss these methods later in the book, but the Modern Diet includes only traditional fat-loss methods.

The next obstacle is preservation of muscle. We all want to lose only body fat and not sacrifice any lean tissue. Not only do we fear declining strength and performance levels, but also lack of energy and a slower metabolism. Whenever you eat less than maintenance calories, you will always, always lose muscle. Most of the diet information in the sports media aims to help you maintain or increase muscle when on a low-calorie diet.

For non-competing athletes, hunger, anxiety and preservation of muscle are the only obstacles. However, endurance athletes must also consider energy levels. Calorie restriction decreases energy available for performance. Lowering calories cannot be a capricious decision. Some kind of compromise must be accommodated.

Everything up to now in this text is what I consider "light reading" — a nice discussion of dieting philosophy. Nothing I've recommended so far is a struggle. It's not really a burden to eat a few more meals, is it? You won't really miss all of the congealed grease you used to eat, will you?

Crossing the threshold into *real dieting* consists mostly of reducing carbohydrates, which causes stress. Although I will show you some really cool stuff later, we will first perfect the traditional how-tos. If I couldn't inject some personal flourishes into the Modern Diet, I wouldn't include it.

CHAPTER 10

ADJUSTING YOUR CALORIES

MANY PEOPLE try to base their diet on elementary school arithmetic. They decide how much fat they want to lose, how long the diet should take, and presto! With simple mental division, they determine how much fat they want to lose each week. If you read tabloids, or even glance at the front pages while waiting in the supermarket checkout line, you know that there are some absolutely amazing weight loss programs that cause your weight to plummet by a *pound a day*. Is it possible? Well, yeah — with really obese people who have been eating enormous amounts of food every day.

How do non-obese people set a realistic goal? Unfortunately, many athletes have the bad habit of trying to lose fat based on a too ambitious mental calendar. They think: "I want to lose 10 pounds in 4 weeks, so I *have to lose 2-1/2 pounds per week*." While the figures work out math-wise, and the goal is probably physically attainable, most dieters will not be able to fulfill their expectations.

You don't just want to lose a certain amount of weight; you want to make sure that you are losing only fat, not muscle. For this reason, you want to consider the quality of the weight loss

over the quantity. A goal of 2-1/2 pounds per week is not correct if it causes too much muscle loss. Unfortunately, some very authoritative voices echo the 2-1/2-pound weekly limit. Both bodybuilding magazines (which I've been reading for 18 years) and bicycling magazines (which I've been reading for even longer), seem to have a consensus that 2-1/2 pounds per week is a healthy goal. They imply that losing 2-1/2 pounds per week will prevent muscle loss. Many best-selling diet books by MDs also agree on 2-1/2 pounds. Well, they're all wrong. For athletes, 2-1/2 pounds is a bogus number!

Weight-training athletes who don't use any secret bodybuilder tricks and try to lose 2-1/2 pounds per week, will lose at least 8 to 12 ounces of muscle along with the fat. As you may have discovered, the muscle goes away a lot faster than it comes back.

The magical number, 2-1/2 pounds per week, started with the best of intentions as a medical recommendation to sedentary, overweight people who embarked upon a very low calorie diet. How did athletes start to think it applied to them? My best guess is that it was bodybuilders' habit of picking a contest date and backtracking to the traditional 8- to 12-week steroid — er, diet cycle. Even back in the early 1960s, steroids, thyroid hormones and diet pills helped people lose 2-1/2 pounds per week without much muscle loss.

Anabolic steroids and Insulin Growth Factor-1 (IGF-1) are the two most powerful anabolic drugs available. Since the law has cracked down on steroids, and IGF-1 is both expensive and hard to acquire, these drugs are available only to a few. Even if you *could* use them, think twice. Steroids and IGF-1 are primarily used to cover up bad dieting practices.

Our goal is to work with your metabolism, not cover up

mistakes. Although I'm the first to admit that both anabolic steroids and IGF-1 are beneficial in many situations, they allow us to forget that we didn't solve the underlying problems, but just eliminated some of the symptoms.

Losing 2-1/2 pounds per week is a bogus goal for non-chemically-assisted athletes. In the Modern Diet, with only calorie restriction and aerobic activity at your disposal, you should not try to lose more than one pound per week. In the upcoming chapters, you'll learn *all* of the secrets to boosting your weekly fat loss beyond an agonizingly slow o-n-e ... p-o-u-n-d ... per ... w-e-e-k pace. Until then, more weight loss will only cause muscle loss.

Don't rigidly try to lose one pound per week. When bodybuilding contests started testing for drugs, some former freak-of-nature drug monsters had a lot of trouble trying to diet without props. Female bodybuilders, in particular, had the worst cases of muscle catabolism, even on the pound-a-week schedule. It may be necessary to lose a glacially slow half pound per week in order to sustain training performance.

Bodybuilders who are dieting without steroids, GH or IGF-1 should not debit maintenance calories by more than 20 percent. Of the 20 percent, 10 to 15 percent should come from a decrease in calories, and 5 percent or so from additional aerobics.

For example, a male bodybuilder with a daily maintenance calorie level of 3000 calories, who debits half the calories (300 calories) through decreased food intake and half from aerobics (300 calories), will lower total calories by 600. Over 7 days, he will have debited 4200 calories, slightly more than a pound per week. This 1200 calorie margin gives him some flexibility in varying his calories and aerobics.

A female weight-trainer with a daily maintenance intake of

2000 calories should debit 400 calories. She should reduce food intake by 200 calories, and increase aerobics to burn 200 more calories. Although she will be losing less than a pound per week, she will not lose much muscle. Many women, unhappy with this rate of fat loss, will increase their aerobics, cut their calories, or both. Unfortunately, a greater calorie debit will cause women to lose more muscle than men, because women don't have as much muscle-preserving testosterone as men do. Instead of decreasing calories further, women should use one of the dirty tricks I'll describe in later chapters, such as thermogenic agents or thyroid hormones. Traditional methods will sacrifice muscle *pronto*.

Perhaps people worry too much about how much fat they lose each week. Personally, I only look at the scale once a month when I diet. Once you know your maintenance calories, just debit that by 20 percent. It's a piece of cake (well, ditch the cake). Through trial and error, I've discovered that men do better if they achieve the 20 percent debit with 15 percent calorie reduction and 5 percent aerobic activity. Women have done best with 10 percent of each.

My personal slant on the Modern (low-fat, reduced calorie) Diet doesn't stray too far from the accepted path. Fat loss of a pound per week and aerobic activity make sense. Is this the best advice? It's a pretty good diet for people who primarily weight train and don't have to worry about temporary decreases in performance.

For endurance athletes, a 20 percent calorie debit is too enervating. Luckily, some sports nutritionists specialize in runners and their ilk, so I don't have to deal with them. Runners are usually diet crybabies who bitch about any calorie reduction.

Many impatient dieters will not be satisfied with losing only a pound of fat per week. Some athletes are lucky enough

to have a daily maintenance calorie level of 6000 or more, so a 20 percent debit will cause greater fat loss.

Maintenance calories	6000 calories
15% calorie reduction	900 calories
5% aerobic activity	300 calories
Total daily debit	1200 calories
Estimated weekly debit	8400 calories
Fat loss	2-1/2 pounds

See! See! That's 2-1/2 pounds per week! Although we all want the Platonic 2-1/2-pound-per-week ideal, it is reserved for the genetically gifted. If your maintenance calorie level was 6000 per day, you probably wouldn't need to read this book for advice. The daily maintenance calorie level for most non-behemoth men is 3000 per day. For women, it is only about 2000 calories per day. Most bodybuilders who lose more than one pound per week do it with thermogenic agents, thyroid hormones and repartitioning compounds.

Use the 20 percent calorie debit as a rough reference. You can debit less, but never more. If you want a "crash diet," turn to the BODYOPUS Diet section. It works better, but it's less fun.

Instead of picking an arbitrary time span, like 8 weeks, determine the length of your diet from your body fat percentage, maintenance calorie level and daily calorie debit. Calculate the number of diet weeks from these figures, instead of the other way around. You may be a male bodybuilder preparing for your first local contest. (Of course, I don't expect every reader to aspire to be a competition bodybuilder. You may be planning for an upcoming vacation or class reunion, or looking at a turning point birthday.)

However, for our male bodybuilder:

Body weight	200 pounds
Body fat percentage	15%
Hoped-for body fat	5%
Percentage to be lost	10%
Body weight reduction	20 pounds
Maintenance calories	3000
Debit of 20%:	
15% from food restriction	450 calories
5% from aerobics	150 calories/day
Projected fat loss per week	1.2 pounds
Number of weeks needed to complete a 10% reduction	17 weeks

These are the *paper* figures, and they're kind of depressing. Most people don't want to diet for 17 weeks, especially when they're used to 8 or 12 week diets. There are 3 problems with this bodybuilder's plan. First, he started off *too fat* to diet in one stretch down to a very low 5 percent body fat, especially if he's never before shown that he can do it without problems. Male bodybuilders should never go over 10 percent body fat off-season.

Second, although a 17-week diet would accomplish the goal, I, personally, would be unhappy dieting for 17 long weeks for a measly 20 pounds of fat. I'd want to accelerate the fat loss. With common thermogenic and repartitioning agents, a neophyte dieter could "trim" 5 weeks off this schedule by losing an extra half pound of fat each week. If you have a substantial

income and a willing doctor, human growth hormone can shave off another 4 weeks. It is possible to lose 20 pounds in a very tight 8 weeks without much muscle loss.

Third, even with the prudent 20 percent calorie debit, some of the 20 pounds lost will be muscle, not fat. Some truly metabolically hapless individuals, will lose 1 pound of muscle for every 3 pounds of fat lost, no matter how slow they lose it. As you lose the 20 pounds of weight, 6 pounds might be muscle. Don't panic — and please, please, do not make a mad dash to the health food store to buy the latest dieting supplement. The BODYOPUS Diet, engineered to slow catabolism and *rebuild* muscle, was designed to work in this situation.

There's nothing really revolutionary in the Modern Diet. Most people, whether sedentary or athletic, a doctor, nutritionist, or layperson, would agree that this is a safe (healthy) and sane (follow-able) diet plan. In a nutshell, the Modern Diet à la Guru (me) is:

Daily calorie debit	20% from maintenance
The new ratios are:	
Protein	25%
Fat	10%
Carbohydrate	65%

Although most dieters consider this enough information to map out a diet strategy, those pesky bodybuilders always want more details. What kinds of protein? How much at each meal? What about *fat*? What kind of carbohydrates? How much fiber? And those are just the intelligent questions. Details, details, details. I usually deal with two types of athlete-dieters in a

coaching capacity. The very few really want to know the best food choices and are willing to accommodate many, if not all, of my recommendations. It's s-o-o-o simple: I tell them what to eat and they do it religiously. Dream clients.

And then there's ... the others. They ask for advice, but what they actually want is my *approval* of what they are determined to do. It goes something like this:

Bodybuilder: "I should eat fish and rice, right?"
Guru: "No, champ."
Bodybuilder: "But I always diet on fish and rice."
Guru: "No, champ."
Bodybuilder: "All of the champions do fish and rice."

Get the picture? Not advice, approval. Let me tell you, this happens a lot.

The next sections are for those who truly want to know the best food choices while dieting. Remember, if you're not using anabolic steroids or growth hormone, food *quality* is very important. Get ready to throw tradition out the nutritional window. Keep an open mind, be flexible, and hey, champ, "Will ya forget the fish and rice shit and *SHUT UP!*"

CHAPTER 11

PROTEIN RECOMMENDATIONS

MOST BODYBUILDERS have been conditioned to be extremely aware of the protein in their diet. Since protein powder supplements have been a staple of weight-lifters' kitchens for decades — at least 40 years — and written about for as long, you'd think the subject of protein had been flogged to death. Not so. In fact, the hottest topic in the sports nutrition field today is, again, protein. If you want a story that includes Big Brotherism, intrigue, influence peddling, hidden agendas, special interests and abandoning the consumer, it would be about protein.

The FDA has revised the protein rating system so that soy protein is now considered as good as the best. They are trying to pretend that soy protein is as good as egg and whey proteins, the previous gold standards. Manufacturers will be replacing good proteins with soy in infant formulas and health preparations for the elderly. Sedentary adults, who do not need even as much protein as they eat now, and athletes, who will find better proteins, will not be greatly affected. Sadly, it will be years before we see the results of this flawed policy on children.

The word "militant" in this book's title illustrates my attitude toward the FDA. FDA recommendations are never intended

to benefit athletes and life extensionists. For us, the FDA is mostly a hindrance. Therefore, I'll be focusing on protein quality in this chapter, not protein politics. Sometimes, however, I can't resist; I'm not as objective as I used to be. I view those "soy power" freaks much more cynically now.

In general, I recommend that you fulfill your daily protein requirements with supplemental, refined proteins, and without meat or fish. It's scientifically valid, logical and surprisingly economical. Of course, my recommendations run counter to the accepted dogma.

With the pre-diet diet, I'm not so strict. Most refined proteins are bland, and it takes time to work them into an appetizing meal. However, on a real (low-calorie) diet, you will lose more muscle if you do not fortify your diet with the key amino acids. Animal proteins are not ideal.

The quality of protein consumed during dieting is important. Traditional fish, chicken and turkey meals do not replace the catabolized amino acids as well as refined proteins, especially if you are not reinforcing your metabolism with anabolic steroids. Steroids lower your need for protein quality because they partially block cortisol's muscle wasting effects. Since muscle proteins aren't being disassembled, replacement isn't as necessary.

Most top bodybuilders don't use protein supplements in their kitchens. They eat chicken, fish and eggs just like you. Of course, what you *don't* see is the bewildering array of steroids, growth hormones, and other "helpers" that bullet-proof their muscles against the diet assault. Even if you could raid this hidden pantry and use all of these "advantages," you should always go for the best choice. In the end, "best" wins over "good enough" every time.

In the Modern Diet, protein is 25 percent of daily calories (5 percent less than the pre-diet diet) because you will be consuming higher quality protein. At 30 percent of daily calories, any old protein, including the FDA's blessed soy, will work adequately. Instead, I recommend you consume proteins in these proportions:

30%	whey protein
25%	egg white
20%	casein
20%	meat and fish
5%	miscellaneous vegetable proteins

Let's wake up last chapter's novice male bodybuilder from his nap and plug these figures in:

Maintenance calories	3000 calories
Minus 15% food debit	– 450 calories
Adjusted daily calories	2550 calories
Protein (25% of calories)	635 calories
Protein grams	155 grams (approximately)

If he weighs 200 pounds and 15 percent of it is fat, his lean weight is 170 pounds. 155 grams of protein does not reach the well-ingrained gram-a-pound dictum that bodybuilders diligently follow. It doesn't matter. Because the protein is high quality, 155 grams is sufficient.

Do you have to be exact to the gram and unwavering with

each percentage? Don't be foolish. You aren't going to shrivel up into a 98-pound weakling if you don't get your whey or egg whites every day. There's an expression in athletic nutrition called "all of the plumbing," which means that some individuals are more motivated if absolutely everything is laid out for them. After responding to hundreds of letters, I see a discernible pattern. They all want to know: how many grams and when should they eat it?

Athletes who haven't written a letter in years consider these questions important enough to take the time to write me. I can't respond with "kind of" and "good enough." These athletes want precision. Are *my* figures the perfect choices? Probably not. There's always some one-upmanship among nutritionists, and new discoveries are being made every day.

My recommendations come from a lot of canny tinkering. As dim as my view is of meat and fish as protein sources, athletes will work tuna or skinless, boneless chicken breasts into their diet whether I like it or not. I expect people's prejudices and work them in to make dieters happy. I'm ... acquiescent. Are you all clear on the concept? It's protein arbitration.

30% — WHEY PROTEIN

Most endurance athletes are fixated on carbohydrates and aren't too choosy about their protein sources. It's probably because they assumed for years that because they didn't need a lot of bulk, they didn't need a lot of protein. This is incorrect. Recent research illustrates that typical runners and cyclists actually sacrifice a significant amount of muscle during training. Pound for pound, they need more dietary protein than — gasp! — bodybuilders.

Bodybuilders have always considered themselves top dog

in protein requirements. "Meat builds meat" was the weight-lifter's creed. The story behind weight-lifters' use of non-meat proteins began at the turn of the century at Battle Creek, Michigan with a gathering of crackpots — Kellogg, Post, (Upton) Sinclair and the physical culturalists, and the McFadden brothers — all espousing the meatless life.

However, modern protein supplementation is primarily market-driven and only uses science when it suits business. Weight-lifters, bodybuilders and powerlifters don't read too widely, and surveys have shown that their average reading level is about sixth grade. Most of their protein education comes through weight-lifting magazines, such as *IronMan, Strength & Health* and *Muscle Power*, which have been influential since the 1950s.

The concept of protein supplementation originated in the muscle magazines. Magazines need advertising revenue to turn a profit. It dawned on the magazine owners that if they owned both the magazine *and* the supplements, they would make more money. From this point on, many articles became, to put it bluntly, tainted. Their goal was not primarily to educate the reader, but to condition the consumer. The absolutely nutball articles that *IronMan* presented to an increasingly gullible readership only made things worse. The early weight-lifter was bewildered by protein pills from *Strength & Health* and the Samson Milk and Honey diet in *IronMan*. Is there any reason to wonder why rational scientists thought that muscleheads were idiots?

Now, most protein supplement information for weight-lifters is disseminated through specialty periodicals which have vested interests. The recommendations in the articles are driven by prices at the wholesale level.

When eggs were cheap, egg protein was "in." Eggs are not a bargain anymore, so eggs, while not exactly "out", are just not currently "featured." Milk protein was big for a while. When prices increased, soybeans were touted as politically correct. When dairies in Ireland and New Zealand, with their heavy government subsidies, priced milk casein more attractively, soy began to languish. Then Ralston-Purina (chow-chow-chow) muscled a favorable rating out of the FDA, which boosted soy sales immensely.

Personally, I've been championing *whey protein* for years. Perhaps you remember the nursery rhyme:

> Little Miss Muffet sat on a tuffet
> Eating her curds and whey
> When along came a spider and ...

Curds and whey, a warm, honey-sweetened, pudding-like breakfast food made of cottage cheese (the curd) and the sweet runoff of the cheese-making process, whey, is still popular on British dairy farms.

Whey is one of the two proteins in milk. Most people are familiar with casein, the white-colored protein in cottage cheese. Several of the other proteins are grouped together and called whey. The milk protein at health food stores is not usually whole milk protein, but isolated casein. Milk and milk products such as buttermilk and yogurt have small amounts of whey protein. Most cheeses, from cottage to cheddar, are casein and fat, because whey is a waste product of the cheese-making process. Liquid whey is very sweet because of its high lactose content. For a long time, liquid whey, considered useless, was poured down any convenient drain. No one wanted it.

Eventually food scientists analyzed whey. They were astounded that it had protein in it. It wasn't the junky protein you'd expect from a product cheaper than soy, but a better protein than eggs, which had been considered the gold standard. Whey had better amino acid ratios, and was more digestible and soluble. This dynamite protein was cheaper than cheap — all you had to do was haul it away.

Unfortunately, whey contains a lot of lactose. For some uses, lactose doesn't cause a problem. Babies, for example, use lactose as a major source of carbohydrates, either in mother's milk or in formula. Sweet whey also worked well in hot cocoa or chocolate milk. However, protein supplements either shouldn't contain any sugar at all, or should contain a more digestible sugar. The protein from basic sweet dairy whey had to be separated from the sugar.

It's tricky to remove the lactose without damaging the protein because whey is very delicate. Removing the sugar from whey requires heat and processing, which can change the amino acid structure that makes it so desirable.

After sweet dairy whey, the most common type of whey protein is lactalbumin. To food scientists, lactalbumin is the major constituent of whey protein. To consumers, lactalbumin is a commercial term signifying that the whey has been processed and dried with high heat. Although all of the right amino acids are still there, they have been cross-linked into new bonds. Lactalbumin doesn't mix, dissolve nor disperse well. It acts like sand. A poorly-made whey supplement is worse than well-made soy or casein. Nevertheless, some manufacturers include lactalbumin because whey is currently a "happening" protein and because lactalbumin is cheap on the wholesale level.

You can do better. Well-made whey proteins are usually called concentrates or isolates. I'm familiar with two types of extraction: filtration, which is the most cost-effective, and ion-exchange, which is virtually perfect, but costly. Both preserve the amino acid bonds correctly. Filtration can achieve whey that is 85 percent protein and 15 percent lactose. However, the ion-exchange process yields a supplement that is 95 percent pure protein.

At the wholesale level, ion-exchange whey can be twice as expensive as the best filtered whey. For businesses, doubling the cost to increase the yield by only 10 percent is not very cost-effective.

There are additional processes to improve proteins or, in the case of lactalbumin, to fix it. The protein can be attacked with enzymes to break down some bonds, which sometimes improves the solubility of the protein or the dispersability of the powder. Unfortunately, extreme solubility creates practical problems. High solubility causes the protein to ball up on contact with cold liquids, like the cocoa balls that form when you stir chocolate powder into milk. You have to mash the lumps against the inside of the glass to break the still-dry cocoa free.

For example, the most soluble whey powder on the market sticks to the inside of the blender as an instantly drying "skin", enclosing still-dry powder pockets. To dissolve it, you have to scrape the sides of the blender. Extreme solubility is a pain in the ass, and wasteful if you don't take the time to scrape the powder all of the time. The ideal whey protein would also disperse easily, so it could be stirred, shaken or blended with cold liquids.

In sum, the ideal protein should be soluble, dispersible, and virtually lactose-free. You could call it a designer protein,

more than just the usual repackaging from a big bag into a little can.

Whey protein should fulfill 30 percent of your protein needs while dieting. Whey has the highest amount of non-dispensable amino acids (the word "essential" is now passé), and branched-chain amino acids (BCAAs). BCAAs are the first to be sacrificed in muscle catabolism, and you will lose less muscle if you include them in your diet. Meat and fish aren't as high in BCAAs as whey, which is 25 percent BCAAs.

Life extensionists have embraced whey protein because of its high cysteine content, which has been shown to boost the immune system. Whey is an ideal protein: it prevents muscle loss, imparts a drug-like action, is made in the United States (casein is imported) and is healthy for the environment (now used, no longer dumped).

Whey's only problem is lack of availability. Although whey is in almost all milk products, it is not very concentrated. Whey protein must be taken as a supplement. Most of the protein supplements currently on the market are made of casein, soy or dried egg white. Whey proteins are more elusive. When in doubt, read the label. Whey isolate, whey concentrate or a savvy blend of the two are your first choice. Next, choose enzyme- or acid- reduced lactalbumin. Don't choose heat-processed lactalbumin. Sweet dairy whey is cheap and contains good quality protein, but it is loaded with lactose, a sugar that dieters don't need.

Your daily portion of whey protein will be about 2 ounces, or 50 grams of protein (and about 12 grams of BCAAs). Currently, quality whey costs between $1 and $1.50 per ounce. Two ounces of whey cost about as much as 6 ounces of canned white tuna fish, and contain much better protein.

I've discussed whey protein at such length because whey will not be peddled very hard outside the bodybuilding marketplace. It's costly at the wholesale level and there aren't many quality manufacturers. Soy and casein are pushed hard to the general consumer. With the recent FDA blessing, soy will dominate in the years ahead.

I haven't settled for normal and average. Neither should you. Six years ago, the Venice Beach bodybuilders and I were making whey and egg white pancakes, whey custard and whey and rice puddings. You can sneak whey into just about any food. We even made whey-enhanced fresh pasta. Don't feel limited to boring protein blender shakes. In summary:

1. Thirty percent of your protein intake should be whey protein. Therefore, whey should be 7.5 percent of your total food intake.
2. Consider whey a main food, not a supplement.
3. Whey's solubility, digestibility and amino acid profile make it an ideal all-around protein.
4. Purchase concentrates or isolates of whey, never plain sweet dairy whey or lactalbumin.
5. Whey protein costs about 4 cents per gram, about the same as traditional meat and fish protein sources.
6. Protein powder doesn't have to be boring.

25% — Egg White Protein

Food scientists and vegetarians have considered egg the king of the proteins for a long time. In every scoring method, and in all of the laboratory rat chow-ins, egg was always at least royal, sometimes divine. Before the arrival of cheap foreign casein, egg white protein was competitive with domestically-

produced casein. Currently, egg proteins are too expensive to be used more than sparingly. This is good news for consumers, because egg white protein is a lousy protein source.

Egg whites are almost pure protein. The yolk has some very good protein, but lots of fat. Most powdered egg protein supplements are egg white protein, because it's difficult and expensive to extract the protein out of the yolk. *Whole* egg protein has a PER and BV of 100, but egg white has a score of only 88. The only commercial whole egg protein powder that I know of was the Rheo Blair protein that was popular with bodybuilders during the 1960s. It was a mixture of whole dried egg, casein, non-fat milk powder and lactalbumin, which had a cult following around it even though it had both fat and sugar in it.

For practical purposes, we'll discuss egg white protein only. Its spectrum of non-dispensable amino acids is very good, and its solubility and digestibility has been a standard for years. When you are not dieting, its lower levels of BCAAs aren't important. We don't even have to discuss availability: eggs are plentiful and cheap.

Egg protein powders have their place in infant formulas and liquid meals for the malnourished. For healthy athletes who eat regular food, I see *no* purpose for egg protein powder. Most American egg powders I've sampled over the years are overdried, sometimes burnt and probably old. Although a good nose can smell the slightly burnt smell of dried egg whites, you have no way of knowing what else they've done to it. What's wrong with buying fresh eggs and chucking out the yolks? Nothing. Many athletes do and many more should. It only takes about 6 eggs a day to get 25 percent of your protein calories from egg whites.

It does seem to be a big waste of the spurious yolks, and it's

a bit labor-intensive to crack them, separate them and figure out where to dump the yolks. Disposal? No, stinks it up. Trash bag, slimy. Dog? Died from heart disease. The toilet? Yeah, that's the ticket, but a little bit of a trek. Don't forget to flush, or your non-bodybuilder house guests will look at you rather oddly. And there's a legitimate health concern. Although some athletes are still plugged into the blender, liquid egg whites á la nouveau Rocky cause a slight possibility of death from bacteria. What to do?

Years ago, when I went looking for egg whites without the shells or yolks, I ended up at a bakers' supply shop that stocked frozen, pasteurized egg whites. They were wonderfully economical — half the cost of supermarket whole eggs. The only problem was the size. The frozen egg whites came in a 5 gallon block, about the size of a block of ice for an igloo when Eskimos buy them pre-fab. How big? Bigger than the freezer in my refrigerator, and there's no room in the big freezer in my basement 'cause I got my dead grandma in there. Finally, my old gym (Gold's in Venice) started to sell frozen egg whites in a convenient size. Check out the hard-core gyms in your area. If not, try the yellow pages or a helpful baker. Egg Beaters will work, but they're no bargain.

Egg white protein, like whey protein, is easily hidden and virtually tasteless. It can be used as a recipe "glue," to hold together ground beef too lean to keep its burger shape, for example. Use egg glue in pancakes and custards — or the ritual morning egg white omelette. Eggs are 25 percent of your daily protein requirements because they are easily available, cheap, palatable and make vegetables and starches more interesting to eat.

Should you scrupulously avoid all egg protein supplements? Until recently, I would have said yes. However, I've seen

a very high-tech egg protein that is made with a processing technique developed for laboratory slide preparation. Its price has been attractive enough for people to create commercial versions. It's a nice idea, but why bother?

20% — Milk Protein

At 20 percent of daily calories, you will only need about 30 grams of milk protein. Frankly, I don't feel that casein warrants too much attention. Compared to meat or fish, casein is deficient in non-dispensable amino acids. However, it is digestible and soluble. I've included it because most dieters will want to include milk in their diet for its calcium. Who wants to take another expensive pill to get calcium? No one I know eats eggshells like Adelle Davis did.

Dairy products used to be a no-no for bodybuilders, who claimed that dairy products "made you fat and hold water." Arnold Schwartzenegger said it best in the movie *Pumping Iron* back in the 1970s, when he proclaimed, "Milk is for babies!"

Since then, fat- and sugar-free dairy products have invaded the American supermarket. Dieters' main complaints about dairy products, milk fat and lactose, are no longer applicable.

Dairy products will make your diet much more interesting. Yogurt is a nifty medium to hide whey protein in. Non-fat cheeses liven up egg white omelets and make low-fat cheeseburgers possible. There's always cottage cheese, casein in the raw. I suppose there are people who actually like it. The Venice bodybuilders were adept at hiding cottage cheese in pasta or oatmeal.

I don't recommend supplements unless they are absolutely necessary. After disrupting someone's normal and comforting eating habits, it's easier to convince them to eat this food or that one. My suggestion that my clients dump various powders and

chemicals (all of which are at best bland) into a blender and drink most of their meals has not always been followed.

On the other hand, high-tech liquids are controllable and precise. Some dieters do best when their selection of foods is severely limited, but this has to do with discipline, not palatability. In most other cases, diets — Modern, Isocaloric or BODYOPUS — work fine with real food. Even athletes, who are used to eating things that are "good for you" (but don't taste very gratifying), usually follow supermarket food diets as opposed to health food or esoteric diets.

In addition, protein supplements, especially egg white protein and casein, are more adulterated than their fresh, whole counterpart. Fresh liquid egg whites are less damaged and burnt than egg white powder. Casein powder is never fresher than milk, yogurt and cheese.

The quality and source of any casein supplement is a mystery. Casein is a real commodity at the manufacturing level. Because most casein is imported, wholesalers are always shopping for price.

There are many factors to consider about casein. Is it sodium or potassium caseinate? What's the moisture, residual lactose and ash percentage? What temperature was the protein dried at? How long has it been sitting in the warehouse? Protein damage, the process of cross-linking amino acids, is called the Maillard effect (after the French scientist, not the duck). Cross-linking always decreases solubility and digestibility. In the most common example of the Maillard effect, meat changes color from red to brown to gray when it is cooked. Even after the heat is removed, the protein continues to degrade. Your casein is deteriorating while it sits on the warehouse shelf.

Although I don't recommend soy protein, Ralston Purina's

Supro is at least reliable. Supro, although only a fair protein, is always the same. Casein is the crap-shoot of protein powders. You have absolutely no idea whose casein is in the can.

All of these arguments also apply to whey protein, but unfortunately, the only way to get whey without lactose is in supplement form. My advice in choosing a protein concentrate (There! "Supplement" is banished) is to trust the company that sells it.

As for casein, since there are so many palatable sources available at the supermarket, why bother with a powder? Stick to yogurt, cottage cheese and the dazzling new non-fat cheeses. I do not recommend *any* casein protein powders.

20% — MEAT AND FISH

Traditionally, meat has been considered a muscle builder, and fish a dieting staple. Most Americans expect to eat some — make that quite a lot of — meat and fish to fulfill their protein requirements. I won't use the usual arguments that meat is unnecessary, unsanitary and uneconomical. Meat and fish are convenient protein sources. They provide texture and taste, and a nice way to exercise your jaw muscles and stomach enzymes. Many dieters find including some kind of flesh comforting and vaguely fulfilling while on low calories.

The casein, meat and fish proportions can fluctuate. Always make sure you eat 30 percent whey and 25 percent egg white protein. However, the other proteins can vary. At 20 percent of his daily calories, Joe Bodybuilder is only going to get to eat about 30 grams of meat or fish. That's not a lot of food: only a quarter pound of (very lean) beef, fowl or fish, less than one regular can of tuna fish. That's a sore point with some bodybuilders. They say: "But Serge Nubret eats ten pounds of beef a day!" or

"I live on fish and rice and water on a diet." Both might have a place, but for now, get used to not relying on flesh products. But I'm not completely heartless (I'm not a scientist). You can plunder the casein and miscellaneous percentages to increase the meat and fish allotment to about 30 percent.

The problem with flesh is that it contains a lot of saturated fat. On a 10 percent fat diet, the no-value saturated fats can crowd out the essential ones. Although fish oils are good for you, be realistic. You probably don't eat much high-fat oily fish.

Fourteen years ago, I would have recommended beef for its creatine content. Creatine is part of creatine phosphate, the substrate for adenosine triphosphate (ATP) production in muscles. Beef's reputation for building strength may come from creatine — or perhaps from the anti-catabolic action of the unusual fats in cooked beef. If you want to supplement with creatine, it's cheaper and less fattening to add supplemental creatine to whey and egg protein.

Have I skated on fish? Although fish doesn't have great protein, some species have excellent fats. We'll discuss fish oils in Chapters 15 and 16.

Should you use beef protein supplements? Beef supplements are highly digestible, but some amino acids need to be replaced after damage in processing. The interesting question is whether the creatine content is preserved. In addition, some people have gas problems with both whey and egg proteins. Would beef protein supplements solve this problem? Until these questions are answered, I have no definite conclusions.

5% — Miscellaneous Vegetable Proteins

Most starchy vegetables contain protein. A gram here and there will add up to about 5 percent of your daily calories.

Years ago, the very influential book *Diet for a Small Planet* persuaded many people to combine incomplete vegetable proteins. The book explained which proteins should be eaten together, such as rice and beans or soybeans and milk. The advice was well-intentioned, but we now know that it's not necessary to eat the proteins together. The proteins will eventually get digested into amino acids and circulate in the blood in a holding pattern until the rest of the amino acids are digested later. If you don't eat the tofu at the same time as the milk, don't worry. You'll eventually consume enough other proteins to cover the missing amino acids.

Closing Thoughts

Frankly, I've never seen a bodybuilder with a protein deficiency. However, I've seen BCAA or glutamine dieting deficiencies due to bad protein choices. Choices that would be sufficient in other circumstances will not suffice on low calories.

My protein recommendations are much more rigorous than a doctor's or a nutritionist's would be. This is because dieters who don't use anabolic steroids or growth hormone have to be very careful which proteins they eat.

In addition, I've encountered a number of people who have tried to lower their body fat to contest bodybuilding levels and failed. They didn't fail because of lack of discipline, lack of hard work or even injury, but usually because they became discouraged by the amount of muscle they were losing. Each week they got lighter and smaller, but not leaner. It finally dawned on them that they fucked up somewhere when a friend or training partner said, "Hey bubba, you look like shit!" End of diet.

Although I can't point the finger directly at protein — there are a zillion factors that can throw a dieter off — tracking

protein in such detail makes sure that protein is not the problem. Yes, protein, the subject of so much monthly propaganda for so many decades, is in fact very important.

CHAPTER 12

AMINO ACIDS: NON-RECOMMENDATIONS

DURING DIGESTION, proteins are broken down into amino acids. First, ingested protein is liquefied in the stomach with acids. Then the liquid protein goes to the small intestine for breakdown into peptides (small groups of bonded amino acids) and a few free-form amino acids.

From the small intestine, the peptides are taken to the liver though portal circulation. The liver then converts the peptides to free-form amino acids for release into general circulation. Research has demonstrated that of all proteins and protein fractions — whole proteins, peptides, and free-form amino acids — peptides that contain two amino acids (dipeptides) are the most easily absorbed. But does it matter? Are any amino acid supplements as good as dietary protein? I think not.

First, amino acids are quite expensive. Gram for gram, they are more costly than even the best ion-exchange whey protein.

Second, free-form amino acids don't work as well as peptide-bound amino acids. This is why most free-form amino acids started out as intravenous solutions for use in hospitals.

In addition to the economics and the science, I have a personal dislike for amino acids from years of working in the health food business. Because I occasionally design supplements, I know the back-end of the business that most consumers never see.

Most peptide-bound amino acids are reduced from whole proteins by either of two methods: enzyme processing or acid reduction. Although (unlike acid reduction) enzyme processing keeps the amino acids intact, it always creates some free-form amino acids along with the dipeptides. Are free-form amino acids so bad? Physiologically, they are probably not that bad. However, free-form amino acids have a noticeably bad smell and taste like spoiled milk when the starting proteins are casein and lactalbumin. You can imagine the odor of free-form amino acids derived from egg.

To avoid this problem, many enzyme-processed proteins are broken down into larger peptides, with more than two or three amino acids, which are not as easily absorbed.

Acid reduction is cheaper than enzyme processing, but it destroys some amino acids and has the same free-form residue problems. I'm not aware of any way to get pure dipeptides without any free-form amino acids mixed in.

Both processes are used on whole proteins. Originally, companies used liquids made from the leftover skin and hair of slaughtered animals. Even Socks' hair ball could be made into digestible amino acids. Amino manufacturers now use casein, lactalbumin and egg, usually when they are spoiled and can't be used for whole proteins. Marginal proteins that have been too heat-damaged, over-dried, old, spoiled or whatever (use your imagination) are used to make amino acids.

Although the solubility or digestibility of an adulterated

protein can be improved somewhat by reduction to peptides, I personally don't see any reason to pay for this band-aid processing. My recommendation has always been to pick a high quality, well-made (and mostly not "made") protein instead. Invest your money in ion-exchange whey protein. In an ideal world, enzyme-reduced filtered or ion-exchange whey peptides could be useful, but why bother?

Although I have faint praise for amino acid supplements in general, there are uses for specific amino acids. You might consider using the BCAAs (leucine, iso-leucine and valine), which are unusual because they need an active transport mechanism, like insulin, into the muscle cell. Other amino acids don't *need* an active transport mechanism, although more will be transported if one is present.

Once the BCAAs are in the muscle cells, they are used up surprisingly quickly. Many of the other amino acids needed in muscle are converted from BCAAs, particularly leucine. During dieting, the BCAAs are sacrificed first, either directly or conversion to other amino acids that are used to make glucose. Thirty percent of the amino acids absorbed into muscle cells (in a healthy, non-dieting person) are BCAAs. Because BCAAs convert easily to other amino acids, and can't be converted back, BCAAs are not stored for long periods in the cell.

Whey protein is about 25 percent BCAAs. Of course, because it is a whole protein, the BCAAs in whey are peptide-bound. By following my protein recommendations, you should fulfill all of your BCAA needs while dieting. However, on days when you don't follow the protein guidelines to the letter — when you eat out or run out of whey protein — BCAA supplementation can be your contingency plan.

I recommend BCAA supplements (wince) on the days

when your whey protein requirements are not met. Of course, if you get anxiety attacks over muscle loss even when you eat your whey protein, BCAA supplements can placate and soothe, perhaps better than Xanax.

I'm not completely happy with BCAA supplements because all of the commercial forms are free-form, not peptide-bound. Perhaps it's just a matter of supplement aesthetics; I always strive for the best. It reminds me of the studies which tried to show that free-form cysteine boosted immune function. In fact, only cysteine bound in whey works. I've always wondered if we aren't getting the expected benefits of BCAA supplementation for the same reason. A peptide-bound BCAA supplement is on my wish list of ideal supplements. For now, however, I recommend whey protein.

CHAPTER 13

AMINO ACIDS AS DRUGS

THIS LITTLE CHAPTER is not about dietary proteins, but about the drug-like characteristics of high doses of amino acids. In the introduction, I explained the concept of using common substances, such as vitamins, minerals and amino acids, as drugs. For example, L-Dopa, an amino acid available by prescription, is used to combat Parkinson's disease. In addition, it has been shown to increase growth hormone when taken in doses of 1/2 to 1 g daily. In the early 1980s, Pearson and Shaw, the famous life extensionists, propounded the idea of using large doses of arginine and ornithine to enhance growth hormone secretion. More recently, ornithine keto-glutarate (OKG) has been touted as an anti-catabolic nutrient (a drug-like action). Ordinary people, from sedentary adults to the frail elderly, buy amino acids in the hope of achieving drug-like effects. I remember a particularly sly low-dose ornithine and arginine capsule that supposedly allowed one to "Lose [fat] while you snooze."

High doses of amino acids are usually not toxic nor dangerous (the FDA differs in opinion). However, pills containing small doses of amino acids never duplicate the drug-like effects of their high-dose or intravenous counterparts.

The problem (and it is *always* a problem) is the commercialization of a scientific study. Scientists can make amino acids do amazing things when using intravenous infusions, stomach tubes or staggeringly high dosages. These techniques allow them to generate a *measurable* metabolic change. However, there's a big difference between measurable and merely "feelable" changes. Tryptophan worked; people fell asleep faster. Most growth hormone enhancers do not work.

The biggest problems with amino acids as drugs are cost, convenience and palatability. Many people found out that 10 to 15 g of arginine or ornithine were expensive, foul-tasting and gastrically distressing. Even if the compound could have a discernible effect, it won't if the individual unconsciously avoids consuming it. Does OKG really work? Maybe, but I predict that we'll never know. Hardly anyone will use it because the optimal dosage is 10 g per serving.

I hate to be a fuddy-duddy about amino acids. I'm all for economical, convenient and legal "drugs". However, most oral amino acids are ineffective. I think it would be better to just use a real drug. Of course, some athletes want to follow a natural, non-drug philosophy, and amino acids are comforting because they somehow qualify.

Don't despair — I have lots of really nifty tricks ahead, including some new high-tech amino acid derivatives that might actually be useful.

CHAPTER 14

ARRANGING YOUR PROTEINS

BY NOW, you must think I have a protein fetish. We just went over every possible bit of protein esoterica: grams, calories and percentages. This book includes this detailed information because my clients have asked so many questions. I have about 200 unanswered letters on my desk from just last month, some of them with page after page of queries. If a question can be asked about nutrition and protein, someone has asked it of me. I hope this book will answer them all. In the future, I'll just say: "Read the book."

In this chapter, we'll wrap up protein with a discussion of protein arrangement. What's that, you ask? Is it like flower-arranging? It's not an art form, but simple science. Protein arrangement answers the classic questions: How many grams of protein should you eat at each meal? At what time of day should you eat it?

Some people believe that one can only digest 30 grams of protein per meal. Perhaps this is true if you are eating fatty, stringy meats which take a long time to digest, but this doesn't apply to any of the diets in this book. The protein sources we've discussed, whey, egg and casein, are highly digestible, soluble

and assimilable. Although a few individuals have problems with the membrane around egg white, and others can't digest the immunoglobulin component of whey, these problems are rare.

I recommend that your hard-to-digest meals, such as meat and high-fiber vegetables, be consumed during your last meal before bed. If you fulfill your meat and fish requirement at this time, you will be consuming 20 percent of your calories before bed. The high bulk items should stave off hunger during your sleeping hours. However, you needn't be rigid. If you want a (low-fat) hamburger and salad at midday to be sociable, no points will be deducted.

Another fallacy almost as prevalent as the 30-gram myth is that proteins shouldn't be eaten with carbohydrates. Usually some kind of rationale of acid-alkaline environments is presented. This is shaman nutrition. Most of the time, it doesn't matter when or with what you eat protein. Eventually, all of the protein will reach the bloodstream as free-form amino acids.

Most amino acids are passively transported into the cells as needed. However, the BCAAs need insulin to enter the muscle cells. Because carbohydrate intake increases insulin secretion, you should eat carbohydrates with your whey protein.

The meal directly after your workout should contain higher amounts of carbohydrates and protein than the other meals. After exercise would be the perfect time to consume all of your whey protein, which is 30 percent of your daily protein. Most glycogen storage and amino acid transport takes place using the nutrients in the meal immediately after exercise. If you train twice a day, split your whey protein consumption so that 15 percent is consumed after each workout.

Between these 2 meals, you've used up 50 percent of your protein requirements. Spread the other 50 percent throughout

the day over the four remaining meals, so that you are eating about 15 percent of your protein calories at each meal (okay, it's 12.5 percent, smartass). Is it important that you eat exactly 12.5 percent of your protein at each meal? Of course not. It's convenient and logical to eat small amounts of protein at each of the remaining 4 meals, but not of paramount importance.

The post-exercise meal is the most important. Although other meals can be adjusted slightly for your convenience, eating regular meals will cause more predictable absorption and help to alleviate hunger.

CHAPTER 15

DIETARY FATS: RECOMMENDATIONS

DIETARY FATS ARE ON shaky (jiggly?) ground in athletic research. There's a lot of information about proteins and carbohydrates, but dietary fats have been the performance duds over the years. Fats have been pretty much abandoned by both endurance and strength sports researchers. Although the Bulgarians rely on beef fat and butter fat, their choices fly in the face of convention. Saturated fats have become the great cardiovascular Satan. Even the general public has been educated about what type and amount of fat to eat, although it mostly ignores the advice. First, simple cholesterol was the demon. As time went on, we perceived a real fat conspiracy that included saturated fats and finally trans unsaturated fats. Ironically, you can ask a sub-minimum wage employee in any American fast food restaurant what kind of fat is in the French fries, and probably get an accurate answer!

None of this information will help an athlete's performance. Athletes usually choose fats by omission. Most of their mental energy is used up determining what *not* to eat.

The anecdotal evidence to support fat in athletics is not good. Ground beef fried in butter? Oh, my! It's like I've just sat

down on a nutritional whoopee cushion. The success of butter fat is pretty easy to explain. Butter fat contains some short-chain triglycerides, which are digested quickly and available for energy pronto. However, beef fat is an enigma. How much do you need to eat to get enough creatine and conjugated linoleic acid? Will eating large amounts of beef fat cause prostate tumors later in life? And would a modern bodybuilder eat 10 pounds of very fatty beef every day?

Modern dieters are usually quibbling about fat calories. They try to omit all saturated fat, or more radically, all fat. In fact, many athletes have dietary fat deficiencies. They would be healthier if they ate some essential fatty acid salad dressing every day. Usually, however, the resolute dieter suffices with just vinegar or lemon juice, and holds the oil. In the Modern Diet, you must be careful to eat only the best fats, because fat is only 10 percent of your total calories. The Isocaloric Diet is 33 percent fat. The BODYOPUS (don't try it; the exits are locked) Diet is 70 percent fat. Howzah! It's easy to fulfill these fat quotas if we blank out everything we know about cardiovascular health. But if we want to crawl out of the saturated slime, we need to become ethical fatties. Let me illustrate some choices other than the Bulgarian Death Fats.

Your first choice is the one nobody likes: fish oil. You may be familiar with the eicosapentanoic acid (EPA) and its fishy twin, docosahexanoic acid (DHA). You can remember them as the we-don't-usually-eat-fish oils. Americans are used to white fish, which is low in fat. How do I convince you to eat salmon, trout (are those two so bad?), mackerel and (uh-oh) sardines? I can't. Sardines in particular conjure up memories of the little mouse in the Tom and Jerry cartoons cruelly baiting the poor old Tom cat with enticing sardines. I still remember the vapors

rising from the turned-back lid while Jerry held his mousy nose. Oily fish is an acquired taste, unsettling on the tongue with its unusual slickness. I have consumed innumerable cans of tuna fish, disliking every one, so I think it is possible to train yourself to have one 4- to 6-ounce serving of oily fish every day. Just can the can of tuna. Maybe turn the usual can-o'-tuna into a can-o'-salmon or mackerel or ... sardines.

Why these stinky, icky fish? Because fish fats cannot readily be made in the body, but are needed by organs (especially the brain). This is your brain (see picture of a walnut). This is your brain on sardines (see movie still of The Brain From Outer Space). Any questions? Of course, plenty of people don't consume oily fish and still have healthy brains — or do they?

Humans can build these necessary fats from two polyunsaturated vegetable oils, linoleic acid and linolenic acid. Most supermarket oils, such as corn, sunflower and safflower, contain linoleic acid. Linolenic acid, on the other hand, has been elusive. Soybean oil is the only supermarket oil that contains linolenic acid. However, the ideal choice is flaxseed oil. You should take the time to find a source of it. Most health food stores that have refrigerators carry it. You can also consume whole foods that contain linolenic acid, such as walnuts and pumpkin seeds. Flaxseed oil is on my "must-have" supplement list, right next to whey protein.

Fish oils and polyunsaturated vegetable oils should cover your fat needs. On the Modern Diet, a meal of oily fish and a green salad with flaxseed dressing would fulfill your fat requirements. At 2000 calories, 10 percent fat is only 200 calories. This is less than 2 tablespoons of oil. Don't forget that part of the 200 calories will be tagalong saturated fats from other foods.

In the Isocaloric and BODYOPUS Diets, the fat require-

ments are higher. The easy way to fulfill them is to just eat more of the above. You don't have to eat essential fats exclusively; the unsaturated fats in avocados and nuts will do. Olive oil contains monounsaturated fatty acids, and there's a real buzz on the cis form of oleic acid, the main fatty acid in olive oil. It's one of those do-no-harm fats, but unless you have a real olive fetish, consuming a lot of olive oil is difficult because of its pungent flavor. I prefer the new genetically altered sunflower oils that are 90 percent oleic acid simply because I don't like the taste of olive oil. The beauty of olive oil is its neutral effect on the metabolism. While saturated fats impair insulin sensitivity, oleic acid does not.

Now we can move into the weird fats that don't comfortably fit in any particular category and do not occur in abundance in nature. Medium-chain triglycerides (MCTs), have been the subject of much athletic research. Although they are saturated fats, they behave differently than longer-chain fats.

Think of fats as pieces of chain. The short lengths, like butyric acid, are easiest to digest. Really long fats, like wax and paraffin, are indigestible.

MCTs are found in relative abundance in coconut oil. Less than half of coconut oil is MCTs, but it is the highest source in nature. I seem to remember a Mexican wild bush that yielded high amounts of MCTs. There was an ongoing project at the University of California at Davis to domesticate it. How do you domesticate a wild bush?

MCTs are weird because, unlike longer fats, they don't need bile to emulsify them, and they go directly through portal circulation into the liver.

MCTs were originally created in the petroleum industry in the 1950s, and have been used primarily as nutritional support for individuals who cannot produce bile to digest normal fats.

MCTs have been extremely beneficial for infants with this condition, as fat is essential to good growth.

In the bodybuilding world, MCTs have had an unjustified reputation. Although MCTs go directly to portal circulation like carbohydrates and proteins, they do not elevate body temperature. I will admit that I assumed they did (about 12 years ago), and probably helped to propagate this falsehood.

Another false claim is that MCTs cannot be deposited into fat cells. This is not exactly true. Intravenous infusions of MCTs are not easily deposited in fat cells. However, digested MCTs are broken down in the liver and then reassembled into familiar long-chain triglycerides. MCTs exit the liver as regular fats.

MCTs are tasteless, but they have a startling aroma of petrochemicals when used as frying agent. MCTs should not be used for baking because the enzymes in seeds and seasonings break them down into individual fatty acids that have a soapy flavor.

MCTs have no place in the Modern Diet because 10 percent fat calories does not allow much room for anything other than essential fat.

Although MCTs are more rapidly available to the bloodstream than more complex dietary fats, people assume this means that they somehow give an athlete more strength, speed, endurance or size. Research has not shown these assumptions to be true. Although I was initially enthralled by MCTs back in the early 1980s, I now feel that if you eat a Modern Diet with moderate amounts of carbohydrates, MCTs have no useful place.

End of story? No. In the Isocalóric and BODYOPUS Diets, MCTs can be useful. To reduce insulin, you need calories that are not carbohydrates or protein. Perhaps this is MCTs' golden moment?

Ah, I wish it were that simple. Adult humans cannot digest very much MCT oil at one time without stomach upset. Most fats are digested in the small intestine by lipase. However, the stomach does have some lipase action, which breaks down MCTs before dumping them into the small intestine. Eight-carbon MCTs are the easiest to break down and cause the most stomach upset, nausea and diarrhea.

All MCTs are mixtures of C-8, C-10, and C-12 fatty acids. The C-8 component is present in large enough amounts to limit each serving to 1 or 2 tablespoons. Ideally, a highly individualized C-10 MCT oil would prevent stomachache. By the way, C-12 cannot do the job because it is only a quasi-MCT. About 35 percent of the C-12 fatty acids are transported like other longer fatty acid chains, skipping the direct route to the liver.

Unfortunately, MCTs are hard to find. There are not many brands, and the few that are available do not label the ratios of the carbon lengths they contain.

In the BODYOPUS Diet, MCTs become even more useful. During the 7-day dieting cycle, fats are converted to ketones. Because they are shorter, MCTs convert to ketones more rapidly than longer fats. Of course, your body can make ketones without MCTs, but MCTs will make you feel better when the low blood sugar from carbohydrate restriction is dragging you down.

You can use coconut oil instead of MCTs. Unfortunately, over half the longer fats in coconut oil are ordinary saturated fats. They're not the Bulgarian Death Fats, but not too far off in the public's mind. In addition, the saturated fats in coconut oil impair insulin sensitivity.

There are other weird fats. I've skipped short-chain triglycerides because they have been associated with some nasty health problems. Conjugated linoleic acid (CLA) is an anti-catabolic,

anti-oxidant fatty acid found in heated beef fat. It is one of the few good trans fats. In addition, there are a few fats intermediate in status between essential fatty acids and fish oils that could be of interest in a small group of individuals. Gamma linolenic acid (GLA), found in primrose oil and borage oil, has almost a cult following. GLA has beneficial effects on both estrogen and testosterone.

If there was more hard evidence that relates specific dietary fats to performance, I'd give firmer recommendations. Rat studies show that a diet containing 15 percent essential fatty acids improves growth. However, we need human lab rats to validate this. For now, I'm still working up the courage to roll back my first can of sardines, or not to spit the pizza out of my mouth when I inadvertently bite into an anchovy.

CHAPTER 16

DIETARY FATS: HIERARCHY AND ARRANGEMENT

FAT IS THE NEGLECTED NUTRIENT of athletic performance. Over 12 years of coaching bodybuilding competitors, I've seen how dietary fat can make or break a pre-contest carb-up. (Carbing-up is the process of over-supplying the muscles with carbohydrates after a period of carbohydrate restriction.) Bodybuilders who cautiously increased carbohydrate intake without adding much fat had only small, disappointing muscle gains. Those who included unsaturated fats attained a muscle glycogen supercompensation beyond my predictions.

The following is the hierarchy of fats for the Modern or Isocaloric Diet, from ideal to hum-drum.

FISH OILS

These fats are identical to the fats used in the brain and other organs. Although humans *can* synthesize these fats, this is an enzyme-driven process that can decline with age.

ESSENTIAL FATTY ACIDS (EFAS)

Certain vegetable oils have high amounts of linoleic and

linolenic acid, the essential fatty acids. Although many animals store these essential fatty acids in carcass fat, they become adulterated when the meat is cooked. Consuming cooked animal fats will not fulfill your essential fatty acid requirement.

Many commonly available oils, such as corn oil and canola oil, contain EFAs. However, I recommend using whole unprocessed food sources, such as walnuts and pumpkin seeds, whenever possible. Cold-processed flaxseed oil, although more difficult to find, is ideal for fulfilling linolenic acid requirements. As an added bonus, 20 percent of flaxseed oil is EPA. Flaxseed oil will perhaps be your most important supplement purchase (after whey protein).

OLIVE OIL

This monounsaturated oil is not essential. However, whole olives are surprisingly low in calories, considering their satisfying bulk. In contrast, nuts are high in fat and dishearteningly small in volume.

UNSATURATED OILS

These nonessential oils are vehicles for the essential fatty acids in many vegetable oils.

SATURATED FATS

We can't help it. All flesh products, and even some vegetable oils, contain saturated fats. Because they lower insulin sensitivity, it's not a good idea to eat them with carbohydrates.

MEDIUM CHAIN TRIGLYCERIDES (MCTS)

MCTs are helpful in the BODYOPUS Diet because you will require an unusually high amount of dietary fat. As MCTs offer

fast conversion to ketones (which the body can use in lieu of glucose), they are an ideal fast energy source for BODYOPUS. As much as you might like to jam in as many MCTs as possible, the practical limit, because of stomach upset problems, is 120 to 240 calories per meal. Over 6 meals, this adds up to between 720 and 1440 calories per day.

There is only one rule for scheduling unsaturated fat consumption: Keep dietary fats away from the post-exercise meal. Because dietary fats slow gastric emptying to the small intestine, adding fats to carbohydrates will slow their absorption (which is why ice cream, which contains sucrose, is a low glycemic food). This property can be useful in stabilizing blood glucose throughout the day. After a workout, however, you need foods that can be digested rapidly.

CHAPTER 17

CARBOHYDRATE RECOMMENDATIONS

CARBOHYDRATES are the fundamental test of any fat-loss diet. To arrive at a suitable food debit, you must cut carbohydrates. You can't blame excess body fat exclusively on dietary fats. Of course, dietary fat does affect weight gain. However, most dieters automatically lower dietary fat — and they still fail. Cravings for dietary fat are easily subdued, but carbohydrate cravings always persist. Even moderate reductions in carbohydrate intake will cause anxiety. When body fat drops to between 3 and 10 percent, the influence of carbohydrate quality becomes especially apparent.

Carbohydrates are not some evil, drug-like substance. Eventually all digestible carbohydrate sources reduce to ordinary glucose or triglycerides. However, they do affect insulin secretion, which profoundly influences fat loss.

Frankly, the total amount of insulin secreted over a specific period, say 24 hours, doesn't vary substantially with a fixed carbohydrate amount. If we ingest X amount of carbohydrates over 24 hours, the pancreas will secrete Y amount of insulin. The total insulin amount will be similar, whether the 500 g are a complex starch or liquid glucose.

Why do we bother to judge the quality of carbohydrate sources? Because insulin secretion depends on carbohydrate quality. Fat and muscle cells accept glucose at different insulin thresholds; if they were the same, glucose would be driven equally into both.

To gauge carbohydrate quality, we use the same scale that diabetics use to estimate their requirements for injected insulin: the glycemic index. The glycemic value of a carbohydrate is the rate at which it is converted to blood glucose, as compared to liquid glucose, the reference value of 100. Other carbohydrates usually have lower glycemic values than liquid glucose. The glycemic index is not a reliable indicator of the amount of insulin secreted because most people don't eat carbohydrates exclusively at each meal. Other nutrients will interfere with absorption and alter the glycemic value.

Total carbohydrate intake has the greatest influence on insulin secretion over a 24-hour period. Both the Isocaloric Diet and the BODYOPUS Diet work by reducing insulin secretion by reducing overall carbohydrate intake.

The next (and very important) step is to decrease the insulin peaks caused by fast (high-glycemic) dietary carbohydrates. These insulin peaks will, of course, rapidly drive glucose (and amino acids) into both muscle and fat cells. However, muscle cells don't need as much insulin as fat cells. As you can imagine, these high insulin levels will drive glucose preferentially into fat cells. To make things worse, high insulin levels also interfere with fat cell disassembly. Chronic high insulin levels will also eventually reduce insulin sensitivity in muscle cells.

Sometimes even normal blood glucose levels can cause high insulin peaks if you have faulty insulin transport mechanisms. There are two broad categories of insulin transport malfunction: insulin resistance and low insulin sensitivity.

Insulin resistance is primarily a deficit at the insulin receptor level, while insulin sensitivity involves both receptor and post-receptor mechanisms. These deficits cause you to secrete too much insulin, which sledgehammers glucose into the fat cells. This condition is called hyperinsulinemia. The BODYOPUS Diet works spectacularly well for middle-aged and older people, because hyperinsulinemia is a fact of growing old.

Insulin sensitivity is highest in the morning and declines during toward evening as cortisol levels rise. For years, bodybuilder coaches recommended that their athletes eat meals low in carbohydrates at night. Now you know why.

My suggestions will not be readily accepted outside of the bodybuilding community. Many food items from Slimfast or Jenny Craig contain the worst possible carbohydrate choices.

There are three broad categories of carbohydrates: starches, sugars and glucose polymers. Starches come in many configurations. Some molecules are laid end to end, like strings of pearls, while others look like ragged tumbleweeds. Enzymes break down all of these complex carbohydrate structures — breads, pastas, cereals and vegetables — into simple glucose.

Many factors will slow absorption, either delaying gastric emptying into the small intestine or slowing transport across the small intestine to the liver. We already know that dietary fat will slow gastric emptying. In addition, the amount (and type) of fiber in the starch source will slow absorption. For most dieting situations, slowing gastric emptying is a good thing because it evens out the insulin peaks.

I don't engage in nutritional quarrels over which complex carbohydrates to choose for a low-calorie diet. There are too

many interesting choices to try to limit complex carbohydrates to single items, like brown rice, beans or vegetables. Some nutritionists split hairs over the lower glycemic rating of, for example, sweet potato versus white potato. Ultimately, the quantity of starch will have more impact on the number of insulin peaks than the quality.

However, I do not recommend bread, processed cereal or other highly refined starch sources. Instead, choose more complex, high-fiber items like sweet potatoes, brown rice, beans and raw green vegetables. However, nothing is absolute. I love bread. Others crave rice cakes. Technically, there are better carbohydrate choices, but a bowl of Alpha Bits will not throw off your whole diet. Just don't eat the whole box like I do.

Highly refined starches will have a different glycemic rating than their unprocessed counterpart. Those bodybuilding diet staples, rice cakes, are actually rated over 100, above liquid glucose. Corn flakes have a glycemic rating in the 90s, much higher than whole corn. For most complex carbohydrates, insulin oversecretion is not too much of a problem, unless, of course, you have a compulsion like I have with Alpha Bits.

Sugars, however, do present problems. All sugars — sucrose, glucose and lactose — cause insulin to peak rapidly.

Most savvy dieters try to avoid concentrated sugars simply because they don't alleviate hunger for very long. However, some dieters do include fruit, which contains both fructose and sucrose. In its favor, fruit has nice amounts of fiber, vitamins and minerals. However, removing fruit from a diet always causes visibly greater fat loss, especially towards the end.

Fructose isn't too much of a problem, for a variety of reasons. First, fruit does not have terribly high amounts of fructose. Most fruit actually contains more sucrose and glucose than

fructose. Second, fructose is used by the liver in two ways: it can be converted to glycogen or to triglycerides. Ideally, all fructose would be transformed into liver glycogen and eventually converted to glucose for use. Remember, though, that all conversions are enzyme-driven. The liver has very little fructose-converting enzyme. Most individuals can only convert about 200 calories (50 g) of fructose to glycogen over a 24-hour period. Then, the fructose is converted to fat.

Most of the insulin peaks that occur after eating fruit are caused by the tag-along sucrose. Sucrose is a disaccharide (two simple sugars bonded together) of glucose and fructose. Insulin has a greater effect when you eat disaccharides because not all of the sugar reaches the bloodstream at the same time, but much of the insulin does. Although fruit seems appetizing, I recommend that dieters, especially women dieters, avoid copious amounts of fruit. About 200 calories or so each day will replenish your liver glycogen, but 200 calories is not much fruit.

Sugar is often hidden in foods. All frozen milk desserts, such as yogurt and ice cream (especially the new no-sugar ones), contain lactose, another high-glycemic sugar. If you consume these foods late at night when insulin sensitivity is reduced, you can be sure that blood glucose will transport into your fat cells.

Sugar consumption greatly affects fat loss on a low-calorie diet. Of the three macronutrients, dieters crave carbohydrates the most. The current term (and it is quite correct) is "carbohydrate addiction." I recommend that you consume no more than 200 calories of simple sugars (including fruit) per day. Plan your meals so that you eat high-glycemic foods when your insulin sensitivity is highest, in early morning or immediately after a workout. Since these sugars reduce insulin sensitivity, it

would be a good idea to take insulin sensitivity boosters like chromium, vanadyl sulfate and magnesium along with the sugar.

I suppose I should discuss powdered carbohydrate supplements, although I feel they are uninteresting and unfulfilling. When I embarked on the path of Guru-dom back in the early 1980s, I was a strong advocate of high carbohydrate consumption in general and maltodextrins in particular. I now know that I, along with the majority of nutritionists and athletes, was just wrong-wrong-wrong about carbohydrates. Most other "experts" are still in stepping in time to the ill-advised eleventh commandment: Thou shalt eat copious amounts of complex carbohydrates.

Maltodextrin is actually a trade name for a particular glucose polymer derived from corn. However, glucose polymers can be created from just about any vegetable starch material, such as potato, pea or rice. The starch is isolated, then cut to a length between a simple sugar and a full-length starch. Shortening the starch changes its pourability in dry form, its solubility in liquids and its perceived sweetness.

Before the early 1980s, maltodextrins (the most popular of the glucose polymers) were relegated to use as binders, fillers and glues (such as the glue on postage stamps). Many in the food industry erroneously thought that all maltodextrins were sugars. It was Michael Zumpano, working with the Weider organization, and then with Unipro, who noticed that certain maltodextrins are a blessed combination of the best qualities of starches and sugars.

His ideas and the introduction of the CARBOPLEX nutritional supplement revolutionized the not only the health food industry but mainstream food preparation as well. Today, maltodextrins can be found in baby food, cocoa, diet products, sports drinks and even reduced-fat peanut butter.

Do I have any objections to glucose polymers other than that they are boring and bland? Consuming carbohydrates that have a higher glycemic value than cornstarch won't help non-endurance athletes. Most maltodextrins cause a sharp dip in blood glucose after 2 hours. Although the glucose polymer market has become more sophisticated, the real solution to the drop in blood sugar was the creation of a new class of soluble starches called amylopectins.

The chief problem in using a product that includes glucose polymers is that you have no idea what its glycemic rating is. Maltodextrins, for example, can have chain lengths as short as 3 glucose molecules or as long as cornstarch. The selection is based on manufacturing needs, not the need of an athlete to avoid high-glycemic foods.

Here's a new trick you can use to slow absorption of any carbohydrate, including glucose polymers. While dietary fat will slow the absorption of carbohydrates, soluble fibers or gum will turn the whole carbohydrate-protein-fat matrix in the stomach into a gel-like mass. I prefer guar gum because scientific research has documented that it heightens insulin sensitivity and increases thermogenesis. I imagine that other gums, like locust bean gum or one of the pectins, would have similar benefits. You can take up to 10 g of guar gum 3 times per day. I have had no digestive problems from ingesting guar gum, but you may want to start with 5 g and work up to 10 g. Of course, combining guar gum with dietary fats will slow gastric emptying even more. By the way, many individuals whose stomachs cannot tolerate even small amounts of MCTs can consume them with carbohydrates, protein and guar gum, which will hold the

irritating C-8 component in the stomach.

This section has been less scientific than the sections on proteins and fats, because I've found that while people are willing to change their protein and fat choices quite readily, they are stubborn about carbohydrates. Since dieters crave carbohydrates more than other foods, trying to stick to precise carbohydrate recommendations can quickly jettison your resolve to stick to the diet. Don't get too anxious over the exact quality of the carbohydrate sources in your diet. Just reducing carbohydrates will make you nervous; don't make it any harder.

CHAPTER 18

PROBLEMS WITH MODERN DIETING

YOU NOW KNOW most of the currently accepted opinions on nutrition for athletes. The diet articles in just about any athletic magazine would advocate eating numerous small low-fat, high-carbohydrate and moderate protein meals, doing aerobics and not trying to lose dramatic amounts of weight each week. Although I have refined this advice, and educated you to reach for high goals, I haven't shaken the earth beneath your feet. No diet revolutions, yet.

In many aspects we've laid out things perfectly. However, there is a lot fundamentally *wrong* with this way of dieting. Its advantages are what make me call it the Athletes' No Tantrum Diet. It is nutritionally correct, considering I'm giving it to a big, irrational baby that constantly craves carbohydrates. Its disadvantages are the subject of this chapter.

Each of the small problems caused by the Modern Diet causes more and more problems, until the diet goes terribly wrong, and you give up before you reach your goals. Even worse, sometimes dieters go out-of-control and get even fatter from binge eating.

The first obstacle to correct dieting is your misjudgment of

your body fat. A bodybuilder will typically estimate his body fat percentage around 10 percent, when it's really 15 percent or more. He picks a contest and gives himself 12 weeks to lose all of the fat and get in contest (winning) shape. Some bodybuilders only give themselves 8 weeks!

It's pretty common for bodybuilders to be deluded. After reading the glamorous success stories in magazine articles and advertisements (aren't they the same thing?), the sub-excellent bodybuilder, with legitimate hopes and dreams, thinks, "I can do it too." However, the top professional bodybuilders in the stories rarely have more than 9 percent body fat off-season and use an arsenal of (not mentioned) steroids, growth hormones and other secret weapons.

Impatience is the next obstacle on the course. You want the fat to *go away faster* than a puny, picayune pound per week. So you throw all of the careful planning, numbers and calculations out the window — you drop calories dramatically or add hours of aerobics every day. Sound familiar? Oh yes, the number on the bathroom scale plummets each week. However, your size and shape and strength are diminishing, too. You say to yourself: "I weigh the same as before I started working out." Yeah, and still have a floppy butt.

The body does have a brain. It knows it's slowly being starved to death. Metabolism slows d-o-w-n. You think, "Gee, at 1500 calories a day and 3 hours of aerobics, I should be losing 2-1/2 (the magic-magic-magic number) pounds a week, but *I'm stuck!*" You're not losing much weight, and what's coming off is muscle. You've come down with pencil-neck-itis. You get discouraged and abandon the diet and the contest. Then you binge to gain the lost muscle (my body really needs this extra peanut butter) and strength back. Oh yeah, the fat goes back on, too.

What do we do about these obstacles? Lectures, illustrations, chidings to just "be better" are pretty lame on my part. I am the *Guru* and am expected to help.

A big rear view mirror would solve 90 percent of the delusions about body fat. The back and glutes hold a lot of fat.

The only thing to do about impatience is to face reality. A pound a week just isn't enough — fat loss must be accelerated without muscle loss or metabolism slowdown.

When you have overcome these obstacles, you will realize all your dieting goals. Conventional modern diets will never be enough. If they were, you wouldn't need this book. I call the next step Isocaloric Dieting.

CHAPTER 19

THE ISOCALORIC DIET

WHILE IT IS POSSIBLE to lose more than one pound per week through further calorie reduction or by increasing aerobics, you will lose some muscle along with the fat. On paper, your body will look as if the diet is working. The mirror, however, will tell a different story. Even a 5 percent change in calories or aerobics will cause muscle loss.

The first way to prevent muscle loss is to change the fat to carbohydrate ratio. In the Modern Diet, the ratios were:

Protein	25%
Fat	10%
Carbohydrate	65%

In the Isocaloric Diet, these are changed to:

Protein	1/3
Fat	1/3
Carbohydrate	1/3

Adjusting these ratios will cause faster *fat* loss. Although

there is a scientific explanation for this phenomenon, I first discovered it the hard way through trial and error. No other combination worked.

At first, it seemed logical to try reducing calories further, but this caused too much muscle loss too quickly. Does increasing protein help maintain muscle mass? Nope, it doesn't. Increasing aerobics looks like a popular choice — after all, gyms have lots of steppers and rowers and bikes, all occupied with well-meaning individuals. Aerobics must be good, right? Wrong! As a matter of fact, increased aerobics causes just as much muscle loss as calorie restriction.

After screwing up in so many other ways, I finally arrived at the 1/3 ratios. Most athletes won't be happy with this. They've been conditioned not to eat dietary fat. Besides, lowering carbohydrates increases hunger and anxiety for a while. However, eating lots of carbohydrates makes your metabolism unable to burn fat efficiently.

If you have patience and not too much fat to lose, you will probably get damn close to your goal with the Modern Diet. The Modern Diet will allow you to be relatively happy, sociable, energetic and feed your carbohydrate addiction.

When "damn close" isn't close enough, you need the Isocaloric Diet. Will you be hungrier? Only at first. Will your strength decrease? Again, only at first. Will you lose muscle? Less than you would with any of the other alternatives.

In the Isocaloric Diet, we are once again concerned with the quality of the body's energy sources, not the quantity. Some people will object to eating a diet that is 1/3 fat. Fat is B-A-A-A-D, isn't it?

Fat isn't perfect, but it's all we have to work with. We can't decrease total calories because we don't want to lose muscle.

The high carbohydrates of the Modern Diet will need to change to either protein or fat. Exchanging the carbohydrates for protein won't work because not all of the amino acids can be converted into energy. Much of the amino acid content is excreted as urea, a waste product. Calorie for calorie, protein will not provide the same energy as carbohydrates. This is why high-protein diets cause faster fat loss than high-carbohydrate diets. Because protein has less usable energy, the body will strip down muscle to scavenge the energy-producing amino acids. Glutamine will be used first, then the branched-chain amino acids, then alanine.

If we can't use protein, all that's left is fat. Eating more fat will also reduce insulin secretion and make the fat-burning energy pathways more efficient. In the presence of insulin, the body will not release stored fat for energy. Therefore, as dieters, we want to reduce insulin secretion.

In the future, there may be better alternatives. The latest nutritional research shows that dietary pyruvate and lactate can activate alternative energy cycles that work better than fat or protein. These future foods will not cause insulin secretion, allowing faster fat loss while preserving more muscle from catabolism. Right now, however, these options are both tantalizing and futile. Currently, both pyruvate and lactate are hard to find, expensive, bad-tasting and boring to eat.

Almost any fat — saturated or not, essential or not — will work in the Isocaloric Diet. Energy-wise, it doesn't matter. You could use MCTs, for that matter, but they're are not as much fun as an additional serving of oily fish, walnuts or avocado.

If you have followed my recommendations for fat choices in the Modern Diet, you are eating mostly essential fats. You would be shocked at how little fat you'll need to eat to increase

fat calories by 23 percent. Salad and cooking oils don't take up much room. It doesn't take many avocados or walnuts to add a lot of calories. How about — dare I say it — peanut butter (no trans, that is)? Surely this isn't diet food!

Some people have asked me: If the Isocaloric Diet is so superior to the Modern Diet, why didn't I recommend it first? Well, most people are used to something like the Modern Diet. It's easy to start, "believe" and follow. Each change in long-standing habits requires more discipline.

Why increase protein by 8 percent? Fatty foods usually contain protein. Eggs, fish, meat, and that slice of cheese you can finally eat all contain protein in addition to fat. Even peanut butter contains protein.

The Isocaloric Diet requires more discipline than the Modern Diet, but if you're impatient, or have an inflexible timetable, the Isocaloric Diet will get you virtually all the way to your goals. The Modern Diet won't. Of course, strength and energy will suffer for about 5 days, but after that, you'll feel even better than before.

The Isocaloric Diet begins to solve a major problem in dieting (aside from hunger and anxiety): impatience. While the problem of impatience has not been completely solved, we've appeased it for now. Although there is a better diet plan to come, it is illuminating to examine the preliminary solutions to the dilemmas I've encountered in my years as a professional body confidante.

CHAPTER 20

MUSCLE CATABOLISM WHILE DIETING

AS ATHLETES, we want to make sure that the weight we lose is fat, not catabolized muscle. While "catabolism" technically means the breaking down of any tissue, we will focus on muscle catabolism exclusively.

Ultimately, the chemical that allows us to move, create heat, think and live is Adenosine Triphosphate (ATP). As you move your eyeballs to read this page, you are using the same energy source that lights up a firefly. All substances used for energy are eventually converted to ATP. All of the carbohydrates we eat (unless we eat too much) will be converted to glucose and then to ATP. Although glucose is converted the fastest, ATP is not picky. Fats, either dietary or stored, can also be converted to ATP. When you "lose" fat, your body is converting stored fat to ATP.

Many people assume that once your blood glucose and liver glycogen are low, your body automatically switches over to stored body fat. Voilà — the stored fat is shed and all of us can live happily ... Of course, the truth is much different.

The body can also convert protein to ATP. This conversion can happen locally; an exercising muscle will use the amino acid

leucine right in the cell. However, most of the amino acids are leaked out of the muscle cell into general circulation. They are then picked up by the liver, which disassembles them into usable energy substrates. This process is called gluconeogenesis, an unwieldy word meaning the creation of glucose from amino acids (or other substrates). Supplementation with branched-chain amino acids, glutamine or alpha-ketoglutarate is supposed to prevent this process.

Gluconeogenesis can use dietary protein or protein from catabolized muscle tissue. Do we have any say which it is?

There are a number of strategies to prevent muscle wasting. Beyond good genetics, how clever you are will determine how much muscle you lose. Sometimes a potentially wonderful anti-catabolic trick will interfere with fat loss. Sure, you could just use steroids, but there are other options. Let's take a look at a few.

CHAPTER 21

ANTI-CATABOLIC STRATEGIES

THESE RECOMMENDATIONS for anti-catabolic strategies start simple and get more daring as the list progresses. Dieters usually stop at some point on the list because they find the substance difficult to acquire or somehow morally repugnant. This is your personal choice.

PRESERVE GLUCOSE

Since glucose is the fastest substrate for ATP, a high-carbohydrate diet (which is easily converted to glucose), will keep the raiding of muscle amino acid stores to a minimum. This anti-catabolic strategy only works when calorie debits are less than 10 percent. High-carbohydrate diets with calorie debits greater than 10 percent will actually cause more muscle loss than a higher fat diet would.

MINIMIZE INSULIN SECRETION

This is the fix-it remedy for the shortcomings of a high-carbohydrate diet. Carbohydrate quality influences insulin secretion. Simple sugars are fast and concentrated, causing high insulin secretion. Even fructose, the noninsulinergic sugar,

should be avoided because it impairs insulin sensitivity. Refer back to the chapter on carbohydrates if you need to refresh your memory.

Supply Key Amino Acids In Dietary Form

The solution bodybuilders first came up with was just to eat more protein. However, not every amino acid can be used directly to produce ATP. Many of the amino acids in whole proteins are broken down to urea and excreted in urine. Since glutamine is the main amino acid used to create glucose, proteins high in glutamine would be ideal. Unfortunately, the two best choices, beet and wheat protein (which are 50 percent glutamine), are not commercially available yet.

Since these proteins are hard to get, the next choice would be supplemental amino acids. Sports nutritionists have recommended the branched-chain amino acids (BCAAs), and more recently, free-form glutamine. Interestingly, most ingested free-form glutamine doesn't get into general circulation because the intestines use it up first. This is called the glutamine paradox.

Better than free-form glutamine is its analogue, alpha-ketoglutarate, which survives digestion intact. Like many supplements, all forms of glutamine — free-form, peptide-bound and alpha-ketoglutarate — are really bad tasting. In all of the interesting research, they were taken intravenously or by intubation. Will you want to swallow these foul substances? Currently, not many people do. This is why I think whey protein, with its high BCAA content, is so important. Food should be enjoyed. Although whey is bland, the other choices taste awful.

Will dietary pyruvate and lactate take the place of amino acids in the future? According to the ATP flow chart, pyruvate and lactate seem to be preferable to fatty acids and amino acids

for ATP production. Unfortunately, I have no idea how to make them even innocuously bland, other than loading them all into capsules. Oh swell, another bunch of pills to swallow.

Lower Insulin By Quasi-Nutritional Means

Chromium and vanadyl sulfate both reduce the secretion of insulin. How do they work? Beats me. These two minerals either support (chromium) or mimic (vanadyl) insulin and cause the transport of blood glucose into muscle cells preferentially over fat cells. Although there is some research showing these effects, scientists haven't found all of the mechanisms at a cellular level. Remember, vanadyl sulfate is not on the FDA GRAS list and could easily be yanked at any time. Curiously, the more potent of the chromiums, chromium picolinate, is not on the GRAS list either. However, chromium nicotinate is.

Use Insulin Replacements

Chromium and vanadyl sulfate are readily available, but they are not the best insulin mimics. Metformin and phenformin, which I call "insulin agonists," work much better. I've used metformin (available in Mexico and Europe), while life extensionists prefer the more potent phenformin. Metformin is now a prescription drug in America, under the trade name Glucophage.

Don't Overtrain

This should be obvious, but most athletes overtrain anyway. People sneak aerobics more than anything else. The fat-burning zone of aerobic activity is only 60 to 65 percent of your maximum heart rate. To figure your maximum heart rate quickly, subtract your age from 220. During aerobics, your heart rate should be just slightly above *half* that. Most dieters do aer-

obics at about 70 percent (usually higher) of maximum heart rate, which forces too much reliance on anaerobic energy substrates. The only way to sustain a high aerobic workload and still keep your heart rate between 60 and 65 percent of maximum is to be tremendously aerobically fit, which you should accomplish before the diet.

Weight training can be overtraining too. Each workout causes microtrauma to the muscle cells — inflammation, tears and strains. To recuperate, you need to replace amino acids and glycogen. Research illustrates that the classic 10 sets of 10 repetitions of squats raise cortisol significantly. Consider this carefully if you are trying to train every day.

Even with these nutritional fortifications, muscle catabolism still happens. Catabolism is not a passive process; once amino acids are in the muscle cell, an active messenger is needed to get them out.

The messenger is a hormone called cortisol, secreted by the adrenal glands. Some cortisol is necessary for life, but too much will interfere with athletic performance. Cortisol is a natural anti-inflammatory that combats stress and starvation. Cortisol is a white hat kind of hormone in these extreme situations, but *excess* cortisol is the Black Bart of the metabolism.

The most potent strategy against catabolism is to thwart cortisol. Exotic nutrients are only a passive defense against catabolism. Replacing lost amino acids repairs damage that is already done. Active anti-catabolics catch the damage before it happens.

Reduce The Inflammation

Some of the cortisol secretion is a response to tissue inflammation from the physical stress of exercise. To stop tissue

inflammation, you can use anti-inflammatory drugs before you work out. Any of a wide variety of over-the-counter medications — aspirin, acetaminophen, ibuprofen and naproxen — will work. Remember that all of these medications have side effects, so you may want to rotate them or not use them every day. In addition, 500 mg of Vitamin C taken right before your workout will also prevent inflammation.

Use Anabolic Steroids

Cortisol antagonists block the cortisol receptor on the muscle cell, the "parking space" where the hormone attaches to the cell. There are no perfect drugs specifically designed for this purpose, but we will make do with what we have. Anabolic steroids are the best cortisol antagonists currently available. Anabolic steroids and cortisol (which is another type of steroid) are so close in chemical structure that steroids will block the cortisol receptor. In fact, most of the "anabolism" from anabolic steroids comes from this anti-catabolic effect. Some anabolic steroids are also anti-inflammatory.

Use Other Cortisol Antagonists

There are some cortisol antagonists, but they would be more aptly named lame cortisol antagonists. In a disease called Cushing's Syndrome, the adrenal glands secrete too much cortisol. To help these patients, scientists have sought specific cortisol antagonists. The one you will be most familiar with is the "abortion" pill, RU486, which is primarily a progesterone antagonist, but also affects the cortisol receptor. A new Italian quasi-steroid that has some promise is Decylroxibone, which has no overt anabolic action, no androgenic side effects, but potent anti-catabolic activity. However, none of these non-anabolic

steroid drugs are as effective or as free of side effects as anabolic steroids themselves. In many instances, using a cortisol antagonist will increase the number of receptors or raise cortisol secretion.

REDUCE THE NUMBER OF CORTISOL RECEPTORS

A small amount of research shows that some anabolic steroids can cause a reduction in the number of cortisol receptors. For decades, researchers have been fixated on androgen receptors. The new research explains why steroids work so well. Although cortisol receptors are pretty abundant, cortisol receptor attenuation has exciting implications.

REDUCE ADRENAL CORTISOL SECRETION

This is the most basic attack on Cushing's Syndrome. The most popular of these drugs is Cytadren, which unfortunately has been virtually unusable for athletes and dieters. Too much Cytadren will raise adrenocorticotropic hormone (ACTH), the hormone that the pituitary secretes when cortisol is too high. Even a moderate amount of Cytadren reduces cortisol enough to cause joint pains. Perhaps Cytadren plus anabolic steroids or over-the-counter anti-inflammatories will be the happy medium. So far, Cytadren hasn't fulfilled its promise as a true alternative to anabolic steroids.

USE PHANTOM ZONE ANTI-CATABOLICS

Some drugs impart a perceptible anti-catabolic effect, although there isn't any substantial research (or any research at all) on this effect. Bodybuilders are not afraid to fool around with drugs that don't seem applicable. For example, clenbuterol has quite remarkable anti-catabolic effects, which were verified

in human studies long after bodybuilders started using it. Nolvadex, an anti-estrogen, has no studies proving that it causes muscle gains, but it does. Studies of cortisol reduction from morphine use inspired some athletes to use Nubain and Stadol. Visually, you can see that *something* anabolic or anti-catabolic is happening with these drugs. Can we measure these effects in a laboratory? No one has bothered to do it yet.

Until now, anabolic steroids have covered up most catabolic blunders so well that coaches (including myself) didn't have to address them. Anabolic steroids are no-brain solutions. Working without them is dieting without a net. I hope that ultimately these alternative methods will achieve an effectiveness similar to steroids.

For more detailed information on particular anti-catabolic substances, turn to Chapter 30, which contains the top 50 dieting drugs. Chapter 48, the Special Section on Diuretics, has additional comments on anabolic steroids while dieting.

CHAPTER 22

ANTI-CATABOLICS IN THE REAL WORLD

PROFESSIONAL BODYBUILDERS use virtually every anti-catabolic strategy except cutting back on training. I'd like to comment on the actual implications of these anti-catabolic strategies for the rest of us.

First, I urge you to supplement your diet with both chromium and vanadyl sulfate. Although we don't completely understand how these two minerals work, the effects are discernible.

Secondly, evaluate your weekly training schedule. You may benefit from purchasing a heart rate monitor to ensure that your aerobics are in the fat-burning zone between 60 and 65 percent of maximum heart rate.

In addition, most weight-lifters work out too much. After seeing and trying every imaginable workout routine, I have reached the conclusion that no bodybuilder needs to exercise each body part more than once a week. The following schedule has been the most productive for all of the athletes I've trained:

Day 1	Shoulders and Arms
Day 2	Legs and Abdominals

Day 3 and 4	Off
Day 5	Chest and Back
Day 6 and 7	Off

Although this routine can be started on any day, it fits nicely into a regular week, working out between Monday and Friday, with the weekends off. Although some people think it's hard-core to split the body parts up into two workouts over the day, this is not necessary nor productive. While dieting, you don't build up enough glycogen for a second workout. In addition, you'll secrete less cortisol with just one workout.

Many anti-catabolic supplements look appealing in magazine advertisements, but the problems of cost and palatability make them too cumbersome for sustained use. For example, ornithine alpha-keto-glutarate (OKG), like all amino acid supplements, is a foul-tasting powder. Manufacturers tried creating a salt of OKG to reduce the bad taste, but it didn't work. The challenge to nutritionists and supplement designers is to make these wonder substrates at least bland.

Although it involves some sleuthing, learning how to import non-FDA-approved foreign drugs is a worthwhile pursuit. In the future, substances like vanadyl sulfate and OKG may be restricted.

I just can't ignore anabolic steroids. It seems odd to me that when so many dieters are losing muscle from catabolism, the FDA won't recognize this as a medical condition. It is currently a felony for American doctors to prescribe anabolic steroids for this purpose. However, an American citizen can have a physician in a foreign country write and fill a prescription for anabolic steroids (up to a 90-day supply), which you can then bring back into the United States. There are many Mexican doctors

who would be happy to write and fill a steroid prescription for you on your vacation. By the way, you can also do this with any Customs Alert drug that is usually disallowed if imported by mail. Anabolic steroid prescriptions are not any more illegal than the foreign prescriptions of Valium, Xanax and Codeine.

Are phantom zone anti-catabolics worth pursuing? Clenbuterol, at least, is definitely worth the effort. It has both thermogenic and anti-catabolic properties. Is the bother of traveling to Mexico (or Italy or Germany) and finding a doctor worth the effort? Yes. Besides you might need the practice. In the future, these circuitous routes may be the only way to acquire amino acids, vitamins and herbal preparations. It may seem extreme now, but in the future, there may be anti-catabolic vacation tour groups. Life extensionists currently sponsor growth hormone excursions.

Is there such a thing as a diet fringe? Of course. When people with AIDS (PWAs) couldn't get the drugs they needed because of FDA interference, they made them in underground laboratories. RU486 is being manufactured openly in New York State and is legal to use as long as the drug does not cross a state line. I've published a "recipe" for gamma-hydroxybutyrate (GHB). Is this militant? Yes, indeed. Illegal? Definitely not!

Over the years, I've seen a lot of magic pills and wish-fulfillment supplements. I've sampled arginine, ornithine, L-Dopa, Catapres, GABA, GHB, OKG, creatine and more. They all claim to have some anabolic or anti-catabolic action. I play with these substances because it's my job, my hobby, and at one time, my obsession.

I've been wishy-washy about many of these anti-catabolics because I've spent so many years working with anabolic steroids, which are the best anti-catabolics in the world. It

reminds me of my 1976 Corvette. It was heavy, slow, with big ugly bumpers and a gutless engine. At the time, it was the fastest new car I could buy. After I drove it, I said, "This car s-u-c-k-s!" because I remembered my pre-smog cars. But the laws had changed.

Anabolic steroids and clenbuterol are the only effective anti-catabolics! All of the others are shit! A-h-h-h-h. Now I feel *much better!* There's not a whole bunch you can do about these drugs. They're damned inconvenient to get and use legally. I'm not going to break any more laws, nor do I advocate such reckless behavior. It's just been frustrating that none of these anti-catabolic compounds are quite good enough.

CHAPTER 23

HOW DIETING SLOWS DOWN THE METABOLISM

EVERY DIETER DREADS the awful day when he stops losing weight. Suddenly the lowered calories have become the new maintenance level. Although many people expect it, and a whole diet book (*The Rotation Diet*) was written to avoid it, it's still a shock when your metabolism slows down.

I have some happy, happy news to tell you. Metabolic slowdown doesn't have to happen. Once you understand why it happens, you can take a number of steps to avoid it.

Regulating thyroid hormone levels is the cornerstone to keeping the metabolism humming along. You might be saying: "Uh-oh, don't be monkeying around with my thyroid, that's b-a-a-d." Granted, most of the following information is, well, radical. Most physicians will start with the "No, no, no" litany about the idea of even touching your thyroid, like it's sacred or something. Surprise! Bodybuilders and life extensionists have been adjusting their thyroids for years.

Thyroid is *the* regulator of your overall metabolism. It sets your basal body temperature after the hypothalamus commands, "Make it so." Thyroid hormone also adjusts the rate of other

metabolic processes, including protein synthesis. The thyroid gland secretes two types of thyroid hormones, T4 and T3, in a ratio of 80 percent T4 to 20 percent T3. Although most of the thyroid hormone in general circulation is T4, T3 is the real dynamo. At the cellular level, T3 is the one that hooks up to the receptors. It's curious that most active T3 comes from the deconstruction of T4 to T3, not the dollop that the thyroid gland produces.

The main cause of metabolic slowdown is a decrease in active thyroid hormone. There are three major reasons why thyroid hormone attenuates. First, thyroid levels adjust to the amount of muscle in the body. When you lose muscle, the thyroid gland secretes less. Therefore, the factors that cause muscle loss — calorie restriction, protein deficiency, amino acid substrate deficiency in the muscle cell and (yes) training too much on lowered calories — also cause decreased production thyroid hormone.

If the body didn't lower thyroid hormone secretion, and thereby lower body temperature, body temperature would ... rise! To help you understand this, imagine that you are eating maintenance calories, but you suddenly lose 10 pounds of muscle. Make up some lurid reason why. If your thyroid levels didn't decrease, the same amount of thyroid would be supplying less muscle to move and heat. It's not nice for dieters, but if thyroid levels stayed the same with less meat to cook, the too-high thyroid levels would burn off more muscle.

It's pretty obvious that maintaining muscle mass while dieting is important. Less heat-producing muscle means less thyroid hormone. Less thyroid hormone means you can't eat as much. Not only does muscle wasting cause a decrease both T4 and T3, but T4 does not convert as well into T3. Many doctors

are not aware that on low-calorie diets, when insulin levels are lower (from lowered carbohydrate intake), T4 doesn't convert to T3 very well.

The second cause of thyroid hormone attenuation is cortisol. When the cortisol receptors on the pituitary gland are activated, they reduce production of thyroid stimulating hormone (TSH), which is the messenger between the hypothalamus (in the brain) and the thyroid gland. Many physicians are not aware of this new area because they don't have physically stressed athletes as patients.

Cortisol also affects the T4 to T3 conversion process. A specific enzyme called 5'-deiodinase is impaired in the presence of cortisol. Overtrained athletes experience this phenomenon more than is commonly suspected. A variety of factors will contribute to this reduction in T3 — overtraining, stress, insulin levels and other drugs (thermogenic agents in particular). Often, T4 levels are appear to be within the normal range, while T3 is very low, but still "normal." If T3 is too low, body temperature is lower than before, then (ipso facto), fewer calories are burned.

T3 impairment is called Euthyroid Sick Syndrome (ESS). There is quite a controversy among thyroid specialists about how to treat it. One camp proclaims that T3 lowers as part of a natural and body-preserving action. The opposing side recognizes that lowered metabolism should be treated like any other disease.

This is the first totally new concept in this book. Damn it, finally! Most of the metabolic slowdown from dieting is from ESS. Overtraining and interference from thermogenic drugs will cause ESS, even at relatively high calorie levels.

The first thing to do to avoid ESS is not to decrease calories too much, which we discussed way back in the beginning.

It's also important make sure you do not overtrain. Besides these two "safe" choices, there's only one thing left to do: Regulate thyroid levels by supplementing the (lowered) thyroid hormone with a daily oral medication. This would be a *big step* for many of you. Thyroid is a prescription medication; to put it bluntly, most doctors will not look kindly on your self-therapy.

For a minute forget about dieting and consider that most normal, sedentary people's thyroid levels are not *ideal*. Average, yes; optimal, no! To a doctor, good health is normal. My job is to optimize the metabolism to create maximum performance. We don't just want good health, but superior health.

Although thyroid problems are most noticeable while dieting, I've learned (from countless body temperatures and thyroid blood tests) that many athletes who appear healthy have suboptimal thyroid levels. Dieting only exacerbates it. So what do we do?

CHAPTER 24

OPTIMIZING YOUR METABOLIC RATE

MANY INDICATORS of metabolic rate are easy to observe: body temperature, heart rate, blood pressure and respiration rate. Even a layperson with a handshake and a finger on the wrist can make a rough judgment of your metabolism. In this modern medical age, we can use blood tests to even more accurately determine thyroid hormone levels.

For many decades, physicians didn't have such fancy (and expensive) blood tests. The most common method of determining thyroid levels was basal body temperature. Early morning resting body temperature reading was (and probably still is) the first method to test thyroid status.

Most people think that body temperature is pretty close to 98.6°F, which is considered normal. It is — you guessed it — an average. However, body temperature fluctuates throughout the day. To get the most accurate and consistent reading, you should take your temperature at a specific time each day.

What follows is the step-by-step procedure my athletes have used to regulate their thyroid thermostat. Most of these adjustments should be made before dieting. Why? Although most dieters have some degree of Euthyroid Sick Syndrome

(ESS) some people have a subnormal amount of both thyroid hormones (T4 and T3) even when they think they're healthy. By optimizing your thyroid, you will be able to eat more calories, store less body fat and — a little-known bonus — achieve better protein synthesis. Optimizing your metabolism through thyroid regulation is the most important non-nutrition, non-training thing an athlete can do. Hardworking dieters with ideal nutrition and training will achieve only mediocre results if they have sub-optimal thyroid hormone levels.

Doctors agreed years ago that the best time to take temperature readings is right when you wake up from overnight sleeping, while you are still lying down in bed. This important initial reading should be done before dieting. Of course, monitoring temperature while dieting is also wise, but this reading will be our reference point. Don't take any drugs that will affect this reading: no caffeine, thermogenic drugs (including herbs) or aspirin. Needless to say, a cold, flu or any kind of fever will make the initial readings worthless for our purpose.

I've tried to use old-fashioned mercury thermometers, but they drive me crazy because I can never read the damn things. Digital oral thermometers (which can be purchased for under $10) are usually accurate, but I check them initially against a mercury one (yes, I do use a magnifying glass) to make sure. After much trial and error, I now use the Thermoscan inner ear infrared scanner thermometer, which costs about $100. It's accurate, and I don't have to wait for the reading.

After reviewing my client's daily temperature diaries, I've established a range of ideal body temperatures to strive for. Good to great bodybuilders who maintain a lean physique, eat lots of food, and don't yo-yo diet have the best readings.

Why bodybuilders? They're the healthiest. Many endurance

athletes' heart rate, blood pressure, temperature and overall metabolism are unhealthily low. They also don't have much strength (in body and mind) after training. In my mind, these athletes are sick.

The morning temperature range I've determined to be optimal is different than doctors'. For optimal performance, your reading should be between 97.8°F and 98.2°F. Most women, even female bodybuilders, are below this range. By the way, 9 out of 10 thyroid prescriptions are written for women.

Some very rare individuals have a temperature above 98.2°F. If this reading can't be explained, it is a potential medical problem and should be addressed by thyroid specialists.

If your temperature is outside (on the downside) of the normal range, there are a few ways to fix it, none of them "natural." Supplements won't work. People tried taking supplemental iodine, but it actually slowed down the pituitary's output of TSH.

To boost your body temperature to 98.2°F, you will need to increase the level of T3. T4 is only used to store the hormone in the blood for eventual conversion to T3; it has no metabolic purpose. Although T3 is the real locomotive of the metabolism, if you care to look up "thyroid preparations" in the *Physicians' Desk Reference*, you'll be confronted with a bewildering array of prescription drugs.

Taking the giant step, optimizing your body temperature with thyroid, will be frustrating. Most doctors won't embrace the concept of optimizing anything in your metabolism. Sure, an MD will order various tests to make sure that everything is — you guessed it — normal. In most cases, you won't get a prescription written. The practical solution is to find a source for thyroid medication from outside of the country and have it

mailed in. Unfortunately, foreign mail-order companies are in business one month and gone the next. I advise you to stock up to tide yourself over while locating another source.

Which is the best thyroid medication? The quick and dirty solution is to use straight T3. T3 is what we need, right? It's quick because you don't have to worry about any underlying cause for the thyroid insufficiency. You also avoid all sorts of expensive blood tests and doctor visits. All you need is a bottle of Cytomel and a $10 thermometer and you're rolling.

Any physicians reading this would be all near-apoplectic at this point. Reckless! Dangerous! Perhaps you could fill in a more alarming adjective: _____! However, in reality, virtually all of the bodybuilders who use thyroid hormone, especially while dieting, use T3 with no blood tests and no thermometer, either.

As I've matured in this human performance business I've gotten more precise. I recommend frequent thyroid blood tests so you can see what's going on. Only with a blood test can you see why thyroid hormone levels are normal but not optimal.

I like to look at 3 tests. You should be familiar with them (and their prices) so that you can be specific with your doctor. Even though you probably can't wrangle a thyroid prescription out of him, you can use him for the testing.

THYROID STIMULATING HORMONE (TSH) TEST

This recent advancement in thyroid tests is called a "sensitive thyrotropin assay," because the older TSH tests were not sensitive enough. The test costs about $25.

Normal	.3 – 5 µU/ml
Subclinical	5.1 – 20 µU/ml

High	20 µU/ml
Lowest sensitivity	.1 µU/ml

TSH is produced in the pituitary. Most hypothyroidism, which is a deficiency of both T4 and T3, is usually indicated by an *overproduction* of TSH. The older TSH tests only went down to 1 µU/ml. This new test is nice to have, because if you overmedicate with thyroid hormone, T4 and T3 levels can look normal because of the medicine. However, if TSH is too low, you will know that too much medication is being used and TSH and natural T4 and T3 are being suppressed.

Unfortunately, athletes who are optimizing their body temperature will unfortunately suppress TSH when increasing T3 to optimal levels. With a normal person a thyroid specialist will try to balance the hormones so that T4 levels are as normal as possible and TSH is still above .3 µU/ml or above. However, the dosage required to achieve body temperatures between 97.8°F and 98.2°F will be often so high that it will suppress TSH. It can take 8 weeks after stopping the thyroid medication to get TSH levels back to normal.

TSH is not the only important test. Although a reading above 20 µU/ml will usually predict low T4 and T3, T4 and T3 tests are also necessary.

FREE T4 TEST

Technically, this test is called an "equilibrium dialysis." This is the *only* T4 test you want to do. There are others, such as Total T4 and Free T4 Index, but they aren't accurate enough. In fact, Free T4 by Immunometic is only 89 percent accurate! At $65, this test is the most expensive T4 test, and not every blood testing lab offers it. Normal Free T4 ranges from 4.5 to 12.5

µg/dl. Athletes are rarely below this range. If body temperature is below 97.8°F and T4 is low but not out of the normal range, a synthetic T4 thyroid drug like Synthroid may be the best choice. Don't be surprised, though, that raising T4 will not raise T3 appreciably. Remember, unlike classic hypothyroidism in sedentary people, most Euthyroid Sick Syndrome (ESS) in athletes is caused by faulty T4 to T3 conversion. Most T4 daily dosages are in the 100 to 150 mcg range, and Synthroid is available in dosages that vary from 25 mcg to 300 mcg.

RADIOIMMUNOASSAY FREE T3 TEST

This is where the action is, athletically and metabolically speaking. Although commercial T3 drugs like Cytomel and Triostat have been the most popular choice with bodybuilders, most thyroid specialists work predominantly with T4. T3 is a great thyroid drug, but is difficult to work with for most people. It is hard to get consistent T3 readings because most of the T3 is unbound (as opposed to T4, which is 99.95 percent bound). T3 levels will peak within 4 hours of ingestion and rapidly attenuate after 60 hours. Most doctors don't like to work within these variables.

As long as you always have the blood drawn at the same time (usually in the morning) and you don't take the T3 medication before the test, then reliable T3 values should not be a problem.

The Free T3 blood test values should be somewhere between 80 and 175 ng/dl. Pay close attention to the this amount; when low-calorie diets stop working, it's usually a problem with T4 to T3 conversion. If you've been tracking your temperature each morning, (what, you haven't; why not?), this number will only confirm your suspicions.

ESS occurs when TSH and T4 are both somewhere in the normal range, but T3 is low. T3 could be below 80 ng/dl or, more commonly, T3 will be toward the low end of normal while T4 is normal or high. What's happening? T4 is normally converted to T3; if something goes wrong, it is diverted to into non-active *reverse* T3. Is this confusing? Ha-ha-ha — have a GP explain it to you!

When you have low T3 and normal T4, supplementing with Synthroid will not help very much because it will not correct the enzyme inhibition. The ideal solution, most doctors would say, would be to take a break from the low-calorie diet. Yeah, right.

Another solution would be to use Cytomel (synthetic T3). This is the fork in the road. Prevailing medical opinion is that non-medical cases of ESS should not be treated with exogenous thyroid hormone. Most physicians think that a lowered body temperature is not a sickness. I, not being a doctor, differ in opinion. The true guide is the original body temperature measurement, which should be between 97.2°F and 98.2°F even while dieting — especially while dieting. Some thermogenic drugs that have tremendous fat-burning properties will block conversion of T4 to T3.

Let's condense what we've learned so far. Thyroid optimization should start before you begin dieting. You will want to adjust your body temperature with oral thyroid medication so your morning temperature will be between 97.8°F and 98.2°F.

If you skip the blood tests and just start using Cytomel, you will never know why your body temperature was low in the first place. If you use T3 with only a thermometer as a guide, you may overdose and suppress production of TSH. Once suppressed, it takes 8 weeks to get TSH functioning again. Unfor-

tunately, the amount of T3 needed to boost body temperature into the preferred range will usually stop TSH production. Most doctors would rather see a patient with TSH, T4 and T3 in the normal range, even if each measurement is not ideal.

To get the blood tests, you can go to a doctor, or in some states, a chiropractor. The 3 tests will total about $125 plus the office visit. The initial tests should be done when on maintenance calories and no thyroid medication. If you have a low body temperature, the TSH, T4 and T3 readings will indicate why. If the values show classic hypothyroidism, which is high TSH and low both T4 and T3, then Synthroid is a good choice.

If you have ESS, which is low T3 with normal TSH and T4, use Cytomel. Find a daily dosage that sets your temperature between 97.8°F and 98.2°F. Once you determine your ideal temperature and daily dosage of Cytomel, do the T3 blood test again to establish the Free T3 value that corresponds to the ideal temperature.

Why redo the T3 blood test? Whenever you use thermogenic agents, your body temperature will rise. Use of these agents will not allow you to see a *true normal* body temperature reading. While dieting, Free T3 tests are the only correct indicator of T3 levels, *not* body temperature. For example, using the thermogenic agent clenbuterol will raise body temperature and *lower T3 levels.*

Whenever you redo the Free T3 test, you should do another TSH test. It should not surprise you if your TSH is suppressed. Unfortunately, this is the price of admission for an optimal body temperature, not forever, but as long as you want the optimal body temperature. What? You thought that low body temperature somehow heals itself after a while? I wish. Many times, getting the right Cytomel or Synthroid dosage will

shut down TSH so that if you stop taking the medication "cold turkey," you will have low levels of natural thyroid hormone for 2 months. All of these things must be considered carefully before you "monkey around" with your thyroid.

By the way, although it is rare, I have encountered a few athletes who have normal to high T3 levels who still have a problem achieving optimal body temperature. Although thyroid is the chief regulator of body temperature, the adrenal system (adrenaline and noradrenaline) also has an effect. A faulty adrenal system can lower body temperature even when thyroid levels are high. You will find more information on the adrenal system in Chapter 26, "Thermogenic Agents and Body Temperature."

CHAPTER 25

(UGLY) LOWER BODY FAT

YOU'VE LEARNED A LOT about fat loss in the last 24 chapters. You've wrestled with catabolism and metabolic slowdown. You've taken a crash course in thyroid management. Many of you could jump into the diet right now and lose a good amount of weight, and might be able to reach your goal of a single-digit body fat percentage. However, many of you (especially women) would still encounter problems. In fact, you may already have discovered that there is a point when the stubborn fat stops melting away like the rest of the fat on the body. Some people have an alarming discrepancy between their upper and lower body fat, as if they had two different bodies glued together at the waist.

Bad things usually happen while chasing down the last of the sub-equator fat. Muscle wasting accelerates, especially in the face. You may become so disheartened that you abandon the diet and start a rampage of binge eating, which puts the fat back on. In the worst-case scenario, the fat from bingeing lands precisely where you don't want it: on your hips, thighs and buttocks.

Your doctor will say that it's "genetic," or "a female thing,"

and you can't "spot reduce." For about 12 years, I've pursued this lower body fat problem in female bodybuilders. I've tried every technique, from traditional to harebrained — more exercise in the area, fancy French rub-on creams and injections, anti-estrogens and steroids. Most of them had absolutely no success at mobilizing fat out of these areas. Money mobilizers, yes. Fat, no.

Well, if I didn't keep pursuing this problem, then the chapter would end right here with, "Lower body fat? You're fucked." However, you will see that this chapter is gloriously exciting. Lower body fat *can* be dieted off (without liposuction). Lower body fat does not just have more fat cells. It responds differently to weight loss because its response to certain hormones differs markedly from most of the other fat on the body. These crazy fat cells are not only the last to reduce, but just as importantly, they can cause further metabolic slowdown and catabolic action in areas far away from your butt.

Although this chapter specifically discusses how to target lower body fat, you can think of it as a bridge. It's a continuation of the previous chapter's discussion of thyroid and a prequel to the upcoming chapter on thermogenic agents. This chapter contains elements common to all three areas.

I'll warn you before we get started that this chapter contains the most complex (and worthwhile) information about fat. As usual, I will try to simplify the scientific jargon, condense the information and skip over the unimportant stuff.

You've read the headline: "Mother Lifts Car to Free Trapped Child!" Perhaps friends have told you about the "rush" from jumping out of an airplane. Or perhaps you've been involved in a near-miss auto accident, after which you have uncontrollable shaking and nausea. All of these events have one thing in common: adrenaline, the "fight or flight" hormone. Think of it as an octane booster to the body whenever you encounter a ***BIG*** stress.

In America, most physicians call this hormone epinephrine, and its close-acting sibling norepinephrine. Europeans and most non-doctors call them adrenaline and noradrenaline. I'll use the adrenaline tag because it's easier to remember. (I'm one of the syllabically impaired.)

Adrenaline and noradrenaline are hormones, naturally produced chemical messengers that impart instructions to various cells in the body. Adrenaline is produced by the two adrenal glands located over each kidney, which weigh about 5 to 7 grams each (for reference, an ounce is 28 grams). Noradrenaline, which is slightly different in chemical structure, is generated at the nerve endings.

Why are there two sources for this hormone? Because noradrenaline can only be generated in the nerves of certain cells. Cells that don't get much blood circulation (like fat cells, for example) aren't candidates for adrenaline, which is circulated systemically.

Some people think that adrenaline is only released under extreme conditions, because that's when it's most noticeable. In reality, both hormones are being produced and consumed continuously. The adrenaline siblings affect many of the same systems as thyroid hormone — body temperature, blood pressure, respiration and heart rate. In fact, the adrenalines and thyroid hormone have synergistic effects. Daily temperature fluctuations and fat distribution in part controlled by the adrenalines, which are properly called catecholamines.

Hormone receptors on cells are like assigned parking spaces, tailored in size and shape to each type of hormone.

Receptors for both adrenaline and noradrenaline are called adrenoreceptors. Adrenoreceptors are almost everywhere: in the blood, the organs, the muscles, and *the fat cells.*

Now it gets either interesting or too damn complicated, depending on what mood you're in. There are 4 types of these receptors (well, maybe 4-1/2), and each one communicates a different message to the cell. Sometimes a fat cell gets completely different messages from its receptor sites. Lower body fat has very screwy adrenoreceptors, much like my crazy old granny in my basement. (Remember, she's in the freezer now.)

Although adrenaline was identified in 1895, it wasn't until 1948 that scientists figured out that they were dealing with Sibyl receptors. At first, they found two receptors and named them alpha and beta. Over the years, they discovered more receptors, which they named alpha-1 (A1), alpha-2 (A2), beta-1 (B1), beta-2 (B2) and the very shy beta-3 (B3). The A2s are bad, bad characters.

Fat cells have both B1 and A2 receptors. Fat cells don't get much blood circulation, so it is noradrenaline that attaches to these receptors.

B1 receptors send good messages. They activate lipase, the enzyme that breaks down fat. Lipase causes the fat cell to disassemble itself, breaking down stored triglycerides into fatty acids and glycerol, which are used for energy throughout the body. B1s are the good guys, and it is noradrenaline that lights them up. Regular adrenaline would do the same thing if it could reach the receptor. However, fat doesn't have any major arteries or veins, only capillaries.

A2s are the bad guys. They block lipase in the fat cell. Worse, A2s also encourage the formation of triglycerides in the cell. A2s also (this was included at no extra charge) decrease the

generation of noradrenaline at the nerve sites. Less noradrenaline means that the good B1s don't light up as brightly. Oh well, lower body fat doesn't have many B1s anyway. The picture looks pretty grim: fat cell disassembly is blocked, more fat is stored, and — I almost forgot — body temperature is slightly reduced. Did I leave anything out? Ummm, yes. Low-calorie diets cause an increase in the number of the A2 receptors.

Let's envision how your lower body fat works. Lower body fat cells have very few B1 receptors, so they do not release much stored fat. They have a vast number of those pesky A2 receptors. When you go on a low-calorie diet, the following things will happen:

1. Fat is lost first and fastest at the cells with lots of B1 receptors.
2. Very little fat is lost in the fat cells that have lots of A2 receptors.
3. Eventually, your noradrenaline levels drop, reducing your body temperature.
4. The number of A2 receptors increases. The last of the fat becomes so hard to mobilize that the body will have to use more amino acids (from muscle) for fuel.
5. When you finally give up on the diet, even so-called normal eating will cause new fat accumulation right in the fat cells that have just increased their number of A2 receptors.

At first glance, it looks like you're screwed. It's not your thyroid. It's not an estrogen problem. Neither steroids nor antiestrogens will help. Ephedrine doesn't fit too well into the B1 receptor. Besides, there aren't very many B1s in lower body fat. It would be perfect if only we could get rid of the A2s or maybe

move them around a little ...

Wait a minute. With all of the anti-this and anti-that drugs available, isn't there something that would block A2s from accepting noradrenaline? Perhaps there's something that would leave the rest of the adrenoreceptors alone. If there is, gimme, gimme, gimme! I gotta have it! NOW!

This wonderful drug, this A2 antagonist, already exists. It's been around a long time, and it's not even high tech. It's a natural herb that even has FDA approval! It's yohimbe, the herb from the African tree bark, the male erection pill. Why hasn't it been used in the past for fat reduction? There isn't much scientific research on A2 receptors or their relationship with fat cells. Even though this herbal product has monumental implications for dieters, its entry in the *Physicians' Desk Reference* doesn't mention fat reduction at all.

I would like to say that all you have to do is take a magic pill like yohimbe (actually, 4 to 5 pills) and voilà, your lower body fat would take care of itself. I hate to rain on the parade, but yohimbe is not perfect in oral form.

Let me remind you that fat cells don't have very good blood circulation — what little there is comes from capillaries. Unfortunately, to adequately saturate the lower body fat receptors with yohimbe, you would be overdosing the rest of the receptors in the body. Yohimbe is a wonderful idea, but just taking a pill won't produce optimal results.

Yohimbe's effect needs to be *localized*. Doctors pooh-pooh spot reduction as a bogus marketing scam, like fat massage or cellulite wraps. On the contrary, new research shows that lower body fat reduction can be achieved with creams or direct injection into the fat.

You may have heard of aminophylline cream, an over-the-

counter asthma medication that appears to measurably reduce body fat. We don't quite know if this is caused by true lipid reduction or just a reduction of the water in and around the fat cell. Technically, aminophylline is supposed to be potentiating B1 receptors. However, stubborn fat doesn't have many B1 receptors. Direct local injection of yohimbe would work better.

Now that you understand adrenoreceptors, I can explain their interaction with thyroid hormone. Thyroid hormone stimulates muscle cells to burn more energy. Through the B2 receptor, both adrenaline and noradrenaline also send a heat message to the muscle cell. On a low-calorie diet, heat production from thyroid hormone decreases, which causes an increase of A2 activity and an attenuation of the B2 receptors. Sure, you could maintain body temperature by increasing thyroid medication, but you'd have to take so much that you would suppress natural TSH and thyroid hormone production. An additional hazard is that more thyroid hormone would speed up processes that shouldn't be accelerated, like heart rate, respiration and blood pressure.

Trying to keep body temperature optimal on a low-calorie diet by taking too much thyroid hormone will cause hyperthyroidism, even though your temperature is in the optimal range. Thyroid dosage should be optimized before you diet. The free T3 levels you found while at maintenance calories should not be increased while dieting. The interplay of low calories, thermogenic drugs and thyroid hormones can make maintaining optimal body temperature can be a real juggling act.

Although we've discussed lower body fat exclusively, which is usually a "woman thing," A2 receptors are present in other areas. Future research may find that fat distribution is intimately tied into A2 receptor distribution. Many male body-

builders, who have no lower body fat problems, have had a hard time stripping away body fat in the lower back area. Would yohimbe work in these areas? Or are androgen steroid receptors making the fat stubborn? We don't know, but the grand experiment is continuing.

CHAPTER 26

THERMOGENIC AGENTS AND BODY TEMPERATURE

THIS IS ONE OF THOSE heavy, scientific chapters, but cheer up — now that you know the essentials of thyroid hormone and the catecholamines, this information will be much easier to understand. Most thermogenic action, other than what we discussed in the thyroid chapter, is caused by the effect of noradrenaline on B2 adrenoreceptors. Increasing natural adrenaline will raise body temperature, but natural adrenaline is not specific. Some of its effects help you lose weight, but it may cause unwelcome changes too.

Rev up your imagination. Let's dream up a way to burn more calories, not from extra exercise but from non-shivering thermogenesis. The most natural way to do this is to encounter the right environmental stress — for example, you could immerse yourself in cold water. Your natural noradrenaline would be stimulated, and both the fat-mobilizing receptors (B1) and the muscle heat-producing ones (B2) would get the message. Studies have shown this technique to burn fat effectively while preserving muscle. It causes less catabolism than aerobic exercise.

However, when you think of thermogenic agents, you probably aren't thinking of a nice tank of freezing water, but pills. "Magic" pills, while non-natural, are more convenient and don't take up as much room. The ideal magic pill would activate B2 receptors specifically, with perhaps a side effect of B1 fat mobilization. It would raise body temperature without the need to reduce calories or add more exercise. It would help you burn fat without hunger or anxiety. These magic pills do in fact exist — they're called asthma medications.

Technically, these drugs are called beta-adrenergic agonists. For asthma sufferers, the main function of these drugs is to dilate the bronchial tubes to allow breathing. B2 agonists cause dilation of the smooth muscle that lines the lungs and other organs. In a separate action, B1 agonists dilate the blood vessels.

EPHEDRINE

Ephedrine, which is over-the-counter in America, is easy to acquire. It is a refinement of the Chinese herb Ma Huang (Ephedra vulgaris), which has been used in America since the turn of the century.

I have no idea when Western scientists first realized that ephedrine promoted thermogenesis. Chinese herbalists have known about the body-toning properties of Ma Huang for a very long time. For the rest of us, ephedrine became popular in the early 1970s in the Danish "Elsinore Slimming Pill." Athletes became aware of it in the late 1980s.

Studies on obese volunteers showed significant fat loss on a daily regimen of 50 mg of ephedrine 3 times per day. I first encountered ephedrine in late 1989 when the owner of AST Research was kind enough to forward some journal references to me. Since then, ephedrine has been embraced by the athletic

community, and its use in bodybuilding become more refined.

In America, over-the-counter ephedrine comes in 25 mg doses in either tablets or capsules. Ephedrine hydrochloride is cheap and widely available, although the more expensive ephedrine sulfate is easier to assimilate. The generic and brand-name versions of ephedrine hydrochloride are identical.

Research shows that ephedrine works synergistically with other drugs; both caffeine and theophylline will dramatically increase its fat-burning effects. Theophylline is the only drug that the FDA has approved to be "stacked" with ephedrine in the same pill. Primatene tablets and Bronchaid tablets, the two most popular brands of ephedrine, are ephedrine and theophylline combinations. For fat burning, caffeine works just as well as theophylline (and has less of an effect on the lungs), but this dieting duo was not able to get a license to cohabitate from the FDA.

Plain old aspirin has also been proven to extend the effects of ephedrine and caffeine. It's this menage à trois that causes the most exciting thermogenic effects. By 1993, scientists had created a real fat-burning orgy by adding grapefruit to the mix. The bitter component of grapefruit, naringin, prolongs the effects of caffeine by slowing down its breakdown in the liver. That old grapefruit-and-coffee diet wasn't completely bonkers.

The following dosages are the result of my work with athletes, not research studies. Do this combination 3 times per day — on awakening, at noon and no later than 4:00 p.m.:

Ephedrine	50 mg (two 25 mg OTC tablets) Most people prefer ephedrine sulfate, but ephedrine hydrochloride is cheaper. Ephedrine is also available in 50 mg tablets by prescription.

Caffeine	No-Doz, Vivarin or Pep-Back (between 100 mg and 200 mg) The research studies used 10 times as much caffeine as ephedrine, but this is much more than most athletes take. 500 mg of caffeine is a damn big honking jolt of caffeine. A cup of espresso or Middle Eastern coffee made from Robusta beans would be more sociable, but doesn't have enough caffeine to do the trick.
Aspirin	Half of an adult tablet or 1 children's aspirin
Grapefruit	It doesn't matter if it's whole or juice. Naringin is highly concentrated in grapefruit flowers and fruit peels. Refined, canned juices will not be as potent as the peel of the fruit.

The FDA, prude that it is, takes a dim view of this thermogenic orgy. You won't find an all-in-one pill. Some companies have circumvented the regulations by combining the herbal sources of the drugs.

In the place of ephedrine, you'll see ephedra or Ma Huang. Unfortunately, it's hard to tell until you sample the product how potent the herbal concentration is. For caffeine, the label will show South American guarana seeds or kola nuts. Aspirin is a refinement of white willow bark, and, of course, desiccated grapefruit flowers are actually a better choice than the fruit.

There's lotta love out there over ephedrine. It's legal, cheap and doesn't require a visit to the doctor. However, like all drugs, ephedrine does have some side effects. Ephedrine mimics some of the actions of adrenaline, but it does not fit completely into the

B2 receptor. In technical language, it has low receptor affinity.

Ephedrine's low receptor affinity has advantages and disadvantages. The B2 receptor stays "open," and the effects last longer than with more accurately matched molecules, like clenbuterol. Remember, ephedrine is not a pure B2 agonist. Ephedrine also hooks up with the other alpha and beta receptors, and affects noradrenaline generation.

Athletes don't like to talk about ephedrine's dirty big cousin, amphetamine. However, ephedrine's effects — increased heart rate, higher blood pressure and smooth muscle dilation — are like amphetamine on a small scale. Ephedrine has an annoying tendency to relax the bladder and dilate the smooth muscle in the prostate. This causes an urge to urinate although the urine flow is restricted from the slightly enlarged prostate. These side effects are not usually life-threatening, and seem small when contrasted with relief from asthma. However, the FDA is considering changing ephedrine's over-the-counter status because of what they consider frivolous non-medical use of the drug. Herbal concentrates would be yanked too. Today's legal diet trick may be tomorrow's prescription drug.

If you've never tried this ephedrine combination, I'll warn you that the effects are not subtle. You won't just feel warmer from the body heat; ephedrine and caffeine cause central nervous system stimulation. This is not like your morning coffee. It's more like ping-*ping*-*PING*-*PING*-RICOCHET-RRRABBITTT!! in a bottle.

CLENBUTEROL

Although ephedrine works, it isn't elegant. It is an agonist for all of the other adrenoreceptors in addition to the B2 receptor. Biochemists have pursued pure B2 agonists that have no B1,

A1 or A2 agonistic effects. The most popular, albuterol, has been around since the early 1970s. It's better than ephedrine, but it's not a perfect B2 agonist.

The B2 agonist that has gained worldwide attention is clenbuterol. An excellent oral asthma medication, it also has tremendous fat-burning and anti-catabolic properties. It is sold over-the-counter in many countries and is considered safe enough for use in liquid preparations for children and geriatrics.

Clenbuterol uses a very unusual thermogenic pathway: brown adipose thermogenesis (BAT). There is much controversy among scientists about how much BAT happens, and at what stage of human life.

Most body fat is the type that we see in the meat department in the supermarket. The fat cells vary in size and adreno- or androgen receptor make-up, but other than that, fat is pretty uninteresting stuff — not all that different from the leftover scraps from a steak dinner. Scientists call it white fat, even though it's kind of a pastel yellow color. Fat doesn't have much color because its only blood circulation is from capillaries, which are very small. How small? A micrometer is 1/1000th of 1 millimeter. Capillaries are between 5 and 20 micrometers in diameter.

Oxygen reaches all of the cells of your body through red blood cells (erythrocytes). Red blood cells are about 7 micrometers in diameter. When a 7 micrometer wide red blood cell travels through a 5 to 20 micrometer wide capillary, you can bet they go through one at a time. Fat is whitish largely because very few red blood cells get through it. Most of the liquid circulating through the fat is straw-colored plasma.

Fat that had a larger blood supply, from arterioles (branches of arteries) instead of capillaries, would be a different color.

More red blood cells flowing through the fat would make it appear a dark orange-brownish color. Scientists call this fat *brown fat*. Why don't they call it orange fat? I don't know.

Brown fat is different in many ways from regular fat. Not only does it have more red blood cells (which means more oxygen), but the cells also have mitochondria, which create energy. Let's see ... brown fat has more red blood cells, more oxygen, more mitochondria. Bingo! It's a recipe for heat production. You've just cooked up Brown Adipose Thermogenesis, BAT for short.

During the first few months of human life, brown fat is an important regulator of body heat. Babies have a lot more brown fat than adults. The remaining brown fat is located on your upper back between your shoulder blades.

BAT, like muscle cell thermogenesis, is regulated through B2 adrenoreceptor stimulation by noradrenaline. You can actually feel the thermogenic effect between your shoulder blades. Have someone place a hand there while you are using a thermogenic agent — it will feel warmer than the surrounding areas.

The lingering question for the scientists is this: Is the heat actually produced in the brown fat, or is the effect from hotter blood coursing through an area that has better circulation than the fat around it? Although many people want to think the heat comes from the brown fat, the evidence is beginning to suggest that BAT in adults is caused by hotter blood.

Clenbuterol does more than just cause brown adipose thermogenesis. It is an agonist to all B2 receptors, including heat-producing muscle. Clenbuterol is much more potent than ephedrine because it is has a much better receptor affinity. Clenbuterol burns fat better than both albuterol and metaproterenol.

As an added bonus, it has anabolic and anti-catabolic properties that help to increase muscle mass while *dieting*.

Bang! The initial research on humans contained some amazing body transformations. It looked as if the fat was turning into muscle. The Scottish University study hit the British newspapers in 1988, and I learned of it in time to include it in my *Underground Steroid Handbook II*. Talk about a bomb going off! By the time I re-entered the athletic community in 1990, clenbuterol use was in full swing. A totally fat sedentary slob sitting in an airport lounge in 1988 had turned into a national fitness model by 1990. I could fill another book with stories of such clenbuterol transformations.

Clenbuterol wasn't ever approved by the FDA, but for a while it was easy to come by. It was imported for personal use. It was imported as a raw powdered research chemical and made (underground) into tablets. It was easy to make human versions from the raw chemical. I'd whip up a few bottles of liquid clenbuterol drops for my friends in my own kitchen. As usual, the official party pooper put out Alert Bulletins to stop clenbuterol importation. Nevertheless, a lot of clenbuterol still sneaks into the country.

Clenbuterol is potent. A standard 20 mcg tablet is more thermogenic than a 25 mg tablet of ephedrine. Through almost 5 years of trial and error, we've refined its use as a thermogenic and anabolic agent. Clenbuterol has rattled sports organizations so much that it is often grouped in the same class as anabolic steroids! Currently, it is still legal to own and use in America. Although you cannot use the personal use exemption, you can legally bring it back from a foreign country with a foreign doctor's prescription. Don't be surprised if FDA puts it on the same schedule with steroids, making it much harder to acquire

and use legally.

You might think that because I've helped research, refine and apply clenbuterol, I must be the de facto leader of the Clenbuterol Cult in America. That assumption is incorrect.

I think that the athletic world became so enamored with clenbuterol because, besides anabolic steroids, there isn't another drug with the same bang-for-the-buck, instant-gratification attributes of clenbuterol. To anyone who has seen or felt its effects, they are eerily extraordinary.

I've seen some absolutely remarkable transformations over just a 2-week period. Body fat virtually vanishes and muscles grow bigger and more toned. Even at normal dosages of 2 to 5 tablets per day, clenbuterol has fewer side effects than ephedrine and, of course, much greater potency.

Nevertheless, I'm sorry to say that not everything is hunky-dory with clenbuterol. This roaring thermogenic effect appears to last only 2 to 3 weeks before petering out rapidly. After the body adjusts to clenbuterol through a very complex down-regulation of the B2 receptors, body temperature cools back to near normal.

This rapid attenuation of thermogenic and anabolic effect was noticed almost immediately in laboratory animal experiments. The researchers concluded that the B2 adrenoreceptors were down-regulating. First, the B2 receptors become increasingly insensitive to B2 agonists because of the higher temperature. Then, the receptors "burrow" into the cell so the agonist can't reach them. Next, they are deactivated through phosphorylation of the receptor. Ultimately the actual number of receptors decreases.

This is not earthshaking news. We've known this about natural adrenaline for decades. If there's anything remarkable

about these effects, it's that the attenuation is so rapid. The researchers suggested a dosing schedule of 14 consecutive days of clenbuterol use, followed by an alternating schedule of 2 days off, then 2 days on. This appeared to reinitiate the beneficial effects in the laboratory animals, but I don't know how long this new dosing arrangement succeeded. However, in working with numerous athletes, I found that this strategy didn't work for very long. The remarkable intensity of clenbuterol's initial action doesn't appear to repeat itself.

When reviewing blood test results of bodybuilders using clenbuterol, I noticed a pattern. Serum Free T3 levels would drop very much like classic Euthyroid Sick Syndrome. I theorized that clenbuterol was interfering with the T4 to T3 thyroid conversion. Cytomel works quite well to adjust the T3 level (and body temperature) back to normal. At this point I was pretty happy with what was happening in Clenbuteroland. By combining the researchers' dosing schedule (2 days on, 2 days off), and supplementing with thyroid hormone, we seemed to achieve a continuation of thermogenic effect. It wasn't dazzling, but at least we got a consistent thermogenic effect without escalating the dosage of clenbuterol into the stratosphere. Some athletes were using 400 mcg (that's 20 tablets) each day. Most people would say "case solved" and move onto other things, but I couldn't leave it alone.

Eventually, even with this careful dosage schedule, two things will happen. First, your B2 receptors will down-regulate. In addition, somewhere along the way your natural ability to produce adrenaline and noradrenaline will down-regulate, too. At this point, clenbuterol is not an addition to your body; it replaces normal production.

The problem is that the damage is done already. Increasing

the dosage of clenbuterol will just decrease the number of receptors and the amount of noradrenaline even further. Chasing your plummeting body temperature with additional T3 is initially effective and somewhat benign, but escalating dosages of Cytomel will cause a suppression of natural thyroid production and hyperthyroidism. When you finally stop using clenbuterol, there is a staggering systems crash.

It will take at least 2 weeks (and usually more), for the adrenal system to become fully functional. Until then, alertness, body temperature and energy will be noticeably diminished. When coming off clenbuterol, athletes look and feel like, well, shit. It's not life-threatening and not like the kind of withdrawal caused by other drugs. It's less severe and doesn't last as long as withdrawal from anabolic steroids. Perhaps clenbuterol is best taken in infrequent 2-week dosing periods every 2 months. Unfortunately, clenbuterol's effects are so dramatic and enticing that most people won't leave it alone.

Because of clenbuterol's problems — its limited span of activity and unpleasant withdrawal effects — I have abandoned it. Although it is visibly effective and not entirely dangerous, its problems escalate with continued use. Unfortunately, it still happens to be the only useful anti-catabolic agent besides anabolic steroids.

I now work with another, more potent, thermogenic agent that does not affect the adrenal system at all. As the compound is still under development, it is not discussed in this book.

Researchers have recently isolated another adrenoreceptor that regulates heat production exclusively, the B3 receptor. Drugs that affect this receptor should produce a more tailored thermogenic response. For now, however, B3 agonists are still in the research stage.

CHAPTER 31

AND FINALLY, AT LAST: BODYOPUS

IS THERE SUCH A THING as the "best" fat-loss diet? Doctors, nutritionists and weight-loss specialists would each have a different answer. First, however, they would all agree that the diet would have to be easy to follow. Many diets fail simply because the person can't (or won't) do it. However, easy diets intended for the obese are not my concern. I find it more worthwhile to specialize in people who are at least normal and strive to become extraordinary.

If you already have the discipline to tolerate deprivation and suffering, then the choice of the best fat-loss diet is apparent: one that lets you lose all of the fat you want without losing any muscle. Many diet plans aspire to this goal, but most of them fail. Some are almost, close, near perfect — but none qualify for "best." They all sacrifice muscle.

The BODYOPUS Diet is the best fat loss diet that I know of. In 1982, I published the *Ultimate Dieting Handbook*. Now, after 12 years of experience, I have created BODYOPUS.

BODYOPUS, in one sentence, is: a 7-day cyclic regimen which incorporates 5 days of low-calorie and very low carbohydrate intake, coupled with 2 days of high carbohydrates and

moderately high calories to encourage glycogen supercompensation.

There have been a few similar diets — the Ultimate Diet, the High Fat Diet, the Cycle Diet, the Zero Carb Diet and a few others I'm sure I've slighted. BODYOPUS, although the best, is not completely new. To better appreciate BODYOPUS' elegance, you should know its history.

In addition, BODYOPUS is a *radical* diet — not something you'd find on the cover of the National Enquirer — and it will do you no good if you don't believe it enough to follow it. To better explain some of its more controversial aspects, I will now present the history of BODYOPUS.

CHAPTER 32

BEFORE BODYOPUS

THE IDEA of drastically lowering carbohydrate intake is not new. Eskimos and Inuits are forced to sustain themselves throughout the winter only on protein and fat, eating meat and fish without any carbohydrates. Although these Indians eat this way because they don't have access to other foods, not out of preference, their example does illustrate that such a diet will not malnourish you.

Diets devoid of carbohydrates were recommended before 1900 to control diabetes before the commercial introduction of insulin, and were perpetuated even after insulin became widely available.

For non-diabetics, the earliest low-carbohydrate diet I know of is Dr. Seale Harris' *Hypoglycemia Control Diet* in 1924. Although Dr. Harris devised a diet system that prevented hypoglycemia (very low blood sugar), he probably didn't understand exactly how it worked.

Shortly after World War II, Dr. Alfred W. Pennington, working with the employees of the DuPont Company, made a major advance in understanding the effects of low-carbohydrate diets. His experiments were not designed to control hypoglycemia or cause fat loss (although both did happen), but to

explore the metabolic changes caused by ketosis. Pennington introduced the first ketogenic diet for people who were not diabetic or Alaskan Indian. For many years afterward, this ketogenic diet was out of the public eye. I speculate that the main side effects of the ketogenic diet, high blood acid levels from ketone and lactic acid, alarmed many classically trained MDs, who dismissed it as "hazardous."

In 1963, the first ketogenic fad diet was created by Dr. Walter Bloom. The Bloom Diet cautiously restricted carbohydrates for only 3 days, which skirted the issue of sustained acidosis by resuming carbohydrate intake just when ketosis began. After a year or so, the Bloom Diet disappeared from the American dieters' fancy. I imagine that mainstream doctors criticized the Bloom Diet, but these criticisms faded away as the diet lost the interest of fat-loss hobbyists.

The real popularity of ketogenic diets began with the publication of *Dr. Atkins' Diet Revolution* in 1972. *Dr. Atkins' Diet Revolution* was designed around a prolonged quasi-ketogenic diet that was monitored by checking the quantity of ketone excretion in the urine with the color-changing sticks that had been available to diabetics for years.

Dr. Atkins promoted his diet as a way of eating for life, not just a quick diet for weight loss. His book was immensely popular, with over 6 million copies sold (and still counting). My friends and I used his diet in the mid-1970s, and all of us lost a tremendous amount of fat. My closest friend, who had been obese since childhood, lost over a hundred pounds.

But fad diets aren't popular forever, and Dr. Atkins' Diet was no exception. Medical science contributed to the demise of the diet as much as the passing fancy of the American public. I seem to recall that the entire AMA organization condemned the

Atkins' Diet as dangerous. They repeated the same criticisms: that it caused acidosis and potassium loss. This time, the AMA was also concerned with the staggering amount of saturated fats and cholesterol included in the diet. Dr. Atkins did not sufficiently address these concerns. Although all of these criticisms can be successfully countered, Dr. Atkins did not have the right aggressive attitude. He had stumbled onto the ketogenic diet at a point in his life when he was overweight, depressed and dependent on prescription drugs. The ketogenic diet became his salvation, and carbohydrates were his personal Satan.

The key elements of his diet could be found in the oddest places. When I first became interested in bodybuilding, the preferred method of dieting for a contest was to eliminate broad categories of foods, such as bread, fruit and milk, leaving a diet of meat, fish, eggs and some salad. This was to be followed as long as one could stand it. The cuttest of the cut competitors achieved their condition through a Draconian fish-and-water diet. Dieting for contests was a very macho thing. Diets were supposed to be hard and require discipline. It separated the real bodybuilders from the dilettantes. The whole point of competition was to prove to your peers that you could "go the distance." It didn't matter where you placed as long as you got on stage in great shape.

At the same time, another discipline was developing in the bodybuilding community. The exact opposite of fish-and-water "carb-down" was glycogen supercompensation, a "carb-up." Carb-ups are a method of ramjetting glucose, water and electrolytes into the muscle cell to increase the size and roundness of the physique. While bodybuilders stumbled onto fish and water, the carbing-up technique was stolen from endurance running, where it was developed in the mid-1960s in Europe.

Here's how it works: after depleting a muscle of virtually all of its glycogen stores through a combination of carbohydrate restriction and exhaustive exercise, a curious phenomenon occurs. The two enzymes that hold glucose in the muscle (by sticking some phosphorus onto it and building the glucose into long chains of starches, called glycogen), become more active. If enzymes had brains you'd think that they were planning retaliation. Once glucose is available again, muscle glycogen is replaced to previous levels and then beyond. It's almost like topping off the gas tank in your car. After filling your tank, goosing the pump handle past the initial click will make your tank "super-filled."

For endurance athletes, the extra glycogen meant a longer time before hitting the wall or a few more seconds of all-out sprint. The Energizer Bunny goes from a C cell to a D cell.

Bodybuilders didn't give two hoots about energy. Glycogen and electrolytes carry water along with them. Glycogen supercompensation makes the muscle cells swell. It swelled, and the effect was swell, also. The extra body weight might be a hindrance for a runner, but for a bodybuilder it added size and created a rounder shape.

After a while, the idea of 3 days with no carbohydrates while working out like a maniac, followed by a 3-day carb-up, was known to everyone. It was almost set in stone. At first glance the whole process looks like Dr. Bloom's 3-day ketogenic diet. Yes and no.

Through further research, scientists learned more about severe carbohydrate restriction. The discovered that glycogen supercompensation was caused by an increase in the enzymes that store glucose and heightened insulin sensitivity, which did not absolutely require ketosis. Although eating *no* carbohydrates will deplete glycogen the most, eating *less* carbohydrates will deplete it enough to cause supercompensation. The craziness of the old 3-day carb-down could (mercifully) be loosened up.

During the 1970s, there were two parallel disciplines: the Atkins' Diet, for ordinary sedentary people, and the athlete's carb-down, carb-up energy storage trick. It seems obvious that some smart bodybuilder-type would combine the strengths of the two techniques into a complete system.

CHAPTER 33

KETONES, GLUCAGON AND KETOGENIC DIETS

KETOGENIC DIETS work through metabolic trickery. By "starving" the body of carbohydrates and sugars, two major metabolic changes occur. First, insulin secretion is drastically reduced. If insulin secretion falls low enough, the pancreas (which ordinarily secretes insulin) starts to produce glucagon. You don't hear much about glucagon, because it is not usually secreted in adequately nourished people. Glucagon is considered a catabolic hormone. When glucagon levels rise it's usually an indication that something very wrong is going on, such as starvation or diabetes. However, Eskimos have high glucagon levels for weeks or months at a time and remain amazingly active and hardy. Glucagon is not the enemy — it is secreted for a reason. If we're clever enough, we can use it to our advantage.

Most glucagon never reaches general circulation because it is used in the liver. Glucagon exists to supply the brain with energy to maintain function. Glycogen stored in the liver will be mobilized by glucagon into general circulation so the brain will continue to receive steady energy. However, for dieters, glucagon's raison d'être is to convert fatty acids into ketones.

Ketones are fractured fats created through a process that involves fatty acids, carnitine and glucagon. Presto! After processing in the liver, fats have been transformed into beta-hydroxybutyric and aceto-acetic acids and others. Can we just call them ketones? Fine by me.

Ketones are very cool things. The major advantage of ketones over fats is that the brain can use them for energy. Your brain, even though it has fats in it, will not use fats as fuel. In a ketogenic state (which is when there are more ketones than glucose in the blood), ketones are the primary fuel source. When ketone levels are high enough, muscle cells will use them instead of glucose and fatty acids. This has significant implications.

The ketogenic state reduces muscle catabolism by slowing the conversion of amino acids into glucose. Ketones are also inefficient: a pound of fat converted to ketones yields less than 3500 calories. In addition, ketones that are not used for energy are excreted in urine and respiration, and cannot be converted back into fat.

Wait a minute! If ketosis is so great, why do all of the doctors criticize ketogenic diets? Ketosis is a dangerous condition for sedentary people. However, ketone fuels make the blood acidic only as long as they are cruising around waiting to be burned. Sedentary people will achieve acidosis on a ketogenic diet because they don't require a lot of energy. However, athletes (like Eskimos) will use tremendous amounts of ketones for energy. In addition, the BODYOPUS Diet only causes ketosis for 4 days out of 7 and not for sustained durations, like the old Atkins' Diet. Ketogenic diets are not suited to inactive people, but are ideal for bodybuilders.

Although most glucagon is used in the liver, the amount that does make it to general circulation causes some very nice

direct and indirect (from noradrenaline secretion) fat mobilization. Glucagon seems to decrease fat in areas that are normally very resistant to reduction, like the lower body. Perhaps the combination of low insulin and glucagon's triglyceride disassembly is the reason why ketogenic diets work better than traditional high-carbohydrate, moderate-protein, calorie-restricted diets.

Although we have been thinking of ketogenic diets primarily as fat-loss tools, ketosis also causes the carbohydrate depletion which makes glycogen supercompensation possible. In fact, supercompensation happens most quickly when you have just entered ketosis.

CHAPTER 34

THE REBOUND TRAINING SYSTEM

I CAN'T EMPHASIZE IT strongly enough: The Rebound Training System and its creator, Michael Zumpano, completely changed my life and set me on the path of whatever I have become today.

The Rebound Training System was a cyclic 10-day plan that coordinated a ketogenic diet (but *not* a low-calorie one) with a carb-up phase. All exercise was weight training, incorporating three different disciplines: heavy weights and failure training à la Arthur Jones and Mike Mentzer for intermediate workouts, volume training with high repetitions and sets for the final exhaustive workouts, and power-lifting training after the carb-up. Rebound Training's goal was to help people who had plateaued on every other type of program to grow. Even though the ketogenic phase of the diet didn't restrict calories, Rebound-Trainees lost fat.

When it was released, there were two opinions of the Rebound Training System: either it was a work of genius (which it was) or completely harebrained. Either way, you couldn't argue with the results. Every person who dared to try the bizarre 10-day Rebound Training System had spectacular results. However, there were a couple of factors that kept it from achieving

wide acceptance.

First, people had problems sticking to the plan. The logistics of a 10-day plan interfered with most people's 5-day workweek and 2-day weekend schedule. In addition, the initial stretch of carbohydrate deprivation required more mental discipline than most people believed they had. A carb-fed brain is a happy brain. Enduring the low blood sugar blues before the ketone-induced euphoria was a bodybuilder's idea of diet hell.

Most people didn't want to be called diet wimps and found a better sounding rationale to avoid the system. They said it wasn't healthy, and seemed to have a lot of scientific ammunition to back them up. The diet had lots of fat! Yikes! Eggs and cream and butter and bacon and cheese! Cholesterol, triglycerides, saturated fats, dairy, nitrates — the diet included the whole slimy armory.

I didn't help start Zumpano's Rebound Training System. One day, he just showed up in Gold's Gym in Santa Monica with a mission to change everything in bodybuilding nutrition. I tagged along. He became my best friend, my mentor — and I became an intellectual vampire. My brilliant mind, which had been on hiatus for years since pursuing a performing arts degree, was ready to learn. Reflecting back, I must have been a real pest. I asked a zillion questions.

Frankly, it was a time in my life when I was tremendously unhappy. I had moved to California, hobnobbed with the body elite at Gold's and did the usual rounds of the steroid specialty doctors in the area. I lived the life of the bohemian jock; that is, I lived for bodybuilding contests. Finally, I faced an awful realization — I was a terrible bodybuilder and I would never be better than average. To top it off, I had nothing else I wanted to do in my life.

I had followed all of the correct advice, even the secrets that aren't written in the magazines, and although I had brains, discipline and commitment, I was virtually a failure at bodybuilding. I was shopping for a new salvation.

In retrospect, Zumpano and I were a pair of complementary minds. Zumpano was (and probably still is) a creative, brilliant thinker, although somewhat lazy and undisciplined. I worked to actualize his plans; I was many steps behind him in biochemical knowledge, but a quick study and a detail man. I knew that Zumpano had some terrific ideas meandering about in his head. My job was to coax them out, organize them and put them in a lively and understandable format. Together, we transformed the Rebound Training System into the *Ultimate Dieting Handbook*.

CHAPTER 35

REBOUND REDUX

THE MOST COMMON COMPLAINT about the Rebound Training System was loss of appetite, which caused bodybuilders not to fulfill the diet's calorie requirements. Rebounders were unconsciously dieting, even though Zumpano admonished them not to. To bodybuilders who were hesitant to try the system, but who were familiar with carb-downs, carb-ups and Atkins-type diets, a modified Rebound plan geared to fat loss was an easier sell. The Rebound Training System went on a diet, and re-emerged as the Ultimate Diet.

Although the Ultimate Diet was an excellent weight-loss program, and probably the best system to lose body fat and preserve (or increase) muscle, it was never embraced by mainstream bodybuilders.

I can think of three reasons why the Ultimate Diet didn't catch on. First, it just looked too damn weird. People had forgotten Bloom, Atkins and the fish-and-water diet. The science was valid. People could accept high protein in a diet. They could even tolerate low carbohydrates. But include the panic words *"high fat"* in a diet, and the American social dieting consciousness rebels against what it finds intellectually, emotionally

and almost morally, repugnant.

A modified version of the Ultimate Diet was re-introduced by the Canadian sports doctor Mauro DiPasquale in early 1991. He couldn't have picked a worse title when he called it the *High Fat Diet*. Of course, the words "High Fat Diet" pique interest, just like a clay pigeon in a clear blue sky. The public only considered it long enough to take aim. I have been careful to avoid calling BODYOPUS a high-fat diet. Think of it as a ketogenic diet or as a glucagonic diet.

Of the three reasons, this one is the shakiest. To dismiss it out of hand is, well, *your* loss. Modified ketogenic diets are the best diets. Period.

The second reason why the Ultimate Diet did not achieve wide acceptance was that carbohydrate deprivation regimens are the hardest to follow. Are they complicated? No, but they require a high degree of self-discipline. It's not a Ghandi diet, but it feels damn close. You will not be starving yourself, but your mind will try to trick you into thinking you are. Your brain will be screaming, "Sugar, sugar, *sugar*, now, now, *now!*" Less drastic diets cause less anxiety, which is why I have included the Isocaloric Diet in this book.

A number of athletes who started the Ultimate or BODYOPUS Diet with the best of intentions and full-blown enthusiasm, gave up after 2 days of carbohydrate deprivation. Nobody likes carbohydrate depletion; it's not supposed to be fun. However, it is the ideal solution to achieve a physical zenith.

The book's game plan is to use BODYOPUS as a last resort. It's just common sense to use the two previous diet plans, which work semi-effortlessly and don't cause too many problems or intrude too much into your social or work life. However, when the easier diets stop working, or won't perform well in a limited

time frame or you have too much lower body fat, turn to BODYOPUS. If you tend to lose too much muscle on the traditional diets, then BODYOPUS is the only choice.

Third, the Ultimate Diet was not widely accepted because we didn't invest a lot of time in public relations. We didn't bother trying to convince bodybuilders to believe in Zumpano's diet, to trust it enough to follow it. People were looking for a philosophy, but it was just a snazzy diet that caused anabolic growth without relying on drugs.

At the time, Zumpano and I were not into salesmanship or preaching. Neither of us came off as charismatic zealots. Two unmuscular nobodies, a Gomer Pyle and a tall, big-nosed Maynard G. Krebbs, didn't make an arresting picture. Also, ketogenic diets and subsequent carb-ups don't need a lot of fancy supplements that can be peddled by the major catalogs, er, muscle magazines. Besides, we both had impatient, restless, inquisitive minds that were always looking ahead to new, unexplored territory. Although the Ultimate Diet was a great idea, we had lots of other ideas to explore. Why stick to one that was going to be an uphill battle?

So I forgot about the Ultimate Diet. Over the years I would get reminders, letters from bodybuilders who remembered or somehow had just discovered the *Ultimate Dieting Handbook*. I would also mentally file away interesting metabolic tidbits that explained, amplified or refined the original plan, like carnitine, liver glucose metabolism, MCT to ketone conversion and glucagon (which we didn't even think about back then). Learning of glucose disposal agents prodded me into action. I thought, "Hey, these things could have been very important if we knew about them 12 years ago."

Since 1988, when I revised and expanded the *Underground*

Steroid Handbook, I always had in mind a new diet book that would illustrate the dirty tricks that bodybuilders use to get ready for contests. Since I was focused on steroids at the time, I assumed that the new diet book would be a drug book for dieters. Many bodybuilders were interested in such information. With my infamous reputation, such a book would almost be expected.

I unconsciously put the book off for many years. At first, I thought it was just laziness or writer's block. I now realize I was avoiding it because I wasn't going to be content with another "drug book." Although it's true that it would be harder nowadays to find public acceptance for a steroid dieting book, this was a minor obstacle. Business and money are not my major concern — the writing has to please me and tell the truth as I know it. I don't factor in the payoffs beforehand.

I was avoiding a diet drug book because drugs will not magically solve all dieting problems. Even with drugs, we still face the same problems of muscle loss and stubborn lower body fat. There's no lack of drugs — steroids, anti-estrogens, thyroid hormones, beta-agonists. Just look at the Top 50 list. These drugs cause some remarkable metabolic adjustments, but there is no *one* genie-in-a-bottle, wish-fulfillment drug. Sure, you hear the "drugs are not the answer" diatribe a little too frequently, but when the Steroid Guru says the same thing, take pause. I've *been there*, and BODYOPUS is not the drug diet book promised in 1980.

I would say that the biggest impetus to re-examine the old Ultimate Diet was Mauro DiPasquali's *High Fat Diet*. This diet piqued my interest because Mauro is unusually bright for a doctor. Most jock docs are injury specialists, not nutritionists. DiPasquali was in charge of drug testing a stable of top professional bodybuilders. He had to try to maintain their performance and condition while stopping anabolic steroids cold turkey.

On paper, the High Fat Diet was an ideal choice for drug-free bodybuilders. However, I predicted that he would run into trouble in the same areas where I had problems in the early 1980s — public acceptance and dieter discipline. It would be safe to say that not one of DiPasquali's stable really followed the diet with any fervor.

I looked forward to the details of the High Fat Diet. I had hoped that he would have made major enhancements to the basic plan that Zumpano and I had assembled 10 years earlier. Our use of amino acids, medium chain triglycerides, succinic acid and glucose polymers was quite avant-garde at the time. Although the High Fat Diet did have some refinements (carnitine, different amino acid recommendations, and — its best feature — a more forgiving 7-day rather than 10-day cycle), it omitted significant features.

The diet didn't have specific information on which proteins, carbohydrates and fats to consume. Even worse, the diet did not coordinate nutrition and exercise in any way. Ketogenic-anabolic growth cycles are significantly more effective if you schedule weight training to match the metabolic state of the dieter. Granted, trying to convince a top bodybuilder that his training *must* be changed is usually futile. Most sports doctors and nutritionists don't even try.

What became of the High Fat Diet? Most of the brave new drug-free pro bodybuilders did not achieve top physical condition, and the organization was disbanded. In the aftermath, just about every aspect of the unpleasant experience was blamed, but particularly the High Fat Diet or, as some called it, the High

Fatter Diet. From past experience, I would tend to blame the dieter, not the diet. Although the High Fat Diet didn't go out with any fanfare, out it went.

Before we begin BODYOPUS, I wanted to recognize the contributions of my predecessors, from Bloom to Atkins. Of course, Michael Zumpano and his original Rebound Training System were the real fulcrum. Mauro DiPasquali did much to rekindle my interest in non-drug solutions for the metabolism. And me? I see myself as a very clever intellectual ferret, stealing useable ideas from the damnedest places. Welcome to the elegant assemblage that I call BODYOPUS.

CHAPTER 36

BARE BONES BODYOPUS

ALTHOUGH BODYOPUS will help you lose fat, it is also an integrated nutrition and training system which will trick the metabolism into anabolic growth. It is unique among fat-loss diets because it also increases muscle mass. Most diets concede *some* catabolism, and rely on passive anti-catabolic aids like glutamine and branched-chain amino acids. The cause of the catabolism is usually ignored. The best that passive anti-catabolism can hope to achieve is a slight decrease in the amount of amino acids pulled from the muscle instead of the bloodstream. As you can imagine, passive strategies don't perform well.

BODYOPUS approaches catabolism in an unusual way. By forcing the metabolism into ketosis, the brain will burn ketones instead of glucose. When in ketosis, the brain actually prefers ketones over glucose. Once blood glucose slips below 50, muscle catabolism is reduced, and the gluconeogenic machinery in the liver is significantly revved-up. Scientists know that catabolism is reduced during ketosis, but they don't know why.

In addition to decreasing catabolism, BODYOPUS packs a two-part punch. Although there is nothing we can do about the catabolic action of glucagon, we can rebound into an anabolic

state. We knew some of the reasons for this 12 years ago, but years of additional research have still left some anabolic processes unexplained. Even then, we partly understood how glycogen supercompensation causes extra strength. Heightened insulin activity transports amino acids and glucose into the muscle cell. All of these substances expand the muscle cell.

Back in 1982, we knew that larger muscle cells caused increased strength. We didn't know that this cell volume expansion triggers other still not fully explainable anabolic mechanisms. Although insulin is usually the trigger hormone, many of these anabolic processes are not started with the recognized hormone-receptor messenger signal, but with the mechanical expansion of the cell membrane. As Zumpano intuitively realized years ago, glycogen supercompensation causes a tremendous anabolic response. The new explanations merely vindicate his original theory, and allow us to do some "Ha, ha, ha, I *told* you so" intellectual chortling.

It is absolutely necessary for a fat-loss diet to cause an anabolic response in order to maintain and increase muscle mass. Even if you increase dietary protein, supplement with glutamine or branched-chain amino acids, they won't be magically incorporated into the muscle. The cellular kinetic expansion caused by glycogen supercompensation is an anabolic driver just like steroids and growth hormone.

BODYOPUS is metabolic trickery. Some might call it "alternative." Others will herald it as body salvation. I just call it a cool tool to solve a body problem. BODYOPUS' effectiveness comes both from a decrease in catabolism (as compared to a low-calorie non-ketogenic diet) and an anabolic rebound from kinetic cellular expansion.

Although other dieting strategies can preserve muscle, they

need anabolic drugs to address the deficiencies within the diet. Although such drugs are effective (even cost-effective), new laws, morals and rules from sport organizations have prohibited their use. Although BODYOPUS is unusually labor-intensive tool, it is highly refined.

CHAPTER 37

BODYOPUS IN THE FLESH

I'VE SPENT an unusual amount of space on BODYOPUS' forerunners because ketogenic diets have always been a hard sell. I hope you now believe, as I do, that BODYOPUS is the only practical solution to muscle wasting and stubborn fat. Enough of the salesmanship; it's time for specifics. Many of the components have been discussed previously, so you shouldn't find them terribly strange. I've artfully arranged the nutritional and metabolic tricks you're now familiar with.

The BODYOPUS Diet is a 7-day cycle. The first 5 days of carbohydrate depletion rapidly establish ketosis. The final 2 carb-up days encourage glycogen supercompensation.

As you may remember, ketones are modified fatty acids transformed in the liver by glucagon, insulin's evil twin. Ketones can only be burned when the body is deprived of dietary carbohydrates (bread, vegetables, fruits, juice, milk — it's quite a list of things not to eat).

Once blood glucose is about 50 mg/dl, ketones start being produced. They will continue to be manufactured as long as blood glucose stays below 50. Once ketones are available for fuel, the body prefers ketones over both glucose and fatty acids.

In addition, ketones are inefficient fuels — they yield more energy per gram than glucose, but less than fatty acids.

The 2 carb-up days accomplish many things. By disrupting ketosis, we allow the body to resume insulin secretion, lower cortisol, replenish the muscle cells with the amino acids and electrolytes that were depleted along with the glycogen. In addition to the increased strength from the newly abundant glycogen and increased cell size, the glucose, amino acids, water and electrolytes rammed into the cell by insulin cause an anabolic kinetic cellular expansion.

It is necessary to disrupt ketosis every 5 days to reduce the muscle catabolism caused by glucagon and cortisol. (By the way, cortisol is also a potent fat cell shrinker.) This break allows your body to rebuild the muscle lost during ketosis. This rebound is the major difference between BODYOPUS and other ketogenic diets like Atkins'.

The original Ultimate Diet (the seminal BODYOPUS) was a 10-day cycle. While the 7-day BODYOPUS is more convenient, the 3 days were not cut just for convenience. The 3-day reduction remedies two areas deficient in the initial plan. Practical experience with both the Rebound Training System and the Ultimate Diet showed too many workouts and not enough rest after six to eight 10-day cycles caused overtraining. This problem was fixed in BODYOPUS by incorporating 3 workouts every 7 days instead of 6 workouts every 10 days.

Some applicable research on blood glucose disposal and transport has accrued over the years, and not as much time is needed to descend into ketosis and glycogen depletion. The chief metabolic trick, ketosis, occurs when glucagon is switched on at a blood glucose level of 50. This is a gradual switchover, balancing the glucose and ketones so as to not upset the fuel

supply to the brain. Before, it took an average of 4 days to establish ketosis. Our new nutritional tricks will allow this to happen in 2 days.

Of course, fitting the whole cycle within 7 days makes it enormously attractive for most working people. The really hard part, the carbohydrate deprivation part, is spread out from Monday through (not exactly true, but close enough for now) Friday, which coincides with the traditional 5-day work week. The high-calorie "let's boogie" carbohydrate replenishment falls nicely on the weekends along with, at the same time, no gym workouts.

This 5-plus-2 arrangement is the least intrusive to work, personal, and family interests. In fact, on weekends you will eat and act much like your fellow normal humans. At times it will look like (dare I say it?) you're eating junk food. Between us, we'll call them highly insulinogenic simple carbohydrates. I like to call them Satan sugars because it gives people the willies.

Here's a broad outline of the plan:

Sunday	Begin at 6:00 p.m. Eliminate all carbohydrate foods.
Monday	Today's menu consists of no carbohydrates, moderate protein and high fat. This is a weight-lifting workout day.
Tuesday	Nutritionally, Tuesday is exactly same as Monday. Finish the other half of the body during the weight workout.
Wednesday	Nutritionally, Wednesday is a repetition of

Monday and Tuesday. This is a non-weight-training day, but any reasonable amount of aerobics is fine.

Thursday Thursday is another boring day, with the same diet as Monday.

Friday This is the pain/pleasure day. In the morning you will still follow the no-carbohydrate regimen. By mid-afternoon, you can eat 100 to 200 calories of carbohydrates, just enough to raise blood sugar out of ketosis. In late afternoon or early evening, do the grand depletion workout. After the workout, the high-carbohydrate supercompensation feedings begin.

Saturday Continue glycogen loading. Don't work out at all.

Sunday Continue glycogen loading. The last carbohydrate meal is between 4:00 p.m. and 6:00 p.m. Eliminate carbohydrates from 6:00 p.m. on. Again, don't work out today.

We'll discuss the BODYOPUS workout further on, but to give you a preview:

Monday	Abs, chest, shoulders, traps, triceps
Tuesday	Back, biceps, legs, calves
Friday	Whole body (!) in one workout

CHAPTER 38

OPTIONAL THINGS NEEDED

IF YOU THINK ABOUT IT, the Eskimo "blubber-and-snow" ketogenic diet is as basic as you can get — no need to ever see the inside of either a supermarket or health food store. This idyllic picture is just our quaint notion of what the Eskimos ate; the modern Nanook of the North probably hops on his Ski-Doo to go to the 7-11.

I tend to distrust diets which require you to purchase special foods or supplements. I'm especially sensitive to this because (with a different hat on), I design such specialty foods and supplements, and all probability will develop new products that could be helpful with BODYOPUS. However, I've tried very hard to make this a BODYOPUS Diet Handbook and not a BODYOPUS Supplement Catalog, as many bodybuilding magazines are designed to be. In most cases, BODYOPUS doesn't require any foods that can't be found in the average supermarket.

However, there are special circumstances that might warrant the inclusion of supplements. If you object to the high quantity of saturated fats in the no-carbohydrate phase, you'll need to go to a health food store for the recommended oils. If you will not

eat oily fish, but still want the benefit of omega-3 fatty acids, you can find them in supplement form. Although you could meet the minimum linolenic acid requirements from supermarket soy oil, flaxseed oil is much better.

Additionally, if you don't want to consume red meat, which is a good source of carnitine, creatine and B vitamins, you can substitute a flesh product like fowl or fish (or none at all), and use supplements. Your arrangement may equal or even surpass the quantity of micronutrients in red meat.

In the Ultimate Diet, I advocated the use of MCTs, which convert to ketones quickly. MCTs, unfortunately, are one of those exotic supplements that are not readily available, even in health food stores. Since most MCTs are derived from coconut oil, you can use that instead. Unfortunately, the rest of coconut oil is long-chain saturated fat. Frankly, I have no problem with saturated fats on no-carbohydrate diets. Yes, saturated fats reduce insulin sensitivity, but with no carbohydrates and no insulin, what's the problem? Short chain triglycerides (SCTs) are as readily available to the liver as MCTs, and plain dairy butter can supply you with small amounts of SCTs. Personally, I have problems with both coconut oil and butter; I just don't like the taste of either. I would prefer to only use C-10 MCTs because I have had problems with most commercial blends. However, C-10 MCT supplements are not available yet.

Glucose disposal agents are a trick to hasten ketosis. You have a lot of flexibility at your disposal (ha-ha). Although bodybuilders have embraced chromium, vanadyl sulfate and (my favorite) phenformin, you can substitute with cinnamon and brewer's yeast, which are both potent glucose disposal agents.

I have kind of painted myself into a corner with whey protein. There are no concentrated whey protein sources available

at the supermarket. Although I've read about whey cheese and whey tofu, I've never actually found them at the store. Twelve years ago I was a guinea pig for the Ultimate Diet, going through cycle after cycle, for months at a time. We didn't have whey protein then, and the plan worked anyway. Because I don't consume much meat or fish (as a matter of personal choice), I include whey protein in my diet.

We'll discuss gadgets next, which I have a real fetish for. Gadgets are virtually unnecessary for BODYOPUS. However, since even Eskimos drive snowmobiles, I will include my favorite toys for BODYOPUS.

A food scale is the most essential gadget in my toy box. It's an ideal way to weigh food and measure calories. I've tried them all, from the junky $5 boing-boing spring types to the digital battery-powered ones. They all work well enough; we aren't doing precision lab work here. I've had good luck with a mechanical one from Cuisinart and a really cool traveling digital scale from Brookstone. Neither were cheap. Of course, I have them both.

A bathroom scale is nice, just don't get obsessive over it. I wish there was one that only allowed you to weigh yourself on a timer set every 2 weeks. Many dieters weigh themselves too damn much; morning, night, before and after meals, after bowel movements (it *is* a bathroom scale — maybe we should call it the toilet scale), after a good horoscope. Athletes' and dieters' weights will vary over the day, depending more on water than fat.

If you have ever tried a ketogenic diet before, you've encountered ketosticks, a urine testing strip primarily used by diabetics that will change color from tan to purplish when unused ketones are excreted. Most corner drugstores still stock

them. They should turn purple when blood glucose has dropped below 50 and you are in ketosis. Remember, however, that ketosticks test for *unused* ketones. Low calories and high activity might mean that all available ketones are being used as fuel, and none are being excreted. You may actually be in ketosis, but not have any unused ketones to measure.

Ketosticks are a nifty, fast and cheap tool to see how these tricks work. Of course, calorie quantity, activity, supplements and drugs will all effect the rate of descent into ketosis. If the ketostick doesn't turn purple, you may be using up the ketones, *or* you may be eating too many carbohydrates. Sometimes just 100 calories of carbohydrates over the day can keep blood glucose over 50.

Ketone bodies do not immediately appear when blood glucose reaches 50; it's not an on/off switch. Ketosis usually takes about 72 hours after carbohydrate restriction, although this is considerably reduced if you use glucose disposal tricks. Try taking really effective insulin agonists like vanadyl sulfate right before bed so you can avoid the transient nausea, crankiness and lethargy that low blood sugar causes.

Our next gadget is something that diabetics are familiar with: glucose testing strips. These sticks look similar to ketosticks, but require (yikes!) a pinprick of blood to be deposited on the end of the strip. A color scale displays the number of milligrams of glucose per deciliter (one-tenth of a liter) of your blood. Normal blood glucose is between 80 and 120 mg/dl. Ketosis can begin at 50 mg/dl.

Some strips need to be washed off; others will suffice with a quick dry blot. The old-fashioned strips match the strip color to color scale on the side of the label. It's much easier to use a glucometer, an electronic hand-held device about the size of a

very small Walkman radio that will give you a digital readout of blood glucose. The retail price for such devices is around $100, but most of them have coupons and rebates that bring the actual price down to between $5 and $50. The catch is that glucometers use only one type of testing strip, which happens to be more expensive. Because I am colorblind, I choose the electronic gadgets.

For our purposes, a glucometer is better than ketosticks. However, all hand-held glucometers can be off by up to 30 points. The best time to take a reading is immediately after waking up in the morning. Use the second, not the first, drop of blood. Yeah, it looks creepy, but I think that glucometers will eventually be widely used in athletic nutrition — not to measure ketosis, but supercompensation.

Calipers are last on the gadget list. Lange calipers cost about $160, last virtually a lifetime and can be shared with friends. The $25 plastic Slimguide is surprisingly accurate. It's the best of the cheapies. Both are available from Creative Health Products (800-742-4478). Unless you are a contortionist, you will need an assistant to pinch you in the right places. Medical-quality metal calipers from Skyndex with gee-whiz built-in computers are really only useful in a clinic setting when speed is needed.

Should I mention the "ralphing" pail you'll need on leg day? Frankly, you don't need any gadgets. Just don't eat any carbohydrates for 5 days. Me, though, I got 'em all — even the pail.

CHAPTER 39

BODYOPUS WITH ALL OF THE PLUMBING

IN THIS CHAPTER, you will get to use all of the information you learned in the previous chapters. While some dieters can follow BODYOPUS with the simplest of directions, such as "no carbs for 5 days, then eat like crazy for 2 days," most of us yearn for more precision.

SET CALORIE LEVELS

To set the correct daily calorie level, you should know your regular mixed diet maintenance calorie level. I recommend one of two calorie levels for ketogenic diets. If you don't need to lose a lot of fat, or you're not in a hurry, then (believe it or not) you can eat maintenance calories while losing body fat and preserving muscle. This works because of ketones' fuel inefficiency. Remember, a gram of fatty acid, once converted to ketones, does not yield 9 calories.

If you want to lose more fat per cycle, then eat 10 percent less than your maintenance calories. You can try lower calorie levels if you like, but I've found that beyond a 10 percent debit you constantly feel sick or turn into a Zombie Shuffling Dieter.

FAT-PROTEIN RATIOS

Many athletes eat too much protein. Your diet should contain 25 to 30 percent protein; more is not necessary nor productive. People tend to consume more protein while dieting because they believe that more protein will prevent muscle loss. This only works in ultra-low-calorie, near-starvation diets in which protein is too low in the first place. Most excess protein intake is scavenged by the liver for gluconeogenic amino acids, and the rest is turned into (saturated) fat. This is not an economical way of getting saturated fats. Fat is converted most easily to ketones, not amino acids.

Aside from the 25 to 30 percent protein, the rest of the diet is fat. Although I've stressed that you are to eat no carbohydrates, none, zero, in reality nothing in nutrition should be absolute. Yes, it's important to establish ketosis quickly, and that means "no carbs." Do you realize what "no carbs" means? It means no fruit, starch, juice, milk or most vegetables. Actually, carbohydrates make up most of the wholesome food that you usually eat. Unfortunately, you can't escape trace carbohydrate amounts. It would seem rather silly to avoid dairy proteins. Cheese can contain a gram of carbohydrate every ounce or so. Olives have nice healthy fat in them, but do contain small amounts of carbohydrates. You can cautiously eat some green vegetables like celery and some kinds of lettuce. However, the safest course is to avoid even low-carbohydrate foods until ketosis is established.

SATURATED FATS

It's hard to avoid saturated fats on a ketogenic diet, especially for larger bodybuilders who have unusually high maintenance calorie levels. If your maintenance level is above 6000

calories, very fatty meats and whole eggs may be the only practical way to consume enough calories, unless you can stomach large amounts of MCTs.

MCTs are the most benign saturated fats, because they don't affect insulin sensitivity as other saturated fats do. Since many people have problems digesting them, or even tolerating them comfortably, the best course of action is to divide them equally among the 6 daily meals. Even sensitive individuals should be able to consume at least 700 calories daily. MCTs make ideal ketone substrates. You might burn off more fat without MCTs, but you'll feel much more "alive" if you use them. In addition, high ketone levels reduce catabolism. Ketones are not "anti-catabolic" — they do not reverse catabolism except on high-calorie diets — but on low calories they do slow catabolism.

Whole coconut oil is a distant second to purified MCTs. Remember, other than the MCTs, the rest of coconut oil is as saturated as egg yolk fat. There are more interesting food choices that contain saturated fats.

FISH FATS

This would seem to be an easy call, but remember that fish is not dripping with omega-3s. You'd have to eat a lot of fish, because each serving of fish only has about 50 calories of healthy oil per 4 ounces. Much of the oil in canned fish is added vegetable oil. There's nothing wrong with that, but it's probably not what you expected.

UNSATURATED FATS

Although there are lots of foods to choose from, most whole foods high in unsaturated fats also contain too many carbohydrates. You can't eat things like avocados or whole nuts.

Am I turning out to be a spoilsport or what?

AND THEN THERE'S BEEF

At first glance, the reasons many athletes avoid beef seem valid. Beef protein is not an especially good protein. It's not very digestible or soluble. Its amino acid profile is not ideal for dieting. The fat in red meat is saturated, and beef also contains cholesterol. However, the odd thing is that for most BODYOPUS dieters, high consumption of fatty beef is satisfying, strength-inducing and helps them bitch less about not being able to eat any carbohydrates.

Beef is a tasty source for carnitine, creatine and B vitamins. Yes, we can replace these micronutrients with supplements, and substitute better proteins and healthier fats. Will these high-tech substitutions be better than beef? Only if the trace fats in beef don't influence performance. The latest research is beginning to show that beef fat has drug-like characteristics. It doesn't seem so cut and dried now, does it?

The worst kinds of foods make BODYOPUS fly — bacon, sausage, fried pork skins, hard cheese and whole eggs. The most important thing is to avoid carbohydrates so blood glucose slips below 50 mg/dl.

A number of no-sugar fiber drinks can replace the fiber you'd usually get from eating roughage. If you aren't sure what has carbohydrates and what doesn't, get a paperback carbohydrate counter book at any bookstore. Buy it, read it, memorize it.

MEAL FREQUENCY

We've already discussed the reasons for 6 small meals per day: insulin secretion, blood glucose, muscle cell insulin sensitivity and enzyme activation. As you've noticed, we've allowed

the carbohydrate part of the diet to dictate meal frequency. On low-carbohydrate diets, meal frequency is not terribly important.

However, don't forget that soluble proteins, such as whey, can cause insulin secretion during the first day or so of carbohydrate deprivation. These insulin-boosting proteins can cause sleepiness and transient nausea when blood glucose is between 80 and 50 mg/dl. At this level, soluble proteins make you feel best when they are consumed shortly before bed. Wouldn't you rather that this unpleasantness hit while you are sleeping?

If you decide to use MCTs for a significant amount of your daily calories, eating 6 meals a day suddenly makes sense. The most unpleasant way to eat MCTs is to spoon them in on an empty stomach. Because you can only eat 1 or 2 tablespoons of MCTs at once, you should spread them out over your 6 meals. MCTs hide well in egg whites, a tiny bit of egg yolk and a dash of lecithin.

For the ketogenic part of BODYOPUS, meal number and frequency can be arranged to your convenience. During the 2-day Recomposition phase, it is an entirely different matter. Recomposition *is* a race to increase glycogen deposition before insulin sensitivity returns the body to its sub-optimal condition. Carbohydrate meals must be rigidly planned. Enjoy your ketogenic feeding habits now, because by the weekend you'll find my recommendations to be a pain in the ass.

CHAPTER 40

BODYOPUS COUNTDOWN

IN MY MIND, BODYOPUS really starts at 6:00 p.m. on Sunday, when you stop eating carbohydrates. This is confusing to many diet "shoppers," so we'll start describing the BODYOPUS cycle on Monday.

Monday

Calorie level — On Monday, your total calories should be 90 percent of your normal mixed diet maintenance calorie level. You should eat *no* carbohydrates. For example, if your daily maintenance level is 3000, you would eat 2700 calories on Monday. Protein should be about 800 calories. The rest, all 1900 calories worth, is fat.

Food Types — This will not be fun unless you actually enjoy eating fatty foods. You will eat eggs (white or whole), meat or fish. You are free to use oils and fats for cooking. Flaxseed,

walnut and olive oil are ideal, but corn, canola and soy oils are not evil either. Butter is all right. A very small amount of hard cheese is permissible. The only "junk" food you can eat are fried pork rinds (George Bush's favorite). Fried pork rinds are a chip substitute made entirely of saturated fat and cholesterol — but they are crunchy. Try to include a replacement fiber drink on Monday (one without sugar, of course). Ketogenic diets use up electrolytes, especially potassium, calcium and magnesium, so it's important to supplement them.

Nutrient Ratios

Unsaturated fats and MCTs should be at least 35 percent of daily calories. Fish oils should be included, but it will be hard to get even 10 percent of daily calories from fish fats. The rest of the fat, 25 percent of daily calories, should be monounsaturated and saturated. Although MCTs are nice dietary fats, they will not be terribly effective until the body is in ketosis. For protein, be sure to consume 200 calories of whey protein. The rest is up to you. I've found that trying to meet the protein requirements with blender drinks will only make you hungrier.

Activity

At the beginning of the second cycle, your muscles will be full of glycogen from the weekend carb-up. Train at least half of the

body on Monday. As your blood glucose declines over the day, so will your strength. Try to work out in the morning. You will be strongest on Monday, so train the body parts that need the most intense workout.

Tricks

Glucose disposal agents will speed your descent into ketosis. The milder ones like chromium and cinnamon can be used during the day. More potent ones should be done before bed. OKG may be beneficial when taken on an empty stomach at night, although it may make you feel nauseous.

Aerobics

Aerobics are not recommended because they will affect Tuesday's workout negatively. However, aerobics will speed descent into ketosis, especially if the intensity is above 70 percent maximum heart rate.

Gadget Alert

A glucometer reading upon arising will be informative. You could try a ketostick dip before bed, but most people will show no change.

Mood

You won't be suffering on Monday. Blood glucose will usually be around 80 mg/dl, so you won't be too irritable. The hardest time for dieters is when blood sugar dips to 50. Monday is a big uplifting adventure for most first-timers, who think, "No sweat, I

can handle this. Besides, it's kind of nice to have no guilt eating juicy steaks, bacon and whole egg and cheese omelettes."

Tuesday

Tuesday will probably be the most uncomfortable day of all. Throughout the day, blood glucose will be between 50 and 60 mg/dl. You have not yet reached ketosis, and your brain is screaming for fuel. You won't give in to it, will you? Some individuals will exhibit symptoms of low blood sugar — lethargy, shaky hands, nausea, headaches and just all-around feeling like shit. Some BODYOPUS dieters will have descended into ketosis by early Tuesday and the ketostick will be light purple.

This is the make-or-break day for BODYOPUS. Most athletes don't feel healthy when their blood glucose is below 80 mg/dl. I am perfectly fine with blood glucose below 70 mg/dl, but I have poor insulin sensitivity, hyperinsulinemia and hypertension. Your brain will really play a number on your body. Tough it out. Nanook never went into a diabetic coma squatting over his ice fishing hole. MCTs can really help during the switch to ketosis. Some of the old High Fat Dieters concocted a beverage of ice water, MCTs, baking soda and some diet Kool-Aid for flavor. Personally, I always thought that there wasn't enough baking soda to really alkalize the blood. Think of it as a low blood glucose placebo cocktail.

You can screw around with the workouts, the aerobics and the calorie, fat and protein levels. Just don't eat any carbs!

Calorie Levels Eat 10 percent less than maintenance calories and no carbohydrates. If you're already

in ketosis by early morning and plan to do aerobics after the Tuesday workout, you could readjust calories to maintenance levels, you big crybaby. Between the ketones' fuel inefficiency and the aerobic activity, your body will certainly feel debited.

Food Types Tuesday's diet is similar to Monday, but you can be a wee bit looser with carbohydrates. Eat no more than 50 calories, which is only 12 g. This is not much — just the cream in your coffee and a spoon or two of diet ketchup or salsa.

Nutrient Ratios On a typical 3000 calorie diet, 50 calories works out to less than 2 percent from carbohydrates. See, I'm not completely heartless.

Activity Train the other half of the body on Tuesday. You won't feel as wonderful as you did on Monday. Your muscles will still be fairly filled with glycogen, but because blood glucose is low, you won't be able to do as many repetitions as you're used to. Your strength for the first 3 reps or so will be surprisingly good, but you will not be able to sustain it. Sometimes you will wish you had brought your ralphing pail.

You will have to determine what time of the

day you prefer to work out. Early in the day, most people will still be running on glucose. By mid-evening, you will be in ketosis. Some exercise better when running on glucose in the early morning; others like the ketogenic workout. If you wish to do aerobics after your workout, knock yourself out. You will notice that your respiration will accelerate greatly once you are in ketosis. That burning sensation in your lungs is the respiration of acetone, a by-product of the ketone burning. Be very careful if you light up a cigarette.

Tricks

Monday's tricks will work here. If your glucose stick isn't showing around 60 by early morning, you could use vanadyl sulfate along with chromium and a soluble protein drink.

Gadget Alert

As on Monday, take ketostick and glucometer readings. If you weigh yourself on Tuesday, you will notice a marked drop. It's not all fat, just a lot of water, electrolytes and glycogen.

Wednesday

By now you should have your ketogenic training wheels off. You are in ketosis. These magic ketones will negate much of your hunger. You might even feel euphoric when your brain

starts saying, "Hey, these ketones aren't half bad!" If you've been checking your blood glucose, it will be around 40 mg/dl. If you aren't consuming red meat, you might consider supplementing with carnitine and creatine. Don't lift weights on Wednesday, but any reasonable aerobics will be fine.

On Wednesday, we move into dangerous territory, consuming minute amounts of carbohydrates. As long as blood sugar is at 40 mg/dl or the ketostick is purplish, you can eat a small amount of carbohydrates. Another 50 calories will allow you to throw in some green leafy vegetables. Make sure to check the carbohydrate book because not all greens are the same. I like celery and Romaine lettuce with olive oil. How much should you increase over Tuesday? 50? Maybe more? The ketostick and glucometer can lie so be conservative with carbohydrate intake. Don't get an anxiety attack if your ketosticks aren't purple or the glucometer is above 50. You may have no unused ketones or the glucometer may be way off.

Unless your regular job includes a lot of vigorous activity, Wednesday is pretty much a cruise day. Dieters who cut calories more than 10 percent and added in a high amount of aerobics will feel like they're in slow motion. In this case, coconut oil or MCTs will really give a boost.

Thursday

Thursday is exactly the same as Wednesday. Don't work out except for aerobics. If you get a little antsy from not training for a couple of days, work your abdominals and do hyperextensions for your lower back. Although these exercises are not especially helpful, they're not damaging, either.

Some people ask about the intensity of the ketosis. What if

your ketosticks are deep purple? Is this beneficial? We don't know. If we were sustaining this state for long stretches of time like the old Atkins' Diet, most doctors would be worried. Frankly, I've never seen a BODYOPUS or Ultimate Dieter get that deep into ketosis.

During ketosis, you will have terrible-smelling breath because ketone by-products will escape during respiration. Some individuals will try to mask it with sugar-free breath mints. Unfortunately, many of these contain sorbitol, which is not recognized as a sugar, but is still a carbohydrate. I've seen some people get out of ketosis because they consumed too many sorbitol candies. Aspartame-sweetened gums and candies may help.

You won't be hungry on Thursday. You won't be irritable. But you may be starting to feel a little beat, especially if you do intense aerobics for a long time. Again, MCTs will come to the rescue. Most people who are eating maintenance calories won't feel tired. If you debit food intake by 10 percent (or more) and do a lot of aerobics, you will start to drag by late Thursday afternoon. Although you will burn a tremendous amount of body fat this way, you won't feel like going out dancing later on that night.

Friday

Friday is the most unusual day because you will be progressing through three metabolic states: ketosis, post-ketosis (low blood glucose but out of ketosis) and Recomposition (*lots* of carbohydrates).

Many people dread Friday's workout, but it doesn't have to be terrible. Sure, there are a lot of repetitions and sets, and training the whole body in one workout is unusual. However, it's a monster workout, not a maniac workout. Your goal is to deplete muscle glycogen, not to make Hamlet-length monologues into the ralphing pail. Sprinting from exercise to exercise without a rest between sets will not make it more glycogen depleting. It will just increase the acid level in the blood so fast that you'll get nauseated. Although you should do the sets and repetitions reasonably quickly, strolling leisurely to the next exercise will make the experience more comfortable.

Even if you train too hard and have no appetite after you workout, you *must* eat.

Calorie Levels

For most of the day, you will be in ketosis. Just before your workout you'll want to boot out of ketosis to better deplete the muscles of their last bit of glycogen. Your blood glucose level should be at about 60 mg/dl, and the ketostick should be tan. Remember, though, that there will be extraneous ketones floating about, so the reading won't magically turn from purple to tan within only an hour or two. The Recomposition schedule will dictate calories after the workout, so set daily calories as if the day ended at the beginning of the depletion workout.

Food Types

About 1 to 2 hours before the depletion workout, you should eat 100 to 200 calories of carbohydrate. Although I don't usually recommend fruit to dieters, this is the one

time when fructose, sucrose and glucose will work together to serve our purpose. I like apples because they are crunchy. Others crave bananas.

Nutrient Ratios

Throw the nutrient ratios out the window today. Up to the depletion workout (hopefully in early evening), treat Friday as a complete day of dieting. After that, carbohydrates and calories will be adjusted to the Recomposition formula.

Activity

Friday's whole body 2-hour glycogen depletion monster workout is detailed in Chapter 46, the BODYOPUS Workout Schedule. Monday's and Tuesday's workouts and aerobics were quite flexible, but the depletion workout is more precise. You could do aerobics earlier in the day to burn ketone calories, but I guarantee you will not want to do any aerobics after the 2-hour depletion workout.

CHAPTER 41

RECOMPOSITION RODEO

AFTER DEPLETING your liver and muscle glycogen and increasing your store of glucose-to-glycogen converting enzyme, it's time to replenish. Athletes call this process "carbing-up." Scientists call it glycogen supercompensation.

I'd like to point out some misconceptions about carb-downs and carb-ups. First, muscle glycogen depletion is not necessarily related to blood glucose levels or, for that matter, ketosis. From either complete fasting or simple carbohydrate restriction, blood glucose will eventually drop into ketosis. This is not an indication of the amount of glycogen in the muscles. After enough time, muscle glycogen will become depleted just from minor activity and heat production. However, glycogen depletion from simple carbohydrate restriction will not intensify the enzymes that cause *super*compensation.

True glycogen supercompensation requires dietary carbohydrate reduction *and* vigorous exercise to deplete the muscles. Bodybuilders are uniquely suited to accomplish both requirements because they are better able to accommodate the symptoms of low blood glucose than, for example, endurance runners. In addition, bodybuilders can deplete virtually all skeletal mus-

cle within one workout.

Ketosis actually interferes with glycogen depletion. In a ketogenic state, ketones are the preferred fuel, not glucose. Throughout the week, we've used ketones to manipulate fat energy efficiency. However, glycogen will be used up faster during the grand depletion workout if we turn off the glucagon-carnitine-liver ketone factory. It's simple, really. Just raise blood glucose to about 60 mg/dl and, presto, ketogenic sabotage.

Once the monster workout has depleted the muscle of the last vestiges of glycogen, there is a narrow window of increased insulin sensitivity which is caused by increased permeability of the cell membrane and heightened enzyme activation.

Both insulin sensitivity and enzyme activation are highest within the first hour after the workout, and decline steadily afterward. One of the main reasons BODYOPUS works so well with the genetic non-elite is that many people have very poor insulin sensitivity, compounded by borderline hyperinsulinemia. Muscle cells that are resistant to glucose cause more insulin to be secreted to compensate. This diverts even more glucose from the muscles into the fat cells, and is the reason why middle-aged people don't get the same pump from their workouts.

To supercompensate all of the muscles, they must be worked during the same workout. For runners who are just trying to target the leg muscles, this is no big deal. However, bodybuilders have to work a greater area. Spreading the workout over a few days or even a few hours is not the optimal solution. The muscles worked just before the first carb-up meal will be supercompensated best. Muscles worked days or hours earlier will be compensated, but not supercompensated. Insulin sensitivity and stores of glucose-converting enzyme decline rapidly.

When your muscles have been insulin- and enzyme-sensitized, blood glucose is prioritized first to muscle cells. In a normal or sub-standard metabolism, high insulin levels would load glucose into fat cells. However, this sensitized state allows the high insulin to preferentially fill the muscle cells with sugar. After a vigorous whole body workout, you won't get fat from overeating — even if you eat Satan sugars.

Although the scientists studied supercompensation in runners, their conclusions can be extended to bodybuilders. The research covers two broad areas: timing, which we've just discussed briefly, and maximizing glucose disposal with insulin.

Researchers have tried to influence glucose disposal in variety of ways. The most overt method is to increase insulin through controlled injection. The maximum amount of insulin in the blood under normal conditions is about 150. Although additional insulin will increase glucose disposal, a *lot* is needed. One research study showed maximum glucose disposal to occur at an insulin level of 2400! However, it's saner to raise insulin by selecting carbohydrates carefully. We have a large palette of carbohydrates to choose from, from liquid sugar to long-chain starches.

The carbohydrate sources that have the worst reputation are the best for rapid glucose disposal. Liquid glucose, sucrose and small amounts of fructose maximize blood glucose and insulin secretion. These Satan sugars are the best insulin boosters. However, as the hours progress after the depletion workout, the heightened insulin sensitivity and enzyme levels diminish. Individuals with extraordinary muscle insulin sensitivity will thrive on any kind of haphazard junk food whatever the hour. They'll pull off a supercompensation on 3 days of Sugar Smacks, Twinkies and chocolate milk. For many (probably most) others, such slipshod carb-ups will divert too much glucose into fat

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.