Breakthrough Sticking Points

RE-CHARGE Your Metabolism

Everything You Need To Know About Fat Loss...

- Physiology of Weight Loss
- Calories
- Carbs, Protein, Fats
- Fat Storing Foods
- Hormones
- Drugs
- Diets
- Exercise

By Chris Aceto

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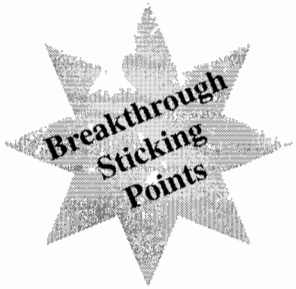
Second Edition



By
Chris Aceto

The objective of this book is to inform and educate. It is not intended as a prescription or substitute for health care by a professional.

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Chapter One

Everything You Need To Know On Weight Loss

Why another book about weight loss, losing body fat, and diet? Surely, there are enough! Just peruse your local book super store, and you will soon become overwhelmed with the amount of books guiding, prescribing, and selling the latest tips, info, research, ideas, potions, pills and promises pertaining to losing fat.

I find much of the weight loss information to be conflicting, confusing, overwhelming, and ultimately can do more harm than good. For example, we have the "rice diet" and the "fruit diet." Some say fruit turns to fat while others only eat fruits before noon. Fruit can turn to fat compared to what, donuts? I think not! I never saw anyone sit down and eat too much fruit, say 3 apples a pear and a banana. However, we've all, at some time or another, sat down in front of the TV and gobbled down a whole pizza, or a box of cookies, or a mound of ice cream. Is fruit fattening? You're smart, you tell me. For those who prescribe eating fruit only before noon, I say this, "What if you work the late shift and do not wake up until noon, then what?"

Of course, the low fat diet, the incredible dietary revelation started by Pritikin works. Or does it? The low fat approach to losing weight prescribes lowering your intake of dietary fat to less than 10% of your total calories. The food industry has responded by making nearly every food product available with no fat or little fat added. Now, we can eat fat free pretzels, fat free potato chips, fat free ice cream, fat

free pizza, fat free tuna sandwiches, fat free cookies, and the list continues. My question is this. With so much to choose from, why are we Americans, on average, fatter than ever?

Some weight loss books blame your laziness. The authors of these books sound something like this. "Exercise, burns calories, so performing enough exercise will keep a person lean or promote fat loss in everyone." Sorry. While exercise can help, it is not the full story, the end all. What you eat, the amount of total calories you eat, and the types of foods you eat also has an effect on fat storage. Some people can get very lean with exercise, but others should rely more on diet. Furthermore, there are more gyms, health clubs, resorts, personal trainers, exercise machines, and gadgets than ever. So what's the scoop? How is it, we are fatter than ever? Sure, there are lots of awesome and incredible bodies around, but as a whole, the population is pretty sloppy. I know we are failing the fat test when I consistently see fat kids at malls, schools, and church. Sure there were some chunky kids around when I was young. Every school had its fat little kid who was the brunt of jokes and picked on, but there are so many now!

There are fat loss pills, creams, drinks, gurus, prescription pills, appetite suppressants, and therapy. There's late night infomercials, gadgets, clinics, medical weight loss programs, Jenny Craig, Weight Watchers, Slimfast, MetRx, Ensure. And if that is not enough, we are bombarded with stars, who have always appeared lean, fit and trim, hocking everything from a thigh toning machine to an indoor roller blading device. I am sure you've seen those ab machines on T.V. too. I'll let you in on a secret. First, the models used for the ab machines probably never in their lives used these machines. Second, the infomercials imply you will be able to achieve some awesome looking abs by using the ab machine. I highly doubt that would occur. To get the abs the model has, you would need to eat the right diet to strip away all the fat covering the abdominal region to allow the abs to shine. Next, you would have to build the abdominals with exercise.

P.T. Barnum was the founder to the phrase, "There is a sucker born every minute." This was true in his day, and still holds true today. Let me tell you how crazy the diet and exercise industry is. A few years ago, I had a meeting with a very prominent publisher of an exercise magazine. Over a business lunch, he told me, "Chris, if you want to make money, you should write a diet book, but not just any old diet and exercise book. Take an odd approach, make it really gimmicky and outrageous. Promise overnight transformations, promise instant results, promise the reader that this diet is top secret, one used by Hollywood stars and top professional bodybuilders. Tell the reader you consult with Pro Athletes, movie stars, even politicians." As I grew skeptical and as my feeling of respect for this individual suddenly began to change as he spoke, he added, "The crazier the promises sound, the more people will buy. The buying public is just so damn naive, confused and desperate, they'll try anything!" After that conversation, I called my wife and we agreed that if I ever wrote a book, it would be the exact opposite of the rich publisher's recommendation . . . .

Chapter Two

History of Fat Loss

It is common sense and obvious to me people have been dieting since the invention of the mirror. Vanity is nothing new, it simply has become magnified over time.

Today experts tell us lean people live longer and are more productive in their daily lives. For this reason, millions have embarked upon some sort of weight loss program. Although millions diet and exercise to live longer or to feel better and have more energy, my guess is the majority do so to look better. We aspire to the lean image portrayed by those we see on television, in print ads, and in movies.

Years ago, people who wanted to lose fat did so based upon a very limited amount of information. Before the invention of the word "calorie" people lost weight by fasting. Fasting was introduced to mankind by God. The jews fast, as do the Christians, and muslims. All do so because God told the prophets that abstaining from food was good for the soul as well as the physical body. A common physical change that all three groups noticed was a loss in weight, a decrease in body fat. Thus, to lose weight, the first dieter would abstain from food and drink water. It was then, and is today, a proven way to lose fat, albeit an extreme approach.

When a person abstains from food, the body has to break down body tissue to use for survival. Most of this fuel comes from stored energy in the form of body fat reserves. Unfortunately, a severe fast also is a dangerous fast as the body

also calls upon other tissues to be used as fuel. With fasting, the body chooses a mixture of stored body fat as fuel and lean body mass. Lean body mass is readily tapped as fuel. Just as the body taps body fat and breaks it down to use it as energy, it can do the same with muscle and organs. When deprived of food, the body can easily break down the heart, the liver, and other organs to make fuel. The body will also rip apart the muscles throughout the body to make fuel during a starvation fast. While fat is burned up quickly as fuel, muscle and organs are also burned. This can lead to exhaustion and eventually death. So, we can conclude, the fast, while spiritually advantageous, isn't exactly the smartest approach to losing fat.

Once people figured out prolonged fasting worked, but the negative was death, they began to alter the fasting approach to weight loss. Thus, the modified fast was born. The modified fast involved abstaining from food completely for as long as you could, and when you finally broke down, your willpower crushed and your appetite screaming in high gear, you would eat. Some would eat a small amount and drink a ton of water to suppress the appetite, but others would go crazy, break down, and eat as if it was their last meal on earth, probably negating any fat lost during a few days of fasting.

With the breakthroughs in science, man "discovered" the calorie and the never ending task of tabulating numbers, keeping records, and avoiding large portions began. However, the dieter did not know how many calories he required in a day, so in hopes of losing fat, and with little knowledge, he resorted to a method that is still prevalent today. That method is, "If you are not sure how many calories you should be eating to lose weight, just take the conservative route, and eat less." For many, the magical number of 1000 seemed to be low enough to work, and many who followed a diet that yielded only 1000 calories in a day lost weight.

Many who chose the 1000 calorie a day approach soon discovered what scientists would prove many years later, the dreaded dieting plateau. Science has shown that when calories are restricted, the body compensates by obtaining energy from stored body fat. But, as calories remain low for an extended

period of time, the body makes another adaptive response. With prolonged calorie restriction or with severe calorie restriction, the body will begin to conserve calories. In time the 1000 calorie approach fails because the body, not wanting to die as happens in a severe and long fast, but having enough calories to survive, will make the most out of the 1000 calories by radically slowing down the rate at which it burns those 1000 calories. The result is fat is lost on a very low calorie approach, but the diet ultimately ceases to work like it did in the beginning.

Early research into metabolism and nutrition revealed many physiological understandings that dieters tried to use to enable them to lose fat. From day one, dieters have realized that eating less leads to weight loss. However, astute dieters realized the limitations of the 1000 calorie diet. Research began to prove that with a caloric restriction, body protein, specifically in the form of muscle mass was also being shed along with body fat. To combat this, dieters put a simple twist to the 1000 calorie diet. They ate all the calories from protein foods. The idea was simple. Count calories and limit the total to 1000, but eat only protein foods. The 1000 calories is low enough to cause the body to shed fat and eating more protein would prevent the body from using muscle as fuel. The mind set was simple. Flood the body with extra protein foods like meats, cheese, pork, hamburg, and chicken, but limit the caloric intake. The extra protein will keep the body from tapping muscle as fuel since it has the raw material or protein it needs in the foods. This worked better than fasting but it lacked variety and was just too difficult to maintain even for those who had the greatest willpower.

Around the early 1900's, scientists began looking into the reason why people overate. Scientists realized if people ate less, they would lose weight. Thus began the search for effective diet pills. The first diet pills focused on suppressing the appetite so less food would be consumed. Inventions like benzocaine were common. Placed upon the tongue, benzocaine would dull the taste buds and leave a tingling and weird sensation in the mouth which scientists hoped would

suppress the appetite. It worked for some, and failed for others. Similar success probably could be reached by washing your mouth out with soap every time you felt hungry. Surely, any foul substance that alters the sense of taste could keep a person from eating, no matter what the substance.

Other approaches included suppressing the appetite by stimulating the brain. This was initially accomplished with the administration of amphetamines - speed. Speed seems to suppress appetite by stimulating the appetite center of the brain. Plus, it fights fatigue by stimulating the nervous system. So far, it sounds like a monumental discovery and aid for dieters. You lose weight by eating less and you have plenty of energy. Unfortunately, as with many drugs, they work too good. Over stimulating the nervous system can lead to many maladies like schizophrenia, paranoia, irritability, inability to think clearly, and total exhaustion. Other drugs have been developed to decrease the appetite. Most exert strong stimulatory effects upon the nervous system but are much safer than pure speed. These drugs are similar to speed in their ability to suppress the appetite though they have been altered to have lesser overall body stimulating effects. Therefore, they are believed to be much safer. I will discuss many of them in the Chapter 15 on drugs.

At one time, drugs to increase the amount of calories burned were popular among the medical profession. Thyroid hormones govern the amount of energy the body uses in any given day. Supplemental thyroid could increase the metabolic rate but the body can readily adapt to the artificially high amounts of thyroid a patient is using. In healthy individuals, the body releases thyroid hormone into the blood and this is converted into a more active form that the body tissues use. When a patient, in hopes of shedding fat, swallows thyroid medication, the body eventually responds and adapts by slowing the conversion of the artificial hormone to the more active form in the body. Furthermore, the body's own release of this hormone is suppressed. Any increase in metabolism does not last. Those who try to drastically increase thyroid medication to force the body to increase the metabolism,

ultimately fail, as high amounts of thyroid will exert effects similar to a modified fast. Fat is lost but muscle tissue and organs are destroyed and broken down to be used as fuel.

Scientists soon discovered a special phenomena that occurs with food intake called thermogenesis. Thermogenesis is a fancy word for heat. Foods are really forms of energy. When food is eaten the body breaks down the fuel from the foods to obtain this energy to maintain life and to do work. The fate of this energy is three fold. Energy can be used up by the body, it can be stored as muscle glycogen to be used at a later date or it can be stored as body fat. The third fate of energy derived from food is it can be "wasted as heat." The body is always producing heat, much like a furnace. When foods are consumed the body temperature rises and some of the calories from the foods we eat are simply burned off as heat leaving less "net" calories available for the body, the muscle cells and fat cells. Some foods exert a strong thermic effect while others do not. Specifically, protein foods exert the greatest thermic effect. Roughly 20% of the calories derived from protein foods are not available to be used by the body because they are burned off as body heat. Of course, dieters adopted this fact, and once again, protein became the dieter's choice food. People ate a lot of protein hoping it would have a thermogenic "over-drive" effect. As with any diet that is lower in calories, the approach worked to some degree, mainly due to a total lower caloric intake.

Over time, as dieters failed in their quest for a lean body, psychologists postulated the theory that people overeat or under eat due to their emotional state. Some studies showed a correlation between depression and overeating. Psychologists reasoned a person could only free themselves from overeating with intensive therapy. Once the underlying psychological problem was found and treated, a patient would resume eating normally. While therapy may be helpful for some, it did not accommodate the fact that millions are overweight who seem to be perfectly content in their lives, and many can not lose weight who have undertaken years of exhaustive therapy.

To some degree, I have been involved and infatuated with

body fat control for 15 years. Diets come and go. The Rice Diet, The Fruit Diet, The Low Carb Diet, The High Carb Diet, The High Fat Diet, The Low Fat Diet, The Fiber Diet, and the list continues. What each and every diet has in common is a controlled caloric intake. One thing we know for sure, when calories are reduced, the body calls upon other sources for fuel, one of them is stored body fat. So, unlike others who say, "Diets do not work," I disagree and say, "All diets do work!" The problem is this. They are either difficult to maintain for long periods of time, or they do not supply enough calories, so a discouraged dieter usually throws in the towel and quits.

My first diet was usurped from my sister. She lost a lot of weight, and I didn't like the way I looked and thought I would feel better by shedding some excess fat. Like any dieter, the only information I knew was "calories." Calories, my sister told me, caused body fat to accumulate. Being young and naive, I set out to rid myself of calories. I stopped eating, save for an egg and one piece of toast for breakfast, nothing for lunch, and salad and chicken for dinner. I quickly lost 13 pounds. I felt great when I could fit into clothes that were previously too snug, but became exhausted and just damn irritable and mean. The diet ceased being a diet when I broke down and obliterated myself with an un-ending stream of food: cookies, ice cream, cake, pizza, etc., all in a period of 6 hours. I felt so mad, discouraged, and upset. Instead of getting right back on the diet that was severe, but was accomplishing what I wanted, I gained 15 pounds in a few weeks by eating relatively normal. Now, two pounds fatter than when I started my first diet, I began to strategize. I needed a new diet - a better one. Everywhere I looked from the newspaper to magazines, to the library and bookstores, I found plenty on the confusing topic of weight loss. I purchased all of it. I read everything. I reasoned I would absorb and digest every bit of info out there on diet and become an authority! Surely, if I read everything available pertaining to the subject of weight loss, I could figure out or find the best diets and disregard the bad ones. Well, in doing so, I became more confused, as I am sure many of you are right now.

Chapter Three

Types of Calories

Calories are derived from foods and there are three types or sub groups of calories. They are carbohydrates, proteins and fat.

Carbohydrates are derived from non animal foods. Examples of healthier carbohydrates include rice, pasta, beans, breads, potatoes, yams and fruit. Other carbohydrates, sometimes called "manufactured carbs" include pretzels, low fat cakes, cookies and related items. Of course, desserts are full of carbohydrates found in the flour and sugar and, in most cases, they're loaded with fat. For our purpose, we're trying to differentiate, "what's a pure carbohydrate".

All carbohydrate foods are eventually digested, broken down and absorbed as sugar - sometimes called blood glucose. Technically, there's not much of a difference eating rice, potatoes or candy. All three dissolve and digest into a simple form of sugar called glucose.

The body keeps a tight check on the amount of sugar in the blood. For the body to function normally, the ***concentration*** of sugar within the blood remains fairly stable or "normal" between 70 mg/100 ml to 110 mg/100 ml of blood. In other words, the body prefers a sugar range of 70-110 mgs of glucose within a millimeter of blood. Still, to uncomplicate it a bit further, simply think of the 70-110 range as something that is quite normal and a guideline the

body has self imposed to keep it functioning at normal levels. One more thing; as sugar levels rise towards 110, and especially if sugar levels rise above 110, the body will attempt to reach a state of homeostasis - or a "balanced state" by releasing a "clearing" or "storage" hormone which whisks the excess sugar out of the blood and stores it into muscle tissue or fat tissue. On the other hand, when sugar levels approach 70, or fall below 70, the body releases a "liberating" or "breakdown" hormone which pulls sugar out of muscle tissue and drags it back into the blood. The storage hormone is called ***insulin*** while its opposing hormone, the liberator is called ***glucagon.*** It both cases, there exists somewhat of a tug-o-war where the body throws into action insulin ***or*** glucagon to keep blood glucose levels in a comfortable zone of 70-110.

To move on, we have to make a few assumptions, one being the 180 pounder will need 1800 calories a day - with no activity, *at complete and absolute rest.* Sure the 1800 calorie guestimate is not dead on and 100% accurate, but it's darn close, more than "in the ballpark." The 180 pounder who sits all day and remains completely inactive will need approximately 1800 calories to maintain his weight, to maintain his muscle mass and to keep the organs healthy. At 1800 calories a day, the 180 pounder would likely stay within a 70-110 range with regards to blood sugar levels, though likely closer to the lower end of 70.

When more calories are consumed than the body needs each day, and especially carbohydrate calories, the amount of sugar in the blood rises. When blood sugar levels rise, the body will kick up its production of insulin and store some of the carbohydrates so they can be used later. In general, the body stores the excess carbohydrates in the muscles as muscle glycogen or in the liver as liver glycogen. Glycogen is really nothing more than a ***storage tank for sugar.*** When sugar levels in the blood rise above 110, the body begins to pack away the excess sugar in these reserves. To a smaller degree, the body is capable of storing excess sugar as body fat as we'll see later. Though excess sugar from the blood is

commonly whisked away and stored as muscle or liver glycogen, the tanks that capture sugar within both the muscles and liver are limited. In simple terms, the muscles or liver can only hold onto "so much" sugar. ***Once these tanks are full, excess carbs will be stored as body fat.***

For example, the 180 pounder eating 3000 calories a day, yet remaining completely inactive, will experience chronically high sugar levels within the blood from munching down carbohydrate calories beyond what he needs each day. After a day or so, his muscles and liver will quickly fill up with glucose, forming "full to the brim" amounts of glycogen. At that point, all extra carbohydrates will be stored as body fat.

In most cases, if glycogen stores are not full, excess carbs will be deposited as glycogen. If glycogen stores are full, excess carbs will be stored as fat.

When calories remain closer to 1800 in the completely inactive 180 pounder, the concentration of sugar within the blood falls closer to 70 and very easily can fall below 70. When this occurs, the body outputs glucagon which permits sugar to flow out of glycogen and liver reserves. In effect, glucagon causes muscles and liver to "give up" sugar, to restore blood sugar levels closer to a normal range of 70-110. If calories and carbohydrates stay low for an extended period of time, the glucagon will also begin to liberate fatty acids from fat cells. Thus, glucagon can not only drag sugar from glycogen stores, but it can promote the breakdown of fat cells so fatty acids can be used as fuel.

Protein

Protein is derived from animal foods; chicken, turkey, meats, lamb, fish and all dairy products are complete sources of protein. These foods are commonly referred to as "complete" because they contain all of the essential amino acids, the tiny building blocks required for health. The protein found in non animal sources of food are called "incomplete" proteins. Incomplete proteins lack 1 or more of the essential

amino acids.

Thus, proteins supply the building blocks of life called amino acids. All animal source protein foods are digested, broken down and absorbed as amino acids akin to the way carbohydrates are broken down into glucose. Amino acids are to proteins as glucose is to carbohydrates. Aminos are the "tiny fragments" of protein while glucose is the "tiny fragments" of carbohydrates.

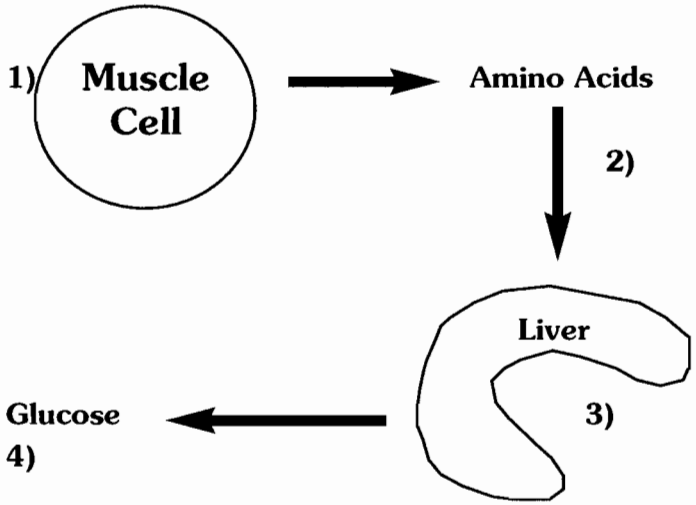
Amino acids are used for thousands, likely multi-millions, of reactions in the body. Low protein-low calories diets promote self catabolism. In other words, a low calorie diet that is also too low in protein causes the body to scavenge for the aminos necessary for everything from immune support, hormone production, to strong teeth and healthy hair. If the body is low on protein and there is insufficient amino acids in what's termed "amino acid pools"- temporary waiting pins for amino acids consumed from recently eaten protein foods - the body enters a state of catabolism. Catabolism is derived from the word catabolic which is really a fancy way to say, "canabalism." That is, when calories are low and protein intake is low, the body, in dire need of essential amino acids to maintain life itself, will begin to tear apart it's muscle tissue and organs as both are literally comprised or "made up of" amino acids. Interestingly, the body will, with the help of glucagon, take those amino acids that have been torn apart from muscle tissue and convert the aminos into glucose! Called gluconeogenesis, its sort of a survival mechanism in two ways.

1) First, when calories are way too low, the body can make sugar to keep itself alive by catabolising/canabolising its own muscle tissue into glucose. Specifically, this catabolism of muscle is used to fuel the brain. The brain is the "crown jewel" of all human organs. It's what makes us human and distinctly different from animals and it is glucose that keeps the brain alive. Survival wise, the body can eat up its own tissue to make sugar. Why? So a starving human can ***decide*** what to do next, to put an an end to such hunger. Crude. But true.

2) Second, when muscle tissue falls, the body's internal engine, called metabolism drops. When the metabolism drops, or the total amount of calories it burns each day decreases, the body requires less fuel so, in the long run, it will have lowered its demands for fuel by stripping off its own muscle mass. Again. It's about survival. Getting the body to burn less so it can survive and, if needed, search longer, for food.

Thinking about embarking on a low calorie and low protein diet? Think again. The combo's a dead end and will lower your metabolic rate making fat loss very difficult. Remember the person weighing 180 pounds and requiring 1800 calories daily? Imagine having shed away 15 pounds of muscle with an extreme low calorie-low protein diet, ending up at 165 pounds. In effect, he would have lowered his daily caloric demands to 1650 a day (at complete rest). Not the best move if fat loss is the goal.

Tissue Loss Associated with Low Protein-Low Calorie Intake



1) Muscles breakdown and release amino acids
2) Amino Acids are sent to the liver
3) Liver changes amino acids into glucose (sugar)
4) Glucose enters blood from the liver

Result: Muscle Wastage!!

While carbohydrates release insulin, the sugar storing hormone, proteins release both insulin and glucagon, with glucagon being the more dominant of the two. Thus, from a hormonal point of view, we can assume carbs have a greater potential to store or stimulate the accumulation of body fat because carbohydrates ***exclusively*** kick up insulin levels which can effect the storage of carbs as not only muscle and liver glycogen, but body fat. On the other hand, protein tends to kick up glucagon levels. The benefit of glucagon? It can off set the fat storing potential of high insulin levels and it has the potential to stimulate the fat burning cycle within the body by liberating fatty acids from fat cells. Protein also is calorically inferior to carbs and dietary fat. Simply, the body is less efficient in abstracting 100% of the calories found within protein foods than it is from abstracting energy from carbohydrates or dietary fat. When you eat 100 calories of dietary fat, say a tablespoon of butter, the body will ultimately "gain access" to 97 of those calories as it is efficient in breaking down fats and using them as fuel. With carbohydrates, the body is a little less efficient. For every 100 calories you eat, the body will access roughly 88-90 of them. The other 10-12 calories are "burned away" in the process of breaking down the food. Since breaking down carbohydrate foods "costs" energy, we can say there is a small increase in metabolism that comes from eating. With dietary protein, the body is rather inefficient in obtaining 100% of the calories found within the protein. For example, when you eat a chicken breast that yields 200 calories, reality is, the body is roughly 80% effective in "accessing" all 200 calories. Instead, only 80% of the total 200 calories is accessible. Therefore, your 200 calorie chicken breast ultimately yields 160 calories.

Where does the other 40 calories go? They're "wasted" or burned in breaking down the food. The bottom line here is that the foods we eat supply us with fuel in the form of calories but the body ***expends*** fuel in order to obtain the fuel within the foods.

REVIEW NOTES:

1) Carbohydrates release insulin.
2) Insulin is a hormone with storage properties.
3) In the absence of carbohydrates or with a low calorie diet, blood sugar levels decrease which increases the output of glucagon.
4) Glucagon is a hormone with liberating properties.
5) Proteins release insulin and glucagon.
6) The glucagon released with protein foods is greater than the insulin release.
6) The body expends fuel in trying to obtain fuel from the foods we eat.
7) The body expends more fuel in obtaining fuel from protein, less with carbs and still even less with dietary fat.

Fats

Dietary fats have the greatest reputation as a fat storer though we, as Americans, have seemed to have switched our focus away from concentrating on dietary fat. These days, dieters focus on both carbs and fat.

Each gram of dietary fat yields 9 calories while each gram of protein yields 4 and a gram of carbohydrate also yields 4 calories. Throwing in the body's "inefficiency" at obtaining 100% of the calories from the foods we eat, it is rather clear how the common adage "fat is more fattening than carbs or protein" came to be.

Let's take a closer look at dietary fat versus dietary carbohydrates and dietary protein.

✔ 100 calories of fat at which 97% is "accessible" = 97 calories
✔ 100 calories of carbohydrates at which 90% is "accessible" = 90 cal.
✔ 100 calories of protein at which 80% is "accessible" = 80 calories

As you can see, fat is "more fattening" than carbs or protein. Furthermore, ***gram for gram,*** fats produce more energy in the body than carbs or protein. For example, one gram of dietary fat yields 9 calories per gram while a gram of either carbohydrate or protein yields 4 calories per gram. A side by side comparison of 100 grams of fat, carbs or protein illustrates dietary fat is more calorically generous of the three.

✔ 100 grams of fat at 9 calories per gram = 900 calories
✔ 100 grams of carbohydrate at 4 calories per gram = 400 calories
✔ 100 grams of protein at 4 calories per gram = 400 calories.

Very simply, in terms of calories, you would have to eat 225 grams of protein or 225 grams of carbohydrates to yield the same calories found in 100 grams of dietary fat.

✔ 100 grams of fat at 9 calories per gram = 900 calories
✔ 225 grams of carbs at 4 calories per gram = 900 calories
✔ 225 grams of protein at 4 calories per gram = 900 calories

Yet another aspect to consider in trying to control total caloric intake is food volume. Fatty foods, which yield gram for gram more than 100% more calories than carbohydrates and protein, usually do not take up much "space" within the stomach. Nor are they visually voluminous. For example, 2 tablespoons of olive oil yield 228 calories while 4 inch by 4 inch potato yields the same amount of calories. And a large chicken breast would yield approximately the same number of total calories. Of the three, which is physically smaller in size and likely the one that would be easier to over eat? The oil.

Sugar: The Nitty Gritty

Back to carbohydrates. All carbohydrates foods we eat - whether a potato, a yam, a cup of rice, candy, or a can of soda - will ultimately be digested and absorbed into the blood stream as a simple sugar called glucose. Glucose is sometimes referred to as blood sugar. Glucose stimulates the pancreas to release the specialized storage hormone called insulin. And it is insulin's job to regulate "how much" glucose shall remain in the blood.

The total amount of insulin released is related to the concentration of glucose in the blood and the concentration is related to your total carbohydrate intake.

If there is a concentrated amount of glucose in the blood, in laymen's terms, "a lot of sugar in the blood" the pancreas responds by kicking out a large burst of insulin. If there is a moderate amount of glucose present in the blood, the pancreas responds by kicking out far less insulin. When there is is very small amounts of glucose in the blood, the pancreas puts out dramatically less insulin. In real world terms, eating a massive amount of carbohydrates from an overflowing plate of pasta would flood the blood stream with glucose and kick insulin levels through the roof. A moderate serving of pasta would increase insulin levels, but not nearly to the degree a larger plate would. And a small plate would also promote insulin secretion by the pancreas, albeit dramatically less than a massive plate of pasta and still less than a moderate plate. In all three cases, insulin clears sugar from the blood and deposits it into tissues. The tissues include your muscles, your liver and body fat stores. The first two locations aren't the real problem. When carbs are stored in muscle and liver, they can be readily accessed in between meals if sugar levels within the blood fall or they can be used during exercise. The latter of the three cites, fat stores, is the place the individual, in search of a lean body, hopes to avoid.

We can classify carbohydrates as two main groups with a smaller sub group. The two main groups are simple

carbohydrates and complex carbohydrates. Simple carbohydrates are sugars known as monosaccharides. They are found in fruits, fruit juices, honey, jellies, jams, soda pop and table sugar. Complex carbohydrates are nothing more than multiple chains of simple sugars linked together to form to form a "complex" or "longer" chain carbohydrate. In general, complex carbohydrates are those ***"found in nature;"*** wild rice, yams, potatoes, beans, corn, peas, oatmeal, rye cereal and bread made with only unmilled whole wheat flour. These carbohydrates illicit a "lesser insulin response" than ***manufactured carbohydrates;*** white bread, white rice, cookies, pastries, and all the fat free carbo-rich products like fat free cookies, cakes, potato chips, pretzels and cold cereals. ***Manufactured carbs release, calorie for calorie, more insulin than natural carbs.***

For example 100 calories of carbohydrates from a yam yields less total insulin than 100 calories of carbohydrates from pretzels.

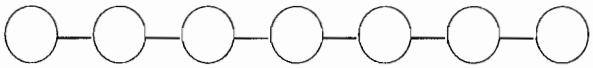
Simple carbohydrates are broken down, digested and absorbed with ease and speed compared to "more natural" carbs. The result of their ease to digest; glucose quickly accumulates in the blood stream and the pancreas reacts by dumping a large amount of insulin into the blood. ***Again, the net amount of glucose in the blood at any period of time is directly related to the amount of insulin released.*** With complex carbohydrates, the speed at which they enter the blood as glucose is slower because the body must cleave the longer chains of sugar, one by one, into smaller sub units of sugar, before they can ultimately become glucose.

Carbohydrate Breakdown

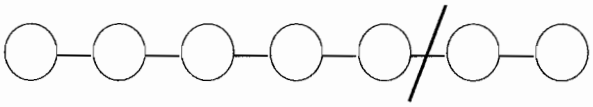
Simple Carbohydrates

= Mono Saccharide

Complex Carbohydrates



Digestion of Complex Carbohydrates



Disaccharide

Mono Saccharide

In terms of controlling body fat, the difference between simple and complex carbohydrates is the speed at which they enter the blood as glucose and the total amount of insulin that is released. As we will see, elevated insulin levels impact fat storage.

While 200 calories of yams will illicit less insulin than 200 calories of a refined food such as pretzels or fat free potato chips, there is another aspect of complex carbs to consider. The more refined, processed or cooked the complex carbohydrate, the faster it breaks down into glucose which, in turn, effects insulin levels. Whole grain bread is processed

into white bread. Brown rice is processed into white rice and corn is processed into corn flakes. A potato "baked" in a microwave, in general, is more firm than one baked in a conventional oven and mashed potatoes are clearly less firm or "softer" than a baked potato. The big deal? The more processed the carb and the softer the carb, the easier it is to digest and the easier it is to digest, the greater the insulin spike.

REVIEW

1) The two types of carbohydrates include simple and complex.
2) Simple are usually "man made." Examples include fat free pop tarts, pretzels or candy.
3) Complex are "more natural." Examples include yams, wild rice and potatoes.
4) Simple carbs illicit more insulin than complex.
5) Elevated insulin impact fat storage.

The Fiber Connection

Fiber has been touted as a promising tool in weight control and with good reason. Fiber is termed "a non-digestible food substance" common to carbohydrate foods. While the main categories for carbohydrates fall into the groupings of simple or complex, fiber-type carbohydrates comprise a third and separate group. Fiber-type carbs include crunchy-hard-to-chew vegetables that are not only extremely low in calories, but essentially calorie free! That's because the body lacks the enzymes to break down fiber and obtain the calories found within the food. The result of eating fiber-type vegetables? They pass right through the body yielding no calories. In fact, fiber-type carbohydrates may actually cost you calories. Here's how. When you eat, it costs the body calories to begin to work on food to break it down and digest it. When you eat a cup of vegetables, the body works to obtain the fuel from the food. In an attempt to obtain fuel from vegetables, calories are expended. Another way of

looking at it; the body uses its own fuel so energy is "expended" in trying to gain fuel from the foods consumed. However, vegetables are nothing more than zero-energy yielding foods. They don't produce usable energy for the body and the human body is incapable of making use of fiber as fuel. The net effect: calories are burned off eating vegetables. Plus, these carbs don't effect insulin levels.

Common fiber-type vegetables include:

asparagus	green beans	squash, spaghetti
broccoli	lettuce	squash, summer
cabbage	mushrooms	water chestnuts
cauliflower	okra	wax beans
celery	radish	zucchini
eggplant	spinach	

Vegetables obviously are beneficial in that they are very difficult to "over eat" and they make you feel satisfied. A person may find it relatively easy to gulp down 3 cups of pasta yielding 450 calories and approximately 135 grams of carbohydrates, yet would likely find it either more difficult or less pleasurable to chomp down 3 cups of broccoli yielding 120 calories and 30 grams of carbohydrates - all of which are unabsorbable as they are "locked within" the fiber - nature's "undigestible carb."

The added benefit of fiber-type carbs is their effect on insulin. ***When complex or simple carbohydrates are combined with fiber-type vegetables, the speed at which the glucose from the complex or simple carbohydrates "hits" the blood stream is retarded.*** In effect, adding veggies to a complex or simple carb slows the rate at which glucose reaches the blood. If glucose enters the blood at a slower pace, the pancreas responds by outputting less insulin. A simple comparison; 200 calories of rice versus 200 calories of rice mixed with a cup of cauliflower. The rice-only meal will illicit a greater insulin burst than the rice-veggie combo. Fiber-type veggies act as a natural "time releasing" agent on simple or complex carbs

and it is this time releasing effect that impacts insulin levels.

The tiny amounts of fiber, or lack of fiber, in many complex carbohydrates effects insulin secretion. Wild rice contains small amounts of fiber compared to bleached white rice and real whole grain bread contains more fiber than white bread. While all are considered complex carbohydrates due to their long branching web of glucose molecules bound together, they are digested at different speeds due to varying fiber content. The white rice will digest faster than wild rice and therefore will kick insulin levels higher. Likewise, white bread, which is devoid of fiber, digests much faster than whole grain bread. The net result? White bread creates a greater insulin response than whole grain bread and the greater the insulin response, the greater the effect on the complex system that keeps you fat!

In the full scope of things, total calories effect body fat levels as do the types of calories we eat. Carbs, protein and fat are unique in:

1) Their calorie value.
2) The body's ability to "access" those calories.
3) Their effect on insulin levels.

Sugar, Insulin and Fat Dynamics

Insulin has positive and negative effects on the body. In terms of controlling body fat, the ultimate success one achieves depends on total calorie intake and the hormones effected by the types of calories we eat.

Elevated insulin levels for the person hoping to control body fat is, possibly, as detrimental as total caloric intake. High or elevated insulin levels result from overeating carbohydrate foods - either complex carbs or simple carbs. When you overeat carbohydrates, you increase the amount of glucose in the blood above 110 which promotes an insulin burst which drags the excess sugar out of the blood allowing glucose levels to return to normal, around 70 to 110.

Here's the tough part. It is possible to stay within your caloric limits and create an environment where insulin levels

remain chronically elevated making it almost impossible to get lean. This occurs when one follows either a diet that is extremely low in fiber or when a person obtains the majority of his calories from fast-to-digest simple carbohydrates like soda, jams, refined white bread, cakes, cookies, crackers, pretzels, fat free chips, imitation fruit drinks and fruit juices. These foods rapidly digest into glucose which promotes a quick collection of glucose in the blood surging glucose levels above 110. The result? An insulin spike. A really big insulin spike

When insulin levels rise, excess glucose is cleared from the blood and deposited into muscle glycogen, liver glycogen or fat stores. If muscle and liver stores for glucose are full, all glucose will be packed away as body fat. ***If there is room within the muscles or liver for additional glucose, excessive glucose is likely to be stored as glycogen.***

However, high insulin levels, the result of eating above your caloric requirements or from eating within your caloric requirements yet choosing simple fast digesting carbs, can promote the storage of body fat even if muscle and liver stores for glucose are not full! Not sure? How many people do you know claim "Not to over eat" yet continue to gain fat year after year. The likely culprit? A highly refined diet comprised of next-to-no fiber and abundant in simple sugars. Together, this nutrition approach continually keeps a concentrated source of glucose in the blood which keeps insulin levels elevated which, in turn, packs away sugar as body fat and, as we will see, prevents the body from tapping into body fat stores.

High insulin levels also effect the appetite center in the brain. Rats injected with high levels of insulin will eat until their stomach explode while rats that have the pancreas removed (which manufactures insulin) will refuse to eat and starve to death. ***In high amounts, insulin is an appetite stimulant.***

High insulin levels also exert other interesting metabolic effects encouraging fat storage and preventing the liberation

of fatty acids from body fat stores. When insulin levels rise, it triggers the release of an enzyme called ***lipoprotein lipase (LPL).*** LPL retards the fat cells and prevents them from being broken apart to be used up as fuel. In effect, we could say ***LPL blocks fat cell breakdown and LPL is stimulated with high levels of insulin.***

The body is always using a mixture of fuel sources when at rest. Primarily, fat is used in a resting body. A distant second is glucose. Some of this fat comes from the dietary fat we eat while the majority comes from fat cells. ***If insulin levels are chronically elevated*** due to eating more calories than you need each day or from eating a moderate caloric intake that is abundant in simple carbohydrates and devoid in fiber, ***fat cells are sealed off and prevented from being used as fuel.*** In fact, so effective is insulin in sealing off fat cells, that even those engaged in heavy aerobic exercise will find serious fat loss difficult if not nearly impossible unless insulin levels are controlled.

REVIEW

1) Elevated insulin is due to excessive calories.
2) Elevated insulin is due to simple carbohydrates with little or no fiber - even if total calories are not excessive.
3) Elevated insulin will store carbohydrates as body fat when muscle and liver stores for glycogen are full
4) Elevated insulin increases lipoprotein lipase which prevents fatty acids from leaving fat cells.

Interestingly, the pancreas which is responsible for releasing insulin also releases an opposing hormone called glucagon. It's job is related to that of insulin. It regulates glucose levels in the blood. While insulin clears glucose out of the blood as glucose levels rise, glucagon increases glucose levels in the blood when glucose levels drop. When calories are low or when carbohydrates are temporarily lacking in the diet, glucose levels either approach the 70 level or fall below 70. At this point, glucagon is released. Glucagon calls upon the the storage cites for glucose, the liver and muscles, to

provide glucose to the blood. Glucagon stimulates the muscles and liver to send glucose back to the blood whenever glucose levels fall. We can say glucagon "opposes" insulin. Although both help to keep blood sugar levels in a normal range of 70-110, insulin is a "storer" of sugar while glucagon "liberates" sugar from storage locations. Recall insulin galvanizes lipoprotein lipase (LPL) causing fat cells to stay full of fat. ***Glucagon*** does the opposite. ***It promotes the release of hormone sensitive lipase (HSL) which works on fat cells to liberate fatty acids,*** dumping them into the blood where they can be used as fuel. The body is always releasing a mix of insulin and glucagon when a mixture of food sources, carbs, protein and fat, are eaten. When carbs are eaten by themselves, the primary hormone secreted in insulin. In a mixed meal, comprised of carbs and protein, the initial hormonal response is elevated insulin levels, though if the meal contains at least 15-20 grams of protein, insulin levels will not skyrocket as the protein will stimulate glucagon release. The small glucagon release initiated with protein "drags" insulin levels lower. Think of insulin as hot water and glucagon as cold water. Adding a little cold water to a tub of hot water drags the temperature down and ***adding glucagon to insulin lowers insulin levels and its fat storing ability.*** Between meals, when glucose levels in the blood begin to fall, glucagon comes into play. A high calorie diet or a caloric intake that's not all that high yet is abundant in simple carbs and lacks fiber will keep insulin levels chronically high which, in turn, suppresses glucagon levels. The net effect is body fat is continually being deposited.

High insulin levels can be tamed by including vegetables as part of your daily plan - as they slow the breakdown and digestion of carbohydrates into blood glucose modifying insulin output. An adequate protein intake will keep glucagon levels up which will offset higher insulin levels.

Dietary Fat: The Body Fat Connection

Dietary fat, along with dietary carbohydrates and protein comprise the three macronutrients. Fats have been avoided by dieters over the last 15 years or so due to the factors previously touched upon. Gram for gram, they yield more calories than carbs or protein, they don't take up a lot of room in your stomach so they are easy to over eat and the body is rather efficient at "accessing" the true calorie value from dietary fat. Recall, unlike calories derived from protein which is 80% absorbable or those found in carbohydrates which are roughly 90% absorbable, the calories found in dietary fat are 97% absorbable. Meaning; when 100 calories of fat is consumed, the body "gets" 97 of those.

Historically in the United States, our intake of dietary fat has increased over the last 50 years as has our intake of refined, simple carbohydrates. At the same time, our intake of more natural/complex carbohydrates has decreased and our intake of vegetables has woefully collapsed. That, combined with less physical activity and a more sedentary lifestyle has utterly destroyed our level of health and fitness. For every new health club popping up, there are a hundred little kids, fat and overweight.

When dietary fat is consumed, the body can't transport the whole shabang about the blood. Food fat has to be broken down into its raw components, fatty acids and glycerol. Fatty acids provide fuel for resting muscles and during aerobic work and glycerol can be, through a long chain of events, "re- manufactured" into glucose. This glucose can influence, to a small degree, the total amount of glucose in the blood.

The body fat storing mechanisms in the body rely on total calories to make new body fat and the inter-dynamic relationship between dietary fat and insulin produced from carbohydrates. While insulin has the potential to store carbs as glycogen or to shoot them off towards fat cells influencing the accumulation of body fat, and to release lipoprotein lipase which essentially blocks fat cells from breaking down, it's

strongest influence in the accumulation of added body fat lies in its ability to stimulate the uptake of dietary fat by fat cells. In a nutshell, a high dietary fat intake in the presence of insulin virtually guarantees dietary fat will not only "make it" to fat cells, but quickly be packed away to make bigger fat cells. Just as insulin is the "trigger" that sets in motion the removal of glucose from the blood and into glycogen or fat, it's the main trigger that allows fat cells to "open up" and allow additional dietary fat to be packed away. The deadly combo: simple sugars or a massive amount of complex carbohydrates and dietary fat.

INSULIN + Dietary Fat = Body Fat

In both cases, elevated insulin escorts fatty acids into fat cells making you fatter. Once there, the fat stays there as elevated insulin "locks and seals" fat cells up making it harder for the body to draw upon them as fuel.

Not All Fat's The Same

There are different types of dietary fat and each exerts different properties within the body. Saturated fats are solid at room temperature and unsaturated fats are liquids at room temperature. All animal sources of fat, like that found in meats, chicken skin, eggs and dairy products (unless they're fat free) contain saturated fat. Saturated fats, consumed in excess are a nemis to good health as a chronically high intake can cause scaring within the arteries of the cardiovascular system. This, in turn, causes mild clogging of the artery walls. In addition, a high saturated fat intake changes the consistency of the blood making it more thick and syrupy. Thicker blood and narrowing arteries puts a greater stress on the heart forcing it to pump harder and harder and typically more often in order to "push" a thicker substance through a smaller tubular system. It's a kin to sucking water through a straw versus sucking a milkshake through a coffee stir stick. It takes a heck of a lot more effort

to draw a thick fluid through an ultra thin tube. Narrow arteries and thicker blood puts a person at risk of heart disease and even a heart attack or stroke.

From a body fat standpoint, saturated fats also aggravate and indirectly enhance the storage of body fat by virtue of its damaging role on muscle tissue. Saturated fats can cause minute microscopic punctures on the very outermost layer of muscle cells. The problem here is the outermost layer is the same location of special "receptor cites" for the hormone insulin, much akin to a door. Under healthy, normal or ideal conditions, a moderate intake in carbohydrates causes a moderate insulin burst and insulin channels the glucose out of the blood and towards the muscle where insulin "locks up" with receptors allowing glucose "to pass through" the proverbial door filling muscles with glycogen. Of course, if glycogen stores are maxed out and already full, all carbs will be shuttled away and re-directed towards body fat stores. In any case, a high saturated fat diet plays real havoc with the receptor cites on the muscle making it very difficult for insulin to "lock up" with the cite and drive glucose into the muscle. Going back to the door scenario, imagine a key hole to your home as a receptor. Now imagine you come home from work one day and slide your key in, but the key fails to turn. You fight and play with the lock and key and try your best to turn the key to open your door, but it simply will not turn. A similar event occurs with insulin receptors on muscle tissue that have been "worn away" with a chronic high saturated fat diet. Insulin can't seem to "get" the glucose into the muscle, so the glucose simply "backs up" until it builds up in the blood. As glucose builds up in the blood, the pancreas reacts as it always does to high amounts of glucose in the blood; by dumping more insulin into the blood. The end result. Fat storage. High insulin levels favor the build up of body fat. Traditionally, this event is termed insulin resistance. The muscles, resist, the glycogen storing effects of insulin due to a high saturated fat diet.

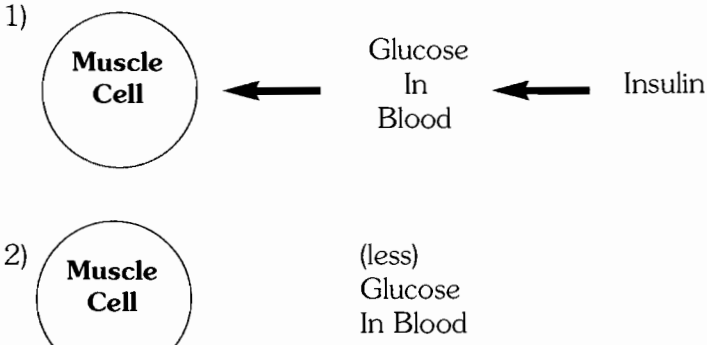
While a high saturated fat diet is a key culprit in wrecking havoc with the receptors on muscle tissue, other factors also

damage a muscles ability to utilize glucose. They include:

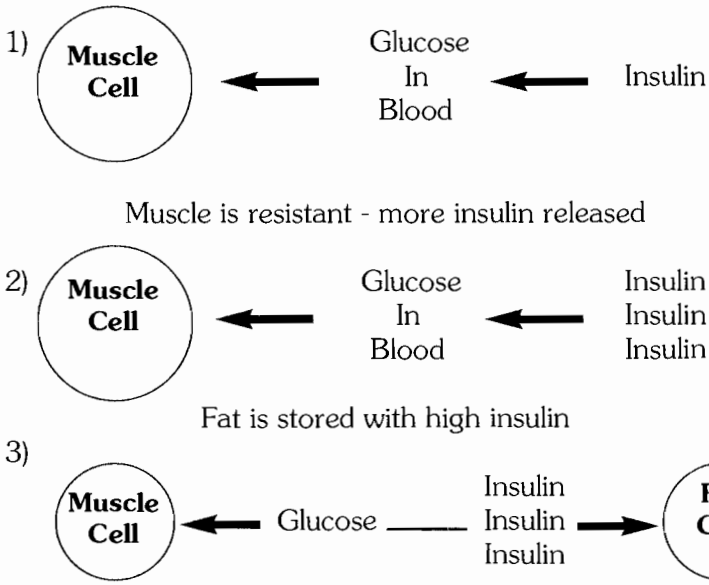
- stress
- a lack of exercise
- alcohol
- a low fiber diet
- a high sugar diet
- smoking
- recreational drugs
- a high intake of simple sugars
- a high amount of body fat

All the factors above damage the muscle cell's ability to uptake glucose. When muscle cells become resistant to using glucose as fuel, the body adjusts and tries to "force" glucose into muscles by outputting a greater amount of insulin. Recall, insulin is a storage hormone, sometimes referred to as a driving hormone because it drives glucose into cells. Well, it could be called a "directional" hormone too as the total amount of insulin secreted influences the direction and ultimate fate of your carbohydrates. ***When muscle receptors are dull and the pancreas reacts by kicking insulin levels sky high, carbs are diverted away from glycogen stores and stored as body fat.***

Normal Storage of Glucose as Glycogen



Resistant Muscle Encourages Fat Storage



There's receptors for insulin located on both muscle cells and fat cells and these two act like a see-saw. When a muscle is insulin resistant, receptors on fat cells become insulin friendly. That is, when carbs are consumed in a state of insulin resistance, brought on by years of poor eating habits, a lack of exercise and a high amount of body fat, the receptors located on fat cells become highly excitable and receptive to insulin. An insulin resistant individual who eats a small amount of yams yielding as few as 40 grams of carbohydrates, may indeed store the glucose as body fat because his insulin receptors on his fat cells literally "open wide" and accept the insulin and the glucose promoting fat gain.

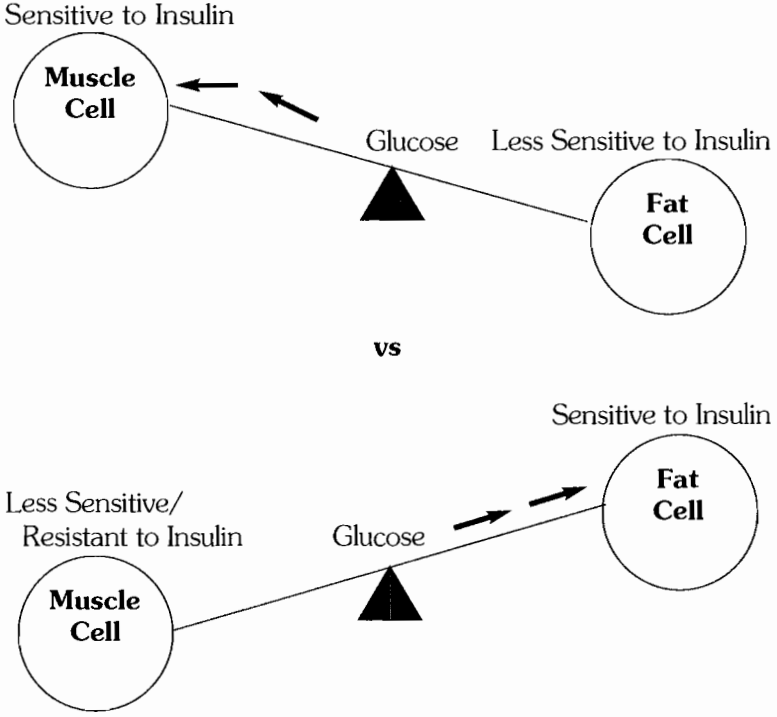
Muscle Reverses Insulin Resistance

Adding muscle via a solid weight training program coupled with a low sugar, low saturated fat diet that includes lots of fiber-type vegetables and adequate amounts of lean protein foods to maintain glucagon levels can, over time, ***reverse the negative and fat storing effects of insulin resistance.*** Weight training calls upon glucose from carbohydrates as an energy source. The longer and harder one trains, the more adaptive the muscles become to storing glucose as muscle glycogen. As the demand for glycogen increases with ever greater training loads, the glycogen storing pathways, including the "receptiveness" of insulin receptors located on muscle tissue become "upgraded" and are much more ready to "accept" insulin and glucose. The result; glucose is more readily deposited into muscle.

The benefit on body fat is two fold. First, if glucose is being deposited into glycogen stores, then it is not being deposited into body fat stores. Second, when glucose is easily stored as glycogen, it does not "back up" in the blood so insulin levels tend to stay lower which is ideal in controlling body fat.

In a nutshell: when you get your body to produce less

insulin by making muscle tissue more insulin friendly, the receptors on fat cells for insulin are downgraded.



Fiber, Fish & Chromium

Making weight training your primary form of exercise not only reverses insulin resistance by increasing your ability to store glycogen, thus "improving" your ability to draw glucose out of the blood and store it as muscle glycogen, but it increases muscle size, including the size of even the tiniest component of muscles; the muscle cell. When muscle cells increase in size, the receptors for insulin actually stretch and increase in diameter making them more "insulin friendly." Insulin friendly muscles impact insulin secretion. ***The more friendly the muscle to insulin - the smaller the***

insulin spike. In other words, the easier it is for insulin to "lock up" with muscle cells, the smaller the insulin output. Smaller, or more moderate insulin secretions as opposed to larger spikes, favors fat burning. Higher spikes encourage fat storage.

One special type of fat common to cold water ocean fish may help upgrade insulin sensitivity on muscles by blocking the damaging effects of saturated fat. Omega-3's fight the damaging effects of saturated fat on muscle cells and they protect against the cardiovascular degeneration associated with a high saturated fat intake. And while the US population has increased its intake of saturated fats it has correspondingly decreased its consumption of omega-3 fats. While saturated fats seem to make the blood thick and syrupy, omega-3's thin the blood. While a high saturated fat diet is correlated with cancer growth, omega- 3's seem to abate cancerous growth. It's no coincidence populations eating plenty of omega-3's are healthier than those who make saturated fat their main source of dietary fat. Eskimos eat a near exclusive high fat diet comprised of omega-3's and population studies will show they are, overall, healthier than Western Europeans and Americans, lovers of saturated fat.

Omega-3's are a factor in fat loss as they, like weight training, upgrade insulin sensitivity. Harping on a common and repetitious theme; the more muscle cells become sensitive to insulin, the less insulin released in response to any amount of glucose in the blood. Shall I repeat? Less insulin = less potential for fat storage. Less insulin = a leaner body.

Common sources of omega-3's include salmon, trout. mackerel, sardines and herring. A 6 ounce can of herring marinated in hot sauce is a very inexpensive, great tasting and convenient way to obtain 8 grams of omega-3's. Or, you can opt for fish oil supplements which are pretty darn inexpensive. To benefit from the insulin upgrade and fat inhibiting properties of omega-3's, you should eat salmon, sardines, or the like 4-5 times a week, daily preferable, or take 5-8 capsules of supplemental omega-3 fatty acids daily.

Fiber, found in veggies, the "indigestible carb," indirectly effects how lean you become as veggies slow up the digestion of simple and complex carbohydrates. ***When digestion slows, the total amount of glucose entering the blood at any one time slows (or decreases) which impacts insulin secretion.*** Less glucose collecting in the blood at one time = less insulin secretion and lowered insulin is an important factor that encourages fat burning. Other fibers, called soluble fiber, common to oats, beans and to a smaller degree yams, have been shown to upgrade insulin sensitivity on muscle tissue. Recall there are receptors for insulin on both muscle and fat tissue. When insulin sensitivity on muscle is high, it's correspondingly low on fat cells. In other words, when your muscles are insulin sensitive, a repartitioning effect results where carbs are more likely to be shuttled towards muscle and away from fat cells.

Chromium's the trace mineral that is somewhat related to insulin function in that it participates in the utilization of glucose and it's absorption rate drops with many of the factors that promote insulin resistance; a low fiber diet, a high saturated fat diet, a high intake of simple sugars, and a high intake of refined carbohydrates. While studies continue to come in, some reporting chromium helps reverse insulin resistance while others report chromium does little to help, my guess is using 200-300 mcg daily via a supplement coupled with a diet that promotes insulin uptake by muscles - a low saturated fat diet, the inclusion of omega-3's, a high fiber intake, and avoiding refined and simple carbs - the net effect as part as an overall nutrition strategy is likely an increase in insulin uptake by muscle tissue or the reversal of insulin resistance.

Chapter Four

How Many Calories Do I Need?

We've established, in chapter 3, the lowest or "ground floor" total amount of calories one needs each day simply to maintain life, at complete rest.

To get a bit more precise, a more accurate measure can be obtained by finding your percent body fat using a simple skin caliper. A simple body fat test will tell you two things:

1) How much of you is muscle.

2) How much of you is body fat.

The 150 pound individual who finds his body fat to be 15%, would, in kind, carry 85% muscle. That is, if 15% of him is body fat, the rest "of him" is muscle - 85%. Thus the 150 pounder walking around with 15% fat would have 22.5 pounds of body fat and 128 pounds of muscle mass.

Weight: 150 pounds	15% body fat
150 pounds	150 pounds
x.15	-22.5 lbs fat
22.5 pounds of fat	127.5 pounds of muscle/"lean body" mass

The individual carrying 127 pounds of lean body mass will require approximately 1270 calories a day, a complete rest. This number is called basal metabolism (BM) which is the total number of calories required daily to maintain muscle mass and to provide fuel for the organs and brain. BM is the bare minimum required to maintain life. Dropping caloric

intake below here is a dangerous game. ***As you can see, the greater the muscle mass, the greater the basal metabolism.*** An individual with 110 pounds of lean body mass will require 1110 calories a day at complete rest while the individual with 220 pounds of lean body mass will require twice that, or 2200 calorie a day. Again, at complete rest.

What happens when an individual, even at complete rest, drops his caloric intake below BM needs? The body will immediately burn protein from muscles and organs. The reason is simple. When calories are too low, the name of the game for the body becomes"survival." In an attempt to protect itself from starving to death, it quickly allows muscle tissue to be burned away. With less muscle, the basal metabolism ***drops*** which allows the body to make it through each day on fewer total calories. In effect, the mis-informed dieter may severely cut back on calories to shed fat, but the body wins the initial battle by dropping it's metabolic rate. It's the body's way of warning the dieter:

"You reduce my fuel intake below what I need each day and I'll show you! I'll drop my needs never allowing you to win!"

Any time muscle is shed, the overall basal metabolism drops and a drop in muscle mass effects insulin resistance. Recall, more muscle increases the actual size of insulin receptors reversing insulin resistance so ***less muscle promotes insulin resistance.*** Ouch! In a way, we could say cutting calories too severely is a losing proposition - no pun intended.

Besides outright dumping muscle mass, the body adjusts to energy deprivation in yet another way. The body can make the most of a low calorie situation by making a low calorie intake"go" like a previous higher intake. It's termed accommodation of fuel and it's part of the downfall of most restrictive diet plans.

Follow this analogy. The individual earning $5000 a month suddenly has his wages slashed to $3000 a month. Though the individual attempts to maintain the same level of lifestyle on $3000 monthly as he did previously on $5000

monthly, he soon realizes, somethings got to give. In time, the individual makes a radical adjustment. Initially, he's fully aware of all the changes he must make. He cuts back a little here, a little more there and, overall, is forced to change his life allowing him to get by on his current income. Over time, he simply gets "use to" the new changes and goes on living his life. A similar situation occurs with overall energy intake. When calories are severely reduced - or fall below BM needs, the BM accommodates and slows allowing the body to "get by" on a new lower caloric intake. It simply adjusts. Like the person experiencing the pay cut, the individual cutting back too aggressively on calories will experience a period where he may suffer a bit; exhaustion, fatigue and irritability, but, with time, and a body that will accommodate to caloric drop-offs, he'll feel better as if nothing happened. However, he will not have shed any significant amount of body fat. His body will have defeated him in his futile attempt to shed a few pounds. Lastly, lipoprotein lipase (LPL), the fat storing enzyme that becomes elevated with a high calorie diet or from a high carbohydrate diet, especially one that lacks fiber and includes copious amounts of simple sugar and refined carbohydrates, actually becomes more active in semi-starvation type diet plans!

What About The Calories I Need After Getting Out Of Bed?

In addition to establishing basal metabolism (BM) needs, the absolute minimum the body needs each day simply to maintain life, one should set estimates to accommodate for his work load each day; his level of activity. Therefore, calories must be added, above and beyond simple BM, providing additional fuel to perform daily chores, work and exercise.

Using the example of the 150 pound individual at 15% body fat carrying 127 pounds of lean body mass, we can take the next step and establish his daily caloric needs.

Basal Metabolism (BM): 1270 calories daily

Next, add to the BM more calories based on your level of activity and lifestyle.

For The Extremely Active	BM x 1 + BM
For Very Active	BM x .7 + BM
For Moderately Active	BM x .4 + BM
For Non Active	BM x .2 + BM

Therefore the individual who is extremely active and has a basal metabolism of 1270 will need 2540 calories in a day.

(1270 x 1 + 1270 = 2540)

An active, moderately active and non active individual with a BM of 1270 will need 2159 calories, 1778 calories and 1524 calories each day, respectively.

To establish your level of activity, use the chart below.

Extremely Active:	Work a physical job, construction, mail carrier, builder, landscaper and work out hard 5 or more times each week.
Very Active:	Either work a physical job and exercise 3 times a week or work a desk job and work out hard 5 times a week.
Moderately Active:	Desk job and work out 3 to 4 times a week or a physical job and do not exercise.
Non Active:	Neither exercises nor works a physical job.

Adding lean body mass (ie. muscle) is really the most effective, efficient, long range successful approach to shed body fat. Muscle is the main and over riding factor that influences your BM. ***The higher you can get your BM, the more total calories you need each day.*** Muscle increases your metabolism, the total amount of calories you burn daily. Take a closer look how it works. An individual carrying 127 pounds of lean body mass could, with proper

weight training, increase his muscle weight from 127 pounds to 137 pounds over a one year period. Bumping up lean body mass to 137 would increase the basal metabolism, the total calories needed at complete rest, from 1270 daily to 1370 daily, about the same amount of calories expended with a 30 minute walk.

What About Carbohydrates, Protein and Fat?

Once you choose the calorie level best suited for your lifestyle, you'll need to set guidelines for protein, carbohydrates and dietary fat. Specifically, "how much" of your total calories should be comprised of protein calories, carbohydrate calories, and fat calories.

Setting fat guidelines is rather easy. Just avoid extra fat found in butter, salad dressings, heavy sauces, avoid fattier cuts of meat, and watch out for restaurant meals that are notorious for mixing into meals, including salads and vegetables, globs of extra calories coming from hidden oils, butter and cream. Though low carbs is making headway into dieting circles, for those who are not obese and who remain active and exercise, especially with weights, "low fat" is still the way to go. Low fat means low calorie. And a low fat intake is a must when including moderate amounts of carbohydrates in your daily foods as "fat + carbs = body fat" while "lowfat + carbs = low body fat and calorie control."

Low fat advice includes avoiding the obvious fatty stuff; fast food, greasy foods, fried foods, butter and oil. But, it also includes staying away from sources of protein high in fat. This means avoiding chicken skin, avoiding chicken thighs and legs, avoiding most red meats and lamb and avoiding full fat dairy products.

Low fat and therefore lower calorie proteins include:

chicken breast	egg whites
turkey breast	non fat cheese
eye of round steak	protein powders
round steak	low carb protein bars
fish	

A low fat diet means limiting your fat intake to 10-20% of your total caloric intake with 15% being a nice ballpark.

Let's look at our example of the individual carrying 137 pounds of lean body mass, with a basal metabolism of 1370 calories. Assuming he is moderately active and with total caloric needs of 1542 calories a day, we can establish guidelines for dietary fat.

Fifteen percent of those total calories will contain fat, even if no additional fat is added to the foods he eats. Fat "shows up" automatically in the lean protein foods consumed - when he eats the appropriate amount of protein. (We'll establish protein guidelines a bit later).

Take a look at the math:

1524 Calories a Day
x.15 represents 15% of total calories
228 Calories of the 1524 will come from fat.

This fat will automatically "show up" in the daily intake of protein.

The goal we are ultimately trying to establish is to set guidelines for:

1) How many grams of protein to eat.
2) How many grams of carbohydrates to eat.

The next step is to subtract the fat calories from the total calories.

1524 Total Calories eaten Daily
-228 Fat Calories
1296 Calories remaining

Set Protein Guidelines

Protein needs are correlated with lean body mass. The more muscle one carries, the more protein is needed. Bodybuilders, the leanest athletes on the face of the earth, usually consume at least one gram of protein for each pound of lean body weight. While such numbers fly in the face of the RDA, the RDA's really don't apply because they're not set to facilitate the stripping away of body fat. Recall, protein has a "dragging" effect on insulin which favors lower insulin levels. This not only effects fat burning in a positive light, but lower insulin also translates into appetite control because spiking insulin is a potent appetite stimulant.

In the on-going example, the individual with 137 pounds of lean body mass will benefit by matching protein intake (in grams) to lean body mass. The individual at 137 pounds of lean body mass needs 137 grams of protein daily.

Each gram of protein = 4 calories.

Protein, unlike carbohydrates or dietary fat, can not be stored in the body to any significant degree. Therefore, there is a daily need for it and, to maximize absorption and to provide a constant influx of glucagon - the hormone released with protein that encourages fat metabolism while dragging down insulin levels - it's important to spread your daily protein intake over at least four meals.

Using four meals, the meal by meal breakdown would look like so:

137 grams/4 meals = 34 grams per meal.

Meal 1:	34 grams of protein
Meal 2:	34 grams of protein
Meal 3:	34 grams of protein
Meal 4:	34 grams of protein

Since each gram of protein yields 4 calories, we can multiply the total grams of protein consumed each day by 4 to represent protein calories.

137	grams of protein daily
x 4	calories per gram
548	calories of protein

Applied to the example we have been using:

1296	Calories Remaining (see page 46)
- 548	Calories of Protein
748	Calories Remaining

Finding Carbohydrates

The final macronutrient to find is carbohydrates. Like protein,

Each gram of carbohydrate = 4 calories.

Using the example above, we can divide the 748 calories remaining by 4 to find grams of carbohydrates.

748÷4 = 187 grams of carbohydrates...should be consumed daily

Using the four meals per day system, this individual should eat 44 grams of carbohydrates per meal. A look at the numbers show a meal by meal breakdown:

Meal 1: 34 grams of protein	44 grams of carbohydrates
Meal 2: 34 grams of protein	44 grams of carbohydrates
Meal 3: 34 grams of protein	44 grams of carbohydrates
Meal 4: 34 grams of protein	44 grams of carbohydrates
Daily Totals: 137 gms of protein	187 gms of carbohydrates

Note: The 228 some-odd calories of fat "show up" in the 137 grams of protein and, to a lesser degree, in some of the carbohydrate foods.

Sample Diets Yielding Approximately
187 Grams Carbohydrates
137 Grams Protein

MEAL 1 7 egg whites 1 slice fat free cheese T. fat free cream cheese 1 bagel	MEAL 1 5 egg whites 1 egg 1/2 banana 2 oz. oatmeal (PCW)
MEAL 2 7 oz. chicken breast (PCW) small salad w/ fat free dressing 6 oz. potato (PCW)	MEAL 2 4 oz. sliced turkey 2 slices fat free cheese salad w/ 2 oz. pasta (PCW) 2 T. Laura's dressing (see Appendage 1)
MEAL 3 1 cup rice 1/3 cup beans 5 oz. ground round steak (PCW)	MEAL 3 7 large shrimp 2 oz. pasta (PCW) cup vegetables w/ low fat dressing
MEAL 4 1 tuna burger (see Appendage 1)) 2 slices whole grain bread lettuce, tomatoes, mustard, fat free mayonnaise	MEAL 4 7 oz. white fish cup vegetables 2 servings no fat french fries (see Appendage 1)

PCW= "pre cooked weight"

Review Questions

Q I want to lose weight as fast as possible, how much weight can I expect to lose a week?

A It's realistic to shed anywhere from 1/2 to 2 pounds each week. Know if you are losing even a half pound of weight each week, your diet strategy is working and you may be able to increase that weight loss to 1 pound a week in forth coming weeks with no adjustments in your diet. If you lose more than 2 pounds a week, your approach is likely too aggressive in its reduction in total calories which, very soon, could leave you stuck at plateaus because your body will surely attempt to down regulate its its metabolism by "dumping" muscle and/or by accommodating to the decreased energy (calorie) intake. To generalize, if you are trying to lose 10-15 pounds, shoot for a pound a week. If your trying to lose 16-30 pounds, look to lose 1-2 pounds a week. If you are extremely over weight, and plan to lose 31 or more pounds, it is possible to lose up to 3 pounds a week for the first 2-4 weeks. The body should adapt a bit thereafter allowing you to lose weight at a clip of 2 pounds per week.

Q What if I lose more than the prescribed amount in the previous amount?

A If you are losing more than the prescribed amount, your likely burning away muscle tissue along with body fat. When you lose weight too fast and are overly aggressive in reducing total calories, the basal metabolism (BM) slows making fat loss difficult. Furthermore, aggressive dieters, those hoping to accelerate fat loss often experience an increase in lipoprotein lipase activity, the enzyme that keeps fatty acids locked into fat cells. Take a mild approach to keep fat loss continuous and to avoid the pitfalls of a slowing metabolism.

Q Can I lose weight without exercising?

A Yes. If you plan your diet carefully, it is possible to shed body fat without exercise. People gain weight with food alone and there are millions who exercise until their blue in the face yet fail to lose weight. Why? Diet; what and how much they eat. Avoiding excess calories, keeping insulin lower and avoiding excess dietary fat are a potent threesome that can unlock fat cells making you leaner - no hard exercise required!

Q Is there a big deal in eating 187 grams of carbs and 137 grams of protein? If each gram of carbohydrate or protein equals 4 calories, isn't it just calories. For example, can I eat 250 grams of carbs and 74 grams of protein. That's still roughly 1524 calories.

A Obviously total calories are important in controlling body fat, but eating a higher carb diet - with less protein- causes a hormonal shift where more carbs and less protein (250 grams carbs and 74 grams of protein) will promote a greater insulin surge than the diet prescribed. Recall, insulin is released in response to the total amount of glucose in the blood and insulin has fat storing potential. Thus 250 grams of carbs will break down into more total glucose than 187 grams. In addition, protein "buffers" insulin secretion by slowing carbohydrate entry into the blood, controlling the concentration of glucose in the blood at one time. Protein also (slightly) raises glucagon levels which lowers the "net" insulin produced. In general, proteins with carbs have a greater effect on "feeling full and satisfied" than an exclusively all-carbohydrate meal of equal caloric value.

Lastly, using the steps above, we can estimate that 187 grams of carbohydrates is the approximate amount of total carbohydrates your muscles can accept. That is, 187 seems to be your personal threshold in terms of glycogen retention. Any carbs above and beyond 187 will be stored as body fat if glycogen stores "fill up" at 187 grams a day.

Maximizing Fat Loss With Diet

After having established projections for calories, carbohydrates, protein and fat, the next step is to alter your nutrition plan as much as possible to allow for maximal fat loss without depriving the body of fuel. While it's quite common to mistakenly cut calories to a really low level to accentuate fat loss, the technique almost always backfires leaving you face to face with an ugly plateau or "roadblock." Fat loss seems impossible. Reducing calories too quickly or too dramatically will cause a decrease in muscle mass which slows the basal metabolism. Furthermore, the fat cells have two distinct roles:

1) With a caloric excess, the job of fat cells is to store extra fuel as body fat.
2) With severe or sudden drops in caloric intake, the job of fat cells is to hoard and hold onto fatty acids!

As you can see, radically decreasing calories not only can burn off valuable metabolic boosting muscle mass, but it can set in motion a "defense state" where stubborn fat cells fight and resist giving up fatty acids to be used as fuel. Were it not for this phenomena, an individual could simply starve himself into incredibly low levels of body fat while holding onto all his muscle mass.

The smart approach to maximizing fat loss is to set your projections for calories, carbohydrates, protein and fat and set your total meal plans up to inhibit fat storage. If you can prevent the body from storing any additional body fat, you can melt away body fat by increasing your metabolic rate. Even a small daily increase in the metabolic rate - the total calories you burn off or expend each day can have a dramatic effect on your progress.

Fat Inhibition

One big mistake many dieters make is to conceptualize weight loss in terms of "restriction, reduction, starvation, cutting, and calorie deprivation." These terms imply severely

reducing calories which, as we have learned, fail as a model for long term fat loss.

While calorie reduction is effective, the degree of calorie reduction, ought to be small and mild at best. Many dieters resort to extremes and reduce calories dramatically from a high caloric intake to a very low caloric intake. In this case, drastic and severe reductions set in motion a starvation response characterized by a loss in metabolic boosting lean body mass and the "hoarding" of fat by fat cells. Smaller, more modest reductions in overall caloric intake encourages the body to liberate fat for fuel without sending the metabolism into a downward spiral. The smart approach to weight reduction entails creating mild reductions in caloric intake. A reduction by 10-15% off of current caloric intake is suffice to set in motion fat loss. For example, an inactive individual eating 2000 calories each day can reduce by 10% or 200 calories to 1800 calories or he may choose to reduce calories a bit further by 15% or 300 calories a day yielding 1700 calories. ***The trick is to stimulate and encourage the body to liberate fat without setting off an alarm stage in the fat cells where they fight back and resist being broken down to be used as fuel*** - even when calories are extremely low. A small cut in caloric intake will allow you to stay energetic so you have sufficient energy and fuel to continue with your daily life. Coax fat loss. Don't force it.

Part of fat inhibition entails eating enough calories to match your BM and to allow for extra calories so you can meet and match your activity requirements (see page 44). Avoiding simple carbs and refined carbs while incorporating plenty of fiber-type carbs is a simple strategy to cap insulin levels as ***insulin and total caloric intake are the two major players effecting the storage of body fat.*** The final part of inhibiting fat storage is meal frequency. Smaller, more frequent meals will illicit less total insulin than larger infrequent meals. Another way to look at it; at any calorie level, insulin levels will remain lower when the carbohydrates you eat are broken into 5 and 6 meals as

opposed to 2, 3 or 4 meals.

Taking a closer look at meal frequency, "how often" you eat each day, we find the number of meals you eat impacts fat storage. The individual eating 1524 calories each day at a single sitting - "all at once"- as in one meal a day can store body fat and possibly fail to lose weight even though he is eating less total calories each day than his body requires. 1524 calories at one sitting will jack up insulin levels which, in turn boosts lipoprotein lipase levels creating a hormonal environment that encourages a fatter body by two mechanisms. First, fatty acids are more readily "trapped" by fat stores. Second, fat stores become sealed shut, preventing fat cells from breaking down. In addition, sky-high insulin levels can divert some glucose away from glycogen stores and towards fat stores. One big meal's never a good idea.

Contrast to one meal, multiple meals encompassing the very same daily caloric intake (1524) have a lesser chance to stimulate fat storage. ***Smaller meals is equated with less total glucose in the blood at any one time.*** Breaking your total food intake into 5 or 6 meals over a day controls "how much" glucose you dump into your bloodstream which, in turn, ***moderates insulin release.*** When insulin levels are more moderate, as opposed to continuously elevated, the body tends to increase and upgrade its ability to store muscle glycogen. And, when glucose is being packed away as glycogen, it is not being stored as body fat.

Thus, many dieters get the fat loss paradigm a little confused, trying to melt fat away through severe dieting which only lowers the metabolism making real, long term weight loss unpredictable. Sure calories are important and reducing them, ever so slightly, will coax the body to lose fat. But, choosing the right foods and eating multiple meals is almost equally important as total caloric value. Thus, fat inhibition is understanding "what else" to do outside of reducing total calories to encourage the genesis of a lean body.

Conceptualize getting leaner via this realm. If an

individual was given a pill to prevent and block additional body fat storage, then achieving a really low levels of body fat would be rather easy. Increasing the metabolism by adding metabolic boosting muscle or expending energy with aerobic exercise would, over time, lower body fat stores. In most cases in the human body, body fat is in a state of continuos flux. Fat is being stored at some time of the day and liberated at others leaving your weight constant with no real significant increase or decrease in body fat or weight. With meal plans that include low sugar foods, plenty of fiber, adequate protein to offset rising insulin levels and multiple meals to control the concentration of blood glucose, ***fat storage becomes inhibited*** and, when calories are moderate creating a slight deficit, ***fat breakdown and burning will prevail.***

Using the on-going example, let's take a look at a daily outline encompassing 6 meals.

Caloric Intake: 1524
Carbohydrate Intake: 187 grams
Protein Intake: 137 grams

Meal 1: 23 grams of protein	31 grams of carbohydrates
Meal 2: 23 grams of protein	31 grams of carbohydrates
Meal 3: 23 grams of protein	31 grams of carbohydrates
Meal 4: 23 grams of protein	31 grams of carbohydrates
Meal 5: 23 grams of protein	31 grams of carbohydrates
Meal 6: 23 grams of protein	31 grams of carbohydrates
Daily Totals: 137 gms of protein	187 gms of carbohydrates

Sample Diet Yielding Approximately
187 Grams Carbohydrates • 137 Grams Protein

MEAL 1
4 egg whites
slice fat free cheese
1 1/2 oz. oatmeal (or) 1 english muffin

MEAL 2
4 oz. chicken breast (PCW)
1 1/2 oz. pasta (PCW) mixed w/ a small salad
fat free and low sugar dressing

MEAL 3
3/4 cup non fat cottage cheese mixed w/
1 cup cooked rice
add cinnamon and EQUAL

MEAL 4
3 oz. lean roast beef
1 slice fat free cheese
1 pita pocket
lettuce, tomato, onion, fat free mayo, mustard
1 cup broccoli

MEAL 5
2 cups no-sugar and fat free vanilla yogurt

MEAL 6
6 oz. scallops (PCW)
salad
1 cup cauliflower
5 oz. potato

PCW= "pre cooked weight"

Review Questions

Q What is the purpose of eating smaller meals?

A Smaller meals break your carbohydrate intake into smaller, but more frequent portions. Carbs are the double edge sword in weight loss. They provide fuel, yet in excess, or when there is too much sugar from carbs in the blood at one time, fat can be stored, and fat breakdown ceases.

Q Are there other benefits of smaller meals?

A Yes, smaller meals allow for better nutrient absorption.

Q If I eat the right number of calories for the amount of lean body mass I carry and eat six meals a day, isn't it impossible to gain fat?

A Well, it becomes more difficult. But, if you eat poor sources of carbohydrates, ones that lack fiber, like simple carbohydrates, and if you do not eat vegetables that contain plenty of fiber, it is still possible, to not lose fat. But, if you eat the right types of carbohydrates, the natural slower burning kinds such as oats, yams, beans, wild rice and potatoes, it would be very likely you would lose body fat.

Notes

Chapter Five

The Role Of Exercise On Fat Loss

It's fully possible to shed unwanted body fat without exercise. Putting together an eating strategy that is calorie controlled to match you basal metabolism and activity level along with choosing natural carbohydrates over simple or refined carbohydrates and eating multiple, protein inclusive meals through out the day are core elements that encourage fat loss and discourage fat gain.

With that in mind, it's important to point out the limitations of exercise on chiseling a sculptured lean body. That is, exercise can be futile, a wasted effort without radically revamping the way you eat. After all, visit any gym in the country and you'll find millions of people who are no leaner than a year ago. Why? Diet, or lack there of. Combining the right diet with an exercise plan is crucial in achieving a very low level of body fat.

Combining exercise with the proper eating plan can certainly lead to faster and more permanent fat loss than diet alone or exercise alone. On the flip side, its fully possible to engage in heavy amounts of exercise on a daily basis yet miserably fail to firm up and lean down because the wrong diet, one that is excessive in calories. Sugar and its insulin spike coupled with dietary fat can over ride the caloric expenditure and hormonal changes brought on with hard physical exercise.

The two types of exercise include aerobic exercise and

anaerobic exercise. While both are effective methods to facilitate a lean body, one far outshines the other. Surprisingly, when it comes to exercise, anaerobic exercise - weight training- beats up on aerobic exercise every time!

Let's take a closer look at aerobic exercise; running, cycling, stair climbing, brisk walking. Aerobic exercise is a calorie burner. Specifically, aerobic exercise taps, for the majority, stored fatty acids locked away in body fat stores as fuel. Muscle glycogen, the body's reserve tank of glucose is also used as a fuel source during aerobic exercise, but not to the degree fat is used. Many people fall under the impression that aerobic exercise burns exclusively and only fat. That is, there's this prevailing idea a person could sit on a stationary bike for 4 hours a day, every day, and burn exclusively body fat. Without immediately delving into the details, this is akin to thinking one could eat 500 calories a day, every day, and evolve into a lean, fit looking physique. Unfortunately, it doesn't work that way. After 90 minutes of continuous cardio, the body melts away muscle with intense accuracy. In other words, at the 90 minute mark (of intense cardio) your burning muscle and killing your metabolism.

So, performing aerobic work is a way to expend calories; to "burn off" extra energy we commonly refer to as stored body fat. High intensity (high effort) aerobic work, working to get the heart rate up to a high level where, as a guideline, it would be extremely difficult to carry on a conversation, burns roughly 10 calories a minute. An untrained person, someone just getting started in an exercise program, who embarks on an aerobic plan and exercises 60 minutes a day at a high level of intensity (effort) can burn approximately 600 calories in an hour's time. (60 x 10 = 600).

Nutritionists and exercise physiologists agree; one pound of body fat is shed from the body when 3500 calories are expended. Thus, the individual exercising aerobically for one hour a day 6 days a week can expect to lose 1 pound of body fat (6 days x 600 calories = 3600 calories).

Now let us assume the individual riding that bike or walking that treadmill is pretty darn heavy, downright obese, yet

fabulously motivated and sticks to the exercise plan for a full year, 52 weeks. Each day, he spends 60 minutes, challenging himself, keeping his level of effort up and dreaming of a radical change in body weight over the coming year. His expectations? To shed 52 pounds of body fat! The results. Nothing close. Perhaps closer to 32 pounds.

Here in lies the problem with aerobic exercise as a sole or premier method of body fat control.The body adapts to aerobic exercise by becoming energy efficient. By the time week 5 or 6 roles around, the body begins to "get use to" aerobic exercise and adapts by performing the same physical work - yet using less calories (fuel) to do that work. By the 52nd week, two things occur.

1) It takes drastically less fuel to perform the same work. That means, the individual uses less energy to do the physical exercise.
2) The body adapts and down shifts its "exercising metabolism." That means, with continuos aerobic work, the body downgrades its release of enzymes and hormones that support the liberation of fatty acids from fat cells.

Sound familiar? It's the same phenomena we see with diets. Over a prolonged period of time, diets become ineffective as the body adapts to the calorie reductions. Take the individual who is trying to control body fat and is currently eating 3000 calories each day and reduces this intake to 2500 calories a day. The calorie deficit; 500 calories a day. Recall the rule in nutrition and exercise science; one pound of fat is equal to 3500 calories. If you expend 3500 calories off the body via exercise or cut out 3500 extra calories from the foods you eat, you should lose one pound of fat. So, the individual creating a 500 calorie deficit should lose one pound of fat in 7 days.(500 calories x 7 = 3500 calories) And he does. Can he sustain that weight loss (one pound a week) over a 52 week period even if he's got plenty of body fat to tap into? Highly unlikely. Why? Metabolic adaptations. The body adapts to a reduction in calories by eventually slowing its overall metabolism making the "most" out of that 2500 calories. (see

pages 42-43)

The real way to change the body, to lose fat and to keep it off and the sole way to radically increase your metabolism is to make weight training the primary mode of exercise - coupled with a nutrition plan that inhibits fat storage. ***Adding muscle mass bumps up the metabolic rate, something aerobic exercise can not do.*** Your lean body mass (the total amount of ***muscle*** you carry) is directly correlated with "how many" calories you use up each day and "how lean" you can ultimately become.

Weight training is totally unique and incomparable to aerobic exercise. While aerobics may initially be a good way to burn some extra calories, we've seen the "calorie burn" slows with time. With weight training, the adaptation is an increase in muscle mass which increases the metabolism.

- ✔ Aerobics only: the metabolism downgrades!
- ✔ Weight training only: the metabolism upgrades!

Increasing muscle mass increases the basal metabolism, the total amount of fuel the body requires and burns at absolute and complete rest. The individual who carries 127 pounds of lean muscle mass will require roughly 1270 calories daily at complete rest. Increasing lean body mass to 137 pounds with a successful weight training program will increase the total amount of calories required in a 24 hour period from 1270 calories to 1370 calories - at complete rest. Thus, having an extra 10 pounds of muscle on the body increases the basal metabolism by 100 calories a day, about the total amount of calories burned off in 10 minutes of high intensity aerobic work or 40 minutes of walking. But, unlike aerobic exercise which eventually fails to continue to burn off what you hope it will due to the adaptation response to aerobics, that 10 pounds of muscle is here to stay and continually keeps the metabolism elevated! While dieting and aerobic exercise causes metabolic adaptations that can backfire, having more muscle is the complete opposite. It has a positive effect, boosting the metabolism and "how much" fuel you burn each day.

127 lbs lean body mass	137 lbs lean body mass
▼	▼
1270 calories required at complete rest	1370 calories burned at complete rest

One last point. With no change in eating habits, no increase and no decrease in caloric intake, the individual carrying 10 pounds of additional muscle will require another 100 calories each day. In a week's time, he will have burned off 700 calories (100 calories x 7 days). Since 3500 calories is equal to one pound of body fat, this individual can expect to shed 1 pound of fat in 35 days (100 calories x 35 days = 3500 calories). Literally, without trying. Pretty neat. And if you worry about a metabolic slowdown - the kind we saw with reducing calories or from performing exclusively aerobic work, it does not happen with muscle! Once you got it, you got it. In other words, the body will ***always*** require an additional 100 calories a day as long as that individual maintains those 10 pounds of muscle.

Three Overlooked Ways to Lose Fat With Added Muscle

In addition to bumping up the metabolism by adding 10 pounds of new muscle, we missed three ways to get even leaner with weight training.

1) Expenditure. Obviously, building that muscle mass required some type of hard physical effort. That is, training with weights to stimulate the body to develop those fresh 10 pounds of muscle mass requires energy. Assuming the individual did not radically alter his caloric intake during the time it took to build the muscle, it is prudent to say many of the calories required to do the physical work came from two places; fat stores or food. Obviously, had some of these calories come from fat stores, body fat levels would have decreased. And, if some of the fuel came from the foods he ate, this leaves "less net calories" available to be stored as body fat. In

other words, he either burned some body fat as fuel or he burned much of his food intake which leaves less fuel available for the body to make body fat.

2) Recovery. Weight training is very different than aerobic training in its need for fuel to recover. When an individual trains with weights, the stress placed upon the muscles causes tiny micro-tears within the individual muscle fibers. Energy (ie. calories) is required to mend these damaged fibers. Put another way, it "costs" the body energy to repair itself. Building back broken down fibers requires energy even at rest! This means the individual who leaves the gym after having engaged in a hard weight training session will continue to experience an elevated metabolism until those fibers are completely repaired. He's literally burning calories outside of the gym to repair his muscles. Aerobic exercise does not cause this effect. Once the aerobic session is completed, net calorie burn returns to zero. In other words, an aerobic session will only burn calories during the exercise. Never after. ***The metabolic edge of the individual training with weights; he burns fuel during and after each workout session.***
3) Glucose Metabolism. Adding muscle to your frame changes the metabolism of sugar which impacts body fat levels. Recall, there are receptors for insulin on both muscle and fat cells and these receptors act in a see-saw fashion. If the receptors on muscle tissue are more sensitive, they tend to dominate over those located on fat cells. Adding muscle makes muscle cells more insulin sensitive which translates into a decrease in insulin output by the pancreas. When insulin levels are on the lower side, as opposed to chronically elevated, the body is more apt to burn fat as fuel and to store glucose from carbohydrate foods as muscle glycogen. When glucose is being deposited as muscle glycogen, it is less likely to effect fat storage.

REVIEW

1) Adding muscle increases basal metabolism.
2) Weight training burns fuel; some from body fat stores, some from the foods eaten - both leaving you leaner.
3) Recovering muscles require energy.
4) More muscle improves insulin sensitivity.

Case Study: Susan Richards

I met Susan Richards a number of years ago. She came to me looking for advice as she had, in her words, "Failed completely" in attaining a low level of body fat. At 42 and 40 pounds over weight, she had clearly become compulsive about getting rid of those 40 pounds. Yet the harder she tried and the more she did, the less success she achieved. Her exercise program was simple. She had been running 20-25 miles a week for the previous 5 years. Still, she could not seem to lose weight and she was totally discouraged. Admittedly, her diet was not the greatest nor was it terrible. During our first conversation, she kept repeating "Isn't the running burning anything?"

I revealed to her the phenomena explained in the beginning of this chapter: the energy-adaptation response to cardiovascular exercise. The body gets better, more fuel efficient, in performing aerobic work and attempts to burn the fewest amount of calories possible in an attempt to be successful. For success as defined by the cardiovascular system is to run farther and longer - all on fewer calories. Furthermore, as fat is the chief fuel source for long distance running, there is speculation the long distance runner's body becomes good at figuring out "how to" become really good at storing and holding onto body fat!

We also discussed the physiques of Olympic sprinters versus those of Olympic marathoners, how the sprinters appear visually leaner than the longest of distance athletes. While the sprinters appear lean, the marathoners appear somewhat soft. While we agreed running and heavy aerobic exercise isn't all its been built up to be as far as a mode of

ridding the body of fat, I could anticipate Susan's greatest fear. She reasoned "If I quit running, won't I gain a ton of weight because I'll be expending less calories?" While her reasoning was logical, it does not consider the fact that her metabolism had slowed, or adapted, considerably due to her heavy aerobic schedule and, with a thorough review of her food records, we were able to discover much of her excess eating was a result of her feeling the need to increase her energy in order to continue to put in her exhaustive daily runs!

After much haggling, we developed a new training protocol using a 4 day per week weight training program - with no cardio work - coupled with a moderate calorie, low sugar, low fat, high fiber diet emphasizing lean protein, complex carbohydrates and fiber-type vegetables. After a 7 month period, Susan reported losses of 14 pounds and had to revamp her wardrobe because her clothes became so loose. We never did take her body fat measurements because she felt too self conscious. Essentially, she traded her cardio program for weights and employed a completely new diet and was able to ditch 14 pounds, where previously she struggled to lose just 1.

Chapter Six

Varying Caloric Intake: Metabolic Trickery

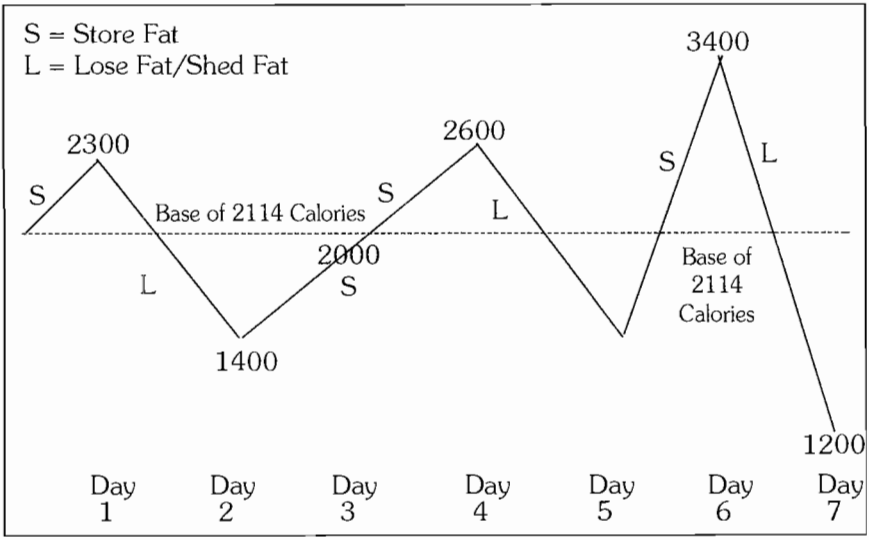
Many people complain it's difficult to lose weight, "Even though I don't eat a lot of food." There's probably a little bit of exaggeration there yet some truth as well. Because, it is possible to get fatter without over indulging in food or going radically overboard in terms of total caloric intake. How? Confusion.

A sporadic, unplanned, or inconstant diet characterized by wide gaping variances in caloric intake from day to day can stimulate fat storage. Just as the mind becomes confused with an over abundance of stimuli, so too can the metabolism with a never ending, and always changing, intake of calories. With radical variances in caloric intake, the fat cells become bigger for two reasons.

1) First, with caloric excesses, calories are always packed away as body fat.
2) And, with sudden deficits following a high caloric intake, fat cells win again. They fight, resist and struggle to hold onto fatty acids entering into "starvation mode."

Let's take a hypothetical look at a non active individual's diet where a different caloric level is consumed on each of the 7 days.

Day 1:	2300 calories (Monday)
Day 2:	1400 calories (Tuesday)
Day 3:	2000 calories (Wednesday)
Day 4:	2600 calories (Thursday)
Day 5:	1900 calories (Friday)
Day 6:	3400 calories (Saturday)
Day 7:	1200 calories (Sunday)



Here's the problem; metabolic confusion which can lead to fat storage. While total daily caloric intake is important. That is, your total caloric requirements and whether you fall below or above them are of primary importance in determining whether you will lose fat or gain fat, we know hormones and enzymes like insulin, glucagon, hormone sensitive lipase, lipoprotein lipase and even dietary fiber are factors that come into play that work in a special dynamic along with total calories making it all too complicated to naively declare "It's all about the calories stupid!" Now we have another factor to deal with called caloric perception theory (CPT). Simply; the body will attempt to lose or gain fat

based on the relative amount of calories it is used to taking in. Throw out calorie charts for a moment and take a ride through the varying caloric web described below.

On Monday an individual begins the week at 2300 calories and cuts back to 1400 on Tuesday. With this initial reduction, the body gives up some body fat as fuel. After all, 1400 is less than 2300 and a caloric reduction will initiate fat loss.

On Wednesday, the individual consumed 2000 calories. Two things occur here. Either the body will perceive 2000 to be 300 ***less than*** 2300 and allow fat to be liberated as fuel or it may perceive 2000 to be 700 ***more than*** 1400 and store fat. Metabolic confusion becomes easier to see. Should the body store fat or lose it?

Thursday, the individual bumps the caloric intake up higher, to 2600 calories which is clearly higher than ***both*** the sum total eaten on Tuesday or Wednesday. Unquestionably, argue the CPT-ers the body will enter a fat storing mode.

Friday, the individual, engaged in a hectic business day, finds it difficult to eat and calories settle in at 1900. The assumption at 1900 calories; fat ought to be tapped as 1900 is lower than Thursday's intake. Guess again. 1900 is higher than Tuesday's 1400 mark. Will the body store fat? The proponents of Calorie Perception Theory would say yes.

Saturday includes splurging on lunch and a big serving of dessert taking calories to 3400 for the day. Definitely enough to store fat and, since the body will perceive 3400 as higher than all the other days, not only will it turn on the mechanisms to help support fat storage, but they'll be turned, "on high."

Sunday, the individual awakens early, knowing Saturday was a mini splurge-fest. With a desire to "make up" for the damage done, calories drop way back to 1200. Here's where the traditional nutritionists and Calorie Perception Theorists likely agree. 1200 is certainly less than all the previous days so fat ought to be shed. Oops! One nutritionist warns; "If the 1200 level is insufficient to support the basal metabolism, the

body may enter a starvation response and fight letting fat go."

The corrective step to ***sporadic eating habits which send conflicting messages to the body and can lead to fat storage, regardless of caloric intake,*** is to take an average of the seven day period and start anew. Add up all the calories eaten in a seven day period and divide by 7. This gives you a sum average sneak peak at the calories an individual typically eats each day. More important, it ***eliminates higher calorie and lower calorie days*** which the Calorie Perception Theorists hold is making you fat. So, in the 7 day example previous, that individual ate 14,798 calories in seven days. Dividing this number by 7 equals 2114 (14,798÷7 = 2114) calories each day. Eating the same amount of calories each day and the same number of meals with 5 to 6 being optimal to control insulin, conflicting signals regarding calorie perception are no longer an issue. When this individual commits to eating 2114 calories daily with 5 to 6 meals each day, the body will become more "regular" and less likely to store fat. Furthermore, the individual who adopts an eating plan that stresses the same amount of total calories each day will benefit by gaining more energy, both physical and mental.

Sporadic eating patterns is a reason many who reduce calories never seem to shed body fat. If an individual who is eating a completely different and widely varying caloric intake each day cuts calories by eating 1600 a day, the body may not recognize the deficit. Why? The body has grown accustomed to relative deficits where calories come down, only to go back up. Down, Up, Up, Down. In the previous example, the individual created a deficit from the mean (2114 calories) on 4 days of the week; Tuesday, Wednesday, Friday and Sunday and was in a caloric surplus on 3 days of the week; Monday, Thursday and Saturday. Every time a caloric deficit was seemingly created, it was broken with an increase in calories. This leads to confusion and if the metabolism could speak, a likely reaction would be "When calories are reduced do not give up fat as fuel because the deficit is

temporary; it'll soon end." What about fat storing? Humans are designed to store fat. When a small excess comes in after a deficit where the body refused to liberate fat as fuel, rest assure, those calories will be quickly whisked off to fat deposits!

Getting the body to recognize deficits requires a "base" diet be employed. A "base diet" is the average sum total or in this case, 2114 calories a day. ***A base diet provides the body with consistency so, down the road if calories decline, the body will recognize a deficit and give up fat as fuel.*** Without a base diet, the body's continually confused and, as it is designed to store fat, it will do just that!

Creating A Deficit & Adding Exercise

Once a base diet has been established, in this case roughly 2100 calories daily, and has been followed for at least 6 weeks and up to 10 weeks, an individual can create a caloric deficit to stimulate the body to call upon body fat stores. For those who had previously followed a sporadic daily caloric intake characterized by high and low calorie days, establishing a base will allow the body to respond to a deficit.

As noted previously, the body responds to small changes in caloric intake. Large or sudden caloric reductions will either immediately cause the metabolism to slow or temporary drops in body fat may occur followed by a rigid slowdown in the metabolic rate.

To shed fat while avoiding a metabolic slowdown associated with severe and sudden reduction in calories, ***try cutting calories by 10-15% from the base.*** The healthy reaction to mild cuts in total caloric intake; body fat is shed, lean body mass is preserved and energy levels are maintained.

Severe cuts in calories are illusionary. In general, the body's reaction is to burn off lean body mass, the most important component in keeping the basal metabolism

elevated. If fat stores are the body's main fuel reserve during famine or during periods where calories suddenly become scarce, why don't fat stores come into play immediately to provide fuel for the individual who has radically reduced his caloric intake? The answer: survival. Yes fat is the backup fuel that should kick in when energy (calories) drop, however, getting rid of muscle will decrease the total amount of calories ***required*** each day. When calorie requirements decrease, fat stores become better at performing their job; to provide fuel in times of famine. In other words, ***the body protects itself by getting rid of metabolic boosting muscle allowing it to ride out the storm; a lack of incoming fuel.*** The flip side of the coin; if the metabolic rate did not drop, a person would quickly deplete his body fat stores endangering his life when calories suddenly become scarce. Most who embark upon extreme low calorie diets or diets that create significant cuts in calories eventually are over run with hunger, a lack of energy, food cravings or a combination of the three which can create extreme cravings or "binges" where the individual breaks down, thrashing himself with awful amounts of food and crazy amounts of calories. ***Problem here, is the incredible calorie intake associated with binge eating is more likely to be stored as body fat than ever before as the metabolic rate has been suppressed with severe dieting.***

After establishing a base diet, an individual can reduce calories by 10-15% or add exercise, specifically weight training exercise. Eating a base diet while increasing lean body mass with weight training will not only burn energy, some coming from body fat stores, but it will increase the metabolism. (see pages 63-64) While a slower metabolism is a death wish for the person seeking a lean body a faster metabolism is the secret to one.

Although many dieticians recommend a reduced calorie intake coupled with an exercise plan, a better idea may be to change one variable at a time. That is, either reduce calories from a base or maintain a base while embracing an exercise

plan. Combining the two, a reduction in calories with an exercise plan, may make it a bit harder for an individual to pin point "what" is causing his body to change. "Is it mainly the diet or is it primarily the exercise that's promoting a leaner body?" Without knowing "what" is providing the main stimulus for change, it becomes challenging to decide "what" to change when results begin to fade. Case in point. If an individual eating a base diet reduces his caloric intake by 10-15% and eventually reaches a sticking point where continual fat loss is nearly impossible, he can change one of two things. Reduce calories further, add aerobic exercise or add weight training exercise. Making a mild cut in calories may be helpful though it could cause a slight drop in metabolism. Performing aerobic exercise would certainly increase caloric expenditure, "burning off" additional calories. But, we know the body also accommodates, though not immediately, to aerobic work by becoming fuel efficient - the body learns to burn less total calories for constant work loads. The third solution, to add weight training, is the better of the three, as embarking upon a serious weight training routine will add more lean muscle to the body which beefs up the metabolism. So of the three, cutting calories or adding aerobics can work, but both could lead to some type of compromise with the metabolism, while ***weight training*** has the opposite effect; it ***increases the metabolism.***

It's possible, those who simultaneously start a diet and exercise program may experience plateaus where additional fat loss becomes more and more difficult. The question that immediately comes to mind, "What should I do, eat less or exercise more?" In effect, the individual struggles to establish "what" of the two - exercise or diet - is the greater of the two in stimulating drops in body fat. Confused and likely motivated, he changes both, cutting calories while adding more activity. While this could overcome a plateau, it will also lead to fatigue as additional exercise coupled with less fuel leads to a tired body and a ***tired body tends to hoard fat*** by decreasing it's output in thyroid hormones or by increasing its output in cortisol, a hormone which chews up

muscle mass! The take home lesson: when the body becomes tired, it becomes very difficult to shed fat. A combo of additional exercise with less fuel also created a perceived large deficit causing additional and stronger plateaus. Make changes of one variable at a time to prevent fatigue and maintain control over your progress.

Varying Caloric Intake: When It's Permissible

Previously, we learned a sporadic diet with day to day fluctuations in caloric intake could send conflicting messages to the body regarding fat loss or fat storage. Without a steady base, the body may fail to to respond to what appears to be decreases in caloric intake. With sporadic eating habits, high calorie days are potent fat storers and when calories drop, fat is rarely shed as the body "knows" the reduction is temporary. The fat burning system simply stalls even though calories may be rather low for a day or two.

However, a variable caloric intake after a base has been firmly established, can lead to continual fat loss without an overall reduction in caloric intake - and without having to suffer from dreaded plateaus. Let's say in the example above, the individual has been eating 2100 calories (a base) for at least 2 months and he has been seeing improvements in his body. He's been shedding fat, but is now stuck at a plateau. The results are a result of inhibiting fat, avoiding swings in caloric intake which can cause fat storage and increasing muscle via weight training which boosts the metabolism. Recall, weight training is the king of fat burning exercise. The unique recovery process to "repair and rebuild" damaged tissue requires calories above and beyond those burned when performing the exercise and carrying additional muscle has a direct bearing on basal metabolism - how many calories burned each day even at complete rest.

So far so good. However, with time, the individual will see smaller changes in his body and gains may come to a halt. This is an ideal time to vary caloric intake. Eating a lower caloric intake for 3 and up to 5 days, followed by 1 day

of a higher caloric intake can facilitate fat loss and side-step plateaus with no significant decrease in calories and no drop in metabolic rate.

Here's how it works. Recall in chapter 3, it was explained excess carbohydrates can be stores in three places; in muscle as muscle glycogen, in liver as liver glycogen and in fat cells as body fat. When muscle and liver glycogen stores are full, carbohydrates will be stored as body fat. And, if muscle and liver glycogen stores are not full, carbohydrates will likely be stored as muscle and liver glycogen. At 2100 calories, this individual has been seeing improvements in body composition, an increase in lean muscle with a drop in body fat. When body fat levels are dropping, it is very likely that glycogen stores are never "full." A contributor to plateaus may be an adaptation process where a person training with weights becomes really efficient at pulling glucose out of the blood and storing it as glycogen giving him ample fuel to train as glycogen is the main fuel source for weight training. The paradox here is while the body adapts and becomes better at storing muscle glycogen - once those glycogen stores are full - all carbs will be stored as body fat. The remedy; to cut back on carbs for 3 to 5 days to reduce muscle glycogen stores. ***When muscle glycogen stores are lower, a metabolic shift occurs where additional fat is used for fuel promoting fat loss.*** There's more. After 3 to 5 days of a lower carb intake, the dieter can return to a higher carbohydrate intake and the extra carbs simply re-fill muscles with glycogen. Why? ***As long as glycogen stores have room for more glucose from carbohydrates, the carbs must be stored as glycogen.***

To illustrate the point, here is the carbohydrate, protein and dietary fat the individual should be eating based upon the guidelines found in chapter 4. Assuming the individual weighs, after a year of structured weight training, 152 pounds with 137 pounds of muscle and eats 2100 calories a day, he may very well be eating more carbs to fuel his training - 309 grams of carbohydrates daily - 137 grams of

protein and 15% of the total calories (315 calories) from fat - naturally occurring in lean protein foods and to a lesser extent in complex carbohydrates. If the body weight is stable, neither increasing nor decreasing, we can assume it takes roughly 309 grams of carbohydrates to saturate or "fill-up" his muscles with glycogen. Another way of putting it; his carbohydrate threshold is 309 grams. That's the upper limit of his ability to store muscle glycogen. Any additional carbs, after his stores have been filled, will be diverted towards fat stores leading to an increase in body fat.

Reducing carbs by 40% for 3 days will lower blood sugar levels which, in turn, causes a drop in circulating insulin levels which, in turn, causes the release of hormone sensitive lipase. The three; ***lower blood sugar, lower insulin levels and higher hormone sensitive lipase levels initiate a metabolic adjustment where more fatty acids are called upon as fuel.*** By the third day, when glycogen reserves in the muscles drop further, even more body fat is liberated? Why? To some extent, there exists a dynamic relationship between muscle glycogen reserves and utilization of body fat. When muscle glycogen is full, the body "turns on" its ability to store body fat and when glycogen levels fall, it "turns on" its ability to burn body fat.

Thus, the individual eating 309 grams of carbs a day can encourage fat loss by reducing carbs by 40% to 185 grams a day for 3 and up to 5 consecutive days. (309 x .40 = 124. 309-124 = 185) A common problem with reducing carbs is that, over time, the metabolic rate can begin to adapt. When carbohydrates stay low for an extended period of time - usually more than 7 days - fat cells attempt to "hold on" by resisting the release of fatty acids. Levels of lipoprotein lipase, the enzyme involved in storing fat, tend to rise and thyroid levels drop; both effect overall basal metabolism and are part of the starvation response which off sets reductions in energy intake and is common with all diet plans. To keep your body from falling into this trap, increase carbs by 15% ***above*** your previous carbohydrate intake. The individual previously eating 309 grams of carbs each day would, after 3 to 5 days of a lower carb intake, eat 355 grams of carbs for a day. (309 x

1.15). Increasing carbs achieves 2 important steps:

1) It interrupts the starvation response which restores thyroid levels back to normal while suppressing the fat storing enzyme lipoprotein lipase (which tends to rise after 5 days of a lower energy (calorie) intake
2) It stimulates the metabolic rate. When glycogen levels drop, followed by an increase in calories - even higher than what the body had been "use to" previous to the reduction in carbs, the body responds by increasing thermogenesis (see chapter 11)

Recall, the body is not 100% efficient at extracting all the calories from the foods we eat. When it comes to carbohydrate foods, the body burns off 10 calories of carbs out of every 100 ingested. In other words, it takes, or "costs" 10 calories of metabolic fuel to get all 100 calories out of the carbs. However, coming out of a carb depleted state where glycogen levels are low, this number becomes exaggerated upwards to 20%. So, increasing carbs can enhance long term fat loss by shutting off the starvation response and by increasing the calorie costs of obtaining fuel from the carbohydrates we eat.

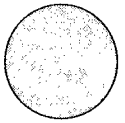
The guidelines to tricking the metabolism into losing fat by using a rotational carbo intake:

1) Reduce carbs by 40% for 3 to 5 days.
2) Increase carbs by 15% higher on the 4th or 6th day.

If Normal carb Intake is:	Reduce by 40% to:	Increase carbs by 15% to:
150	90	172
190	114	218
240	144	276
280	168	322
320	192	368
360	216	414
400	240	460
440	264	506
480	288	552

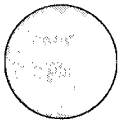
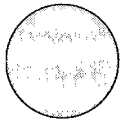
Normal: 309 grams a day
Day 1,2 and 3 (or 4 and 5): 185 grams
Day 4 (or 6): 355 grams a day
Repeat

Normal: glycogen are full at 309 gms

1) 

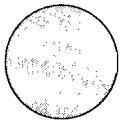
2) 185 carbs lower glycogen, stimulate fat breakdown

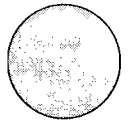
Muscle Cell Fat Cell (breakdown)



→ Fatty acids
→ Glycerol

3) 355 carbs for one day

Muscle Cell + Thermic Effect = Muscle Cell





Calories wasted as heat

Glycogen still Low, fat is still being liberated

After three (or 5) days of lower carbs, glycogen levels fall. When carbs are reintroduced into a body "running low in muscle glycogen" carbs must refill muscle glycogen stores first before having any potential to stimulate fat storage. ***Glycogen hungry muscles take precedent in their need to store glucose (from carbohydrates) as glycogen before storing it as body fat.*** Furthermore, carbohydrates cause an increase in metabolism by generating heat. Every time we eat, the temperature in the body rises ever so slightly. This increase in body temperature burns away a small amount of calories

found in the foods we eat and this "heat blip" is magnified in a low-carb to high-carb rotational diet...compared to eating a standard or consistent carbs intake day in and day out.

The low-carb to high-carb approach stimulates fat breakdown for 3 to 5 days, enhances heat production which revs the metabolism leaving the "net" carbohydrate intake on the single "high carb" day lower. The actual intake using our example would have been 355 grams of carbohydrates in the single higher carb day. Yet, with an increase in metabolism accompanying the higher carb intake as well as the "heat blip effect," the "net" carbo intake comes out to be somewhere closer to 284. For every 355 grams of carbs consumed roughly 20% are wasted through heat production and from the body's inefficiency in "obtaining" all the energy it can from food. Plus, this single day of a higher carb intake is insufficient to saturate glycogen stores. So, when the dieter returns to 3 to 5 days of a lower carb intake, glycogen stores are even more rapidly depleted encouraging fat loss. Plus, ***the high carb day offsets any potential metabolic slowdown.*** So the dieter enters the 3 to 5 day diet mode of lower carbs with an elevated metabolic rate.

Another interesting facet of moving from low carbs to high carbs is the spike in IGF-1. When calories are eaten beyond what is "normal" sometimes called modified overeating, IGF-1 levels rise. IGF-1 is a by product of growth hormone and insulin and it stimulates the body to lay down new muscle tissue. In essence, moving into a ***higher carb day is extremely helpful in laying down new metabolic boosting muscle or at the very least saving it.*** We know the more muscle you can build or save, the more elevated the metabolic rate and the easier it is to become or stay lean!

Lastly, the ***low-carb to high-carb rotational diet upgrades the receptor cites on muscle tissue for insulin.*** This changes the body's ability to store carbs as glycogen rather than fat. Recall, glucose from carbohydrates illicit the release of insulin from the pancreas in order to utilize the glucose in the blood and there are receptors on

muscle tissue for insulin. Anything that improves insulin sensitivity - makes the receptors on muscles more active and excitable - enhances glycogen formation. The benefit here is simple. If the body is storing glucose from carbohydrates as muscle glycogen, then it is less effective at storing glucose as body fat.

Actual Calorie Cut: Not Much

Cutting carbohydrates by 40% promotes fat loss by controlling calories and by influencing hormone and enzyme changes. In terms of overall calorie adjustments, the reduction is really quite small.

To illustrate, we know each gram of carbohydrate in the body yields 4 calories. In the example above, carbohydrates were reduced by 40% or by 124 grams daily for 3 days.

124 grams of carbs is equal to 496 calories (124 x 4 = 496). 496 calories "missing" from the diet for 3 days is equal to 1488 calories (496 x 3 = 1488 calories). 1488 is the total "net calorie" reduction over the 3 day period.

On the 4th day, carbs are increased by 15% to 355 grams or 46 more than the previous carbohydrate intake of 309. 46 grams of carbs is equal to 184 calories (46 x 4 = 184 calories). To find how many calories are really reduced from the diet over a 4 day period:

1) Add up the total calories that would have been consumed over 4 days had the dieter kept his caloric intake stable...not using the low-carb to high carb rotational diet.

   Example: 2100 calories daily
   x 4 days
   8400 calories would have been consumed in 4 days

2) Subtract the "net calorie" reduction found underlined in the paragraph above from 8400.

   Example: 8400
   -1488
   6912 total calories were consumed over 3 day period

3) Now add to this sum, the calorie surplus created by eating 15% more carbs on the 4th day of the rotational plan. In this case, the individual will eat 355 grams of carbs which is 46 grams more than his starting point or 184 calories of carbohydrates.

   Example:

   6912

   +184 calories from eating 15% more carbs than normal

   7096

4) Divide 7096 by 8400 gives us 84%. In the example above: while carbs may have been severely reduced, the total caloric intake over 4 days was reduced by 16% (100% - 84% = 16%) and reducing calories by 10-15% allows the metabolism to stay elevated!

To summarize: the low-carb to high-carb rotational diet is easy for many to apply because it permits a single day where carbohydrates are not severely restricted satisfying the craving for pleasurable carbohydrate foods such as pasta, bagels, potatoes and the like. This type of diet should be used only after an individual has already established a base diet which established "regularity" to the metabolism allowing it to respond to small changes in caloric reductions.

Notes

Chapter Seven

The Weight Loss Accountant

So far, we have been dealing with technicals; types of calories, hormone levels, fiber, receptor cites and other factors that are important to understand "how" the body gains or loses body fat. However, applying what you learn is the bottom line in achieving low levels of body fat. That is, you gotta do it!

While most detest keeping a food journal with accurate records, I feel number crunching is very important in getting results and learning more about nutrition. It's extremely rare to be able to build a nutrition program to attack fat if your "winging it" and not keeping tabs on the foods you eat. You have to keep clear records of how many calories carbs and protein you eat each meal and each day. In terms of dietary fat, it's not overly important to track as you should not be eating any dietary fat outside what is naturally occurring in your lean protein sources and to a lesser extent, carbohydrate foods. Records are important as they serve as feedback, giving you insight to "why." Why aren't you losing weight even though your eating less food? Maybe your eating so few calories, the body's metabolism has slowed negating your dieting efforts. Why are you failing to lose weight though restricting your intake of fatty foods? Perhaps your carbohydrate intake is overly generous. Why do you fail to lose weight though you've been exercising with diligence 7 days a week? Could be your overall caloric intake is still too high and the food choices and combinations shoot insulin levels so high, exercise becomes a wasted effort. The solution? Records.

The ideal way to get a good grasp on what you are really eating and the real quantity, is to record the food you eat each and every day. Record keeping provides the information required to begin a sound nutrition and eating plan. Otherwise, not knowing precisely what and how much you are eating, requires you "guess" and guessing how to shed fat is as difficult and improbable as guessing today's lottery numbers. Will 2100 calories a day be an effective caloric intake allowing you to shed fat while preventing the metabolism from slowing? You can't be sure unless you know how many calories you are currently consuming and record keeping will provide that information. Or, if you jump into a caloric intake of 2100 calories a day and see some nice results, can you expect them to last? Is it a bit too low causing you to burn off some lean muscle with body fat? Again, records will guide your success.

Unfortunately, when an individual starts to keep records, a strange phenomena occurs. People fudge. They alter eating habits. They eat better. Less fat, more fruits and vegetables. While eating better is obviously beneficial, the "fudge effect" does not always give a clear view revealing "how and how much" one really eats. Therefore, keep records for at least 2 weeks as it may take at least this amount of time to truly record the "real way" you eat.

Funny. Many who resist the idea of keeping dietary records are well aware it can be overwhelmingly difficult to organize, control and take charge of their financial lives without record keeping. Records will allow you to establish a starting point showing you the reason(s) you may be fatter than what makes you comfortable. Upon seeing progress, you'll know why, and if progress wanes, you'll have the information and numbers needed to make alterations and adjustments in your nutrition plan leading to continuos success.

WHAT TO RECORD

1) Time of day eaten.
2) How many calories, carbohydrates and protein at each meal.
3) Total calories for each day.
4) Total carbohydrates and protein for each day.

** see appendage 2 for food values

Chapter Eight

Does 3500 Calories Equal One Pound Of Fat?

There was a time when dieters played strict, and sometimes exclusive, attention to total caloric intake with little regard for total carbohydrate consumption, fat intake or variables such as metabolism. The dieter's life was rather simple. Just count calories, cut a certain amount from the diet and fat loss will follow. However, there's a little more to it as illustrated below.

Food scientists tell us one pound of fat is equal to 3500 calories. That is, when a total of 3500 calories is omitted from the diet, one pound of fat should be shed. That's what they tell us, but it's not exactly the full story. Let's take a look using two individuals as an example.

A) John eats 3300 calories a day.
B) Jane eats 1800 calories a day.
Both reduce their caloric intake by 500 daily creating a weekly caloric deficit of 3500 calories.
A) John now eats 2800 calories a day.
B) Jane now eats 1300 calories a day.
A) John reduces his calories by 500 a day, 3500 a week or by 15%.
2800 is 15% less total calories than 3300.
B) Jane reduces her calories by 500 a day, 3500 a week or by 28%.

1300 is 28% less total calories than 1800.

Using the popular premise that 3500 calories will equal one pound of body fat, the two individuals actually see very different results. John can expect to lose one pound of fat a week because he has reduced his calories and is creating a one week deficit of 3500 calories. Furthermore, he can expect continual fat loss at a clip of roughly one pound each week. Of course, he may eventually run into plateaus. But it's safe to assume the body will recognize the 3500 caloric reduction and give up a pound of fat as fuel for at least a few weeks. Furthermore, the reduction in calories is mild, at 15%. And we learned mild reductions in calories are effective in coaxing the body to give up body fat as fuel while greater reductions in calories often cause a down regulation in the metabolic rate where it adapts by decreasing the total amount of calories it burns each day. Aggressive dieting usually backfires as the body accommodates to large caloric reductions by burning less fuel.

Jane may be a less fortunate. She too will lose a pound in the first week because, like John, she has reduced her weekly caloric intake by 3500. However, not all reductions are the same. She has reduced her intake by 28%, almost twice that as John's 15% and the body will likely respond by shedding lean muscle mass along with body fat which slows the metabolism. In addition, cuts in fuel intake greater than 15% can make the dieter feel less energetic and less energetic people tend to expend less fuel in any given day. So while Jane may lose a pound of weight each week, it wont be exclusively fat but a combo of fat and muscle and muscle is the dieter's closest ally as it keeps the body's internal engine, called metabolism, elevated.

In trying to shed fat, aim for a reduction in calories as a percentage of your base diet. Reducing by 15% will lead to fat loss without slowing down the metabolism as smaller cuts tend to burn exclusively fat - never muscle. While a 15% reduction from a base diet may not total a pound a week, it it could add up to one pound in 2 weeks or a pound every 10-12 days. More important, a reduction of 15% will not send the

metabolism into a downward spiral making fat loss nearly impossible. Ideally, Jane should have made a reduction of 15% or by 270 calories a day eating 1530, down from 1800 calories.

Q If I burn 3500 calories a week through exercise will I lose a pound of body fat?

A Yes, expending 3500 calories will lead to a pound of fat loss. However, an individual can burn body fat, even by expending less than 3500 per week. If a person walks very briskly for an hour, he may be able to expend 200-250 calories. Though it would take a bit more than 2 weeks to burn off a pound of body fat (3500 calories), it may be more beneficial over the long term because a less aggressive approach to expending calories is akin to a mild reduction in calories. That is, going overboard and trying to burn off huge amounts of calories with excessive amounts of exercise will back fire as quickly and as dramatic as reducing calories. Extremely heavy bouts of exercise increase ***cortisol*** levels in men and women which is a stress hormone with "muscle wasting" capabilities. In effect, over exercising causes the ***over secretion of this hormone which, in turn, promotes the burning of lean body mass!*** So, the extremely heavy exercisers engaging in hours upon hours of aerobic work each week will never burn exclusively body fat. Due to rocketing cortisol levels, the body shifts fuel sources and begins burning muscle tissue along with body fat. Eventually, the drop in muscle tissue - the result of over exercising - causes a slow down in the metabolic rate. ***Thyroid levels, the calorie burning hormone that drops with prolonged low calorie dieting also drops with extreme increases in calorie expenditure.*** So don't think embarking upon some outrageous exercise plan will melt every last ounce of fat off you. The likely result; a compromised hormone flux that slows the metabolism. Over zealous men engaged in heavy exercise will also experience a ***drop in testosterone levels,*** the male hormone that supports lean body mass and encourages fat metabolism. Lower testosterone levels translate into less muscle, a compromised metabolic rate,

and a compromised ability to burn body fat. Stay away from crazy diets and stay away from crazy amounts of exercise.

Q How about exercise and dieting? Isn't that the best way to go?

A Exercise and dieting at the same time may lead to better progress but many find the combo too overwhelming... committing to daily exercise and recording food consumption at the same time. For many, the best results may come from dieting alone or from exercising alone with no radical changes in eating habits. At least for those who are just getting started. Of course, a mild reduction in calories coupled with exercise is a great combo because any type of exercise bumps up the metabolic rate making it easier to burn calories and weight training would increase lean body mass causing the body to burn more calories in any 24 hour period.

When embarking upon a diet and exercise plan, know that a combined 3500 calories can be burned off/or reduced from the diet causing a pound of fat loss. To create a 3500 calorie deficit in 10 days simply eat 350 less calories each day (3500 calories/10 days = 350). Or reduce calories by 175 while expending another 175 daily. (175 + 175 = 350. 350 x 10 days = 3500 calories.)

It may surprise many that such small alterations in diet can lead to fat loss. Thus, another reason to keep records of all the foods eaten each day. It's easy to forget what was eaten during the day and equally easy to overeat 300 calories each day which could cause one's body weight to increase by a pound over a 12 day period.

Many hate the idea of becoming a food accountant, recording every item of food eaten each day. Instead, they opt to haphazardly cut calories or to make huge cuts hoping to force fat off the body. Losing body fat while holding onto metabolic boosting lean body mass requires willpower, knowledge and action. Many have the will, hopefully this book will give you the knowledge, but only you have the final say. Unless you commit yourself, are dedicated and keep records, all your willpower and dedication may be a futile effort. Now get to it!

Chapter Nine

Alternative Diet Strategies Eating at Night: Rights and Wrongs

Bodybuilders are some of the leanest people on earth. In an attempt to shed every ounce of excessive body fat, they often stop eating late at night. Specifically, many will reduce their carbohydrate intake as the day progresses hoping more fat will be lost.

I've heard it over and over again, "If you want to get lean, cut your carbs out completely after 4 pm." Others suggest 6 pm and I've heard as early as 3 pm. In some cases, eating carbohydrates late at night may very well encourage the storage of body fat.

Carbohydrates seem to pose a special problem for those seeking to lose body fat. After all, carbohydrates are the chief fuel source for working muscles (weight training). They're needed to lift weights which adds lean body mass and, in turn, addition muscle mass supports fat control efforts by increasing the basal metabolism. In addition, eating way too few carbs, especially over a period of seven days, could lead to extreme muscle fatigue. On the flip side, we know excess carbs can prevent the mobilization of fatty acids out of fat cells and all extra carbs, above and beyond what is required to fill the muscles with glycogen, will be stored as body fat.

Carbs and Fat Control

The primary rule in controlling body fat is to prevent the body from storing fat in the first place (see chapter 4. fat inhibition) Avoiding an excess caloric intake, yet eating within caloric needs, is a must if one hopes to attain a low level of body fat. To lose fat, energy from calories must be reduced by eating less food or energy must be expended with exercise. When the body perceives a calorie deficit, it begins to use a greater degree of body fat as fuel. Careful; large deficits will cause the body to fight back by hoarding fat.

While reducing calories is an important step in controlling body fat, other factors play a role. Low fiber diets can lead to over eating and elevated insulin levels. A high sugar diet and a high fat diet can increase the fat storing machinery even when caloric intake is not numerically excessive. Need convincing? Imagine an individual requires 2500 calories a day to maintain his weight and eats 2500 calories from lean proteins such as egg whites, chicken breast and fish. For carbohydrates, he chooses slow digesting complex carbohydrates including yams, oatmeal and potatoes. For good measure he throws in some vegetables and high fiber fruits such as apples and strawberries. In effect he is matching his caloric intake with his caloric needs and maintains his body weight. Now imagine the same individual consuming exclusively fast foods to obtain his 2500 calories each day. An egg Mc Muffin with sausage for breakfast, a candy bar mid morning, lunch is pepperoni pizza along with a large Coke and dinner is a piece of fried chicken, another Coke and mashed potatoes with gravy. The daily total; 2500 calories. Can we expect the fast food menu to promote greater increases in body fat than the aforementioned "clean and healthy" menu? Sure can! The take home lesson is clear. While total calories must be considered in determining fat gain or fat loss, types of calories or quality of calories and their effect on fat storing hormones and enzymes must also be considered.

With this in mind, refined or simple carbs those fast acting, easy to digest carbos including honey, juices, jams,

jellies, white bread, mashed potatoes and all those fat free bakery products like fat free cakes, cookies and muffins have no place in a nutrition plan striving to control or limit the accumulation of body fat. These are the carbs that rapidly digest flooding the blood stream with a hefty shot of glucose causing insulin levels to rise. Recall insulin is a "regulator" as it keeps a check on "how much" glucose is allowed in the blood. When glucose levels rise, insulin levels rise. Insulin transports the glucose into body cells. The first place glucose is stored is in muscles as muscle glycogen. ***As muscle glycogen levels begin to fill up and become saturated, additional glucose begins to be stored as body fat.*** Essentially, the amount of glycogen already stored in muscle constitutes the main factor as to the fate of glucose in the blood. When muscle glycogen stores are low, insulin transports glucose into glycogen stores. When muscle glycogen stores are full, insulin transports glucose into fat stores.

One way to control glucose levels and insulin output is to avoid a high carbohydrate intake later in the evening. While total calories likely have the greatest effect on body fat storage, lowering glucose levels by avoiding late night carbo meals may also play a strong role. Foods, especially carbohydrate foods, eaten later at night have a greater tendency to be stored as fat for 3 reasons:

1) At night, activity levels tend to drop. Clearly, you burn less calories while sleeping than during an active day. Therefore, eating a high carb meal before going to bed will likely be stored as body fat.
2) As the day progresses, muscle glycogen stores begin to fill up from eating through the day. As glycogen levels fill, the percentage of incoming carbs being sent exclusively to glycogen stores changes. When glycogen is ***very*** low, all carbs are sent into glycogen stores. As glycogen is full, all carbs are sent to fat storing pathways. And as glycogen stores approach full, some carbs enter glycogen stores while others can be sent into fat storing pathways. At night, after 4 to 5 meals,

glycogen stores are more likely to be full - or darn close to it - making it easier to send some carbs down fat storing pathways.

3) Carbohydrate sensitivity falls at night. As glycogen levels become full, the receptor on muscles for insulin becomes less "insulin friendly." When this occurs, insulin levels tend to rise and higher amounts of insulin tend to divert carbohydrates towards fat cells. Essentially, 300 calories of carbohydrates at 11 pm, consumed immediately before going to bed will elicit more insulin than the same number of carbs consumed at 7 am when glycogen stores are slightly lower due to an overnight fast. The degree of glycogen stores effect insulin dynamics. ***If glycogen is very low, insulin sensitivity is very high.*** On the contrary, when glycogen levels are saturated, insulin sensitivity drops. Recall, insulin sensitive muscle favor a lean body.

Cutting Carbs & Fat Loss

In a previous section, it was illustrated how and why weight training is, long term, better than aerobic training in controlling body fat levels. Weight training is the exercise that adds muscle, boosting the metabolic rate allowing the body to burn more calories. Plus, weight training causes micro-tears in the muscles which require energy (ie. calories) for complete repair - keeping the metabolic rate elevated around the clock, 24 hours a day! The information below pertains to the individual who chooses weight training as his the primary mode of exercise.

If training with weights earlier in the day, your final meal, or even final two meals of the day, ought to be lower in carbohydrates. Lowering your carbohydrate intake before going to bed keeps levels of glucose in the blood lower and the total amount of glucose in the blood before going to bed effects the release of growth hormone (GH). Growth hormone is a fat liberating, muscle building hormone that is released within 30-90 minutes of sleep. In some, especially those who carry a high amount of body fat, GH levels don't

"pop" when glucose levels are elevated. Stated another way, high glucose levels blunt GH release. To take advantage of the GH surge that accompanies sleep, back off a high carb intake in your final 1 or 2 meals of the day. In contrast, a lean individual will experience the GH surge regardless of blood glucose levels.

If you train with weights after work at night, then you must not skimp on carbs after training. The body needs carbohydrates after weight training to set in motion a cascade of events that promote the re-building of muscle tissue. Furthermore, the carbs consumed after a hard weight training workout are quickly whisked out of the blood to make new muscle glycogen - which is depleted during training. Carbs consumed after training are removed from the blood and stored away as muscle glycogen. This, in turn, leaves the bloodstream with lower blood glucose levels which is an ideal environment for initiating sleep induced GH release.

As body fat levels begin to decline, the hormonal milieu changes. Insulin levels change. ***In response to eating carbohydrates, the lean body outputs less insulin while the heavy body outputs more insulin.*** More insulin is related to greater body fat. As a person leans down, he gains some momentum in that his hormonal response to eating carbs changes, facilitating fat loss. Likewise, as body fat levels drop, the individual will no longer have to curtail carbs before going to bed as lean folks do not experience a compromised GH output with sleep.

Directing Carbs

Wouldn't it be great to be able to divert carbs towards muscles and never towards fat cells? You can, to some extent. Carbohydrates have a greater tendency to be stored as muscle glycogen immediately following hard physical (weight) training. Weight training relies upon stored muscle glycogen as fuel. The harder you train or the longer you train, the lower glycogen levels drop. When muscles become low in glycogen and you eat a meal high in carbohydrates, the muscles "draw" or "suck" the carbs right out of the blood

to replace the glycogen burned away with training. The more you can get your body to store glucose from carbs as muscle glycogen, the less chance they will be stored as fat. To reiterate the point; if carbs are headed towards muscle then they're not headed towards fat.

The individual following a weight training program to increase lean body mass which, in turn, "builds" or "revs" the metabolism, should eat a a greater portion of his daily carbohydrate intake following his exercise session. This technique - eating more carbs after training - will encourage carbs to be stored directly as muscle glycogen (and not as body fat!) for 2 reasons:

1) Glycogen starved muscles crave carbohydrates.
2) Insulin receptors on muscle are highly excitable after training. This means the majority of carbohydrates eaten after traning will be stored *in muscles* and rarely deposited as body fat.

Growth Hormone: A Spark Plug For Fat Loss

Another reason to avoid late night carbohydrates or to lower carbohydrate intake in the evening hours is to harness the body's output of growth hormone. Growth hormone (GH) is released upon falling asleep usually within 30-90 minutes. Growth hormone is a powerful stimulus for the individual wishing to shed fat and hold onto lean muscle mass as ***GH initiates a moderate shifting in fuel sources so the body burns a greater percentage of fatty acids*** - the backbone to body fat. When the shift occurs, the body burns a smaller percentage of glycogen or amino acids. It's the ideal solution for the individual lifting weights to lose fat and add lean body mass. Kicking up GH amplifies the changes that occur with hard weight training. Namely; the burning of fat while preserving lean muscle mass. Even the non training individual can benefit by reducing carbs at night. The dieter's goal is to lose fat and to hold onto as much metabolic friendly muscle as possible. Yet we learned dieting can cause a loss of both body fat and muscle so anything a dieter can do to support GH release can help save muscle by shifting his

body's metabolism so it uses more fat and less muscle mass. Avoiding carbs before going to bed can encourage GH release as lower blood sugar (glucose) levels support GH release while higher blood sugar levels block GH release. The sole exception to eating carbs at night is the individual who weight trains in the evening. He'll need carbs after training to aid the rebuilding process and any carbs consumed after training will quickly pass through the blood and into muscles making new muscle glycogen. This leaves the blood with lower glucose permitting the natural GH "pop" upon sleep.

Applying the Strategy

The lower-carbs-at-night strategy can be applied to our on going example of the individual who, with the use of weight training, has increased lean body mass from 127 pounds to 137 pounds.

Previously eating 137 grams of protein a day split over 6 meals and yielding 23 grams of protein per meal along with 187 grams of carbohydrates a day, the equivalent of 31 grams per meal, the individual will now remove or curtail carbohydrate intake later in the evening in order to keep glucose levels lower which aids in the release of GH.

Original Carbohydrate Intake		**VS**	**New Carbohydrate Intake**	
Meal 1	31 grams		Meal 1	41 grams
Meal 2	31 grams		Meal 2	41 grams
Meal 3	31 grams		Meal 3	41 grams
Meal 4	31 grams		Meal 4	21 grams
Meal 5	31 grams		Meal 5	21 grams
Meal 6	31 grams		Meal 6	21 grams
	Total: 187			Total: 187

In this example above, I took 10 grams of carbs away from the final 3 meals and added them to the first three meals. In this case, the carbs eaten earlier in the day will likely be burned off through daily activities.

A variation is to drop the carbs completely from the final meal and incorporate those into an earlier meal. For example, the individual may wish to eat no carbs in the final meal and take those 21 omitted in meal 6 and include them at breakfast (meal 1) bringing the first meal of the day to 62 grams of carbohydrates. Therefore, a grid would look like so:

Meal 1	31 grams	VS	Meal 1	62 grams
Meal 2	31 grams		Meal 2	41 grams
Meal 3	31 grams		Meal 3	41 grams
Meal 4	31 grams		Meal 4	21 grams
Meal 5	31 grams		Meal 5	21 grams
Meal 6	31 grams		Meal 6	0 grams
	Total: 187			Total: 187

For the weight training individual, a smart approach is to consume 25% of the day's total carbohydrate intake in the morning meal (meal 1) and 25% after training. In the morning, blood glucose levels are at their lowest level of the day due to the restriction of food overnight and ***a high carbohydrate intake has less ability to stimulate fat storage when blood glucose levels are low.*** Thus, eating more carbs at this time is a simple nutritional step allowing an individual to maintain a high carb intake without having to worry about fat storage. Likewise, ***a high carb intake after training will be be stored as muscle glycogen, rather than body fat.*** Finally, when these 2 meals are higher in carbs, the other 4 meals of the day will be lower in carbs. ***Lower carb intakes when not physically active translates into lower blood glucose and insulin levels which encourages fat metabolism.***

Applying the above information, the meal plan looks like so:

DAILY TOTAL CARB INTAKE: 187 GRAMS	
Meal 1	47 grams (187 x .25% = 47)
Meal 2	23 grams*
Meal 3	23 grams*
Meal 4	23 grams*
Meal 5	23 grams*
	Train with weights here
Meal 6	47 grams (187 x .25% = 47)

* At these times, blood sugar levels are lower, probably closer to 70. (see page 15) Any time blood sugar of "blood glucose" levels fall, the body will release opposing hormones to increase blood sugar levels. These hormones; glucagon and epinephrine, not only "drag" glucose out of stored muscle glycogen reserves, but they liberate fatty acids from fat cells promoting a lean body. This is yet another strategy to promote fat loss or to initiate fat breakdown without further reducing calories, without radically changing the diet and without drastic measures which can slow the metabolism.

THE MATH

Breakfast:	47	grams of carbs
Post Training:	+47	grams of carbs
	94	grams of carbs

1) TOTAL DAILY CARB INTAKE - (breakfast and post training) = X
2) X divided by 4 remaining meals = gms of carbs/ meal

Example: 187 – 94 = 93
93 ÷ 4 = 23 grams of carbs per meal

Comparative Between Original Carb Intake and Carb Intake With Training and a Large Breakfast

MEAL 1 1 1/2 oz. oatmeal	becomes...	MEAL 1 2 1/2 oz. oatmeal
MEAL 2 1 1/2 oz. pasta w/ small salad	becomes...	MEAL 2 1 oz. pasta w/ small salad
MEAL 3 1 cup rice	becomes...	MEAL 3 2/3 cup rice
MEAL 4 pita	becomes...	MEAL 4 2/3 pita
MEAL 5 2 cups yogurt	becomes...	MEAL 5 1 cup yogurt w/ 1/4 cup non fat cottage cheese
MEAL 6 5 oz. potato w/ salad	becomes...	MEAL 6 7.5 oz. potato w/ salad

Chapter Ten

Low Carb Diets For The Obese

Over the past ten years, a low fat diet emphasizing plenty of energy rich complex carbohydrates has been the diet regiment that Americans have adopted in a quest for a fat free body. Combined with exercise, a high carbohydrate diet, one that includes foods like potatoes, yams, beans, whole grain breads and low calorie fruit has been used by countless millions to reduce fat stores. However, during the same time, the nation as a whole has become fatter than ever.

Many who successfully subscribe to the high carbohydrate diet believe a low carb approach to fat loss is dietary suicide. For those who have failed to attain a low level of body fat using a high carbohydrate diet, and for those who have exercised religiously, hour upon hour, week after week, and have failed to attain a "six-pack-rack" of abdominals, hard glutes, and a low level of body fat, the low carb approach may be suited for you. For the obese, who have over 50 pounds to lose, this may be a fast and easy to use plan that will work. After all, there's more than one way to get lean

The low carb diet is considered by many to be an extreme approach to fat loss. However, it is an easy diet to follow and may be much easier for those who despise counting carbs and protein, weighing food, measuring and reading labels. The low carb diet allows flexibility in this respect. The individual simply has to avoid all carbs and

count protein. No calorie counting is required. (they'll certainly remain low due to very low carbs and low fat)

We already learned carbs provide fuel to the body and, like any type of calories consumed in excess, the surplus is stored as body fat. We also learned a high carbohydrate intake, especially one that does not include high fiber foods and is liberal in simple or refined types of carbohydrates will cause a chronic release of insulin. A chronic insulin level inhibits hormone sensitive lipase, the enzyme that acts as a gate keeper allowing fatty acids to flow out of fat cells. At the same time elevated insulin kicks up levels of lipoprotein lipase another enzyme with gate keeper qualities. Only this gatekeeper welcomes fatty acids into fat cells making you fatter. Besides retarding the breakdown of body fat, insulin is a potent appetite stimulant. It increases the cravings for food. So powerful is the effect, some animals injected with large amounts of insulin will eat until the stomach ruptures. ***The appetite boosting and fat storing effects of insulin seem to be magnified in heavier individuals.*** In other words, fat people tend to stay fat because, in response to carbs, they produce more or an overabundance of insulin compared to leaner people and more insulin is correlated with a fatter body. For example, ***an obese individual eating 40 grams of carbs will secrete more insulin than a lean individual eating the very same number of carbs.*** Talk about tough luck!

It seems a low fat diet that matches basal metabolic needs and activity levels may not always be the best bet for the obese. Reducing calories might not work. The body appears to adapt to caloric reductions faster than that which occurs in leaner individuals. And exercise might not work. Many very overweight individuals are so out of shape, it becomes completely exhausting to try to continue with regular exercise. ***Plus, the obese tend to rely on sugar as fuel rather than fat.*** This fact makes it difficult for the obese person to exercise as blood sugar levels fall too quickly leaving them feeling extremely light headed during all forms of exercise. ***Sugar burners,*** those individuals who never

burn fat - and instead use sugar as fuel - ***will benefit by restricting sugar/carbs*** as low glucose levels forces the body to rely on fat as fuel and when this occurs, there is a adaptation within the fat burning system, a 'switching' effect, where a greater amount of fat is used as fuel over glucose.

The best way to initiate serious fat burning may be to resort to the extreme. In this case, the extreme is a very low carbohydrate diet. Cutting way back on carbohydrates; no bread, no sugar, no potatoes, pasta, rice, cereal etc. will radically lower the total amount of glucose in the blood. Easy to understand, right? Cut out carbs - nothing more than a fancy word for glucose - and the blood stream becomes nearly devoid of glucose. When the blood is low on glucose for more than 5 days at a time, a fountain of hormonal reactions occur that favor fat burning.

When carbs fall, the body fights back and sends out a team of hormones and enzymes to try to raise glucose levels closer to 70; the lower end of "whats' normal." Specifically, glucagon from the pancreas and epinephrine from the adrenals, raise blood glucose levels by forcing the liver and muscles to breakdown what little stores of built up glucose they may have. Liver and muscle glycogen, the storage units of glucose, subsequently "let go" of glucose which increase the concentration of glucose in the blood.

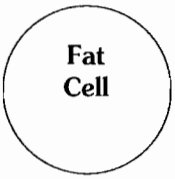
1) 

Blood
Sugar
Is
Low

2) Glucagon, epinephrine, hormone sensitive lipase released causing:

3) 

→ Glucose released to blood



→ Fatty acids → fuel muscles
→ Glycerol → Make glucose for your brain

Epinephrine, and to a lesser degree, glucagon also stimulate ***lipolysis, the liberation of fatty acids*** from fat cells. Fat cells are made of fatty acids and glycerol. The liberated fatty a acids can provide fuel for the muscles and glycerol can be used by the liver to make small quantities of glucose to provide important fuel for the brain. So far, so good. The net effect of constant low blood sugar by avoiding carbs; low glycogen levels and an increase in fat utilization!

Second Stringers

When the body is subjected to long periods of low blood glucose, it responds by releasing more growth hormone - at least more than would accompany a higher carbohydrate, high calorie diet. In addition to growth hormone, the body also increase the release of cortisol. Growth hormone causes fat cells to break down liberating additional fatty acids and glycerol

from body fat stores. While cortisol's got a bum rap - it has the potential to chew up muscle tissue which lowers the metabolic rate - in this case, it chews up fat. Cortisol is a stress hormone released when a person is either under heavy physical stress, like a hard training bodybuilder who does a few too many sets or it's released in larger amounts with extreme mental pressure. In those cases, cortisol tends to attack the muscles which not only slows the metabolism but lowers the immune system. When the immune system falls, it becomes even harder to hold onto muscle. Nearly impossible. However, with the low carb diet, cortisol levels rise ***with the rise in growth hormone.*** Growth hormone protects the muscles from being "chewed up." In fact cortisol will accelerate fat loss by interacting with growth hormone upon the fat cells. In essence, in the presence of growth hormone, cortisol chews up body fat rather than muscle mass and a prolonged low carb intake kicks up GH levels.

Muscle Wastage

The drawback to a low carbohydrate diet is, like any diet, there is some potential for muscle loss as insulin is required to help amino acids from protein foods "make it" to muscle tissues. Recall, amino acids are the building blocks for muscle. Sort of the bricks to a building. With no insulin, some muscle may be lost along with what you want to lose; pounds of body fat. Furthermore, while growth hormone tends to blunt most of the muscle destroying effects of cortisol, it does not completely suppress muscle breakdown. Thus, the goal is to try to manipulate the diet to prevent the loss of muscle.

Muscle loss can be significantly slowed as a result of the natural GH release and by increasing the intake of dietary amino acids found in everyday protein foods. When blood glucose levels drop, the body taps more fat as fuel but also relies on protein as fuel. Specifically, some amino acids from protein foods can be used directly by muscles as fuel while other aminos are sent off to the liver where, through a complex process called gluconeogenesis, they are converted

into glucose. The problem? Your muscles are comprised of amino acids and sometimes the body tears down its own muscle mass in order to obtain amino acids to be sent off and changed into glucose. The downside is obvious. ***Any time the body loses muscle, the basal metabolism - the "engine" in the body burning up calories - slows.*** The solution? Eat more protein to give the body additional amino acids that can be used for fuel, sparing muscle mass. Essentially, the body will burn the amino acids from foods ***rather than burn those from muscle.*** Increasing protein intake while lowering carbohydrate intake is essential. Additional protein, up to 1.5 grams of complete protein per pound of lean body mass has been shown to be suffice to maintain muscle mass in studies with obese patients following a low carbohydrate diet. Eskimos, who eat a strictly meat diet, one that yields essentially zero carbohydrates, consume at least double the amount of protein compared to the RDA, the "Recommended Daily Allowance."

Ketones...A Litmus Test For Fat Burning

Lowering carbohydrates along with a higher protein intake is, a modified form of fasting. When fuel intake decreases the body taps alternative fuel sources including body fat. After the body's stores of carbohydrates are used up in 2 to 5 days, the body begins to tap significantly more body fat and to a lesser extent, more body protein.

As fat is broken down, the fatty acids are sent to the liver where they make a special molecule called acetyl coenzyme A, an intermediary in fat metabolism. When fat metabolism is peaking, so much fat is being broken down, and so much acetyl CoA forms, that the body responds by bundling together the acetate molecules of acetyl CoA and produces ketones. Ketones are intermediary by products of fat breakdown and, when they build up in large amounts, leak out of the liver and blood and "spill" into the urine where they are excreted. Not all ketones are excreted in the urine. Some remain in the blood and are used by the brain and muscles as fuel. Though ketones

have a bum rap, they're actually helpful to the low carb dieter. Beside feeding the brain, they ***spare the loss of muscle mass*** as they can be used by muscle tissue as fuel - sparing amino acids and preventing muscle breakdown and loss. Thus, ketones are called "protein sparing." They save muscle on low calorie and low carbohydrate diets. Interestingly, they suppress the appetite making it easier to "stick to" the low carb diet.

Protein and Carb Requirements On A Low Carb Diet

When carbohydrates are reduced and glycogen stores are very low and fat breakdown is in high gear, protein is broken down to make new glucose which is used to feed the brain. If an individual consumes no carbohydrates at all, the body can use up to 200 grams of protein daily just to keep the brain for falling short on fuel. My recommendation is to first limit insulin release by cutting carbohydrates to 50 a day for those who exercise 2-3 times a week and 75 grams a day for those who exercise 4-6 times a week. Lowering blood glucose levels by limiting carbohydrates stimulates the fat mobilizing effects of glucagon, epinephrine, growth hormone, cortisol and ketones.

Protein must remain high as dietary protein supplied, in higher amounts, can offset some of the muscle wasting effects associated with a low carb plan. On a low carb diet, I suggest protein consumption rise to 1.5 grams of protein for each pound of ***goal body weight.*** For example, the individual weighing 188 pounds and wishes to reduce to 158 pounds, protein intake should be roughly 237 grams a day (1.5 x 158 = 237). On days an individual is working out, protein intake should rise to as high as 1.75 grams per pound of goal body weight. In this case, 276 grams a day. And, if your a bodybuilder and carry a lot of muscle, you will need more protein, as high as 2.2 grams for each pound of goal body weight. Say a bodybuilder has a goal of weighing 180 pounds, he'd consumed 315 to 396 grams of protein a day. (1.75 to 2.2 grams per pound of goal body weight)

Ketostix, purchased at any pharmacy, can quickly inform

the low carb dieter his state of ketosis. Basically, the user urinates into a paper cup and dips these small little sticks into the urine. If the stix turn purple, it means ketone fragments are being produced. If so, the user can rest assure, he's burning a lot of body fat. If ketostix come up negative and do not turn purple, it is likely the ketones are not "spilling" into the urine but are being metabolized and used as fuel.

If you are in ketosis, stay there for no more than 3 days in a row. After the third day of ketosis, lower your protein intake to .5 grams per pound of goal body weight if exercising 2-3 times a week and 1 gram if you exercise 4-6 times a week. At the same time increase your carbohydrate intake to 2 grams per pound of body weight if you exercise 2-3 times a week and 2.5 grams per pound of body weight if you exercise 4-6 times a week. Do this for a ***single day*** and then return to the 5 days of a low carb diet - or as long as it takes to reach mild ketosis.

Upping the carbs and suspending the low carbohydrate diet can off set the metabolic slowdown that is associated with a low carb intake. When calories and especially carbs are radically reduced, the body often reacts by decreasing the output of thyroid hormones. Thyroid hormones are intricately involved in calorie burning and fat metabolism. If thyroid levels drop, the dieter will experience lethargy - extreme exhaustion - and a slowdown in the basal metabolism. Adding in higher amounts of carbs every fourth day, when ketone production and fat burning are in high gear, can trick the body, causing it to continue to release thyroid hormones rather than decrease its output. The effects allows thyroid levels to remain high even when you diet with extreme diligence on low carbs.

Ketones are natural and safe. Excessive ketones for long periods of time could lead to acidosis, a dangerous problem associated with diabetes. It's diabetic acidosis common only to diabetics, that has given ketones bum rap. This lo-carb approach suspends ketosis after 3 days allowing a single high carb day before returning immediately to lower carbs.

No Fat Needed

Many common low carbohydrate diets recommend the user include plenty of fatty foods which, for the most part, makes absolutely no sense. The claim put forth; as long as insulin levels stay extremely low by following a no carbohydrate diet, calories are not important. "Don't be concerned with butter oils, fried chicken, ham, sausage and fatty steaks. You can eat as much dietary fat as desired." Not so fast! We learned calories along with hormones are important in controlling body fat. If calories are too high, no matter where they come from - be it carbs, fat or even protein - the excess has to be stored as body fat. And, on the other and of the spectrum, if calories are borderline, not too high or not too low, and insulin levels are always high due to a low protein diet or a diet rich in simple sugars, then it's easy to gain fat. Finally, ***if insulin levels are low but dietary fat and total calories are high, you'll gain body fat!***

Eating lots of fat on a low carb diet will provide excess calories that can be stored as body fat. Eating fat provides fatty acids giving the body an additional fuel source that would, if eaten in excess, spare the body from breaking down the maximum amount of stored body fat.

However, the low carb dieter can include some fat. Specifically, including omega-3 fatty acids found in salmon, canned sardines, canned herring and mackerel can protect against heart disease. Omega-3's have a lesser chance to be stored as body fat than the fat common to most oils, fried food and high fat meats as omega-3's have a few physiological jobs to perform first. The low carb dieter can also indulge on "free carbs" or "non-digestible carbs" such as broccoli, cauliflower, asparagus, lettuce, spinach, mushrooms, okra, radish, kale and french cut green beans. These provide virtually no calories as they are really nothing more than fiber, through and through. And we lack the ability to obtain energy or carbohydrates from fiber.

Sample 5 Meal Plan for a Non Training Person:
Weight: 188 lbs.
Goal: 158 lbs.*

* Goal weight is approximate to Lean Body Mass.

237 grams of protein and 50 grams of carbohydrates....
All meals yield approximately 47 grams of protein
(47 x 5 = 235)

	PROTEIN	CARBOHYDRATES (50)
Meal 1	15 egg whites	1 slice bread
Meal 2	10 oz. chicken breast	0
Meal 3	10 oz. steak	3 rice cakes
Meal 4	9 oz. turkey breast	salad
Meal 5	12 oz. fish	salad

HIGH CARBOHYDRATE DAY

Carbohydrate Intake Should Be:
158 x 2 = 316 carbohydrates which is approximately
63 grams each meal

Protein Intake Should Be:
158 x (.5) = approximately 80 which is
16 grams per meal

	PROTEIN	CARBOHYDRATES
Meal 1	5 egg whites	3 slices whole grain bread
Meal 2	3 oz. chicken (PCW)	3 oz. pasta (PCW)
Meal 3	3 oz. steak (PCW)	2 cups rice, cooked
Meal 4	4 oz. fish (PCW)	10 oz. potato (PCW)
Meal 5	3 oz. chicken (PCW)	10 oz. yam (PCW)

PCW= "pre cooked weight"

Chapter Eleven

Thermogenesis: Heat Production For Fat Loss

Thermogenesis is a fancy word for heat. The normal body temperature is 98.6 F. It's the "core temperature" - the amount of heat continually produced within the body. Each and every time fuel from the foods we eat is introduced into the body, the temperature rises a bit. It's a kin to a camp fire. To some degree, the more wood added, the hotter the fire. The body is similar. Add food, the body temperature increases.

Thermogenesis was once called the SDA effect or specific dynamic action. SDA concludes... not only does the body temperature rise with food consumption, but it "costs" the body some energy in order to "untrap" the fuel found in foods. Furthermore, smart dieters realized; get the body to produce more heat and it will burn more calories. The thinking; ***increase the body temperature and burn off a greater percentage of all the calories eaten each day.*** To illustrate the calorie burning potential of increasing the body temperature, simply look at an individual struck down with some type of fever. The 150 pounder lying in bed at complete rest can expect to burn, more or less, 1500 calories daily. The 150 pounder taken ill and running a temperature of 102 F could expect a radical increase in caloric expenditure in a given 24 hour period. In fact, the

sick 150 pounder may see a doubling in caloric expenditure, up to 3000 calories daily - without leaving the bed!

Not all sources of calories exert the same heat increasing effect in the body. Proteins exert the strongest thermic effect, carbs exert a milder effect and dietary fat the smallest of the three. One reason dietary fat is more "fattening" than carbs and protein, is due to fat's relatively tiny thermic effect. Fat is only 3% thermic. Upon ingesting 100 calories, 3 of the 100 will be burned away in the production of body heat leaving 97 remaining. When 100 calories of carbohydrates are eaten, roughly 12-15 of those 100 are burned away in body heat. With protein, the effect is about 20% and as high as 30%. For every 100 calories of protein eaten 20-30 are lost in the body, burned away due to a slight increase in heat production.

Interestingly, dietary induced thermogenesis occurs to a greater degree in lean individuals. ***The more body fat one carries, the smaller the thermic boost in the body.*** One reason: insulation. Body fat acts as an insulator trapping heat within the body. When it's really cold outside and an individual struggles to remain warm, he throws on a heavy jacket, right? That jacket acts to trap heat inside so heat can not escape. Body fat is nature's jacket. It traps heat inside the body so body heat is less likely to escape. Now imagine a lean person. He has no body fat to trap heat inside, so it escapes with relative ease. As heat escapes, his body has to produce ***more heat*** to maintain the 98.6 F body temperature by increasing its heat production. When the production of heat rises, more calories are burned. So, those with less body fat experience a greater thermic effect upon eating food.

Diet's that seem to blunt or negate thermogenesis include:

1) Low Protein Diets.
2) Low Carbohydrate Diets.
3) High Fat Diets.
4) Low Salt Diets.

When calories are too low, as common with many diet plans, the body produces less heat. ***With less heat***

production, your maximum ability to burn the maximum amount of calories each day subsequently falls.

One reason many who eat a low fat, but higher carbohydrate and protein diet, see good results is due the relatively greater thermogenic effect of carbs and protein compared to dietary fat.

Interestingly, a low carb diet can lower heat production within the body as decreasing carbohydrates is associated with a lower thermic effect. However, a low carb diet coupled with increased protein consumption - the nutrient with the greatest thermic effect - may off set a compromised thermic effect.

Diets that increase thermogenesis include:

1) Diets that are adequate in calories, matching an individual's basal metabolism and activity levels.
2) Diets that are above daily caloric requirements.
3) Diets that include frequent feedings.
4) Diets that include plenty of fiber from vegetables.

When an individual over eats, especially when over eating carbohydrates, the body temperature rises. It's the opposite effect of starving. With severe restriction of calories, thermogenesis decreases and with overfeeding - eating more than required - thermogenesis increases. Of course, an increase in thermogenesis will not over ride the effects of eating too many calories. In other words, eating more calories than the body needs will still cause an increase in body fat regardless of a step up in thermogenesis. Total caloric intake still counts and is important. However, this increased heat effect is a reason the high carb day suspending a low carb diet and (see page 106) the rotational diet that includes a single high carb day (see pages 76-78) enhances fat loss.

In some, an over eating thermic effect is far greater than experienced in others. For example, 2 brothers of similar weight, height, build and activity level could both over eat above and beyond their daily caloric needs for 8 to 10 weeks. After the term, one may very well have gained 10 pounds

while another 7 or 8 pounds - though they ate the same exact foods and same total caloric intake. Why? Thermogenesis. Some people experience greater heat increases with eating than others.

The same differential effect is seen in dieting. An individual reducing calories may experience weight loss at a clip of 1 pound a week. Upon further reducing calories, the same individual expects to see far greater fat loss but is perplexed upon seeing only minute changes with far greater effort. Why don't bigger reductions cause greater fat loss? To some degree, the answer is thermogenesis. Severe dieting causes the metabolism to slow down and a factor that changes is heat production within the body. Eat less, produces less heat! Eat more, produce more heat. Over eat, and produce even more heat.

An individual cutting 1200 calories from the diet each day would expect to shed a pound of fat in 3 days (1200 calories x 3 days = 3600 . Recall 3500 calories = a pound of fat). In reality, a full pound is not lost due to a slower metabolism and compromised thermic effect. On the other hand, the individual who overeats, especially complex carbohydrates and lean proteins - those foods with greater heat inducing capabilities - will experience an "up-tick" in thermogenesis. This may explain how the individual overeating 1200 calories a day for 3 days does not gain a full pound of fat. While his weight will surely increase and he may gain body fat, it may be as little as to 3/4 of a pound of fat. The increased thermic effect of over eating burns away some of those extra calories leaving fewer "net" calories destined for fat cells.

Take home lessons.

1) If your going to over eat, make it complex carbs and lean proteins, not greasy fatty foods with little thermic potential.
2) Don't go crazy and radically reduce calories as large reductions lower heat production making compromising calorie burning.
3) Low-carbs to high carbs, moving in and out of ketosis

prevents a downgrade in thermogenesis.

4) Go back to chapter 6. A rotational diet that lowers carbs for 3 days followed by increasing carbs for 1 day promotes thermogenesis.
5) Need another reason to eat smaller meals, up to 6 a day rather than 2 or 3 large ones? Besides improved nutrient absorption and more stable blood glucose levels which in turn, avoids spikes in insulin, multiple meals support thermogenesis. Each time an individual eats, thermogenesis increases, so it makes sense to stimulate thermogenesis as often as possible while eating within your daily caloric needs (see chapter 4).

Dietary blunders that compromise thermogenesis include:

1) Eating only 2 or 3 times daily.
2) Eating a low fiber diet.
3) Eating too many simple carbs at the expense of including complex carbs and vegetables.
4) Eating excessive calories before going to bed.
5) Skipping breakfast.
6) Prolonged dieting.

And now...Americans are drastically decreasing the intake of salt or sodium which might not be the best advice for a dieter. Granted, a high salt intake may aggravate high blood pressure in those who already have high blood pressure. There's no denying that. However, salt effects thermogenesis and thyroid hormones. Salt contains iodine, the mineral that supports the production of thyroid hormones and thyroid plays a big role in calorie burning. When iodine levels fall with a zero or near zero sodium intake, thyroid production can become compromised. When thyroid levels drop, thermogenesis really free-falls.

Thermogenesis also works with exercise. Exercise induced thermogenesis occurs in muscle tissue. When an individual exercises, calorie are expended. Some come from the physical effort required to "do" the work but some calories are also burned away when the internal body

temperature slightly rises. Another explanation; when your body heats up by moving it around, some calories are "lost" or burned due to added heat production; outside those burned in "getting" the body to move around.

Some suggest dieters exercise in cold environments or wear less clothing while exercising. The reason; when the body is cold, the internal temperature can drop slightly. In response, the body will expend calories trying to increase the body temperature. In fact, a study a few years back showed submersing an individual in very cold water for 20 minutes burned as many calories as 20 minutes of moderate exercise. How? As the body temperature fell, the body burned fuel to bring the temperature up to its normal point of 98.6. The energy used to "bring up" the body temperature is no different than those used to "briskly walk" for 20 minutes.

Chapter Twelve

Exercise: A Closer Look

Thus far, the main thrust has been nutrition, what to eat and what not to eat to attain a lean body. Let's turn to exercise and the most basic tenet.

All forms of exercise burns calories and if an individual "burns" or expends more calories than are consumed, body fat becomes a major source of fuel.

Earlier, a substantial distinction was made between aerobic exercise and weight training. That being; the body adapts to exclusively aerobic work by becoming efficient. In time, the body can perform the same level of exercise and burn fewer total calories. The body adapts to weight training altogether different. The adaptation process is the addition of muscle mass and the greater amount of muscle one carries, the greater amount of calories burned each day.

A stringent weight loss plan, with no exercise at all, generally causes weight loss but what is lost is another matter. Strict dieting and no physical activity will cause fat and muscle to be shed at nearly a 1 to 1 ratio. For each pound of fat lost, a pound of muscle is lost! The result? The individual losing 50 pounds may very well lose 25 pounds of fat and 25 pounds of muscle. Though his weight may have radically declined, his ratio of fat to muscle on the body, often called "percentage of body fat" has not changed one bit. Worse, a loss of 25 pounds of metabolically active muscle

mass means he has slowed his metabolic rate.

How bout adding cardio work to a really strict diet? The results? Not much different. The individual combining aerobic work with a severe reduction in calories may lose more total body weight, perhaps another 5 pounds or so, but the exercise will do nearly nothing to preserve lean muscle mass. In other words, a severe diet combined with cardio work results in a loss in muscle mass. Losing muscle mass is the single most metabolic slowing event that ruins the metabolism, makes fat loss harder and makes a hard looking body nearly a pipe dream! Aerobics may burn some extra fuel, but it wont save muscle.

When weight resistance exercise is added to a severe reduction in calories, the body holds on to - in worse case scenarios - 80% of its muscle mass and in some individuals, weight training can nearly completely off set the loss of muscle mass regardless of "how severe" the diet is. Weight training saves muscle which keeps the metabolism elevated and causes a 'switch' where a greater percentage of body fat is melted away (instead of muscle). Another way of saying it; if the individual is in a severe caloric reduction state and the body refuses to burn muscle (due to weight training) then it must rely on body fat.

OVERVIEW
Effects of Severe Diet , Severe Diet With Exercise on Metabolism

PERSON A: Severe Diet
PERSON B: Severe Diet & Cardio
PERSON C: Severe Diet & Weight Training

	Start Weight	End Weight	Fat Loss	Muscle Loss	Downgrade Effect On Metabolism
A)	250	200	25 lbs	25 lbs	maximum
B)	250	200	28-30	20-22	strong
C)	250	200	40-45	5-10	light to none

So, weight training acts as the stimulus causing the body to "hold" muscle tissue, something aerobic exercise has dramatically no effect on. Thus, weight training is far superior to aerobic training as a tool to lower body fat levels as the more muscle you carry, the greater the metabolic rate. In fact, a higher metabolism, which can be created by adding muscle mass, is more important than exercise itself in keeping body fat levels under control.

Refer back to page 44, to the easy formula outlining the guidelines for daily caloric requirements. The basal metabolism (BM) - the amount of calories needed in a day at absolute rest doing nothing at all- always exceeds the calories required for "daily activity and exercise." For example, an individual with 180 pounds of lean body mass will require roughly 1800 calories a day sitting at home, barely moving, plopped in front of the television. How many hours of really intense exercise would it take for him to "burn off" 1800 calories? Oh, about 3 hours! Of course he could decide to go for a long leisurely walk to burn off 1800 calories. How bout 16 miles! There's a little more magic to weight training. Besides increasing metabolism, the effect of having more muscle allows a person to burn more calories and fat if he decides to perform cardio. Here's the illustration. Two people decide to perform 40 minutes of cardio exercise each day. One man weighs 200 pounds and carries about 170 pounds of lean muscle weight while another man weighs 140 pounds and carries 119 pounds of lean muscle weight. Each day, they use a stair climber for 40 minutes and each individual wears a heart rate monitor and reaches a training heart rate of 70%. In other words, they both work at the same level of intensity. Who gets lean? Both. Who gets leaner? The larger individual with more muscle mass. Why? Working at similar levels of intensity, the factor that determines "how much" calories and fat you burn is muscle! The more muscle you carry while doing aerobics, the more fuel you burn. Here's the analogy. The same two men decide to drive from Boston to New York, about 200 miles. One takes his Toyota Land Cruiser, the other drives his Honda

Civic. The two drive side by side all the way there - at 60 miles per hour. Do they use the same amount of fuel? Of course not. The larger vehicle requires more fuel to do the same work just as the larger man, with more muscle, uses more calories to do the same amount of aerobic work as his smaller friend. Back to the driving story. The two arrive in New York and pull into a gas station. The Honda has burned 7 gallons of fuel while the Land Cruiser has burned through double, 14 gallons. More muscle mass = more calories burned during long distance (aerobic) work.

The way to shed fat and to keep the metabolism from slowing to a crawl is via a diet plan that provides extremely small deficits while eliminating insulin spikes as a result of refined carbs, simple carbs, and a lack in fiber. Next, add weight training to build the metabolism. Thus, the main form of exercise ought to be weight training with aerobics as a second, though inferior choice. For some, a combo of weights and aerobics may be helpful in accelerating fat loss, though a very lean body can be achieved with no cardio. Just hard weight training and the right nutrition plan. ***Remember, when it comes to exercise, especially aerobics, more is not better just has large reductions in calories are not superior than small reductions.*** The body's always working on tight checks and balances and just as severely restrictive diets are un-effective and slow the metabolism, extremely heavy aerobic plans often backfire lowering hormones that support muscle growth, indirectly slowing the metabolism.

High Intensity Aerobics Is Better

Aerobic exercise makes use of large muscle groups in a rhythmic sustained fashion. When we think of aerobics, activities such as running, cycling, stair climbing, aerobic dance classes and treadmill work immediately come to mind. These activities primarily rely on fatty acids from fat stores as fuel though muscle glycogen is the back up or "secondary" fuel involved. Under severe dieting conditions, amino acids from protein or muscle tissue can also come into play as the

third "back-up" fuel source.

One special adaptation at the cellular level is an increase in the size of the mitocondria. The mitocondria is located within the muscle cell and is nicknamed "the powerhouse" as it is the final destination where fat is burned. When calories are reduced or when an individual exercises aerobically, body fat is broken apart and the fatty acids are eventually sent to the muscles where they are burned as fuel. It is thought the increase in size of the mitocondria increases the efficiency of a muscle making it more effective at burning fat. The mitocondria could be considered the *end of the line* in the fat burning process.

There's some confusion as to what type of aerobic exercise is better? High intensity where the heart rate really rises or lower intensity work, where the exerciser doesn't work as hard. First, it's important to define intensity. Intensity is loosely defined as "effort" and effort can be measured by the heart rate. ***The higher the heart rate, the higher the intensity.*** The lower the heart rate, the lower the intensity. ***Work at high intensity and you will absolutely burn more calories.*** Work at lower intensity and you will absolutely burn less calories.

Intensity of cardio work is an important factor determining how lean you will become. There has been dispute over lower intensity work and higher intensity work. The low intensity proponents label lower intensity work as the "fat burning zone." The spin is a 55% to 60% training heart rate zone promotes a greater burning of fat over glycogen and amino acids. That is, walking on a treadmill for 45 minutes at 55% to 60% of your maximum heart rate is most effective in getting leaner because you burn a greater ***percentage*** of fatty acids than glycogen. At higher levels of intensity, such as 75% of your maximum heart rate, the percentage of fuel burned shifts. ***At high levels of intensity,*** the ***body burns a bit less fatty acids and includes more glycogen*** However, there's a bit more to it. Working at a higher intensity can burn far greater total calories than lower intensity aerobics. Though lower intensity may burn a greater

percentage of fat, higher intensity ultimately is more effective as it burns more total calories and truly more fat calories. Take a look below if you need convincing.

HIGH VERSUS LOWER INTENSITY WORK

500 calories burned at 75%-80% target heart rate (using intervals)

72% of the calories burned come from fatty acids

28% of the calories burned come from glycogen

Net fat burn: 360 calories of fat (500 total x .72)

Versus

340 calories burned at 55% to 60% target heart rate

85% of the calories burned come from fatty acids

Net fat burn: 289 calories of fat (340 x .85)

At higher intensity, 32% more total calories are utilized (340/500) and 20% more fat (289/369). In general, carbohydrates from stored muscle glycogen is the other source of fuel.

The best way to keep the aerobic intensity high for long periods of time - up to 30 and even 45 minutes at a clip - is to employ interval training. Interval training requires the individual work as hard as possible, be it stationary cycling, stair climbing, or whatever the preferred form of exercise, for 3 minutes followed by 2 minutes of low intensity work. The net effect of increasing the heart rate up to 80% of its maximum for 3 minutes followed by 2 minutes of much easier peddling or stair climbing is a "net" elevation in heart rate and a far greater caloric burn than could be achieved through constant and steady aerobic work. Psychologically, it may be easier as it allows for a break of 1 to 2 minutes after 3 minutes of all-out work leaving the individual to perform 9 intervals of continuos 3 to 4 minute spikes in energy followed by 2 minute "break" periods.

SAMPLE 45 MINUTE FAT BURNING INTERVAL

Time Interval	Heart Rate	Heart beats in 10 seconds For 20/30/40 year old
2 minutes	55%	18/17/16
3 minutes	80%	27/25/24
2 minutes	"Break"	Let HR fall to 55%, easy exertion
3 minutes	80%	27/25/24 Kick into gear
2 minutes	"Break"	Attempt to bring heart rate to 55%
3 minutes	80%	27/25/24 Hard work!
2 minutes	"Break"	Slow things down to 55-60%
3 minutes	80%	27/25/24 HR becomes ez to maintain
2 minutes	"Break"	HR will likely stay very elevated with nominal effort
3 minutes	80%	27/25/24
2 minutes	"Break"	Slow things down
3 minutes	80%	27/25/24 Turning the corner!
2 minutes	"Break"	Easy does it
3 minutes	80%	27/25/24
2 minutes	"Break"	8th of 9 intervals complete
3 minutes	80%	27/25/24
2 minutes	"Break"	EZ work still maintains a high HR
3 minutes	80%	27/25/24

DONE!!!!!!!

To find heart rate, commonly referred to as "training heart rate" subtract your age from 220 and multiply by a factor of .55 for 55% heart rate and up to .8 for 80% heart rate. For example, a 30 year old would find his training heart rate accordingly.

1) 220 - age = unknown
2) Unknown X .60 = training target

Example:

220 - 30 = 190

190 X .60 = 114 beats in one minute

The individual ought to work hard enough achieve 114 heart beats in a minute to achieve be considered training at "60% of his maximum heart rate."

Here's an easy target heart rate table. match your age to the heart rates below.

Heart Rate at age . . .	**60%**	**70%**	**75%**
20 year old	120	140	150
25 year old	117	137	146
30 year old	114	133	142
35 year old	111	130	139
40 year old	108	126	135
45 year old	105	123	131
50 year old	102	119	128
55 year old	99	116	124

(heart rates in beats per minute)

To harness the calorie burning effects, an individual should engage in cardio work three times weekly. First, concentrate on building the metabolism with weight training and add cardio work only after having begun a weight training plan. Remember, having muscle enhances how effective your aerobic work will become.

Start at lower levels of intensity and build up to higher

levels closer to 75% of your heart rate and incorporating interval work. Don't go over board with cardio! Too much cardio, more than 4 or 5 sessions a week can compromise your ability to build or maintain muscle mass and muscle mass is the most important factor determining "how lean" you'll become.

Best Time To Exercise

There are times of the day where it may be more advantageous to perform cardio work. The best time is in the morning on an empty stomach as opposed to later in the day.

Aerobic exercise relies primary on fat as fuel. However, the amount of glucose in the blood influences "how fast" the body will dig into fat stores. In other words, a person chowing down a plate of pasta and heading off to the gym to perform 30 minutes of high intensity cardio exercise will burn less total stored body fat than an individual who performs aerobic exercise in the morning on a completely empty stomach. Why? Hormones. As we learned, the presence of carbohydrates or "glucose" in the blood causes the secretion of insulin and insulin drives up lipoprotein lipase levels which, in turn, exert a "sealing" effect on fat cells preventing them from being liberated. Where's the energy come from to do the cardio work? From glycogen stores and glucose in the blood alleviating the burden on fat cells. Contrast to the individual performing aerobic work on an empty stomach. Glucose levels are flat, therefore insulin is absent, so fatty acids derived from from fat stores become the main line of fuel. Furthermore, when insulin is low, glucagon increases and the characteristics of glucagon is the opposite to insulin. While insulin exerts a "sealing" effect on fat cells, glucagon exerts an "unsealing" effect by triggering hormone sensitive lipase to "open up" fat cells so fat can be used as fuel. The other fat liberating hormone involved is epinephrine. Epinephrine is the stress hormone released when a police officer pulls over a car or when an individual receives

devastating news. Epinephrine is part of the "fight or flight" hormones. It helps liberate glycogen and fat stores allowing a person to gain access to additional fuel. Epinephrine is also released with any type of exercise and the higher the intensity, the greater the release. When released, epinephrine, through a multi step process, releases catecholamines which attach themselves to fat cells breaking down body fat. Unfortunately, ***a high carb intake preceding aerobic exercise can blunt or compromise the fat liberating effects of catecholamines.*** As you can see, the better time to perform aerobics is on an empty stomach in the morning upon rising.

If early morning aerobics wont work for you, try avoiding carbs completely in the meal of snack preceding an aerobic workout. Skipping carbs will keep glucose levels in the blood low which will favor the release of glucagon/hormone sensitive lipase/catacholamines. Remember fiber-type carbs (see page 27) are non insulin releasing foods so a combo of a chicken breast and broccoli in the meal 2 to 3 hours previous to an aerobic workout should keep insulin levels low allowing stored body fat to become the immediate source of fuel.

Chapter Thirteen

Genetics and Body Fat

Unquestionably, genetics play a role in the amount of fat cells a person has and his ability to deposit calories as body fat or to liberate and burn fatty acids from fat stores.

Genes play a pretty large role in determining "how lean" an individual can become. In fact, if one parent is overweight, a child has a 40% chance of becoming clinically obese. If both parents are obese, the odds move up to 60%. With that in mind, the total number of fat cells found on the body is influenced by three factors:

1) The amount of fat cells the biological parents have.
2) The amount of weight the mother gains while pregnant, especially during the third trimester. (months 7-9)
3) The amount of fat gained during the teenage years.

As you can see, the individual with obese parents will have to work hard and smart with nutrition and exercise to overcome genes that are, to a large degree, destined to be fat. Other factors contributing to obesity include gaining large amounts of weight in the teenage years. An overweight teen will have a 60% to 70% chance of remaining obese through life.

If an individual has more fat cells than another, he can appear fatter even if the fat cells are not particularly enlarged, gorged with fat. On the other hand, the individual with few fat cells can appear leaner than the former individual - even if his

fat cells are gorged with fat. It's perception. Imagine numbers. Take 100 million fat cells and fill them up to a third of their capacity. That's a lot of body fat. Now, take 10 million fat cells and fill them to capacity. Where is there more body fat? On the first individual with more fat cells. That's where genetics really hurts. The more fat cells you have, the easier it is to look fat.

The individual with genetically, a whole bunch of fat cells, will also experience greater fat-cell sensitivity to insulin. That is, receptors on fat cells for insulin "crave" insulin - so insulin takes what it is carrying and deposits it into fat cells. What's insulin carry? Glucose. Furthermore, the greater amount of fat cells one carries, the greater the insulin release in response to eating carbohydrates. How's that effect the obese individual? High insulin diverts carbs towards fat storing pathways and high insulin is the "sparkplug" and stimulus that enhances fatty acid uptake by fat cells. In other words, though it's dietary fat that becomes part of fat cells, high insulin is the force that ultimately helps get that dietary fat into fat cells. Obese individuals also have higher levels of fat storing lipoprotein lipase and show blunted heat production in response to food. No wonder it's hard for the obese to lean down.

While diet and exercise are proven ways for the obese to radically revamp the physique, promoting gains in lean body mass and losses in body fat, **an obese individual**, especially the obese person with obese parents, ***will retain*** (within the fat cells) ***all its fat storing capabilities.*** So anytime there is a lapse in either diet or exercise, the body will try to rapidly store body fat at a rate that is so efficient and so dramatic that it seems nearly improbable. Contrast this with the lean individual with lean parents who, through extreme over eating and a lack of exercise, became seriously over weight. This person could lose huge amounts of body fat through diet and exercise and have a much easier time keeping it off during periods of dietary and exercise lapses. His fat cells retain far less fat storing capabilities than he who comes from a family of obese individuals. Remember, one reason very lean individuals seem to find it easier to stay lean is because they are lean. Insulin levels remain lower in response to eating, lipoprotein

lipase levels never over run hormone sensitive lipase, the GH release upon bed time is never blunted and thermogenesis - heat production - in the body also works as it should.

Habitual Obesity

As I write this I read it to a friend for approval and he reminds me genetic obesity is often the result of "habitual obesity."

Hmm. I tell my friend that kids born to obese parents have a 60% chance to grow up obese. He vehemently disagrees. "Genetically, they may be burdened, but add to that 60% the fact that many who are obese over eat, eat wrong foods and do not exercise and you'll quickly realize a child born to obese parents will have a 90% chance of becoming fat!" I ask, what is habitual obesity?

Says my friend, "It's when your lean grand parents eat all kinds of junk food and fatty foods and never exercise and end up gaining 20 or more pounds above their desired body weight. The grandmother gives birth to her son who marries your mom. Together, they mimic the lifestyle of their parents, in-activity, poor eating patterns, lots of fat, lots of sugar, all the bad stuff. This causes your parents to become 30 or so pounds overweight. When your born, you follow what you know; the poor eating habits of your parents, and you also get fat. Probably fatter than your parents who were fatter than their parents.

While we are learning genetics play a substantive role in obesity, my friend's point is clear. Overeating, making poor food choices and extreme inactivity collectively lead to obesity - even in lean individuals from lean parents. While some scientists call it "genetics" many recognize bad eating habits and an environment that supports over eating and inactivity is the real problem, the genesis for lousy genetics.

Leptin to the Rescue

There is evidence to support the belief that genetics could be the problem keeping some from achieving a lean body.

Researchers with mice have isolated a gene called OB. A shortening of OBesity. It is thought the OB gene plays a major role in gaining or lowing body fat.

When the OB gene works correctly in laboratory rats, it makes a hormone called leptin. Leptin travels through the blood and signals the brain when the body has stored enough fat. However, if the OB gene is not working properly, rats become lazy. They move around less and gorge themselves with food.

When rats with the genetically skewed OB gene is injected with leptin, they become very active and radically reduce the consumption of food. Genetically fat rats become trim and even rats with a normal and functioning OB gene lose weight when injected with leptin.

Next, scientists applied this knowledge to obese humans. Unfortunately, obese humans do not seem to have a defective OB gene, though they do produce leptin. Interestingly, scientists found obese individuals produce more leptin than lean individuals, the exact opposite as what was expected. Therefore, scientists are postulating obese humans over produce leptin because it may not be binding with its receptor cite in the brain. Sounds similar to clinically obese individuals. They produce, at first glance, normal amounts of insulin. But, their receptors on muscle seem to be insulin unfriendly or "rejecting" of insulin, so the body responds by kicking out more insulin. In any case, researchers have switched their attention back to the brain, searching for answers to the leptin puzzle.

GLP-1

Another hormone that may be connected to leptin is GLP-1. GLP- 1 is thought to be deficient in obese individuals. GLP works in the brain and digestive system by triggering a person to stop eating - though the mechanism is not fully understood. In the digestive tract, GLP slows digestion making an individual feel "full" which should help him eat less food and calories.

Chapter Fourteen

Supplement Yourself Thin

Over the years, the marketplace has seen its fair share of pills, drinks and gimmicks that promise fat loss with hardly any real effort on behalf of the user. Almost every single one of these products is, at the very least, over rated and some don't do a darn thing. However, there are a few nutrients that can be purchased at your local health food store that may be helpful in winning the war on body fat.

Imagine taking a pill that would speed along the fat burning process. Imagine a nutrient helping to shed body fat faster than simply diet alone. Sound too good to be true?

Let me introduce a few nutrients that can be of help, but understand taking them alone, with no decrease in calories or increase in caloric expenditure via exercise, will probably be a waste of money. When combined with a calorie controlled diet to initiate fat burning, these supplements may aid fat loss by either speeding up fat loss or preserving lean body mass. Remember, anything that causes the body to retain more muscle mass causes the metabolism to stay elevated; a key element in losing body fat.

Let's take a look at some common supplements; how they work, how much they cost, possible side effects and recommended doses. I've assigned each one an effectiveness rating of 1-5 stars, with 5 stars being 'most effective.'

Synergism

Adding one or a combination of these nutrients to a sound exercise program and a calorie controlled diet that is lower in fat and sugar, high in fiber and makes use of a 5 to 6 meals per day eating plan, may be helpful in shedding body fat. Some like to use one product at a time, allowing at least 2 weeks to elapse before evaluating the results and determining if the product is having any visible or noticeable effects. At that point, another product can be added.

Most of these substances seem to complement the effects of one another. For example, some manufacturers make hydroxycitric acid with chromium as research, at some point, showed the two together work better than each alone. Another popular combination is the caffeine - ma Huang mixture because caffeine can prolong the effects of ma Huang. Fish oils added to chromium will probably have a greater effect than taking chromium alone or fish oils alone. Taken individually, both enhance insulin sensitivity; taken together, or adding 25 grams of fiber to the diet, one would expect even greater insulin sensitivity. Whatever route chosen, don't subscribe to the faulty belief these supplements work magic. Only when combined with sensible eating habits and proper exercise can one expect to see serious results.

L-Carnitine**

L-Carnitine is a close cousin to amino acids and is found in higher concentrations in organ meats such as beef liver and beef heart. If organ meats don't tickle your fancy, try lamb as it is a good source of carnitine.

This nutrient was used for over 60 years in Europe to treat heart patients with unhealthy amounts of fat in the blood, and was approved in 1986 for the usage in the United States. Athletes and dieters soon began using it in hopes of aiding fat loss and increasing endurance.

Carnitine is a catalyst. When calories are reduced or when an individual exercises, fatty acids are liberated from body fat stores. Carnitine transports the fatty acids from the

blood, across the cell membrane, and into the mitocondria portion of the cell where the fatty acids are burned as fuel. The body can make carnitine from amino acids and vitamins.

Some research reveals high amounts of supplemental carnitine can improve aerobic capacity thereby making the perception of heavy aerobic exercise easier and promoting additional fat loss. It goes like this. The person taking larger doses of carnitine feels the exercise is easier so he puts forth more effort and more effort translates into a greater calorie burn. In an Italian study published in the European Journal of Applied Physiology, researchers found cyclists using 2 grams of carnitine significantly increased their maximum uptake of oxygen which allowed for an increase in power output. However, other studies show carnitine is only helpful in those where a deficiency occurs.

The theory with dieting is this. If the dieter frees up fatty acids with dieting, then the body requires additional amounts of carnitine - outside that obtained in food. Carnitine may be especially helpful in those following a low carb diet as carnitine helps the body make use of ketones.

High doses, beyond 3 grams a day, may promote diarrhea in some individuals. Dieters and athletes typically use 1000 mgs (1 gram) an hour before training with weights or before aerobic exercise. These are times where calorie burning increases and additional body fat is broken down freeing fatty acids.

Recommended Dose: 1000-3000 mg a day
Cost: $1 - $3

Ma Huang***

This popular herb (like its principle cousin; ephedrine) was originally used to relieve the symptoms of asthma. It achieves relief by dilating (expanding) the bronchioles that supply the lungs with oxygen.

Another common effect of both ma Huang and ephedrine is the stimulation of thermogenesis, the techno-term physiologists use to mean "body heat." Thermogenesis occurs with training, food consumption and the use of ma

Huang.

Training causes an increase in body temperature which, in turn, causes more calories to be burned. Each time you eat, at all of your 5 to 6 smaller daily meals, your body temperature rises. Some of the calories consumed in a meal are simply dissipated (expelled) as heat. Once you "minus out" those calories that are dissipated as heat, you have your "real caloric value" of food remaining. Of the remaining calories, there are 2 fates. Either be burned immediately as fuel or store as body fat or glycogen.

Ma Huang supplements work by releasing the neurotransmitter in the brain called noradrenaline which enhances heat production in the body. In response to noradrenaline, the adrenal glands, located just on top of the kidneys, dump adrenaline into the body which causes body temperature to rise and promotes the release of catecholamines which attach themselves to fat cells causing fat loss. This event also triggers the stimulation of brown fat, the body's internal fat located around the shoulder blades, spinal column and the organs. Unlike white fat the fat found beneath the skin - plain ole body fat - brown fat is metabolically active tissue similar to muscle. ***Brown fat requires fuel for maintenance*** and the greater stimulation of brown fat, the greater its caloric needs. Ma Haung can trigger brown fat which increases caloric expenditure making you leaner. On the other hand, white fat/body fat is metabolically "dead," not requiring fuel for maintenance.

In a Danish study, five women used 25 mg of ephedrine for 3 months and lost an average of 6 pounds of fat without dieting. Researchers estimated ephedrine increased the daily metabolic rate by 10%. Another study in Obesity Research found using ephedrine along with caffeine showed dieting obese subjects lost more fat than another group dieting on the same number of total calories.

Diabetics, those with thyroid problems, nursing and pregnant women, those with high blood pressure or gout should not use this product! Also highly stressed, easy to

excite and chronically nervous individuals should also avoid this product.

Recommended Dose: 335-670 mgs daily (about the equivalent to 25-50 mgs of ephedrine) If 670 mgs is used, split the dose into two doses of 335 mgs each.

Cost: 40-75 cents

Fish Oils****

Found in fattier fish like salmon, mackerel, herring and trout, fish oils contain a special kind of fat called omega-3 fatty acids. Epidemiological studies have conclusively shown populations consuming copious amounts of fish (such as the Nordic Countries) experience significantly less diabetes than other parts of the world, particularly the United States. The omega-3 fatty acid encourages the receptor sites on muscle to increase insulin sensitivity, allowing the body to release less insulin. In turn, fat storage tends to become limited and insulin performs one of its vital roles - channeling carbohydrates and amino acids into muscle tissue.

According to Leonard Storlien at the University of Sydney, diets rich in omega-3 fatty acids are effective in over coming even "very profound whole body insulin resistance" which is of extreme importance in controlling body fat.

Omega-3's also fight inflammation; both in joints and muscle tissue. The importance here is that inflammation is not only associated with the aging process, but causes a chronic elevation of cortisol. This chronic elevation can destroy the insulin receptors on muscle tissue and when this occurs, insulin levels rise setting off slow, albeit sure, increases in body fat.

Recommended Dose: 4000 mgs daily, supplying 640 mgs of EPA and 480 mgs of DHA. (EPA and DHA) are the active metabolites in the fat) This amount can be found in 4 ounces of salmon or 8 ounces of canned spicy herring.

Cost: 45 cents in supplemental form

Soluble Fiber**

Soluble fiber, common to beans, legumes and oatmeal

can aid fat loss by 2 distinct mechanisms. First, fibers slow the entry of glucose out of the gut and into the blood. Slowing glucose entry into the blood promotes a more even, spike-less, discharge of insulin and lower or modified insulin release helps maintain a lean body. Second, fiber works similar to chromium. It makes insulin receptors on muscle more friendly. ***The friendlier the receptor, the less insulin secreted and the less insulin secreted, the more likely glucose will be deposited into glycogen stores rather than sent down fat storing pathways.*** Lastly, some fiber can bind with dietary fat making it "indigestible." In a nutshell, adding fiber to the diet or using of soluble fiber supplements 20 minutes before eating is helpful as a high fiber diet will, across the board, lead to a leaner body than a low fiber diet - when calories are kept stable. This means the person who has been maintaining a stable body weight eating 2500 calories of fiber less food including sugar loaded carbs could actually lose weight on the same calorie level upon adding 4-6 grams of fiber before each meal.

An article in The Lancet (1991, vol 3, pg 43-45) by Ivellese found a diet providing 25-35 grams a day of mixed fibers resulted in significantly lower blood glucose levels in healthy subjects. Remember lower glucose equals lower insulin which equals less fat storage. A study in Contemporary Nutrition showed high fiber diets improved glucose sensitivity.

Recommended Dose: 10-15 grams daily or 25 grams daily from a blend of food and supplements

Cost: 30-60 cents in supplemental form

Caffeine****

Caffeine, the drug, yes drug found in coffee, tea and chocolate has long been used as an ergogenic aid by both power and endurance athletes. Caffeine improves athletic performance. Period. It increases endurance by accelerating the breakdown of fatty acids in fat stores and fatty acids are the prime fuel used by endurance/aerobic athletes. Taken an

hour before cardio, it makes the work seem easy, thereby allowing the athlete to train longer and harder which burns off more calories. Caffeine also makes muscle contraction more forceful by promoting greater neural impulse release from the nerve at the neuro-muscular junction. In simple terms, the message sent from the nerves to muscles causing muscle contraction is greater and "clearer." Caffeine works similar to ephedrine but when combined the effect is far greater than taking either alone.

Caffeine's ability to increase fatty acid release from fat cells is somewhat hampered when carbohydrates are consumed in large quantities. For example taking caffeine or a mix of caffeine and ma Huang before aerobics will promote the release of fat from fat cells. But drinking a large cup off coffee and taking ma Huang with a large bagel may put a damper on the effects as carbs break down into glucose which causes an insulin spike and insulin can, to some degree, over ride the fat liberating effects of caffeine and ephedrine, most likely by negating the effects of noradrenalin

Those training with weights often use a caffeine/ma Huang mix as the two also cause the liberation of glucose out of glycogen stores giving the athlete more fuel to train. If the athlete is trying to "rip up" and is following a lower carb diet, he will burn (some) fat during weight training as his stores of glycogen would likely be lower due to the abbreviated carbohydrate intake. Recall, when glycogen is low, fat becomes a fuel source. That said, it's important for the lower carb dieter to consume very slow digesting carbs like beans, oats or cream of rye cereal, along with a source of protein, previous to a training session. Slow acting carbs cause a smaller insulin spike and foods like oatmeal are less likely to "cancel out" the fat liberating effects of caffeine/ ma Huang than a carbo drink or other fast digesting carbs such as cream of wheat cereal, white bread, bagels, or white rice.

Recommended Dose: 100- 200 mgs before exercise (about 1 large cup of coffee or one Vivarin or No-Doz pill.

Cost: less than a quarter. Starbucks; $3!

Evening Primrose Oil****

Gamma linoleic acid (GLA) is a fatty acid that promotes the production of hormone like substances called prostaglandins. GLA is derived from linoleic acid in vegetable oils. Unfortunately, most of the commercial oils purchased as the bigger grocery chains have very little linoleic acid in them. Grocery store oils have been robbed of their most important nutrient - linoleic acid - as companies put them through an extensive heat intensive process in order to extend shelf life. Problem is, the process kills the linoleic acid, making it useless. However, health food stores sell, ***cold processed*** vegetable oils which also have a long shelf life but the process is a cold one which preserves the linoleic acid. Linoleic can be converted into GLA but the body is not efficient in doing so. Dietary factors (a high intake of simple carbs, caffeine, alcohol and saturated fat), stress, age and hormones all influence whether the linoleic will successfully convert into GLA. Thus, many take GLA capsules. It's quick, easy and it does not require a person take in additional calories found in an oil.

In lean individuals, GLA can increase the rate of calorie burning in brown fat. However, the obese may see no increase in brown fat activity using GLA unless a caffeine/ma Huang mix is used to initiate the process. A study as early as 1979 of 38 non dieting individuals - all more than 10% above ideal body weight - found a weight loss of 9 pounds in only 8 weeks by using 450 mgs daily of GLA. Those with the greatest amount of body fat lost the most. Furthermore, GLA supports insulin sensitivity, according to an article by Crawford and Haessler published in the Journal of Clinical Investigation. (1993, vol 3 pg 111-113)

Recommended Dose: 450 mgs of GLA daily and up to 1050 mgs daily.

Cost: 50 cents to $1.50

Chromium**

Avid readers of health magazines are, no doubt, familiar with this trace mineral. It's been marketed in every way

conceivable and it still shows some promise as an indirect aid to building lean body mass which pumps up the metabolism while inhibiting fat storage.

Chromium seems to be difficult for many to obtain from the diet as many of the foods in which it is found are not common to the American dinner table. Here's the short list. Brewer's yeast, clams, mussels, lobster, oysters and mushrooms. Do you eat those? If you answered no, give chromium supplements a chance. Furthermore, chromium is easily excreted from the body during exercise, especially in a humid environment where more sweat is produced, as well as during periods of stress or with a fiber free or high sugar diet.

Using chromium can increase the efficiency of insulin. It works better so less is released. Insulin's prime role is to drive glucose and amino acids into muscles to provide fuel for the tissue or to help replace lost amino acids. Since chromium makes muscles insulin friendly, glucose is diverted towards muscle rather than being kicked into fat storing pathways. When combined with weight training chromium is reported to build muscle at the expense of adding body fat.

Famed chromium researcher Gary Evans PhD. conducted a six week double blind study showing weight trainees who supplemented with 200 mcg of chromium picolinate daily gained $1\frac{1}{2}$ pounds of muscle while those who did not use chromium gained only 2 ounces of muscle.

In a second study with football players, Evans' research showed those supplementing with 200 mcg of chromium picolinate daily lost $7\frac{1}{2}$ pounds in six weeks while those not using the chromium lost only 2 pounds. These same football players (who consumed an average of 4000 calories daily during training) were all chromium deficient leading into the study. Other follow up research has not been so complimentary. At the very least, it may be safe to assume many who do not regularly eat chromium rich foods may be deficient and it may be that chromium works well in deficient subjects.

Recommended Dose: 100 - 300 mcg daily
Cost: 10-20 cents

Hydroxycitric Acid**

Another popular nutrient being used to inhibit fat storage is hydroxycitric acid (HCA). HCA is derived from garcinia cambogia which is found in fruits called tamarind native to Africa and many middle eastern countries.

HCA has been touted as a product that can inhibit excess carbohydrates from being stored as body fat. When carbs are over consumed or when glycogen stores are full and carbohydrates are continually eaten, the body releases an enzyme called ATP - citric lyase, which is involved in the bundling of carbohydrates into body fat. HCA can temporarily interfere with this enzyme - making it more difficult to form body fat from carbs. Furthermore, HCA, by blunting the body's ability to make body fat from carbs, directs the glucose down glycogen forming pathways. The fat inhibiting effects of HCA can be summarized this way; HCA blocks ATP - citric lyase which diverts glucose away from fat stores and towards glycogen stores. Furthermore, it is suspected that "full" glycogen stores are involved with the appetite center in the brain. When muscles become full of glycogen, they signal the brain "enough" food has been consumed decreasing the desire to eat. Another plus seems to be that more glycogen is associated with better recovery so bodybuilders would, in some way, experience a small bump up in metabolism with improved recovery.

While the most recent study indicates HCA had little effect on fat storage, bodybuilders have reported differently. Furthermore, one physician friend of mine told me HCA has fairly decent appetite suppressing effects when used in high enough doses. He recommends up to 1500 mg before each meal. In his opinion, smaller amounts are ineffective

Recommended Dose: up to 1500 mgs before every meal

Cost: 90 cents to $1.25 daily

Phenylalanine**

When taken on an empty stomach, this essential amino acid can increase the concentration of a messenger in the brain called noradrenaline. Phenylalanine works as an appetite suppressant in two ways. First, any general stimulation of the brain by noradrenaline will reduce the appetite. Amphetamines and cocaine shock the body by causing massive releases of noradrenalin which, in turn, virtually shuts down the appetite center of the brain.

The ultra popular over the counter diet drug called phenylpropanolamine (PPA) which was recently pulled from shelves worked in a similar way. (Interestingly subtract the "propano" in the middle of the word and you almost get phenylalanine!) Of course, the drugs are much more powerful in promoting a noradrenalin release than phenylalanine, a natural product. Second, phenylalanine can decrease appetite by releasing cholecystokinin (CCK) in the brain. CCK is released in small quantities as nutrients pass along the digestive system which, in turn, signals the brain "enough" food has been consumed.

Numerous animal studies by Gibbs, Smith and Morley have shown phenylalanine to be a potent appetite suppressant and a clinical study published in Reviews in Clinical Nutrition (1982, vol 2 pg 53-59) revealed free form amino acids in the gut, especially phenylalanine, could have profound effects on CCK release in humans. Fiber from hard to break down veggies including broccoli, cauliflower, okra, celery and radish also effect CCK.

Any nutrient of drug that can increase adrenaline levels should be used under close supervision.

Recommended Dose: 500-1000 mgs in the morning with water before eating.

Cost: 10-25 cents

Forskolin***

Derived from the mint family, forskolin, sometimes referred to as Coleus has been used to treat asthma for hundreds of years. Like ma Huang, Coleus ia common to

ancient Hindu medicine. And like caffeine and ma Huang, Coleus can increase the amount of something called cyclic adenosine monophosphate (cAMP). What's the big deal? Increasing cAMP in fat cells increase the liberation and burning of fat. Coleus works directly on cAMP while caffeine and ma Huang do it in a round about way; by kicking up adrenaline levels. So while caffeine and ma Huang make you feel energized by stimulating adrenaline, like your experiencing an "adrenaline rush," Coleus magnifies the energy burning properties of cAMP which are stimulated with caffeine and ephedrine. And it's because of this, that many supplement companies combine the three. However, one study in Obesity Research in 1995 showed topical Coleus, a cream form, spread over the thighs caused fat cells to shrink in that area. In all, this plant extract shows some solid promise.

Recommended Dose: 50 - 100 mgs daily
Cost: 30-50 cents

Water***

Water a nutrient? Yes! Not to sound like a broken record, but many dieters who reduce too fast experience a metabolic down turn that makes fat loss difficult. Metabolic slow downs occur when muscle is lost and severe restrictions in energy intake (calories) cause a warped thermic effect and trigger fat cells to hoard fat. Low calories also cause a down turn in thyroid production which plays a major role in "how many" calories an individual will burn each day.

Another, albeit smaller factor, contributing to the overall metabolic rate is water. Particularly, the amount of water within cells. Water is the major component to blood and it transports nutrients to tissues while removing toxins and by products away from cells for metabolism and disposal. Cutting back on water can cause a minor slow down in metabolism, yet a minor slowdown, over the cource of a few months, can translate into a few pounds of body fat.

Scientists at the University of Utah administered diuretics to women. Diuretics cause a loss of body water. The body

weight of the women, on average, decreased by 2%, the equivalent of a female reducing from 141 to 137 pounds. The other result; less water caused a mild reduction in metabolism and a greater reliance on sugar as fuel rather than fatty acids.

Water is important for avid Starbucks customer as caffeine causes water excretion. Lower carb dieters need to drink up because water is excreted in clearing ketones from the urine. Lastly, higher protein diets can produce urea, the main metabolic by product in protein metabolism. Every approach in this book is considered - at one gram of protein per pound of lean body weight and even above - a higher protein diet. Any of the three, lots of caffeine, low carbs or higher protein cause at the very least a slight dehydration and even a 2% drop in water weight can negatively effect the metabolism. The take home lesson: Drink! The rule of thumb regarding dehydration: if you drink 20 ounces of water and do not urinate within 1 hour, you are dehydrated.

Notes

Chapter Fifteen

Drugs and Weight Loss: What's Left?

While diet and exercise are the two strongest influences affecting obesity, there are several conditions important for the development of obesity.

Obviously, there are some individuals who respond remarkably well to alterations in diet and exercise. I've witnessed transformations that have literally shocked me. What about those who obtain drastically smaller results from diet and exercise? For millions, the answer may be found in drug treatment. The medical profession uses drugs to treat everything from colds to flu, cancer to AIDS. Why not explore the use of drugs to prevent obesity as obesity is strongly linked to diabetes, cancer, heart disease and joint degeneration.

A viable approach to body fat control should have, as its foundation, diet and exercise. In addition, the use of drugs may enhance the effects of diet and exercise.

Many of the drugs on the market today effect the metabolic system or influence hormones and the nervous system. Manipulating one or all three can effect food intake or energy expenditure.

The common drug therapies today include:

A) Drugs that are designed to control how much food is eaten.

B) Drugs that stimulate the brain adding to the feeling of satiety, "I'm full."
C) Drugs that slow food breakdown in the gut.
D) Drugs that interfere with nutrient absorption.
E) Drugs that increase heat production.
F) Drugs that increase lean body mass.

Anorectic Drugs

Anorectic drugs work by suppressing the appetite, the desire to eat. Obviously, if less food is consumed, less total calories are ingested causing some type of loss in body weight. All anorectic drugs resemble the sympathomimetic amines. Sympathomimetic amines are released in the body in response to direct stimulation of the nervous system. The nervous system has 2 parts. The parasympathetic and sympathetic systems. At rest, the parasympathetic system tends to over ride or somewhat dominate over the sympathetic nervous system (SNS) while the SNS is activated during exercise or periods of physical or emotional stress.

The SNS stimulates a cascade of physical reactions that can elevate metabolism, fat breakdown and decrease the desire to consume food.

Sympathomimetic drugs are relatives of amphetamines or "speed" Pure amphetamines promote several effects in humans including a decreased intake in food consumption, an increase in well being, an individual feels better, increased SNS activity, a change in brain activity and cardiovascular changes. Some effects of amphetamines are beneficial. The decreased food intake and the increased SNS activity lead to weight loss, but the negatives are extremely clear. Over stimulation of the brain and SNS and a constant change in mood where the user is in a state of euphoria make amphetamines highly addictive. And there's all kinds of cardio effects; high blood pressure and increased heart rate alone are two risk factors common to the individual prone to experience a heart attack. So, while amphetamines show tremendous promise as a weight loss aid, they are extremely dangerous. So, medicine marches on

looking for by products or "cousins" to amphetamines that may effect weight loss without blasting the heart rate and blood pressure into ranges that are seen with those with advanced heart disease.

Phen-Fen

Off the market in the US. Available mail order/internet. Both phentermine and fenfluramine were around for years before being pulled off the market due to serious complaints of heart valve problems. That said, both have been successful in decreasing total food consumption. While decreasing food consumption causes a caloric deficit and weight loss, phentermine also works on other mechanisms outside of appetite suppression.

Fenfluramine works by altering the use of the neurotranmsitter serotonin. Serotonin is a brain messenger and increases dramatically with a high carbohydrate meal. In lean individuals, serotonin seems to stimulate satiety causing an individual to eat less food. In the obese, there appears to be some type of defect in serotonin's ability to promote a feeling of being "full."

Phentermine can increase resting basal metabolism by its stimulatory effects on the nervous system similar to, though drastically stronger than, caffeine found in coffee. Being a sympathomimetic, it also causes the release of noradrenaline which promotes the "fight or flight" response which, in turn, signals more fat to be broken down to be used as fuel. Due to its strong stimulatory effects, many find it undesirable reporting feelings of anxiety, restlessness, and insomnia. As an appetite suppressant, it is probably the strongest product available.

Fenfluramine acts as a mild sedative by increasing the availability of serotonin. Though not fully understood, scientists recognize the more serotonin available, the lesser the desire to eat. This product is hard to find even over the internet, so many dieters have resolved to 5-HTP a natural by product of the amino acid tryptophan, and readily available at any health

food store. 5-HTP also increases serotonin as does the herb St John's Wort. As an alternative to fenfluramine, dieters often combine 1000 mgs of St John's Wort with 500 mgs of 5-HTP before going to bed. In addition, they use a mix of caffeine, ma Huang and Coleus in the morning to stimulate the metabolism and increase calorie expenditure.

Although the Phen-Fen mix were on the market for years, it was not until 1992 after a study at the University of Rochester showed a combination of the two appetite suppressing drugs were more effective than the traditional regime of lower calories and exercise. The Rochester study showed, across the board, that a diet and exercise plan combined with Phen-Fen yielded better results than diet and exercise alone. In the mean time, millions ran to doctors for the dynamic duo and, in a short time, reports of heart valve damage began to surface. No doubt there is a link between these drugs and heart maladies. However, one physician told me it's not uncommon for many very obese individuals to, previous to the use of Phen-Fen, already have heart problems. His opinion was the drugs may have enhanced the problems already present in the heart or, the problems reported were actually already there and Phen-Fen was used as a scapegoat for litigation. Keep in mind, this same physician, who called Phen- Fen the most successful weight loss combo he had ever prescribed, had thousands of patients using the drugs and admittedly, "made enough money in two years to retire." The individual who decides to import the two via a web based pharmaceutical house should consult a physician so he may be able to monitor health and side effects that may be related to these drugs.

Redux

Redux, also known as dexfenfluramine, and an off shoot of fenfluramine is, at best "ok" as a diet aid. Originally available in other countries outside the US, it is tremendously popular in France and former French colonies in North Africa. People in the US are still using it, mainly because physicians no longer

have access to phentermine and fenfluramine. However, when approved by the FDA in the late 1990's, it was so over hyped that the diet giant Jenny Craig, lost 30% of its stock value in a single day!

Redux is very similar to fenfluramine but it is thought to work better, with less side effects. Therefore, with less side effects, it can be used for longer periods of time. Generally, physicians feel comfortable prescribing Redux for up to a full year where previously, most seemed to feel comfortable to wean patients from Phen-Fen after a few months.

In a year long study with Redux, 6.4% of subjects using the drug lost 5% or more of their body weight and more than 20% of the subjects lost at least 15% of their body weight. However, a study published in the New England Journal of Medicine (Aug, 29, 1996) reported a rare life threatening side effect of redux called primary pulmonary hypertension. This condition causes blood vessels supplying blood to the lungs to become thick and scarred which cuts off oxygen delivery to the lungs. It can also create resistance which puts stress on the heart. Researchers in Europe found those using Redux have a 6 fold increase chance of experiencing primary pulmonary hypertension and those using the drug for very long periods of time will be subjecting themselves to a 23 fold increase in risk.

Neither Redux or Phen-Fen are designed for people who have a few pounds to lose or are mildly overweight. First time dieters and those who have less than 30 pounds to lose can radically change body composition with the right training and eating program. These pills are not a magic bullet and an "end all" to weight management.

Ephedrine

Earlier, ma Huang was covered and ephedrine is a drug that is a very close cousin to it, more like a brother. Ephedrine is made from ma Huang. It enters the blood radically faster than ma Huang and its effects are stronger. Ephedrine is a beta agonist and has been shown to both increase lean body weight and decrease body fat in animals. Adrenergic receptors

stimulated by adrenergic agonists (like ephedrine) control the cell's response to stress hormones. Ephedrine stimulates the release of catecholamines in the body. Catecholamines act on fat cells by allowing them to be broken apart to be used as fuel. Catecholamines can be considered catalysts; they're necessary to initiate fat cell break down. Ephedrine also stimulates the sympathetic nervous system, similar to Phentermine. The result is a decrease in appetite and and an increase in caloric expenditure.

Ephedrine causes calories to be burned in two ways. By stimulating the sympathetic nervous system, it promotes the release of messengers that make brown fat, the internal fat surrounding organs, more energy dependent. Since brown fat is metabolically active, it requires calories, stimulating brown fat can increase it's fuel needs creating calorie expenditure without exercise. We learned lean individuals seem to have greater metabolic activity within brown fat than obese individuals. Perhaps another reason lean folks have an easier time staying leaner while obese folks continue to struggle. The second way ephedrine burns up calories is by increasing dietary induced thermogenesis. Foods that cause an increase in heat production in the body will create a greater increase in heat production with ephedrine use. Another way to increase caloric expenditure, albeit in small amounts, without exercise.

Caffeine prolongs the effects of ephedrine in the body. There are multiple studies showing 20 mgs a day of ephedrine combined with 200 mgs of caffeine and a reduced calorie diet causes more fat loss and greater retention of lean body mass than with the exact same diet. So, besides stimulating caloric expenditure, ephedrine and caffeine cause the body to hold onto and retain muscle mass while dieting which keeps the metabolic rate elevated which is the most important factor in shedding body fat while decreasing calories.

This product should also be used only under close medical supervision.

Testosterone

Testosterone is the male hormone that dramatically increases upon puberty and declines after the age of 30. It is responsible for secondary sex characteristics of the male - increased facial and body hair and a deepening of the voice. It's what makes a man a man.

Testosterone builds muscle. Remember, muscle builds metabolic rate. While not approved for weight control because it does not work like traditional drugs (decreasing appetite or stimulating the nervous system) testosterone could be used to alter the muscle to fat ratio in the body. In a study in The New England Journal of Medicine (July 4, 1996) 40 men were divided into 4 groups. One received 600 mgs of testosterone a week. The second group received a placebo, a "fake". The third group received 600 mgs of testosterone and exercised. The final group received a placebo plus exercised. The study lasted for 10 weeks. Those who took the testosterone and exercised added more muscle than the other 3 groups. No surprise there. Those using testosterone and did not exercise also gained lean muscle weight. Quite a surprise. The implication here is testosterone can increase muscle mass without exercise and muscle mass is the single greatest factor that increases metabolism and caloric expenditure. Remember, an individual who adds just 10 pounds of muscle to a 140 pounds frame will increase resting metabolic rate by 7% daily.

According to Richard Strauss, MD of Ohio State University, severe weight loss programs in male collegiate wrestlers lowers testosterone levels. This serves as a double whammy on fat control. We know severe dieting causes a shedding of muscle mass and an overall adaptation in metabolism which makes fat loss more problematic. Now we learn serve dieting pushes down testosterone levels which are important in maintaining muscle mass and metabolism.

Side effects include low sperm count, water retention, changes in HDL or LDL levels, possible high blood pressure and depression upon cessation.

Growth Hormone

Growth hormone (GH) is released from the pituitary gland within 30 to 90 minutes of dozing of to sleep. The release is greatest in teenage years and begin to decline after the mid-twenties. By the time a person reaches 60, GH levels are minute compared to that of a twenty year old. GH is lipolytic; it burns fat. Declining GH levels as one ages is a reason individuals gain fat and lose muscle mass. Because GH supports the immune system, prevents bone loss and supports the retention of lean body mass, it has continued to be the craze among longevity enthusiasts.

About 8 years ago, recombant GH, that made in a laboratory, was so expensive, only the wealthy could afford GH therapy as a means to control fat. These days, the price is radically lower and longevity clinics prescribe it like candy to any one who walks through the front door. How's it work? Synthetic GH is injected daily, sometimes twice daily, to mimic the body's own GH. In time, GH causes a shifting effect in the metabolism where the body tries to burn a higher percentage of fatty acids than glucose. The benefit is mild; if you can get the body to burn more stored body fat, you become more of a "fat burner." The other effect, which magnifies the first; GH increases amino acid uptake by muscles and can build small amounts of lean body mass without weight training. We know even slight increases in lean body mass exert metabolic boosting effects on the body. The boost in muscle mass coupled with a shifting in fuel sources towards body fat can promote discernible changes in body composition with no change in exercise or diet. Incorporating GH with training and exercise would surely yield greater losses in body fat than exercise and diet alone.

Side effects include high blood pressure, carpel tunnel syndrome, and possible changes in HDL and LDL levels.

L-Dopa

L-Dopa is a prescription amino acid that is used in Parkinson's Disease. It increases the amount of the neurotransmitter in the brain called dopamine, a cousin, sort of the "yang" to the neurotransmitter serotonin.

Higher Dopamine levels increase the release of growth hormone from the pituitary. Tests sponsored by the National Institute On Aging showed 500 mgs a day in pill form could restore GH levels of men in their sixties to levels common to men in their twenties! With no side effects. Ask your Doctor about L-Dopa. The results seem more than interesting.

Oxandrin

Oxandrin, also known as oxandrolone, is made and marketed by a company called Bio-Technology General. Oxandrin is an anabolic hormone, a distant cousin to testosterone. In simple terms, Oxandrin has been altered from testosterone so that it yields increases in lean body mass with as little influence as possible on developing secondary male sex characteristics. Because there are fewer, though not "no" effects on hormones, women often use oxandrin in small quantities to increase or hold onto lean body mass while dieting. Might surprise you, but many an actress, model and musician have used small amounts to "tighten up" for videos, print and film work. Approved as a means to support muscle mass in AIDS patients, most of the sales of oxandrin are to men trying to increase lean muscle mass.

Side effects include high blood pressure, water retention, potential low sperm count.

Appendage 1

Now you have more information and knowledge to continue your quest for a lean body. I am confident that the ideas, theories and tips in this book can help you to radically transform yourself. You have almost everything you need to get going.

The hardest part to losing weight is continuance. For one reason or another, most people are not motivated to stay with a program long enough to see concrete results. My wife thinks she has the answer. It's in her cooking.

She has found that most people can't lose weight because they really hate the taste of low fat and low sugar foods. People miss the junk, the fun stuff, the foods that taste good and make you feel good. Laura always stresses dieting success is correlated to great tasting foods, and since she is the best fat free cook in the world, I thought I would include a few recipes that may help you to stick with your diet.

NO FAT FRENCH FRIES

4 large potatoes (12 ounces)
2 large egg whites beaten
1/4 teaspoon paprika
Non stick cooking spray

1) Cut potatoes 1/2 inch thick in diameter shaped like a fry. 2) Soak in ice cold water for ten minutes. 3) Drain and place on paper towels. 4) Dip potatoes, one at a time, in eggs. 5) Place on top of a thoroughly Pam sprayed non stick cookie sheet. 6) Sprinkle with paprika. Spray potatoes with Pam. 7) Bake at 450° F for 15 minutes, flip and cook another 15 minutes. Serves 4. Calories: 300. Protein: 7. Carbohydrates: 67. Fat: 1.

TUNA BURGERS

1 can white water packed tuna
1 jumbo egg white
1 teaspoon Mrs. Dash
1/2 ounce pancake mix
1 tablespoon chopped onion

1) Drain tuna so little moisture exists. Place in a bowl. 2) Add egg white, pancake mix, spice and onion. Mix together with a fork. 3) Form into 3 inch diameter patties. 4) Grill both sides on a non stick Pam sprayed skillet over a medium heat. Serve on a bun, or alone with no fat french fries. Serves 2. Calories: 120. Protein: 20. Carbohydrates: 12. Fat: 2.

SPICY CHICKEN FINGERS

1 pound chicken breast, cut into small pieces
1 teaspoon cajun spice
1 teaspoon paprika
1/2 cup flour
1 tablespoon Mrs. Dash
2 egg whites

1) Combine spice and flour in a small bowl. 2) Beat egg whites with a fork. 3) Thoroughly spray a non stick pan with Pam. 4) Dip chicken pieces in egg whites then powder in flour mixture. 5) Grill. Serves 4. Calories: 177. Protein: 20. Carbohydrates: 13. Fat: 5.

TURKEY MEATBALLS

1 pound ground turkey breast
2 egg whites
1 small carrot, finely grated
1 stalk green onion, chopped
1 clove garlic
1/2 teaspoon parsley
1/2 teaspoon oregano
2 tablespoons bread crumbs
extra bread crumbs

1) Mix all ingredients. 2) Form into 1 inch diameter balls. Roll into bread crumbs. 3) Pan fry over a low heat in a Pam sprayed non stick skilled. 4) Turn until brown and the center is cooked. Serve with pasta. Serves 8. Calories: 98. Protein: 18. Carbohydrates: 5. Fat: 1.

LAURA'S LO MEIN

4 egg whites
12 ounce box spaghetti
4 tablespoons soy sauce (low sodium)
1/2 cup fat free mayonnaise
1 green onion, chopped

1) Cook spaghetti according to the directions on the box. 2) Store in the refrigerator overnight. 3) Grill onion in a non stick Pam coated skillet. 4) Next, grill the cold spaghetti with the egg whites in the skillet. 5) When the egg turns white, add mayonnaise and soy sauce. 6) Cook another 3 minutes. Serves 5. Calories: 278. Protein: 11. Carbohydrates: 54. Fat: 2.

HONEY MUSTARD CHICKEN

1 pound chicken breast
1/4 cup Worcestershire Sauce
1 tablespoon honey
3 tablespoons mustard
1 tablespoon molasses
1 teaspoon ginger

1) Marinade all ingredients in a bowl overnight. 2) Broil until juicy and tender in an oven broiler set to 450° F. Serves 4. Calories: 140. Protein: 19. Carbohydrates: 7. Fat: 4.

Appendage 2

	Measure	Weight	Calories	Protein	Total Fat	Carbo
BREADS						
Bagels	1	100.0	296	11.0	2.6	56
Brown Bread, with raisins	1/2 slice	45.0	80	2.0	0.0	18
Cinnamon Raisin Bread	1 slice	28.0	80	2.0	1.0	15
Cracked Wheat	1 slice	25.0	66	2.3	0.9	13
English Muffin enriched	1	57.0	130	4.5	1.1	26
Pumpernickel	1 slice	32.0	82	2.9	0.8	15
Roman Meal	1 slice	28.0	70	3.0	1.0	13
Rye	1 slice	25.0	66	2.1	0.9	12
Sourdough	1 slice	28.0	70	3.0	1.0	12
Whole Wheat Bread	1 slice	25.0	61	2.4	1.1	11
CEREALS						
All-Bran	1 oz.	28.0	71	4.0	0.5	21
Alpha Bits	1 C	28.0	110	2.3	0.7	24
Bran, 40%	1 C	47.0	152	5.3	0.8	37
Bran, 100%	1/2 C	28.0	76	3.5	1.4	21
Cheerios	1 1/4 C	28.4	111	4.3	1.5	20
Corn Chex	1 oz.	28.0 1	11	2.0	0.1	25
Corn Flakes	1 1/4 C	28.0	110	2.3	0.1	24
Corn Grits, cooked	1C	242.0	146	3.5	0.5	31
Cream of Wheat	1 C	251.0	134	3.8	0.5	28
Grapenuts	1/4 C	28.4	101	3.3	0.1	23
Life	1 oz.	28.0	104	5.2	0.5	20
Malto Meal	1 C	240.0	122	3.5	0.3	26
Nutri-Grain, wheat	3/4 C	8.0	102	2.5	0.3	24
OATMEAL						
Cooked	1 C	234.0	145	6.0	0.4	25
Instant	1 pkg.	177.0	104	4.4	1.7	18
Puffed Rice	1 C	14.0	56	0.9	0.1	13
Puffed Wheat	1 C	14.0	52	2.1	0.2	11
Raisin Bran	1/2 C	28.0	86	2.5	0.5	22
Rolled Oats, dry	1 C	81.0	311	13.0	5.1	54
Roman Meal	3/4 C	181.0	111	4.9	0.7	25
Shredded Wheat	1 lg.	23.6	83	2.6	0.3	19
Toasted Wheat Germ	1/4 C	28.0	108	8.3	3.0	14
Total	1 C	33.0	116	3.3	0.7	26
Wheaties	1 C	28.0	99	2.7	0.5	23
DAIRY						
Blue	1 oz.	28.0	100	6.1	8.2	1
Brie	1 oz.	28.0	95	5.9	7.9	0
Feta	1 oz.	28.0	75	4.0	6.0	1
Parmesan	1 oz.	28.0	111	10.0	7.3	1

	Measure	Weight	Calories	Protein	Total Fat	Carbo
EGGS						
Chicken, Boiled	1	50.0	79	6.1	5.6	1
Chicken, Poached	1	50.0	79	6.0	5.6	1
Chicken, White	1 lge	33.0	16	3.4	0.0	0
Chicken, Whole	1 lge	50.0	79	6.1	5.6	1
EGG SUBSTITUTES						
Country Morning	1/2 C	121.0	173	14.6	12.1	1
Egg Beaters	1/4 C	25	5.0	0.0	1	
FISH						
Bass, baked	4 oz.	113.0	287	23.6	19.4	3
Bluefish, raw	3 oz.	85.0	105	17.0	3.6	0
Carp, cooked	3 oz.	85.0	138	19.4	6.1	0
Clams, steamed	3 oz.	85.0	126	21.7	1.7	4
Cod, baked	3 oz.	85.0	89	19.4	0.7	0
Crab, moist heat	3 oz.	85.0	82	16.5	1.3	0
Flounder, baked	3.5 oz.	100.0	202	30.0	8.2	0
Grouper, broiled	3 oz.	85.0	100	21.1	1.1	0
Haddock, baked	3 oz.	85.0	95	20.6	0.8	0
Halibut, baked	3 oz.	85.0	119	22.7	2.5	0
Kingfish, cooked	3.5 oz.	100.0	255	22.3	13.4	12
Lobster, steamed	3 oz.	85.0	83	17.4	0.5	1
Mackerel, baked	3 oz.	85.0	223	20.3	15.1	0
Mussels, baked	3 oz.	85.0	147	20.2	3.8	6
Ocean Perch, baked	3 oz.	85.0	103	20.3	1.8	0
Orange Roughy, raw	3 oz.	85.0	107	12.5	6.0	0
Oysters, steamed	3 oz.	85.0	117	12.0	4.2	7
Oysters, raw	6 med.	84.0	58	5.9	2.1	3
Pollack, baked	3 oz.	85.0	96	20.0	1.0	0
Salmon, pink, cooked	3 oz.	85.0	118	16.8	5.1	0
Salmon, poached	3 oz.	85.0	157	23.3	6.4	0
Scallops, raw	3 oz.	85.0	75	14.3	0.6	2
Shark, raw	3 oz.	85.0	111	17.8	3.8	0
Shrimp, steamed	3 oz.	85.0	84	17.8	0.9	0
Snapper, baked	3 oz.	85.0	109	22.4	1.5	0
Sole, fillet, frozen	4 oz.	113.0	82	18.0	0.8	1
Squid, Calamari, fried	3 oz.	85.0	149	15.3	6.4	7
Swordfish, baked	3 oz.	85.0	132	21.6	4.4	0
Tuna, water packed	3 oz.	85.0	111	25.1	0.4	0
Tuna, baked	3 oz.	85.0	157	25.4	5.3	0
Whitefish, raw	3 oz.	85.0	114	16.2	5.0	0
FRUIT						
Apple, with skin	1	150.0	81	0.3	0.5	21
Apple, dried	10 rings	64.0	155	0.6	0.2	42

	Measure	Weight	Calories	Protein	Total Fat	Carbo
Applesauce, Unsweetened	1 C	244.0	106	0.4	0.1	28
Apricot	3	106.0	51	1.5	0.4	12
Avocado	1	201.0	324	4.0	30.8	15
Banana	1	114.0	105	1.2	0.6	27
Blueberries	1 C	145.0	82	1.0	0.6	21
Cantaloupe	1 C	160.0	57	1.4	0.4	13
Cherries	1 C	145.0	104	1.7	1.4	24
Dates	10	83.0	228	1.6	0.4	61
Fig	1	65.0	47	0.5	0.2	12
Fruit Cocktail, water packed	1/2 C	122.0	40	0.5	0.1	10
Grapefruit	1/2	120.0	38	0.8	0.1	10
Grapes, Green	1 C	200.0	102	1.0	0.2	27
Honeydew	1/10	129.0	46	0.6	0.1	12
Kiwi	1	76.0	46	0.8	0.3	11
Lemon, raw	1 Med	58.0	17	0.6	0.2	5
Mango	1	207.0	135	1.1	0.6	35
Orange	1	131.0	62	1.2	0.2	15
Papaya	1	304.0	117	1.9	0.4	30
Peach	1	87.0	37	0.6	0.1	10
Pear	1	166.0	98	0.7	0.7	25
Pineapple	1 C	155.0	77	0.6	0.7	19
Plum	1	66.0	36	0.5	0.4	9
Prune	10	84.0	201	2.2	0.4	53
Raisins, packed	1 C	165.0	488	5.3	0.8	0
Strawberries, fresh	1 C	149.0	45	0.9	0.6	10
Tangerine	1	84.0	37	0.5	0.2	9
MEATS						
BEEF						
Flank Steak	4 oz.	114.0	222	21.9	14.3	0
Ground Beef, Lean	4 oz.	113.0	298	28.0	20.9	0
Heart	3 oz.	85.0	148	24.5	4.8	0
Liver	4 oz.	113.0	183	27.6	5.5	4
Porterhouse Steak	4 oz.	114.0	322	20.0	26.4	0
Round Steak	4 oz.	114.0	273	22.0	19.9	0
Sirloin Steak	4 oz.	114.0	295	20.7	22.9	0
T-Bone Steak	4 oz.	114.0	337	29.0	24.0	0
Tenderloin	4 oz.	114.0	308	29.0	20.4	0
LAMB						
Leg of lamb	4 oz.	114.0	211	32.0	7.6	0
Chops	4 oz.	114.0	350	25.5	26.7	0
Shoulder	4 oz.	114.0	315	27.7	22.0	0
VEAL						
Cutlet	4 oz.	114.0	170	18.1	10.3	0
Rump Roast	4 oz.	114.0	143	17.0	7.8	0

	Measure	Weight	Calories	Protein	Total Fat	Carbo
LUNCHEON MEAT/SAUSAGE						
Turkey, breast meat	1 slice	21.0	23	4.7	0.3	0
POULTRY						
CHICKEN						
Capon, skin, roasted	3.5 oz.	100.0	229	29.0	11.7	0
Dark w/ skin, roasted	3.5 oz.	100.0	253	26.0	15.8	0
Dark w/o skin, roasted	3.5 oz.	100.0	205	27.4	9.7	0
Light w/ skin, roasted	3.5 oz.	100.0	222	29.0	10.9	0
Light w/o skin, roasted	3.5 oz.	100.0	173	30.9	4.5	0
Whole w/o skin, stewed	3.5 oz.	100.0	177	27.3	6.7	0
TURKEY						
Dark w/o skin, roasted	3.5 oz.	100.0	187	28.6	7.2	0
Light w/o skin, roasted	3.5 oz.	100.0	157	29.9	3.2	0
SAUCES						
Barbeque	1 T	16.0	12	0.3	0.3	2
Catsup	1 T	15.0	16	0.3	0.1	4
Heinz Catsup	1 T		18	0.2	0.0	4
Heinz Chili Sauce	1 T		17	0.2	0.0	4
Heinz 57 Sauce	1 T		15	0.4	0.2	3
Horseradish	1 T	15.0	6	0.2	0.0	1
Mustard, Yellow	1 T	5.0	4	0.2	0.2	0
Mustard, Brown	1 t	5.0	5	0.3	0.3	0
Open Pit, Hickory	1 T	18.0	22	0.1	0.2	5
Pizza Sauce	1/4 C	60.0	40	0.0	2.0	5
Prego	1/4 C	113.0	136	1.9	5.6	20
Spaghetti Sauce, canned	1 C	249.0	272	4.5	11.9	40
Tamari, Soy Sauce					0.1	3
Worcestershire	1 T	11				
VEGETABLES						
Beets, cooked	1/2 C	85.0	26	0.9	0.0	6
Broccoli, raw	1 C	88.0	24	2.6	0.3	5
Carrot, raw	1 med.	72.0	31	0.7	0.1	7
Cauliflower, raw	1 C	100.0	24	2.0	0.2	5
Celery, raw	1 stalk	40.0	6	0.3	0.1	2
Corn, yellow, cooked	1/2 C	82.0	89	2.7	1.1	21
Cucumber, raw	1 C	104.0	14	0.6	0.1	3
Eggplant, raw	1 C	82.0	22	0.9	0.1	5
Green Beans, cooked	1/2 C	62.0	22	1.2	0.2	5
Lettuce, Iceberg	1 C	75.0	10	0.7	0.1	2
Lettuce, Romaine	1 C	56.0	8	0.9	0.1	1
Mixed Vegetables, frozen	1/2 C	91.0	54	2.6	0.1	12
Mushrooms, raw	1 C	70.0	18	1.5	0.3	3
Okra, cooked	1/2 C	80.0	25	1.5	0.1	6

	Measure	Weight	Calories	Protein	Total Fat	Carbo
Onions, Mature, raw	1 C	160.0	54	1.9	0.4	12
Peas, frozen	1/2 C	80.0	63	4.1	0.2	11
Pepper, Green, raw	1/2 C	50.0	12	0.4	0.2	3
POTATOES						
Raw w/o skin	1	112.0	88	2.3	0.1	20
Baked w/ skin	1 lg.	202.0	220	4.7	0.2	51
SQUASH						
Acorn, cooked, mashed	1/2 C	122.0	41	0.8	0.1	11
Spaghetti, cooked	1/2 C	78.0	23	0.5	0.2	5
Sweet Potato, baked	1	114.0	118	2.0	0.1	28
Water Chestnuts, canned	1/2 C	70.0	35	0.6	0.0	9

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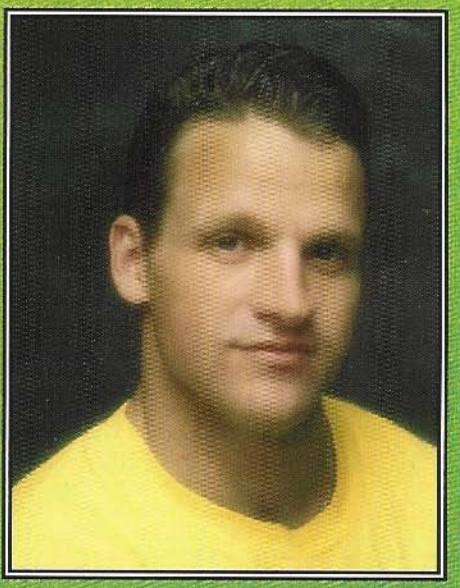
Notes

ABOUT THE AUTHOR



Chris Aceto graduated summa cum laude from Springfield College in Massachusetts with a degree in Applied Exercise Science. He is a nutritional consultant to celebrities, top athletes and has trained three different winners of the coveted NPC National Bodybuilding Championships.

A regular contributor to Muscle and Fitness and FLEX magazines, Chris has authored three other books; *Championship Bodybuilding*, *The Health Handbook* and *Understanding Bodybuilding Nutrition & Training*.

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