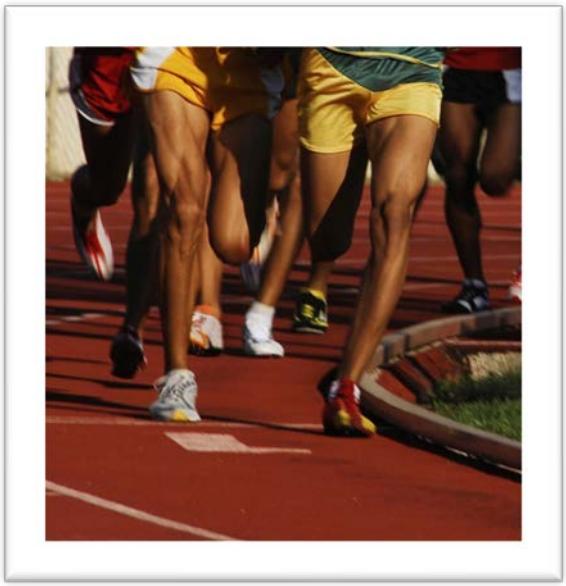


MANAGING YOUR BODY WEIGHT FOR LIFE

Orientation

David M. Player, MD

Health By Design Program Manual

FOREWORD

By Dr. David M. Player

The management of body weight and composition has become America's leading health problem. The majority of "causes of death" in our country are in some way related to body fat stores or inappropriate nutrition. The cost of health care is therefore directly related to body weight, body composition, and nutrition, and only as we effectively manage these fundamental issues can we hope to control health care costs. As most of you are aware, however, managing body fat and composition in this century in America is not a simple matter.

For the past 50 years physicians, and the general public as well, have been taught that people become too fat because they eat too much or exercise too little. It is now apparent that this concept is much too simplistic. Recent studies have shown that there is a very broad range of metabolic rates for the general populace and that this variation in metabolism (how many calories we burn per day) is determined by genetics, illnesses, muscle mass, nutrition, and a host of other factors. A significant percentage of the population is then vulnerable to obesity. When this at-risk population is placed into a workforce that sits at desks, answers phones, or does computing, the result is a devastating epidemic of obesity — and a nation that cannot afford the resultant costs of the health consequences.

Can obesity be managed in those individuals who have low metabolic rates? Yes it can, but it requires:

- an intense commitment by the individual to change weight and composition and to stay changed (motivation).
- an in-depth knowledge of all the medical, physiologic, and behavioral issues that contribute to the management of body composition (education)
- an understanding of one's own unique biochemistry, physiology, genetics and structure and how they influence general management of body composition.

Individuals with low metabolic rates who lack intense commitment, knowledge, or understanding of their own uniqueness will be doomed to fail in their management of body weight and fatness. Current data from several sources has confirmed that 95 percent of people entering commercial weight loss programs will weigh 5 percent to 10 percent more in five years than they did when they entered the program.

Because body weight and composition are so biologically controlled, management can only be done successfully within the health care system — as a part of a lifetime commitment to health maintenance. Such a system requires commitment from the individual as well as complete understanding of his or her medical uniqueness. In return, the system must provide the individual with enough education, management skills, and high quality tools as are currently available to manage this most difficult medical problem. Health by Design is such a health care system. It should be a lifetime resource for those who are truly committed to managing their weight and body composition.

The very best medically-managed commercial weight loss programs have published data showing that 60 percent of patients are keeping off 50 percent of their weight loss two years after completion of rapid weight loss. The other 40 percent of patients are much less successful. More importantly, five years after completion of rapid weight loss, the majority of patients have regained all or most of their weight.

The message is clear to me. If good results last only two years, and five years later patients are not much different in weight from when they started their program, the problem of obesity is:

- too biological; or
- learned behaviors are too difficult to maintain chronically; or
- commercial “maintenance” programs are too short or ineffective.

I suspect that all three reasons are important. Clearly, a good weight loss program must be medically based, must deal with the problems of metabolism and thermogenesis, and must be available and easily accessible for the duration of a patient’s clinical lifetime.

Health by Design programs are committed to meeting all of these criteria in a way that does not demean patients’ intelligence, is not overly restrictive in demanded behavior, and is not overly expensive or time consuming. I wish you well as you begin this very important venture.

MANAGING YOUR BODY WEIGHT FOR LIFE

Chapter 1

Medical Management of Obesity

David M. Player, MD

Health By Design Program Manual

Chapter 1

MEDICAL MANAGEMENT OF OBESITY

The Theory and Practice of Low Calorie Diets

Welcome to Health by Design. The program that you are beginning may be your first attempt at serious weight loss or one of a long series of efforts at correcting or managing one of life's most difficult problems. Regardless of your experience level, we sincerely hope that this will be the last program that you ever have to enter to manage your weight. We have worked hard to see that every important element is present to assure your success. These include:

- medical support – (if needed) including physician consultation, laboratory studies, metabolism measurements, body composition studies, and fitness measurements;
- individual counseling and accountability – to assure that you have your individual needs addressed;
- education in nutrition, physiology, biochemistry and health to assure that you have adequate knowledge to live life healthfully at a leaner weight;
- tools to assist in diet management including diet supplements, low calorie food products, vitamins and minerals, and other support products.

Our physicians are specifically trained and experienced in the complex field of weight management. Our behavioral counselors are experienced in helping patients to maximally use diet products and educational materials to achieve their weight goals. Our video education system and manuals are without parallel nationally. (There is no other physician-directed and taught weight management video series.) Finally, our diet supplements and food products are of the highest quality available in the country. You are entering a program which corrects all of the deficiencies of traditional weight loss programs. Welcome to Health by Design's "Managing Your Body Weight."

Most of you who read this will be participating in a weight loss program. The truth is that it is really a fat loss program, and (as you will learn) there is a gross difference between losing body weight and losing body fat. In fact, they often have little to do with each other. It is very possible to lose weight and gain fat at the same time. Similarly (and more commonly) it is possible to lose fat and gain weight at the same time. This first chapter, then, is a discussion of the composition of the body and what controls it.

BODY FAT CONTENT VS. SCALE WEIGHT

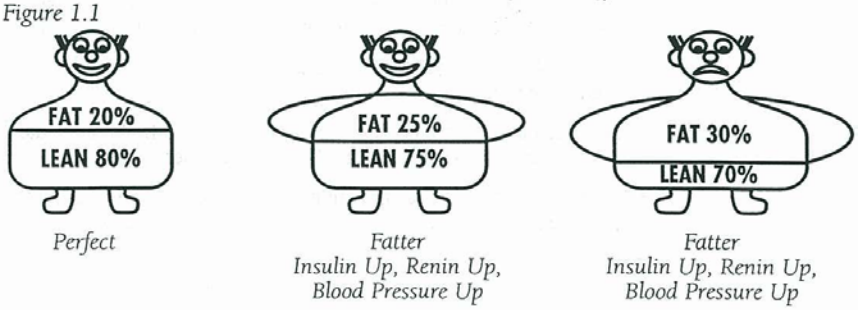
Most of us do not think about it much, but when we get on a scale we are weighing bones, muscles, internal organs, body fluids, and fat. We do not typically hop on a scale in the morning and say, "Darn – my bones are getting too heavy. I will have to lose a little bone this week." Similarly, I am sure it is a rare person who says, "My muscles are getting too heavy; I will have to go on a muscle loss program." When we say we are too heavy, we mean, of course, that we are too fat and need to lose fat to look better, feel better, or get healthier. Our bathroom scale does not tell us much about our composition. It only tells us with what force gravity shoves us into the floor. We may assume that when the scale moves up or down, we have gained or lost fat. The truth is that body fat content and scale weight have little to do with each other. There are some people who are light and fat and others who are heavy and lean. Weekly losses and gains on a scale are likewise totally unrelated to changes in body fat. Of what value then are scales? They are little more than "assistants" that give us a suggestion that our body is

changing. They do not tell us what is changing – but they do tell us that something is changing. We shall see that with good knowledge of our metabolic rate and reasonable information about our food intake and energy expenditure, we will be able to tell with good accuracy what part of our scale weight losses are fat and which parts are other substances.

HOW MUCH FAT IS TOO MUCH?

If our goal is modifying our composition by decreasing fat content, we should first have some concept of how much fat is too much. Although cosmetically there may be some that feel that any fat is too much, medically speaking this is not true. It is a fact, however, that as we get fatter above a certain percentage of our body weight, several things that are negative for health begin to happen. Perhaps the first of these negatives is a rise in the amount of insulin required to keep our blood sugar normal. This secondarily leads to hormonal changes that may cause constriction of small blood vessels and high blood pressure (hypertension). We know that such rises in insulin and related hormones are reversible if body fat content drops. Each person, therefore, has his own tolerance limits for fat storage – his own fat percentage above which he begins to develop hormonal abnormalities that ultimately begin to cause disease. The drawing in Figure 1.1 demonstrates this progression:

Figure 1.1



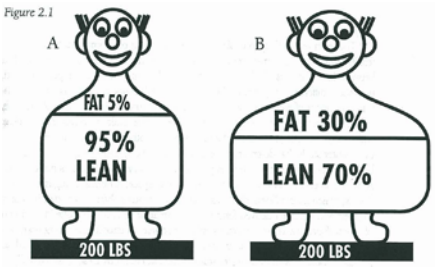
The higher percentage of our weight that is body fat, the more "diseased" these hormone systems become.

For adult women, a good goal is being less than 25% fat. For adult men, less than 20% fat is a more acceptable standard.

Most patients who enter Health by Design risk management programs are 35 to 45% fat (or above). Many have high blood pressure, diabetes, or other health problems as a result of their excess fat storage. Our goal, of course, is to healthfully lower the percentage of our body that is fat and to improve the function of the above hormone systems.

Heavy, Not Fat

Before going into how we accomplish the above goal of getting leaner, I would like to spend a short time discussing some of the distortions in body composition missed by the bathroom scale. As I commented before, there are fat people who are light and lean people who are heavy. Only with underwater weights, skin calipers, or other devices that measure the composition of the body can we tell the differences between these people and make recommendations as regards "ideal" body weight. The drawings below (Figure 2.1) show two men who both weigh 200 pounds.



Man “A” is a typical football player or other athlete. He is heavy at 200 pounds but he is definitely not fat. He would probably hurt me a lot if he ran into me on the football field. Man “B” looks more like me. He weighs 200 pounds also, but he would not hurt me so much if he ran into me on a football field. He is light but fat and would take up much more space than man “A” in an underwater tank. He is less dense than man “A”, and the lower density is related to the larger amount of body fat that he has stored. These differences in people have tremendous health implications and economic importance – especially for the insurance industry, but currently both man “A” and man “B” above would receive the same health-risk rating if applying for a life insurance policy. As we move into the next century with more competition between insurance companies for policyholders with lower health risks, it will become more and more important that something is known of an applicant’s composition rather than simply height and weight.

Light, But Fat

The second distortion of body composition to be discussed here concerns light individuals who are fat. A few years ago, we did repeated sets of underwater weights and skin caliper studies on a local business executive. This person was 6’2” tall and weighed 176 pounds. You say to yourself, “Gee that is just about what I would like to be” – and usually you would be right. But this fellow on repeated studies was 29% fat (obese, if you will). He was, in reality, light but fat. The reasons for this lay in his lifestyle. He was a business executive who had not lifted anything heavier than a pencil in years, who ate a high-fat, low-protein, junk-food diet, and who sat at a desk all day in a high stress situation – running a busy company. He did not feel particularly good – in spite of his weighing only 176 pounds, and you and I know that his composition was part of his problem – high insulin, high renin, and other hormonal distortions. Fortunately, he began to make significant changes in his lifestyle (lifting weights, walking long distances, eating diet supplements, lowering dietary fats and salts, etc.), and by the end of the following year he had gone from 6’2”/176 pounds to 6’2”/184 pounds. He had gained 8 pounds in a year. But - - - his waist had decreased by 3 inches, his cholesterol was down over 50 mg%, his treadmill (test) time was up over 5 minutes, and his body fat was now 17% instead of the original 29%. He had gained weight but lost body fat. All of his gain, therefore, was muscle mass and bone mass – necessary tissues that will help his endurance and overall sense of wellbeing.

Weighing Body Fat

The main reason that none of us knows much about our composition is that we do not have readily available tools to measure the different components of our body. Even the distinction between lean and fat is a little nonspecific since there are at least two types of fat and, of course, a number of different components of lean mass (muscle, bone, and internal organs). There are a variety of pieces of equipment that purport to measure the composition of the body as % lean and % fat. Most of them are inaccurate, bulky, inconvenient, or too expensive for widespread use. The gold standard against which all other measurements are judged is an underwater study that determines the density of the body. Density here means how much space a body of a certain weight occupies. A piece of lead is very heavy but does not take up much space. A basketball is a mixture of various tissues that have different densities. Years ago, scientists obtained the densities of human cadavers and thereafter derived formulas for estimating fat and lean tissue in a living human being of a certain density. There are some significant sources of error in measuring body fat – even using this “gold standard”, but the accuracy of all other gadgets and gizmos is measured against the standard obtained with underwater studies. Here at Health by Design, we use both underwater volumeter and skin calipers to measure body fat. The latter uses measurements of subcutaneous fat (that below

the skin) to estimate total body fat. It is less accurate than underwater weighing and very dependent upon who does the testing. But – it is easy, and it can be done almost anywhere. Regardless of how you measure it, it is extremely important that you have a sense of your composition, that you recognize yourself as a mixture of various tissues, and that the goal for most of us is decreasing body fat without excessive loss of non-fat tissue.

Under-Eating

A third example of distortions in body composition I have observed in my own wife. Several years ago, she was 5'5" tall, weighed 108 pounds, wore a size 4-6 dress, and worked very hard at being "skinny." Her diet was a mixture of lettuce, sprouts, and watercress with no milk or other good protein sources. She was the mother of four small children, ran long distances, and was so concerned about her weight that she climbed on the scales several times a day to "see how she was doing." She felt tired all of the time (most mothers of four children under age 5 probably feel that way), and did not look particularly healthy to me. When we began to measure her density and other health parameters, I began to appreciate the problem (which I think plagues a number of modern women). She was 23 to 24% fat in an underwater study, had bone density below a fracture line on densitometry study, and had low serum potassium and albumin levels. In essence, she was a relatively malnourished young woman who was living below her optimal weight and composition by under eating key nutrients.

Fortunately, she began to make some positive nutritional changes shortly thereafter and her composition has steadily improved. She stopped running, began lifting weights and walking long distances, began eating diet supplements and foods containing high-biological-quality protein – and began to gain weight. When she passed 120 pounds, we stopped talking about it (for fear of fighting). The funny thing was – she looked better to me than she previously had at 108 pounds on her previous nutrition and fitness program. The most interesting thing to her was that she was still wearing the same size 6 clothing at 120 pounds that she had previously worn at 108 pounds. What had happened? Why did she look so good? The underwater tank told the story. She had actually gone from 23% fat to 19% fat while going from 108 to 121 pounds. She had gained lean mass and lost fat mass – a remarkable change in composition, brought about by better nutrition and a change in physical activity. Her "new body" actually takes up less space than her old one in spite of a 15-pound weight gain (a 200-pound block of lead takes up lots less space than a 200-pound piece of fat).

The point of this is that many people (particularly woman) in an effort to be skinny, under eat key nutrients and end up being light and fat. Our goals for you here at Health by Design are that you be strong and fit and not fat. The remainder of this chapter is an introduction to the means of accomplishing this change in you or me.

The drawing below (Figure 3.1) depicts a man (or woman) who is a piece of muscle hooked to a head and covered by a generous coat of fat. He looks a little like me and some other folks I know.

Now this person would like to lose some of his fat without affecting the size of his muscle very much. Think for a minute about the things that will keep his muscle this same size.

1. Genetics.
   The first of these "muscle controllers" is genetics. A given human being can only achieve a certain genetic maximum for muscle mass. (I could never get to look like Arnold Schwarzenegger!)

2. Muscular Work.

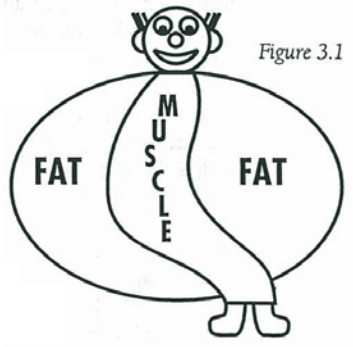


Figure 3.1

The second “controller” is muscular work. There is not a person reading this chapter who by lifting a 5-pound dumbbell over and over could not in time build a bigger, stronger, harder muscle.

3. Feed the Muscle.
   Thirdly, each of us needs to “feed” the muscle if it is to achieve its maximal strength and hardness. (You cannot starve it.) Protein, vitamins, minerals, and energy (fuel) are all necessary for optimal muscle size and function.

4. Testosterone Levels.
   Finally, we know that men have greater muscle mass than women – regardless of workload or nutrient intake. This, of course, is related to testosterone levels, which are much higher in men than women. Some athletes take testosterone-like substances (anabolic steroids) to increase muscle mass or strength. As we know, such substances are not only illegal but also may cause sterility, liver disease, and cardiac problems.

Influence of Age

Now, the above four issues control muscle size for any individual at any given age, but it is important for us to realize that age itself has a profound influence on muscle mass. We reach our peak muscle mass between about age 25 and 35. Most of us know that after age 35 a variety of changes occur that lead to our “going downhill.” One of these is that we begin to lose muscle and bone mass at about 1% per year. This “natural consequence” of aging can ultimately be devastating. It is said that the average American male loses 1/2 pound of muscle mass per year after age 35 and replaces it with 2 pounds of fat per year. It is no wonder that the average 60-year-old male does not look much like he did when he was 25 or 30. Some of this change is inevitable, but some is related to activity and nutrition. These are the issues that all of us have a chance to modify, thus minimizing the lean mass changes. I know men who are in their 70s and have excellent muscle mass and strength. I know others who can barely carry themselves from chair to chair. Diseases and medicines can cause some of this change – but an element of it is related to nutrition and muscular work, and it is these that we need to understand.

Let us go back and look at some of the things that happen as our hypothetical man passes age 35. He is busy at work, has demanding family responsibilities, and has little time for physical activity. He used to play tennis 5 days a week – now only once every 2 or 3 weeks. His muscle mass begins to drop. Muscle is a tissue that demands lots of energy. It needs a large amount of carbohydrate or fat calories to feed it. With a decreased muscle mass (due to a drop in activity) the resting calorie needs for our hypothetical man begin to drop. Food intake (calorie consumption) however does not often drop; in fact it often rises. The result of this is that someone who used to need 2000 calories per day to survive at a certain muscle mass now needs only 1900 calories per day. If he keeps eating 2000 calories per day or more (and he has the genetic capacity to store fat, which most of use do), he will begin to grow a bigger fatty coat. See Figure 4.1.

The net result of inactivity and loss of lean mass is a fatter human being who feels “tireder” trying to lift 200 pounds with his 156 pounds of lean mass than he used to with his 160 pounds of lean mass. If he is lucky, he will still weigh 200 pounds – even though his body is changing. After a year or two of this type of change, a man can have a very different body. If the scales do not change, how does he know that he is different?

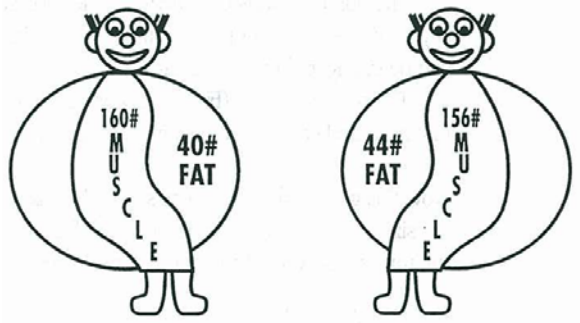


Figure 4.1

He can look in the mirror or try to fasten his pants and tell that he is different. When this happened to me, I thought I had shifted. My fat, which formerly was well distributed, seemed to be settling in my belt line. I was becoming what I like to call "light and fat." Finally, as lean mass is lost and fat is gained, our hypothetical man reaches a low enough energy requirement (see Figure 5.1) that he no longer can eat 2000 calories per day and stay at 200 pounds. At this point, he begins to grow "heavy and fat."

As shown in Figure 5.1, a curious thing happens as this light, fat guy becomes heavier and fat – he begins to gain some muscle to help hold up his heavier body. In essence, he started a weight lifting program by growing heavier, and he actually begins to gain some lean mass (approximately 20 to 25% of weight gain may be lean tissue gains). As I pointed out early in this chapter, it is this absolute gain in fat tissue as well as the change in composition that stresses our pancreas, liver and kidneys, causing elevations in hormones that finally cause type 2 diabetes, hypertension, and other health problems. And, he now is hungrier and needs more protein and other food to stay at 210 pounds.

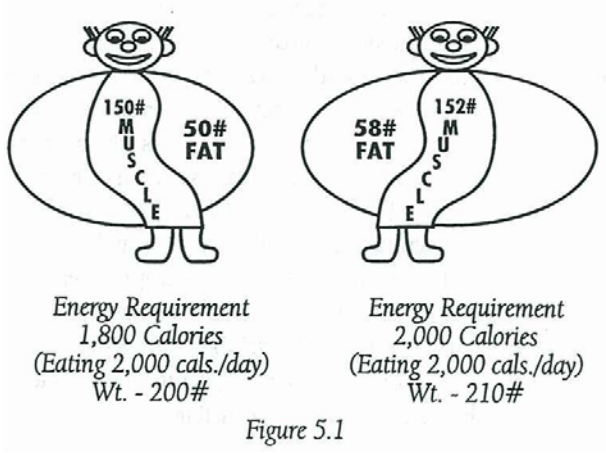


Figure 5.1

It is the heavy fat person in Figure 5.1 who finally comes to the doctor with one of these health problems. The doctor typically says, "Bill, your blood pressure is a little high. You need to lose some weight" or "Here, take these blood pressure pills." When Bill asks the doctor about a diet, he usually hears "just shove back from the table" (or some other profound dietary pronouncement). You must realize that most of us doctors are not taught much about helping patients lose weight. Lacking any firm medical direction, Bill chooses the latest diet in the "Star" or the "National Examiner" and he begins to lose weight. The diet may consist of some grapefruit, one boiled egg and some sprouts. Bill may feel awful. He does not know whether he is losing lean weight or fat weight – he really does not care, because he is losing weight. Typically, a person on a nutrient-depleted diet may lose 30 percent to 40 percent of his weight as lean tissue (instead of the 20 percent to 25 percent that he gained). He goes from heavy and fat to light and fat and is worse off at the end of his diet than he was when he started the whole process. And when he finishes his "diet" – back at 200 pounds (see Figure 6.1), how many calories can he now eat to stay at 200 pounds? - Even fewer than he ate when he last weighed 200 pounds – which was lots fewer than he could eat when he started the whole thing at 200 pounds with a good muscle mass.

What happens to the average person who gets to 200 pounds and is light and fat? He eats over 1500 calories per day and regains both fat mass and lean mass. He has in essence created a perfect situation for the yo-yo effect by eating an un-nutritious regimen while he lost weight. Most people who do this sort of thing repeat it again and again – slowly becoming sicker and fatter as they age and genetically lose muscle mass and bone mass.

How could Bill have prevented this dietary-induced loss of muscle mass? It turns out that the key nutritional ingredient missing in Bill's diet was enough protein. He may have been deficient in certain minerals and vitamins as well (which would aggravate the lean mass loss), but the key deficiency was in protein.

We know now that we can, by measuring urinary urea excretion (a protein breakdown

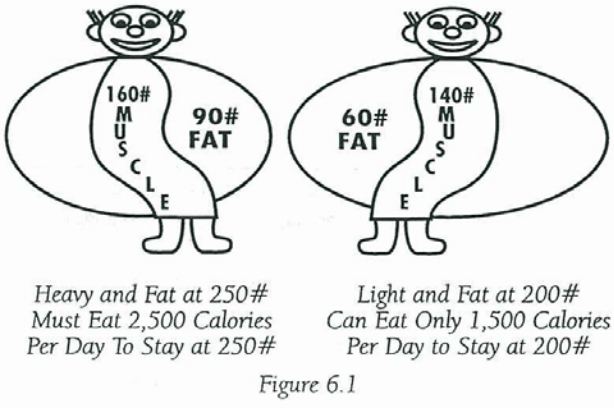


Figure 6.1

product), predict fairly closely how much protein a given patient needs to eat to nutritionally maintain balance (and lean mass). The amount of protein varies from person to person and changes with calorie intake, phase of menstrual cycle, exercise output, and a number of other factors that will be discussed in the next chapter. For simplicity, we can guess that the average person needs about 0.8 grams of protein per kilogram body weight (that is about 0.33 grams protein per pound body weight). Some patients require more or less than this amount. An average 200-pound woman then needs about 70 grams protein per day while a 250-pound man might need 90 grams or more. This is 280 to 360 calories of protein required to maintain the production of pure protein of hormones like insulin and ADH and basic structure like hair, eyeballs, or heart muscle of a given patient. This amount of protein provides the amino acids to maintain structural integrity. It does not let the structure run down a football field or chop wood. (That energy has to come from more protein – or preferably other energy sources). If you and I do not eat that much protein per day, we nutritionally waste away – a situation that is occurring daily in Ethiopia, Biafra, and a host of other third world countries where adequate protein is not available. Our job – simply put – is to eat enough protein to replace nitrogen losses and stay in balance – whether we are dieting or not.

Energy Requirements

Now, having dealt with protein requirements as a first and most important concept, I would like to change horses and talk about something even more complex (and interesting) – namely human energy requirements. If we take a hypothetical Health by Design patient (Bill again) and we want to keep him right at 200 pounds for the next year without change in body fat or lean mass or weight, how much do we need to feed him? First, you have got to feed him his grams of protein (so that he maintains his lean mass) – as I said, that may be approximately 300 calories of protein. But how much extra do I need to give him so he does not change his fat content? This number – known as human energy requirement – is extremely variable from person to person but is usually described in calories of energy required per pound of body weight. Here at HBD, we call this <u>your factor</u> and have determined that for overweight individuals, it is about 8 times body weight for women and 10 times body weight for men. (Men have more muscle and bone). So, if you are <u>an average overweight man who comes to Health by Design</u>, you should eat a total of 10 times your current body weight daily (including your protein) if you want to stay at your same composition this year. If, however, you desire to change composition and lose fat, you would still need the same protein grams (actually even more, as I will discuss later) but far fewer total calories of food (than ten times your body weight).

Where Do Calories Come From?

Before we go on to what we should feed Bill if he hopes to lose fat, we need to detour briefly and discuss how many <u>calories of energy</u> come from various types of foods when they are used by the body. Basically, we only get calories from 4 food sources. They are:

Protein .....4 calories per gram
Carbohydrates .....4 calories per gram
Fats.....9 calories per gram
Alcohol.....7 calories per gram

BUILDING A DIET

That is all there is – nothing else provides calories. So now, if we are building a hypothetical fat-losing diet for Bill, we start with about 80 grams of protein.

80 grams X 4 cal/gm = 320 calories

We next need to ask, "What are the fewest calories that Bill can eat over and above his protein calories and still be healthy?" The question should perhaps be better qualified with "and still feel good?" because some people feel okay on 500 calories per day while others feel energy-less and headachy on 700 calories or more. In my experience, most patients who are getting enough protein, vitamins, and minerals feel pretty good on as few as 600 calories per day – but almost everyone feels very good on 800 calories per day. So, let us suggest to Bill that he needs 320 calories of protein and 300 calories of something else – about 640 calories per day to be well-nourished and feel good too. Where should we go to get the other 320 calories? (We only have three other sources – fats, alcohol, and carbohydrates).

Obviously, we could get the extra calories from any of these sources, but eating fat when you are trying to lose fat does not make much sense, and alcohol has too many calories and has negative effects on muscle and metabolism. We could eat more protein, and there would be nothing wrong with this; but protein does not taste good by itself and eating all protein would unnecessarily stress our kidneys. So – we are left with our best food choice (to add to our protein base) being carbohydrate. Carbohydrates (chiefly grains, fruits, and vegetables) taste good, provide quick energy, and give us only 4 calories per gram.

Our perfect low calorie diet for Bill then would consist of:

Protein, 80 grams X 4	=	320 calories
and Carbohydrate, 80 grams X 4	=	320 calories
Total	=	640 calories

Bill might feel great on this diet or he might feel "spaced out" and headachy – telling us that more carbohydrate is needed. Almost everyone feels very energetic and well satisfied on greater than 800 calories per day – as long as basic protein, vitamin and mineral intake is kept at the above levels. If Bill plays football all day, he of course will probably need somewhat more protein and carbohydrate to feel good.

Projecting Fat Loss

Now, let us look at projected fat losses for Bill – given the above calculations. If his needs to maintain his current body are for 10 times his body weight of 200 pounds - he requires about 2000 calories per day. 320 of these calories have to come from protein to maintain lean mass. 320 more must come from carbohydrates to provide energy. Intake of these 640 calories leaves a deficit of 2000 minus 640 or 1360 calories per day. The body requires this energy from somewhere, and since it is not coming from food, it must come from Bill's fat.

Every time 3500 calories of fat are used, one pound of fat will be gone.

(We will talk about where the fat goes in the next chapter.) So, if Bill eats a 640 calorie diet, he will lose 1360 calories per day or one pound every 2½ days. Bill could therefore expect to lose 3 pounds of fat per week (if he does his normal activity and burns 10 times his body weight per day and does no additional physical exercise). Hopefully, this all makes reasonable sense and gives you an idea of exactly how much fat can be lost in a week – and how long it will take you to lose 20 or 30 pounds or more.

Calories Hidden In Some Protein Foods

Central to the above concept, of course, is the ability of Bill (or you) to eat only 640 calories per day. You and I would struggle going to our grocery stores and buying a 640 calorie per day diet that meets our nutritional needs and tastes worth a darn. The biggest problem is finding protein in a palatable form without getting lots of calories with the protein. Usually, we get our protein from meats, dairy products, and eggs – but these items typically contain fat as well as protein and place us well over 640 calories while getting our 80 grams of protein. For instance, if we eat regular cheese as our chief source of protein (it is a good source of protein), we would eat about 1100 calories per day – just getting our protein without eating any other foods. If we decided to be vegetarians and eat a mixture of beans and rice, we would need over 1000 calories to get 80 grams of protein. If we were content with tuna and low fat cottage cheese, we could get down below 640 calories to meet our protein needs and still have room for some fruit or other carbohydrates. Most people, however, are not excited about eating only tuna and cottage cheese for 6 months while they lose weight.

Getting Protein In Without High Caloric Intake

For this reason, I decided several years ago that I and most people like me who live and work in a sedentary society, would probably need to take some diet supplement, made out of protein and carbohydrate, each day if we hope to remain lean. Most currently available diet supplement products are made of caseinate (dairy protein) or egg white, mixed with various sugars, vitamins, and minerals.

Most such products are portable, reasonably inexpensive, palatable, and easily mixed and eaten "on the run." Diet supplements are really artificial food for an artificial society. You say, "Dave, my grandparents and parents never had to eat diet supplements to maintain health. Why should I?" The answer lies in the ways we live and work. Remember that at the turn of the century, the average 40-year-old American man burned about 3200 calories per day. His wife burned about 2700 calories per day. Now, an average 40-year-old businessman burns about 1800 calories per day while his wife may burn only 1400-1500. Protein, vitamin, and mineral requirements have not dropped very much however. We have good access to excellent protein-containing food, but most of it comes with extra baggage (fat), and we end up eating more calories than we burn just getting our protein nutrition. As a result, we are growing fatter and fatter. The ultimate cause is inadequate calorie expenditure – but the dilemma is getting enough nutrition in few enough calories. Clearly, if we go back behind a plow and a mule like our grandpa, we will not need to eat diet supplements. Mules and one-bottom plows, however, do not seem to be the way of the future for our culture. We are trying to make robots that can pick up pencils and do even more for us. It seems doubtful that our calorie burning is going to increase much in the near future. So, we are going to have to eat differently than we ever have before if we hope to avoid growing fatter and fatter and developing the diseases discussed earlier.

Diet supplements, then, like HMR, Optifast, Medifast, etc., are futuristic foods that help us in our battle against fat. They are about as perfect a food nutritionally as we can get. To my knowledge, there has only been one perfect food in the history of the world. That food, described in Exodus in the Bible was called "manna", which means "what is it." Manna as a single food met all of the nutritional needs of an entire nation for many days. It evidently was not too tasty, but it contained everything needed for survival. The people complained about its boring nature, and ultimately God gave them quail and other stuff, but manna was really all that they needed. In this sense, it must have been something like HMR 70 or HBD 75. These products get boring (when they are all we eat), but they are nutritionally complete. I suspect that manna must have had more fiber, salt, and calories than our diet supplements, since as far as we are told, the Israelites did not have constipation or other side effects while eating manna.

Diet Supplements

This brings us then to the final section of this chapter – a discussion of the common symptoms and side effects encountered when we use diet supplements to do low calorie diets. The products that we use at Health by Design (eaten by all of the staff, too) can be generally divided into two groups: Lactose containing and Lactose-free. Our lactose free products still contain dairy protein – mixed with egg white protein – but they contain no milk sugar. The importance of this, of course, is that many adults – particularly blacks and Hispanics – do not tolerate very much lactose without developing diarrhea, bloating, and abdominal pain. Some people feel very ill when they eat anything containing lactose and, for this reason, I start all patients in our program on our lactose-free products – moving only somewhat later to try the chicken soup supplement (which contains lactose). So, if you are taking a lactose-based supplement and having any kind of GI trouble stop it and change to a product that is lactose free.

Low Sodium Related Symptoms

Even more common than GI intolerance of diet supplements is a problem related to low sodium diets. All of our diet supplements are extremely low in salt (only about one gram per 5 to 6 packages of supplement). Salt depletion (which may occur fairly early in a diet) usually causes dizziness when we stand up after sitting. It can also cause severe cramps – usually in the calf muscles. Prevention of these symptoms obviously involves increasing dietary salt intake. Here you have a choice of nacho chips, bouillon, or pickles. I favor bouillon or pickles (since they have no additional calories to speak of). This is very important since on a regular diet we may be used to eating 5 to 10 grams of salt daily. When we suddenly change to a one-gram salt diet, our kidneys go right on putting out 5 to 10 grams of salt per day (and water with the salt) for a while leading to fluid depletion, dizziness, and cramps. The best plan for most of you who read this is to try to drink at least one cup of bouillon daily while you are eating a low calorie diet. You may not lose quite as much weight with the bouillon intake, but you will feel better and not risk the above symptoms. Remember – you came here to lose fat – not fluids. Let us leave the fluids alone and concentrate on fat loss.

Constipation

As I commented previously, patients eating very low calorie diets often have problems with constipation. Most diet supplements (that taste good) contain little if any fiber. Most of us are used to eating 15 to 20 grams of fiber per day while diet supplement diets may contain just 3 to 5 grams or less. Our colons were meant to be exposed to or presented with fiber on a daily basis, and I feel that patients who are eating diet supplements alone without fruit and/or vegetables should take a commercial fiber product like psyllium (Metamucil) or FiberCon tablets. These natural substances put fiber into our colons and should result in a normal bowel movement every day or two. Some patients need to take a stool softener like Colace or Surfak (to keep water in the colon) and everyone needs to drink lots of water (1 to 2 quarts per day) to keep the body well hydrated. Of course, very low calorie vegetable items (like carrots, lettuce, celery, etc) contain some fiber and may help regularity. If you are trying to eat diet supplements alone, however, you will probably need a commercial fiber like psyllium. The important thing is to maintain a semblance of regularity. I do not want you to drift into my office in a few months and tell me that your last BM was three years ago last Sunday. That is bad form and would almost certainly be associated with weight gain or failure to lose weight – for the wrong reason.

Feeling "Starved"

There are several other symptoms that we experience when we do low calorie diets, and I will try to mention them briefly here. If you are eating few calories and feel starved – really

hungry – you probably need more protein. We know that – because typically patients who eat 5 to 7 packages of a supplement containing high quality protein and carbohydrate rarely feel hunger at all. When you are hungry, you should then solve the problem by taking an extra supplement. If you are still starved after the extra supplement or two, I would suggest your adding skim milk to your supplement or eating a small amount of tuna, egg white, fish or other nearly pure protein source.

"Listless" Feeling

Even more common than hunger as a dieter's symptom is a dull, listless, headachy feeling. Almost everyone who has ever dieted has felt this way at some time. In my experience, such symptoms are almost always caused by a need for more carbohydrate. Remember that a low calorie diet composed primarily of diet supplements is not deficient in protein. Neither is it excessive in protein. It is adequate in protein. The diet is deficient in fat, but that is not a problem and does not cause symptoms, because we need very little fat. The thing that is deficient in this low calorie supplement diet is carbohydrate. Because we are eating relatively low amounts of carbohydrate, we are able to use up some of our fatty coat every day. Some people (as I have mentioned earlier) do not feel well on 500 calories per day, but they may feel great on 600 or 700 or 800 calories per day. The secret for you and me on a low calorie diet is to eat enough carbohydrate that we feel good – but not so much that we do not have to use our fat for energy. So if you are feeling listless or headachy and have taken 5 packages of supplement already, first take another package of supplement. If this does not make you feel better, next add a piece of fruit to your supplement (for example, add ½ banana to a vanilla shake) or eat a piece of fruit. Do not call it food – call it carbohydrate, because what you are trying to accomplish is getting carbohydrate intake high enough that your energy level picks up – but not so high that you do not lose fat. Chicken fried steak might make your headache go away (with 1200 calories) but a peach or an apple might do just as well (with 100 calories). The important thing is that you feel good and are able to do your job as a teacher or businessman or homemaker or doctor or mechanic – or whatever you do.

Hopefully by now, you have a reasonable overview of the concept of body composition, the need of the body for protein, vitamins and minerals to maintain lean mass, the calorie needs of the body to remain at the same composition, and the need to lose body fat to prevent diseases of various kinds. Your behavioral and medical staff is committed to helping you work through various problems that may arise as you seek to use up body fat and change your composition for the better. Good luck! I wish you well on this worthy project that means so much to your health and vitality.

“It Couldn’t Be Done”

Somebody said that it couldn’t be done,
But he with a chuckle replied;
That “maybe it couldn’t,” but he would be one
Who wouldn’t say so till he tried.
So he buckled right in with a trace of a grin
On his face – if he worried, he hid it.
He started to sing as he tackled the thing
That couldn’t be done, and he did it.

Somebody scoffed: “Oh you’ll never do that;
At least no one ever has done it;”
But he took off his coat, and he took off his hat,
And the first thing we knew, he’d begun it.
With a lift of his chin and a bit of a grin,
Without any doubting or quiddit,
He started to sling as he tackled the thing
That couldn’t be done, and he did it.

There are thousands to tell you it cannot be done,
There are thousands to prophesy failure;
There are thousands to point out to you one by one
The dangers that want to assail you.

But buckle right in with a bit of a grin
Just take off your coat and go to it;
Just start in to sling as you tackle the thing
That “cannot be done” and you’ll do it.

STUDY QUESTIONS

Chapter One – Medical Management of Obesity

1. Which of the words (fat, muscle, bone, fluid, something, everything, nothing) best completes the following sentence.

   "A decreasing scale weight means that _____ is changing."

2. Which of the following statements is most true?
   a. When body fat rises, scale weight rises.
   b. When body fat rises, insulin levels rise.
   c. When body fat rises, lean mass drops.
   d. When body fat rises, sex appeal rises.

3. Which of the following takes up the most space?
   a. 200 pounds of lead
   b. 200 pounds of bananas
   c. 200 pounds of fat
   d. 200 pounds of Dr. Player

4. Which of the following takes up the most space?
   a. 200 pounds of Herschel Walker
   b. 200 pounds of David Player
   c. 200 pounds of Roseanne Barr
   d. 200 pounds of Michael Jordan

5. Fill in the blank with one of the following: (intraabdominal, yellow, total body, subcutaneous, skinny, ugly).
   "Skin calipers measure _____ fat."

6. Fill in the blanks: (1%, 2%, 5%, 10%)

   "After age 40, a typical man or woman usually loses about _____ of his or her lean mass (bone and muscle) per year."

7. Match each nutrient with the calories provided per gram.

a. protein	_____	1.	9 calories per gram
b. water	_____	2.	7 calories per gram
c. fat	_____	3.	4 calories per gram
d. carbohydrates	_____	4.	0 calories per gram
e. alcohol	_____		
f. fiber	_____		*may be used more than once.

8. If you require 70 grams of protein daily, how many calories of energy are provided by these grams of protein? _____ calories.

9. Fill in the blank: (1000, 2500, 3500, 4000)
   "Each time I use _____ calories more than I eat, I lose one pound of ugly yellow fat from my thighs."

10. Fill in the blank: (1, 2, 3, 5)

A woman who eats 640 calories per day, but requires 1640 calories per day to run her motor, can be expected to lose _____ pounds of body fat each week.

11. Fill in the blanks: (salt, bullion, carbohydrate, protein, olive oil, nacho chips)

a. "When I am eating a 700 calorie diet and develop headaches or feel energy-less, I probably need to eat more _____."
b. "When I am eating a 700 calorie diet and feel dizzy when I get up from a chair, I need to eat more _____."
c. "The best thing to eat when I feel this dizziness is _____."

12. Fill in the blanks: (fat, protein, carbohydrate, alcohol, fiber).

"After water and salt, the single most important nutrient that must be eaten to sustain healthy body tissues is _____."

MANAGING YOUR BODY WEIGHT FOR LIFE

Chapter 2

Where does the Fat Go?

David M. Player, MD

Health By Design Program Manual

Chapter 2

WHERE DOES THE FAT GO?

The Story Of Furnaces And Tanks

In Chapter 1, we introduced the concept of body composition as a primary health issue – that body weight is a measure of a mixture of tissues, all of which have individual controls for size and mass. The little man in Figure 1 below depicts this phenomenon – showing the body as a mixture of bone, muscle, volume, and fat.

The second issue discussed in Chapter 1 was that of the body's need for protein and how protein, vitamins, and minerals are the backbones of nutrition – providing the basic building blocks for tissues and vital enzymes. We noted that our fundamental nutrition goal in this program was to provide enough protein to keep our bodies in nitrogen balance while decreasing total energy intake (carbohydrates and fats) to a level low enough that some energy each day must be provided by our body fat stores (our fat coat). In this way, each of you should see the loss of several hundred calories of fat per day – ultimately measurable as pounds or kilograms on a scale as well as changes in composition in the underwater tank (and changes in clothing sizes). In this chapter I would like to focus some more on protein requirement and the things that influence it, as well as what happens to your fat. (Where does it go, anyway?)

The Importance Of Doing A Urine Collection Study

Now, you will remember that I said that we can actually measure how much protein a given individual needs by assessing his urinary output of urea, the major breakdown product or metabolite of protein. During the third week of your program I would like for each of you to collect urine in a jug for 24 hours and let us measure your urea output. (This is an exciting experience if you have never done it before and hopefully will not mess up your golf game or weekend shopping spree.) The reasons for your doing this collection are two-fold: First, it will give us an accurate measure of your individual protein requirements – which vary substantially from person to person. Second, it will show you that you do produce urea every day and that daily protein intake is therefore a necessity if you are to maintain optimal health and keep from wasting away or having dysfunctional enzyme systems. I often ask one of the patients in my classes some questions (play a little game, if you will) that go something like this:

"Ma'am, do you have children?"

"Yes, I do."

"Do you love them?"

"Oh, yes, doctor."

"Well, what would happen to your children if during the coming year you fed them a diet consisting of apples, oranges, grapes, Wheaties, Fritos, chips, Twinkies, brownies, bread, cookies, tomato juice, squash, carrots, bananas, and oatmeal?"

Usually at this point the lady will answer.

"They'll probably be fat, won't they?"

And I answer her, saying,

"No, they'll be dead."

This is amazing to her, but when she reflects more carefully, she sees that the above diet was protein free (or at least extremely low in protein).

WHY WE NEED PROTEIN

Protein malnutrition is, of course, a horrible problem in other parts of the world, but I venture to say that there are children right here in our city that eat a diet not much different from the above every day. Over time, such protein deficiency can compromise growth and development – both physical and mental. Fortunately, most of our mothers taught us to eat meat, dairy products, eggs, and vegetables with good protein content.

So, protein intake is very important, and measuring urine urea nitrogen is the best way to measure our protein requirement. Remember that urea contains nitrogen. Carbohydrate and fat do not contain nitrogen – only protein does. Protein foods must be eaten to replace the nitrogen lost in urinary urea. When you collect your urine specimen during the next week or two, we will get back a result like 7 grams of urea per 24 hours. This is the urinary urea, but we also excrete several more grams of nitrogen per day in stools or sweat, so we have to add in an estimate for these losses when we calculate nitrogen balance. The actual calculation is very simple, and we use it daily in the intensive care unit to calculate estimates of protein that we need to administer intravenously to post-surgical patients. An example is as follows:

24 hour urine urea	=	7 grams
24 hour estimated nitrogen loss in sweat & stool	=	3 grams
Total loss	=	10 grams

To convert urea loss to protein, we multiply by 6.2. So, in this example, the protein requirement would be

6.2 x 10 = 62 grams

Of course, we have to learn grams of protein in various foods to give meaning to this number. (You will learn these as part of your laboratory experience. Suffice it to say here that this amounts to about 9 ounces of meat or a half gallon of milk or 9 eggs or about 8 ounces of cheese.)

62 grams of protein per day would keep the above patient in perfect nitrogen (protein) balance. In a person trying to stay at a desired weight, 62 grams of protein would be perfect. However, in a person trying to lose weight, the whole 62 grams probably is not necessary. Remember that we noted in Chapter 1 that as a man gains weight, he gains not only fat, but lean tissue as well, because he is lifting a heavier person all the time and growing bigger thigh and back muscles. So, when we lose weight we want to lose this pathologic lean tissue as well. You would not want to be a 290-pound man with 200 pounds of lean mass who loses weight to 210 pounds with the same 200 pounds of lean mass. You would be a funny looking dude – something like the incredible hulk.

The medical literature states that, in general, about 25% of what you and I lose while we are on a diet calculates as non-fat loss.

So, I tell our patients that they need to keep their protein intake level at least at 75-85% of their measured losses to be sure that the lean mass they lose is caused by their getting lighter rather than their being protein malnourished. In the above example, 80% of 62 grams is about 50 grams of protein required to maintain appropriate nutrition during a weight loss program.

Protein Requirements When Dieting

Now, an interesting thing happens to urea output when people go on diets. Let us say that you did a 24-hour urine collection prior to starting your diet with a result of 7 grams per 24 hours. You then reduced your calorie intake to 600-700 calories per day and repeated the urine collection. Low and behold! The urea output has risen from 7 grams to 9 grams per 24 hours. Very interesting, huh? As we cut our calories back, our protein requirements rise. So, you are at this minute (on a calorie-restricted diet) requiring more protein than you will ever require at any time in your life (unless you get sick or pregnant).

So, if in our example the original protein requirement was 50 grams (80% of 62 grams), the new protein requirement will be 65 grams per day (for a urea output of 9 grams per 24 hours). You can see then that one of the things that influences protein requirement is total caloric intake. The higher the calorie intake, the lower the protein requirement. The lower the calorie intake, the higher the protein requirement. Can you raise calorie intake high enough that no protein is required? No such luck! 24-hour urine urea never drops below about 2 grams – meaning that 24-hour protein requirements never drop below 25-30 grams. Protein can be restricted – but never below this level. This information was learned from patients with progressive kidney diseases who could delay their need for dialysis by restricting protein. However, when protein was restricted below 25 grams, the patients lost progressive muscle mass and died of malnutrition. We of course do not allow that now, but place patients on dialysis long before they develop this degree of malnutrition or requirement for this degree of protein restriction.

Stress

The second important issue that affects protein requirement is stress. In this instance stress is used broadly to include both physical and mental types. Patients with high levels of physical activity have an increased turnover of a variety of nitrogen-containing enzymes and muscular tissue. This results in need for increased dietary protein – often by 25-30%. Similarly, prolonged periods of psychological stress cause chronic elevations of cortisol secretion by our adrenal glands. These high cortisol levels promote increased protein metabolism in the body and raise the urinary excretion of urea – telling us that we need to eat more protein. Stress like this often promotes hunger – but the signal does not say, "eat protein" – it just says, "eat anything." Too often our choice is "eat Oreos" (when a can of tuna or extra diet supplement would have solved the problem). We will discuss stress-related eating in later chapters when we look at reasons why people eat that have nothing to do with nutrition.

Surgical stress is a major cause of increased protein turnover and urinary urea excretion. If a person undergoes a major surgical procedure or becomes badly infected, urea levels in the urine rise dramatically. In fact, we have difficulty giving patients enough amino acids (protein) to keep up with the losses. This massive increase in urea output is again related to the presence of high levels of cortisol and other stress-related hormones and enzymes. The resultant loss of muscle mass and internal organ mass can be frightening – occasionally as much as 2 pounds per day. Obviously, this is not a desired kind of weight loss program.

Steroids

Patients who take steroids for treatment of various inflammatory diseases (ulcerative colitis, asthma, nephritis, Lupus, rheumatoid arthritis, Crohn's disease) or prevention of rejection of transplants all have this same massive increase in protein turnover and urea excretion. Resultant protein needs are extremely high. I recently treated a man who was taking high doses of prednisone (a steroid) for management of one of the above problems. His 24-hour urinary urea was 27 grams, giving him a daily protein need of nearly 200 grams. (That is nearly

30 ounces of meat per day.) Caloric requirements may be increased slightly when patients take cortisone (prednisone) – but protein requirements increase massively.

Menstrual Cycle

Interestingly, one further factor influencing urea excretion, and therefore protein requirement, is women's phase of menstrual cycle. Under the influence of estrogen and progesterone, the urinary urea rises twice monthly – with the greatest rise just before a menstrual period. I always tell my female patients that they are "behind by about a steak" by the time they get to their menses. When you stop to think about it, ladies, when are you most hungry each month? Sure – right before your period. Of course, hunger is a complex symptom influenced by more than protein balance, (hormone changes, etc.) but nitrogen balance has a part in it. Typically, women are ravenous right before a menstrual period, and we have found that tuna, diet supplements, and egg-white creations solve the problem better than M & M's and Fritos.

Some of this variation is related to genetics, but some is clearly related to environmental factors. The point of all of this is that human protein requirements vary over a broad range; and in addition vary some more as influenced by the above environmental factors. So – collect your 24-hour urine for urea with gusto, and look forward to learning something interesting about your individual nutritional needs. Remember, also, that the basis of every good diet is an adequate intake of protein, vitamins, and minerals.

WHERE DOES THE FAT GO?

Leaving urea and protein, let's go on to the second major issue of this chapter: Where does my fat go? What happens to fat anyway? I always like to ask my classes these questions because I get such interesting answers:

"You sweat it off"
"It goes in the toilet"
"It changes to muscle"
"It melts away"

All of these are "a little right" but reflect a lack of understanding of the biochemistry of what really happens when our fat is our fuel. Biochemically, fat is a hydrocarbon made of oxygen, carbon, and hydrogen. In our bodies, when fat is needed to supply energy, the following chemical reaction occurs:

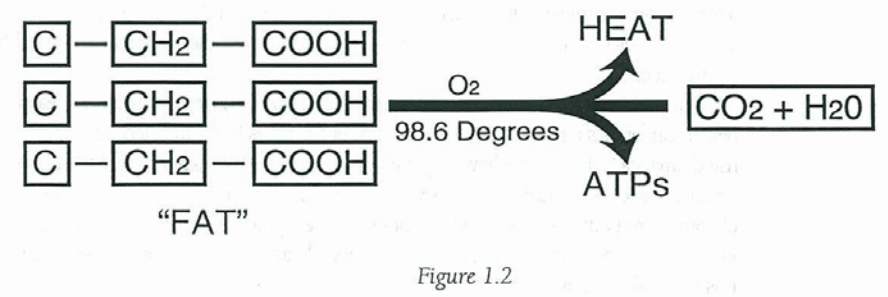


Figure 1.2

As you can see, fat is in our "oven" at 98.6 degrees and is mixed with oxygen. Some energy is given off as heat, and some more energy is given off as high-energy phosphate-containing compounds called ATPs. These ATPs are the ultimate goal of metabolism and provide energy to run our cells. On the right side of the equation, you see the two byproducts or waste products resulting from this reaction. The first of these is carbon dioxide. How do we get rid of that? Of course, we blow it off with our lungs. Take a deep breath and blow out! You just helped use up some fat! The second waste product of the above reaction is water, which we obviously lose by urinating or sweating. Carbon dioxide has no weight, but water has weight. So, ultimately in the above reaction, one pound of ugly yellow fat is chemically converted to about one pound of fresh clear water. Each time you and I use up 3500 calories of fat, we make about one pound of water. Have you thought about what one-pound of water looks like? Well, 2.2 pounds is about one quart, so 1 pound is less than a pint of water. So, when I tell you that a woman is capable of losing 2.2 pounds in a week (which many of you are doing now), I am talking about her losing about 1 quart of water from her body (over and above the water that she drank or water in the food she ate that week).

WHERE DOES THE WATER GO?

Now, let us look at where the water goes – because turning the fat into water does not mean that the water necessarily leaves the body. Figure 2.2 below is a schematic – illustrating what happens to water that is formed from fat metabolism using the above equation.

As you can see, fat is converted to water and is "stored" in a reservoir (Tank A) from which it may be redistributed in 2 directions. It can go over to your bladder (Tank C) and thence out of your body; or it can go into Tank B (your little tank) where it is retained for future use in the body. You say, "I'd like it all to go into my bladder, please." Well, you may want it all to go into your bladder, but that is not always the way it goes (as many of you have found out by now). Patients come to Health by Design some weeks and lose 5 pounds. Other weeks they lose only 1 pound or occasionally they may actually gain weight (heaven forbid). You say, "How can someone gain weight on a 500-800 calorie diet? How is that possible?" As you can see above, if the water formed from the fat drips into Tank B (your little tank), no weight will be lost. The fat has gone and has been converted to water, but the water made from the fat may have dripped into the "wrong" tank resulting in no weight loss or even a weight gain.

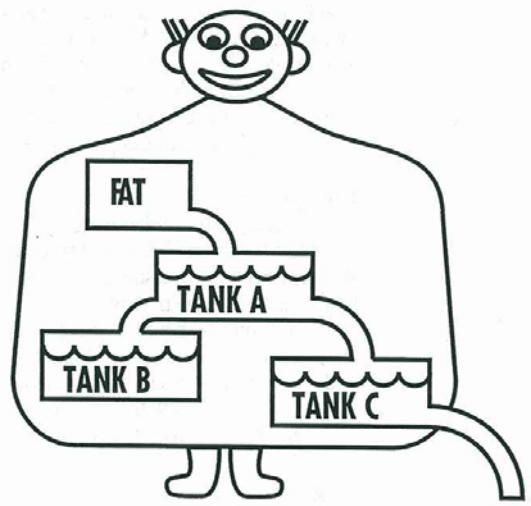


Figure 2.2

Water Retention

Well, what controls whether the water goes into your bladder or into your tank? Interestingly, this control mechanism really is the one that controls body salt content. Things that make you hold onto salt also make your water of metabolism (that which came from fat) move into your little tank (Tank B). So, things that cause salt retention also cause water retention. Let us look briefly here at some of these salt-retaining stimuli and I will speak more of them again in Chapter 4.

FACTORS CAUSING WATER RETENTION

Salt

The first of the factors that causes salt retention (and hence water retention in your tank) is simple increase in dietary salt or sodium. As you and I raise salt in our diet above the levels to which we are accustomed, water moves from Tank A into Tank B (see Figure 2.2) and remains in this tank for as long as the new higher salt intake is maintained.

Menstrual Periods

A second factor that causes increased salt retention (and tank fluid) is having a menstrual period. Female hormones at high levels cause our kidney tubules to retain salt; and when they do this, water moves from Tank A to Tank B again. We will discuss this in more detail in Chapter 4.

Anti-inflammatory Drugs

Thirdly, patients who take what we call nonsteroidal antiinflammatory drugs (including Motrin, Advil, Naprosyn, Tolectin, Voltaren, Nuprin and others) always have some degree of salt retention (and expansion of their tank). So when you take Motrin or Nuprin for a headache, bursitis, or menstrual cramps, you can expect an expansion of your tank and a weight gain of several pounds.

Inflammation

The fourth factor affecting salt retention and tank volume (Tank B) is inflammation. Any time you and I have inflammation of almost anything, we experience retention of salt (and tank water with it). A classic example is sunburn. Several years ago a young girl who was doing a diet program here at Health by Design went to Corpus Christi to the beach and lay in the sun all weekend. She continued on her 700-calorie diet and returned 4 days later with a bad sunburn weighing 9 pounds more than she had the week before. Nine pounds in 4 days!! Can you believe that! In actuality she lost nearly 3 pounds of body fat but gained 9 pounds. (Her tank had expanded by 12 pounds.) You think that she was not disappointed in her diet program? She was red and puffy and swollen all over and had salt and water sitting in a thousand places where she did not want it.

Lifting Weights

A variant of this inflammation also occurs when you and I begin lifting weights and using muscles that have not been used recently. When we do this, our muscles may become inflamed and sore and swollen. This soreness and swelling is, of course, another example of inflammation – which by the definition given above, leads to salt retention and expansion of your tank. Water that would have gone into the bladder goes into muscles instead, and weight gain (or lack of expected weight loss) occurs. I have done this experiment on myself a hundred times. I do not do bench pressing and pullovers very often, but when I do, I always weigh about 2 pounds more for a few days after that. I understand now that my pectoral and shoulder muscles are holding onto about one quart of water. I suspect that some of you who read this may have had a similar experience.

Surgery

A sixth stimulus to salt retention (and tank expansion) is a surgical procedure – especially abdominal surgery. When the colon or gallbladder or small intestines are handled during major surgery, they develop a kind of inflammatory response and begin “weeping fluid” (tank salt and water) into their peritoneum and body cavities. Fluids that ordinarily would have remained inside arteries and veins drift out into the peritoneum – creating low blood pressure in the

arteries and veins. We measure these pressures with IV catheters and give our patient more fluid to try to raise pressure.

Unfortunately, during the first 24 hours postoperatively, the replaced fluid continues to "leak" into the inflamed peritoneum, causing need for more and more replacement fluids. The result of this, of course, is a huge expansion of the tank and a gain in weight. I have had a number of patients gain 15-20 pounds postoperatively by this mechanism – that is 6-9 quarts of fluid – all for the purpose of replacing fluids that are still in the body (and still have weight) but are in the wrong place. Thankfully, as the peritoneum and bowel heal several days later, the extra fluid comes back into the veins and arteries, goes through the kidneys to the bladder, and is urinated out of the body. (Fluid moves from Tank B back bank to Tank A and then to Tank C – see Figure 2.2)

Poor Circulation

Finally, there is a group of patients – perhaps some who read this – whose ankles swell at the end of a day. These patients tend to be quite heavy with large abdomens that sit on the veins in their legs and cause partial obstruction of the return of blood from the feet. This creates high pressures in the veins of the feet and lower legs and causes the water of the blood to "leak" out into the soft tissue of the feet (causing swelling). We replace the water lost from our veins by drinking new fluids, and by the end of the day, we may have gained 4-5 pounds. Most very big people have had this experience, and this is why none of us should ever go to the scales in the late afternoon. When we go to bed at night, the big veins lose their obstruction (the belly is no longer resting on the thighs) and the fluid pressure in the vein drops. This leads to the tissue fluid in the feet re-entering the circulation and triggers our kidneys to put out the extra water drunk the previous day. Generally speaking, this is why all of us (especially people with lots of body fat) weigh more in the evening than in the morning.

The important point in all of this is that fat is constantly converted to water (when you are eating fewer calories than you are using) but the water is often not lost from the body – temporarily. We therefore cannot use a scale to measure our fat losses – at least not over a short period of time like a few days or even a few weeks. Remember that you got involved in this program to lose fat, and eating as you are at present, you are losing fat. If any of the above salt-retaining factors is present, however, all bets on changes in scale weights are off. Scale weight may actually rise while fat is lost. So – do not get hooked by the scales.

Don’t Quit

When things go wrong, as they sometimes will,
When the road you’re trudging seems all uphill
When the funds are low and the debts are high,
And you want to smile but you have to sigh,
When care is pressing you down a bit,
Rest, if you must – but don’t you quit.

Life is queer with its twists and turns,
As every one of us sometimes learns,
And many a failure turns about,
When he might have won, had he stuck it out;
Don’t give up, though the pace seems slow –
You might succeed with another blow.

Often the goal is nearer than
It seems to a faint and faltering man.
Often the struggler has given up,
When he might have captured the victor’s cup,
And he learned too late, when the night slipped down,
How close he was to the golden crown.

Success is a failure turned inside out –
The silver tint of the clouds of doubt –
And you can never tell how close you are,
It may be near when it seems afar.

So stick to the fight when you’re hardest hit –
It’s when things seem worst that you musn’t quit.

--Unknown

STUDY QUESTIONS

Chapter Two – Where Does The Fat Go?

1. The most accurate method of quantitating individual protein requirements is with measurement of 24-hour urine _____. (carbohydrate, protein, sweat, urea, fat)

2. When dietary calories are reduced, dietary protein should be _____. (unchanged, increased, decreased).

3. Which of the following are associated with need for increased dietary protein?
   a. surgical stress
   b. menses
   c. low calorie diets
   d. steroid treatment
   e. all of the above

4. Which of the following best explains what happens to our fat when we go on a diet?
   a. it goes in the toilet
   b. it melts away
   c. it is vaporized
   d. it becomes muscle (conversion)

5. Which of the following does not cause salt retention and fluid gain?
   a. a menstrual period
   b. eating potato chips
   c. Nuprin
   d. abdominal surgery
   e. none of the above

6. Martha loses 2 pounds of body fat on a low calorie diet. Her scale weight rises by 2 pounds. Which of the following is most likely to have happened?
   a. her scale does not work well
   b. she took diuretics
   c. she had diarrhea
   d. she had a menstrual period

7. One pound of fat lost is converted in your body to _____ of water. (1 quart, 1 pint, 1 gallon, 1 liter)

8. Fat loss may be obscured at the scales by:
   a. sunburn
   b. weight lifting
   c. Motrin
   d. all of the above

MANAGING YOUR BODY WEIGHT FOR LIFE

Chapter 3

Why are we Getting Fatter?

David M. Player, MD

Health By Design Program Manual

Chapter 3

WHY ARE WE GETTING FATTER?
Cultural And Medical Contributions To Obesity

In this chapter, I would like to spend some time discussing why our culture is becoming fat. Perhaps you have not considered the magnitude of the problem, but statistics published recently revealed that the average American woman has gotten one pound fatter annually for the past decade. It seems doubtful to me that, when we consider the causes for this change, this statistic will improve much in the near future. There are a number of reasons for this phenomenon, but several are more prominent than other.

REASON #1: CHANGING CULTURE

The biggest of these is that our culture is constantly changing. We do not live like our grandparents lived, and our children probably will not live like we do. It really is not our fault (or anybody's fault for that matter). Society makes progress in some areas and this progress causes problems in unrelated areas. Think of the ways our grandmothers and grandfathers lived a century ago – the things that they had to do to survive – and you can begin to appreciate why we are struggling with body fat. Our ancestors walked everywhere (or rode horses). They plowed behind horses and mules. They walked to the outhouse. They churned butter. They pumped water. They brought in firewood for the stove. They milked cows by hand, built their own furniture, and grew their own food. Thousands of jobs per day required more energy expenditure than you and I ever think of expending today. Compare your grandmother's workload physically with that of a secretary who answers phones and punches computer buttons all day. The differences in energy expenditure are simply huge. Surprisingly, the difference in real nutritional requirements (protein, vitamins, and minerals) is not that great – but our total calorie requirements are much lower than they were 100 years ago. It is not our fault, but we are economically locked into the world in which we live, and our job is to figure out how to live healthfully in that world – regardless of the types of work we are compelled to do.

As the physical workload has diminished for our culture as a whole, the differences in individual caloric requirements have become more obvious. As I commented in Chapter 1, our studies show that the majority of patients who come to Health by Design have a low metabolic rate. In other words, Health by Design sees a subset of the general population, and that subset burns calories differently than the rest of society. Remember from Chapter 1 that we said that the average woman who comes to Health by Design for help with her weight uses about 8 times her body weight in calories per day. (If she eats anything over 8 times her body weight per day, she will store fat.) The average caloric requirement for men who come to HBD is 10 times body weight. It is important for you to realize that these are not average numbers for society as a whole. The diagram below shows this more graphically:

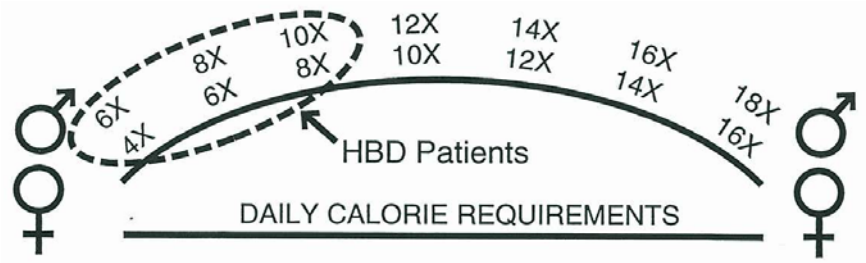


Figure 1.3

As you can see, the energy requirements for adult humans are very broad – even when equated in terms of calories burned per pound of body weight. The people who come to Health by Design for help are in the lower 25-30% metabolically – being those who burn an average of 4-8 times their weight per day for women and 6-10 times their weight for men. Every time these people "look" at food, they gain weight. They have, because of the changes in culture described above, emerged as a group of fat people – people who have to struggle hard to remain lean and fit in an increasingly sedentary world. Because of this, these people have to live differently if they hope to maintain ideal composition and health, and this "living differently" is precisely what this course is all about.

But, why isn't the above "living differently" already well understood by those of us with increased body fat? Why do we go to Nutri-System or Diet Center, or Weight Watchers, or Optifast or a host of other lesser places to try to solve the problem? The answers to these interesting questions lie in several important areas.

REASON #2: LIMITED PHYSICIAN KNOWLEDGE

The first of these relates to our lack of knowledge of medicine, biochemistry, physiology, pharmacology and other sciences affecting our bodies. Most of us have no formal training in these disciplines, which have made such huge strides or advances in knowledge in the past 50 years. We learn bits and pieces of these from the media, from our friends, and through specific medical experiences. But mostly, we count on our doctors to give us the information we need to maintain optimal health. In areas related to nutrition and body composition, however, even physicians have a problem – because most of us who have gone to medical schools in the past thirty years have not been taught much useful information. There is no "Obesity 101" in any of our medical schools today. We all learn a spattering of information related to this subject, but remember that I went to medical school to learn how to "cure the sick" – not necessarily to keep the "non-sick" patients "healthy". As a result of this, the doctors who care for you on a daily basis and give you antibiotics for your cold, or take out your appendix, or replace your heart valves – and are responsible for most of your medical education – do not know a whole heck of a lot about body composition and the things that control it. The lay public is probably more interested in these things on a day-to-day basis than its doctors, but formal medical education in these subjects is limited – and the public is therefore forced to look to a variety of nonmedical sources for medical information. The result is often "disinformation". Obviously, if physicians do not understand body composition and its controls, we cannot expect that the lay public would understand it well.

A second educational problem which hampers the understanding of "living differently" as discussed above is that most physicians (and therefore much of the general public) think that fat people are fat because they eat too much. The assumption here is that fat people are neurotic or psychologically screwed up (because nobody who has all his marbles would eat so much that he became obese). I am here to tell you that neither of these ideas is correct, but if most physicians believe them to be correct, the general public will go on believing it also.

REASON #3: LIMITED PUBLIC KNOWLEDGE

Another educational reason for our being fat relates to a generalized lack of knowledge about nutrition. We all think that we know stuff about nutrition, but the truth is that most people do not. Most people cannot look at a table of food and tell you which foods contain protein, fat, carbohydrate, alcohol, water, fiber or various minerals and vitamins. Even fewer people could even hope to know how much of these various nutrients are in the same food. It is a rare person who knows his personal daily protein requirement or total energy requirement. Most of us just make an assumption that if we felt full, we ate enough. Obviously, that is a pretty subjective approach for something as important as running and maintaining our bodies. In medical school, I may have suffered through one or two lectures on nutrition – but if I did, I

certainly do not remember them. As I said before, I was much more interested in kidneys, livers, hearts and nerves. Although most medical schools are now making efforts to teach about nutrition, the average guy going to medical school is not there to learn about nutrition. It is only after caring for dying human beings with a variety of endstage diseases that physicians begin to wonder whether long-term nutrition had anything to do with disease (which it obviously does). So, part of the overall problem again lies with physicians' lack of knowledge about nutrition and body composition and, therefore, our inability to manage these issues with our patients. We are there basically to take care of illness, not to nurture nutritional health or monitor it.

REASON #4: NUTRITIONAL LEARNING TYPICALLY STARTS LATE IN LIFE

Another related problem is that for a good portion of our lives, focused nutrition is not really very important to us. My teenage boys could care less about this stuff. They are interested in burritos and burgers, and fries and pizza. Thankfully, their activity levels are so high that they probably get enough nutrition by eating high volumes of these foods. The problem is that we do not get very interested in nutrition until we begin to get diseases 20-30 years later. By that time, we are way past any formal educational experiences, and we have to rely on the media, our friends, or a commercial weight loss program to give us nutrition information.

REASON #5: THE "MEDIA"

Our adult sources of information lead to some additional conflicts and problems. Remember, that the information you and I get from the media often comes from the food industry – specifically the fast-food industry. Commercial radio and television is funded by sponsors, and sponsors all have an agenda. The agenda often leads to slanted information for a public that wants honest answers. In other words, if I were trying to sell you Cheetos or burritos, I would not begin by telling you what was in them. If I were selling Miller Light, I would not tell you about alcohol's sterling effect on muscle mass or nerve function. I would try to tell you how great burritos taste or how less filling or great tasting the beer was. The media often uses nutrition information as an attention-getter or a filler on the noon news program. As a result, the information is often superficial, misquoted, or leaves more questions that it answers. So – we have inadequate knowledge about our bodies and inadequate knowledge about nutrition.

REASON #6: BEHAVIORAL ISSUES

Finally, we have inadequate understanding of our behaviors – the reasons that we eat that have nothing to do with nutrition or medicine. We will develop this idea in several other chapters in this series, but most of us have little formal education in human behaviors. Transactional analysis, control theory, positive thinking, spiritual counseling, etc. can probably all offer some insight into our behaviors. The main problem is that we have smatterings of information from each of these models (and usually end up using none of them in our daily lives). The important thing here is that all of us should have a workable model in which we live – a model that gives some meaning to our behaviors. Most of us do not have much behavioral education and are, therefore, vulnerable to every new whim that comes along to help us explain the reasons for the nutty stuff we do. Suffice it to say here that our eating behaviors that have nothing to do with nutrition can be simply divided into

1) eating for socialization
2) eating due to stress, and
3) eating due to addiction.

We will discuss each of these in later chapters of this course. Hopefully, these discussions will lay to rest the concept that fat people all eat too much or are psychologically messed up. The truth is that most of the patients who come to Health by Design are well-educated and well-adjusted people. There is no more psychopathology here than at the corner grocery store. There are skinny people who are crazy and fat people who are sane – and vice versa. The problem then is not psychopathology or neurosis. In fact, a number of studies have shown that when you put fat people in long-term psychotherapy, they do not get thinner. They may be "happier" – but not thinner.

Several years ago, I was managing a program for a group of patients who felt that they wanted psychological counseling as a part of their program. I sent them as a group to one of the really well trained professional counselors in our city, and they began weekly sessions together. It was a "wonderful experience." They loved their counselor. They loved each other. By the time they had finished several months together, they loved almost everybody. Their average weight gain over that first six months together was 20 pounds – obviously not a successful weight loss program. Obviously, the treatment of obesity does not really involve "shrinking" people with high-powered psychotherapy or classical counseling. It does, however, involve giving patients a model for understanding their behaviors around food and understanding the reasons for eating that have nothing to do with nutrition.

REASON #7: THE "MONDAY SYNDROME"

The final reason that we are getting fatter every year has to do with one of our basic human frailties – procrastination. We may know that we need to address the issue of health, nutrition, fitness, etc. – but because of lack of time, stress, or a host of other interferences, we put off starting our program. We do this not only with issues related to our health – but with a host of other "projects" as well. I like to call it the "Monday Syndrome."

Here is how it goes:

> Some Wednesday or Thursday, you and I take a look at our bodies in the mirror, or the doctor tells us that we are too fat, or somebody says something negative or derogatory about us, and we get angry and decide that we are finally going to "do something about this weight problem," And we say, "Let's see, - it's Wednesday afternoon. Next Monday I'm going to start my diet." So, you make all your plans and decide what it is that you are going to do differently next Monday. Of course, this leads to the greatest weekend you have had in a long time – no guilt . . . just eating like crazy all weekend. (I suspect that you can probably identify with that behavior. I certainly can – I have been starting on Monday all my life). Starting on Monday paves the way for some terrific weekend pig-outs. You are able to eat all weekend – stuff that you ordinarily would not touch – because there is no guilt . . . no guilt at all . . . because you are going to fix it all on Monday.
>
> So, Monday finally comes, and you get through breakfast okay and go to work. (You ate an egg and one piece of dry toast instead of your usual two donuts). At 10:30 Monday morning, an important client calls and says, "Bill, come on and go to lunch with me. Let's catch some burgers over at Chili's" . . . . . It's decision time . . . but this guy is an important client, and you cannot just blow him off and tell him that you cannot go because you are on a diet. So – you go off to lunch with the guy, and your conscience speaks – but not loudly – and you are sitting there with burgers floating around and you say to yourself, "I'd better eat with him and start my diet in the morning." So, you have a burger and since you have already blown it for today, you decide to have some fries and

a shake as well. Monday ends at home with a good-sized supper because "your diet never really got started anyway," and you are "starting in the morning."

On Tuesday morning, you do very well with no screw-ups until after your light lunch when your mother-in-law calls and says that she is bringing over her special tuna potpie. She loves to fix it for you, and is looking forward to seeing you enjoy it. After fifteen years of married life, you are too smart to tell her you are not eating her pot pie – you just do not do things like that. So, you eat it – and, in fact, it tasted so doggone good that you asked for seconds – and your mother-in-law is happy, and your marriage is good . . . and your diet has to wait till Wednesday.

Wednesday starts out awful. You cut yourself shaving, step on the dog's tail, slip on an oil slick on the way to the car – and then the car will not start. Your secretary does not show up and the copy machine is broken! By 10:00 AM you have had it and are on your way to the vending machine for a Snickers. It has been an awfully stressful morning. You hate that you are eating a Snickers, but your stress level is so high that food – any kind of food – seems to ease the pain. Lunch seems to make things better. And now, it is Wednesday afternoon, and you have not started your diet yet, and you say, "Well, to heck with it, I've blown this week already. I think I'll just wait until next Monday. Having made this profound decision, you now can head into another fine weekend of pre-diet eating. And on and on it goes . . .

Many people who come to Health by Design have been repeating the above cycle for years – starting and stopping diets. I know that it is fun to laugh at ourselves, but most of us here, including this author, have been through too many Mondays already. I hope that you will view Health by Design, its Staff, its Education Resources, and its products as the end of your Monday Syndrome forever. During the past decade, almost 3 new diets per day have been developed in this country. Obviously, none of them was a solution to the Monday Syndrome. They may cause transient weight loss, but without growth in knowledge about our bodies and their control systems, about nutrition and our individual nutritional needs and about our behaviors and what controls them, none of us can expect to see any long-term changes.

Several years ago, Connie Chung directed an interesting TV documentary called "Life in the Fat Lane." Several interesting facts emerged and have remained with me. The first of these related to the ways that physical appearance was related to self-esteem. Fourth graders were more likely to attribute to fat children the character traits of laziness, dishonesty, slowness, or lack of athletic skills. The same children judged leaner classmates to be energetic, honest, bright, skillful in sports, etc. Obviously these judgments are far from the truth, but commercial media, Hollywood films, and fashion magazines have promoted this type of thinking – whether they intended to or not. "The beautiful people of the world are not fat." The second striking fact brought forth in that program is derived from the first: The average American girl begins her first diet by age 10. How messed up we have become! We have become fatter and fatter as a culture and are doing more diets earlier in life – and none of them work. The average American woman is one pound fatter this year than she was last year, and next year she will be one pound fatter again.

Clearly, we need a much deeper understanding of the magnitude of the problem as well as the cultural, biochemical, physiologic and behavioral factors that influence its development. Health by Design is committed to providing this type of education and to supporting you emotionally and physically as you make the changes necessary to effectively deal with the problem.

“Be the Best of Whatever You Are”

If you can’t be a pine on the top of the hill,
Be a shrub in the valley – but be
The best little scrub by the side of the hill
Be a bush if you can’t be a tree.

If you can’t be a bush, be a bit of grass,
And some highway happier make;
If you can’t be a muskie, then just be a bass –
But the liveliest bass in the lake.

We can’t all be captains, we’ve got to be crew,
There’s something for all of us here,
There’s big work to do, and there’s lesser to do,
And the task you must do is the near.

If you can’t be a highway then just be a trail,
If you can’t be the sun, be a star;
It isn’t by size that you win or you fail –
Be the best of whatever you are.

--Unknown

STUDY QUESTIONS

Chapter Three – Why Are We Getting Fatter?

1. Which of the following numbers best completes the following phrase: (1, 2, 5, 10)
   "Since 1980 the average American has grown _____ pound(s) heavier each year.

2. The most important reason that our society has become fatter and fatter during the past 20 years is:
   a. we eat too much fat
   b. we have more stress than people of past generations
   c. we do too little activity
   d. we have too much leisure time

3. "In a sedentary culture, individuals who become the fattest generally _____."
   a. under-exercise
   b. have low metabolism
   c. overeat
   d. take drugs

4. Women who come to Health by Design risk management programs generally burn less than _____ times their body weight in calories per day. (9, 7, 5, 3)

5. Which of the following is the least likely bona fide source of nutrition information in our society?
   a. the media
   b. dieticians
   c. Nutri System
   d. physicians

6. Which of the following <u>should</u> be our most reliable source of information regarding nutrition and its effects on human beings?
   a. the media
   b. physicians
   c. Nutri-System
   d. Weight Watchers

7. Where do most physicians learn most of what they know about nutrition?
   a. the media
   b. their wives
   c. hospital dieticians
   d. medical school

8. Which of the following is least likely to help an obese person get thin and remain thin?
   a. psychiatrist
   b. weight watchers
   c. Health by Design
   d. dietician

9. When do most diets begin?
   a. January 1st
   b. Mondays
   c. Memorial Day
   d. Tuesdays
   e. Christmas

MANAGING YOUR BODY WEIGHT FOR LIFE

Chapter 4

The Tank Within Us

David M. Player, MD

Health By Design Program Manual

Chapter 4

THE TANK WITHIN US

Scale Weight Is Not The Whole Story

Welcome to chapter four of this manual on "Managing Your Body Weight." This chapter is near and dear to my heart – since I first began to think about the subject matter as early as 1974 when I was a nephrology fellow and learning to teach interns and residents about salt and water and the effects of fluids on our body weight. I trust that this material will reinforce the concepts introduced in chapter two – that scale weight and changes in scale weight have little to do with your fatness or whether you are losing or gaining body fat.

Figure 1.4

The little man in Figure 1.4 with whom you are familiar demonstrates the several components of body composition previously discussed. In this chapter, we will focus mostly on controls on the tank component, since daily and weekly changes in weight are more related to this component than to the other three. A different way to draw the same man is shown in Figure 2.4 on the following page.

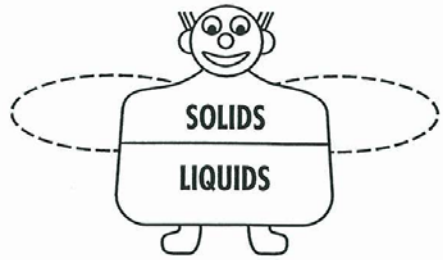


Figure 2.4

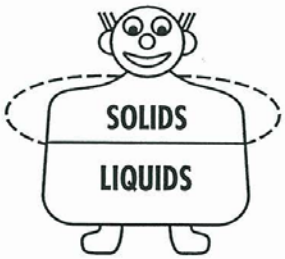


Figure 3.4

In this graphic, the muscle, bone, and fat are all included in "solids". The dotted "wings" on this angelic creature represent added fat (which is the problem with our solid compartment). As we said in previous chapters, our goal is decreasing the fat component of the solids without messing with the other solid components or liquids. This would create a new creature like the one in figure 3.4.

Before developing this further, I would like you to think briefly about a kidney dialysis patient who I have known for the past 10 years. I use this man as an example here because he is a big man who gains relatively large amounts of fluid weight during his days between dialysis treatments. When I last saw Ray on Saturday after dialysis, he weighed 250 pounds. He had a great weekend and came back for dialysis on Tuesday morning weighing 267 pounds. He had gained 17 pounds in just 2½ days. Can you imagine what its like to gain 17 pounds that quickly? Dialysis patients can. Interestingly, when he went home after dialysis on Tuesday, guess what he weighed? That is right – he weighed 250 pounds. He had lost 17 pounds in just 4 hours of dialysis. That is a pretty good weight loss program, but I doubt that any of you would want to lose weight in this way. We laugh at the thought, but every day in our city and around the world misinformed physicians give patients diuretics, laxatives and other concoctions to cause weight loss. Obviously the "weight" lost in this way or on dialysis has nothing whatsoever to do with the body fat that you came here to lose. Unfortunately, scale weight is often our only measure of change when we try to lose body fat, and we therefore get bad data (either good

news or bad news) relative to our body fat content. Understanding the factors that influence weight change without affecting body fat content is therefore important to protect us from bad information.

The movement of water and salt discussed in chapter two is a complex process controlled largely by our kidneys. To understand how the kidneys respond to various signals to retain or dump salt and water is our challenge in this chapter.

"YOUR BIG TANK"

The liquid compartment in Figures 2.4 and 3.4 is really a sack of salt water (not pure water) much like the bags of normal saline that we often use in the hospital. This salt water is well distributed through your body, but for purposes of this discussion, I would like you to think of it as contained in a distinct compartment known as your "big tank." This tank normally contains just enough salt so that there are about 150 little pieces of sodium per quart of water. This bag of salt water typically amounts to about 60% of the weight of the body. As can be seen in Figure 4.4 – 6.4 below, the big tank can be compartmentalized into three separate divisions. (These are not structural-anatomic divisions, but functional ones). The first and largest of these functional compartments is intracellular water – the water that resides inside cells. Fortunately, this water remains fairly constant in volume regardless of whether you and I are eating, drinking, sweating, vomiting, etc. It certainly can change somewhat, but for this discussion let us assume that intracellular water remains fairly constant in volume (and weight).

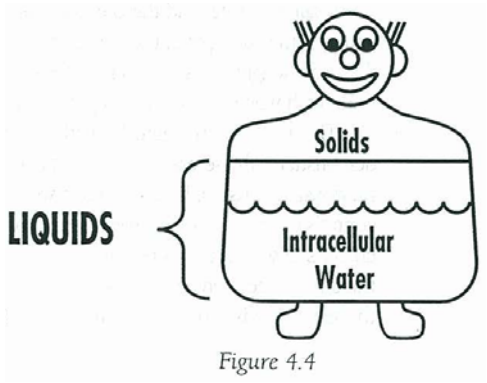


Figure 4.4

Ordinarily, this intracellular water accounts for about 60% of all water by weight, and water is about 60% of total body weight. (See above) This water volume remains constant because of a God-given protective mechanism at the cell wall (the sodium-potassium pump) that keeps the cell at optimal volume in spite of what is happening in the other compartments.

"YOUR LITTLE TANK"

The second salt-water compartment is called the interstitial water compartment. I like to call it the "little tank." It amounts to about 30% of all the water in the body and is water between cells (in spaces around cells). It is water that is around your bowels, around your heart, and around your lungs. It is water that is in your mouth (saliva), in your bladder (urine), or in your skin (ready to be lost from sweat glands).

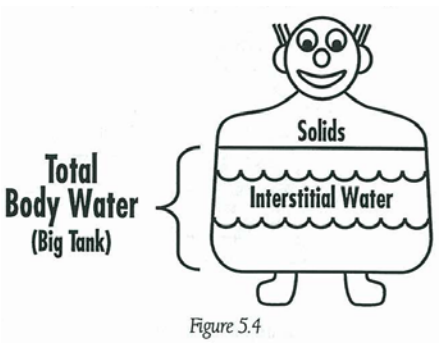


Figure 5.4

It is this interstitial water that can change so much from day to day, depending upon salt intake and the other factors discussed in chapter two .

The final body fluid compartment is the smallest in volume and weight – but the most important on a minute-by-minute basis. This, of course, is our intravascular compartment – the fluid that is travelling around in our veins, arteries and lymph channels. This is our blood compartment (or at least the part of our blood that is water). It is what makes us tick. It is what gives us our

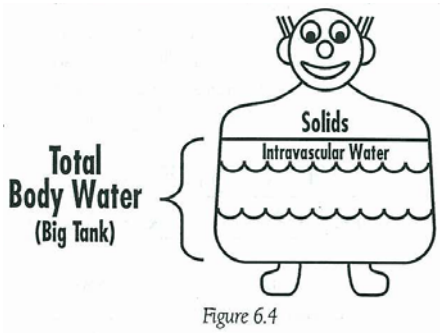


Figure 6.4

blood pressure and pulse. This water, which amounts to about 10% of all body water, is pumped along by our heart and gives nourishment to all parts of our bodies. It amounts to only 5 to 6 quarts (10-12 pounds) but is obviously very important. Fluid does move from intravascular to interstitial spaces, but the movement is slow and for this discussion, I would like you to view them as three separate compartments.

The remainder of this chapter will be a discussion of the interstitial compartment, which I have redrawn in Figure 7.4 below as "little tank." (this looks like a stomach in the drawing, but it obviously is not. Be apprised, however, that you will not find the "little tank" in an anatomy textbook).

In this figure, LT is full (like it is in most of us most of the time). Let us think of some things that can deplete this tank (make its level diminish):

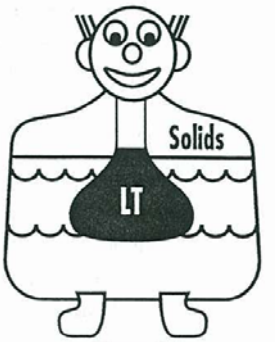


Figure 7.4

1) Urine
When you and I staggered out of bed this morning, we probably ambled to the bathroom and depleted our LTs. We urinated and lost some fluid (and lost some weight). We did not worry much about which tank it came from, but obviously it was fluid that yesterday was somewhere else in our body and now is gone.

2) Diarrhea
When you and I go to Mexico and drink the water, we risk "shrinking our little tank." How? Loss of loose stools (diarrhea) is a potential loss of large amounts of the tank fluid. Think about the thousands of people who have died of cholera. Why do they die? Fluid is lost rapidly from the interstitial space (LT) and replaced internally by fluid from the other two compartments. The water of the blood gets severely depleted, blood pressure drops low, and patients die from the effects of low blood pressure. The treatment, of course, is IV salt water, and patients who are treated with enough salt water usually recover completely.

3) Sweat
Think about the times that you have played athletic events outside on a hot day. Have you lost fluid? Sure you have, and lots of it. I personally used to lose 10 to 12 pounds in double-session football practices in August. Where did the fluid come from? The "little tank", of course. I was a little shaky and weak after practice, but after eating and drinking for 24 hours, I was usually able to stagger back for another day of brutality and further fluid loss (having replaced all of the fluid lost on the previous day).

Figure 8.4 below depicts the process of fluid loss described in each of the above situations:

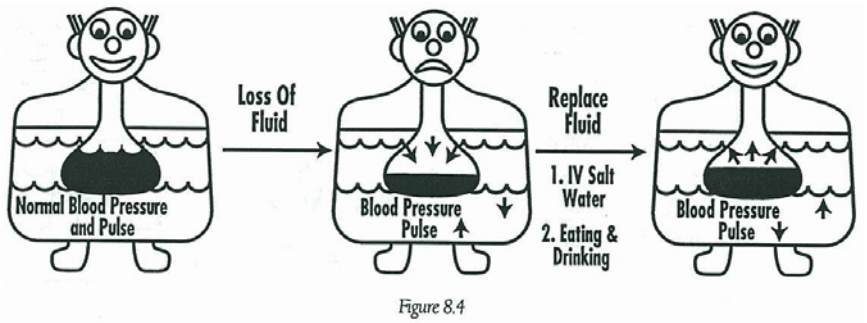


Figure 8.4

The important point here is that none of the weight loss (of as much as 10 to 12 pounds) came from the solid compartment (fat, etc.). All of this loss was from the little tank.

By this time, I am sure that you are saying, "So what, Doc! I came here to lose some weight. Why are we talking about all of this fluid stuff?" Obviously, the goal of this exercise is to get you to "defocus" from the things that control weight loss at the scales and to focus rather on the things that promote loss of body fat. If dialysis patients can lose 17 pounds in 4 hours, and you can lose 10 to 12 pounds of fluid in an afternoon of sweating, a scale is a much better tool for a nephrologist or internist than it is for a layman who wants to lose fat.

WHY DO WE LOSE SO MUCH WEIGHT AT THE BEGINNING OF A DIET?

How does all this relate to your current dietary regimen? For the past few weeks you have been eating mostly diet supplements (I hope). In our usual diets – your diet before coming to Health by Design – there were probably 5 to 10 grams of salt daily. Your body – and particularly your kidneys – was accustomed to this amount of salt. They kept you in balance at this level of salt intake. Unfortunately, your kidneys did not hear that you were starting a diet, so they kept putting out the same amount of salt as usual – regardless of what was in your diet – at least for the first few days of your dietary change. As we discussed in Chapter 1, this loss of salt and its accompanying water can lead to dizziness, muscle cramps, and weakness. You may have experienced some of these symptoms by now and are probably aware that drinking bouillon or eating salty pickles will alleviate the problem. Let me explain how the kidneys respond to our diet.

The Kidneys' Response To A Low Sodium Diet

For purposes of this discussion, I would like you to assume that prior to beginning your low-calorie, low-salt diet you were eating about 9 grams of salt per day. If you were truly in balance at this intake, you would also be excreting 9 grams – perfect balance. You will remember that I commented in Chapter 1 that there is only about 1 gram of sodium in 5 packages of your diet supplement. So, as you began your new nutrition program, you moved quickly from 9 grams of sodium intake to 1 gram intake. Your kidneys did not know that you were going to do that, however, so guess how much they go on putting out? That is right – 9 grams. So, on day one of your new diet, you take in 1 gram of salt and put out 9 grams of salt – a deficit of about 8 grams of salt.

Now it so happens that you and I are incapable of urinating pure salt without an accompanying amount of water. (If you develop the ability to do this, please contact me immediately.) So, for each 4 grams of salt lost from the body, we obligate the loss of one quart of water. (If we do not pass this much water with our salt, we eventually would become charged like a battery – out of salt balance.)

On the first day of your diet, therefore, with a net salt excretion of 8 grams, you obligate the excretion of 2 quarts of water. Each quart of water weighs about 2.2 pounds, so by the end of the first day of your new diet, your weight may be expected to be down by 4.4 pounds. Now that is an exciting first day loss – enough for a celebration. Where did the water come from? From the little tank, of course. How much fat was lost? Almost none. Figure 9.4 below depicts what has happened after one day of this low salt, low calorie diet.

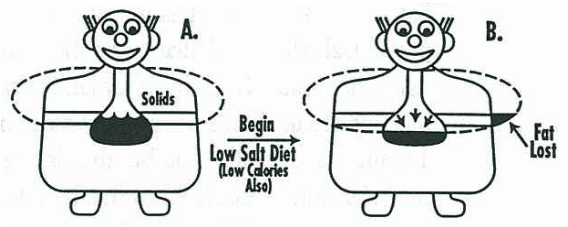


Figure 9.4

As you can see in Figure B, a small amount of fat has been lost (about 6 ounces), but 2 quarts of little tank is gone (about 4½ pounds). Some fluid comes out of the intravascular space into the little tank, resulting in lower blood pressure and faster pulse. Your rings will slide off

and on more easily. Your underwear may be loose – but only 6 ounces of fat have been changed into water. (See Chapter 2, page 23.)

The Kidneys Adjust

If this process continued for many days, you and I would lose plenty of weight (4.4 pounds per day – but we would also be plenty dead. With a deficit of 8 grams of salt per day and its accompanying water, our little tank would soon be empty, our blood pressure would be so low that we could not stand up, and we finally would die of shock. Thankfully, our kidneys do not let such things happen. Sometime during day two of your low salt diet, your kidneys say, "Gee, we know that Bill's been on lots of diets before. We doubt that he'll stick with it. (He usually doesn't.) But, just to be sure, we'd better only put out 5 grams of salt today – just for a hedge." So, the kidneys do an internal adjustment (that I'll describe later), and only 5 grams of salt is passed in the urine. That is still 4 grams more than he took in that day, and the 4-gram salt loss obligates another quart of water loss (and 2.2 pounds more weight loss). Can you imagine that? Bill has been on his new diet for only two days and he is already down 6.6 pounds – almost all from his little tank. Thankfully, the kidneys do not let him get much "drier" than this, and by the end of the first week of dieting he is back to a new balance state in which he takes in 1 gram of salt per day and loses one gram of salt per day. Thereafter, fluid shifts do not occur very much unless Bill's diet changes. The net result of ten days of a low salt diet, however, is that little tank is relatively depleted, blood pressure is lower, pulse is faster, and Bill may be dizzy when he rises quickly from a chair. Weight loss may be substantial, however. I have seen big men and women lose as much as 20 pounds of fluid from their tank – simply by lowering dietary salt intake. Additionally, our stored sugar in our muscles and liver (called glycogen) is bound to water in these tissues. As we use up this sugar in the first week of our diet, this water is released into the little tank and lost from the body as urine.

The point of all of this is obviously that nearly 90% of this initial weight loss comes from the tank and has nothing whatsoever to do with your fat.

This phenomenon, however, is at the heart of promotional schemes for "fast buck fat clinics" that advertise, "We guarantee 30 pounds of weight loss the first month." I always ask (when I read such stuff), "30 pounds of what?" Charlatan physicians who know little about body composition and its controls often prescribe diuretics as a part of their "weight loss program." Diuretics do not change body fat at all. They may promote weight loss from your tank and mess up your potassium, magnesium, uric acid, calcium, blood sugar, and cholesterol – but they will not change your body fat content one iota.

What Happens If Salt Is Re-introduced Into Our Diet?

Now, what happens when we go the other direction and begin to eat more salt or replenish our sugar stores? You can probably guess but may not be aware of the magnitude of the potential change. Let us say that Bill has been very faithful to his diet and has had nothing to eat but diet supplements, fruit, and salad for the past 4 to 5 weeks. It is time for his anniversary and he wisely plans a night out with his wife (who happens to like French food). So they go out to a famous French restaurant and Bill looks over the menu and wisely orders a Chicken a' la Pierre – a broiled chicken breast in some kind of salty sauce. He also eats soup, a small salad, and a baked potato (salted). He calculates that the whole dinner contains less than 500 calories – hardly a significant influence on his body fat. For sake of discussion, let us suppose that Bill's meal contained 9 grams of salt. (That is quite a salty meal – but it is possible.) Remember that his kidneys are used to 1 gram in and 1 gram out, but this day he takes in 9 grams of salt. How much is he going to put out? His kidneys did not know that he was going to eat Chicken a' la Pierre! So, you guessed it; Bill only puts out 1 gram of salt. The net result is an 8 gram salt retention. As before (to keep from sparking), Bill's kidneys hold on to

2 quarts of water to balance out his 8 grams of salt, and Bill gains 4.4 pounds. In just one evening by eating a 500-calorie meal, he gains nearly 5 pounds. I suspect that some of your have had similar experiences. I surely have.

Don't Get Discouraged!

Again, the important thing to remember is that this weight gain has nothing to do with body fat. In fact, this is a classic example of gaining weight while losing fat. Unfortunately, I have seen lots of patients who experience this type of gain – and lose heart and blow off their diet and nutrition program altogether. The fluid gained actually may hang around for as long as 7 to 10 days before the kidneys compensate and dump it back out. The important thing for you and me is that we not get hooked by the scales.

A QUICK LECTURE ON NEPHROLOGY (KIDNEYS)

At this point, I would like to change gears and spend some time explaining how the kidneys do the things described above. This may be more nephrology than you desire to stick into your brain, but it is important to understand if we are going to understand what happens during women's menstrual cycles.

The Nephron

The basic functional unit of a kidney is called a nephron. To explain how it works, I usually do a demonstration using my hand and a small balloon. (See Figure 10.4 below).

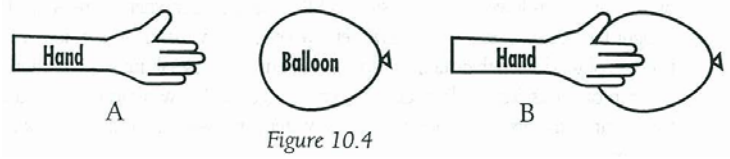


Figure 10.4

In drawing B, the fingers have pushed into the center of the balloon so that the balloon is now tightly lining each finger. Pretend that your fingers are arteries bringing blood to the surface of the balloon. Now pretend that the balloon has "pores" or tiny holes that allow the water of the blood to pass into the interior of the balloon (but are too tiny to allow passage of blood cells and proteins). The balloon would slowly fill with water while the blood cells and proteins remained outside the balloon (and returned to the heart through veins). If we now place a drainage tube into the backside of the balloon to drain the filtered water, we have a perfect working model of a nephron. (See figure 11.4)

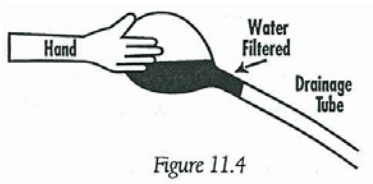


Figure 11.4

You and I have 2-3 million of these little units working in our kidneys at all times.

Figure 12.4 shows some that more accurately what the drainage tube shown above looks like in each of our 3 million nephrons. Each drainage tube begins at the out surface of the kidney, then dives deep into the center of the kidney, then rises back to the surface again before draining into the collecting system of the kidney (ureters).

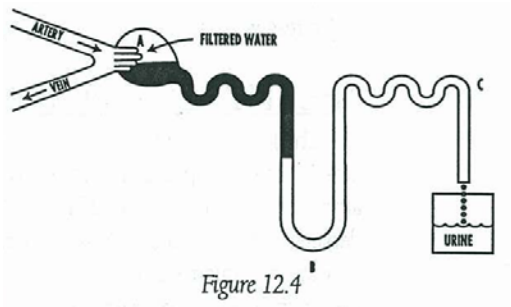


Figure 12.4

The water of the blood is filtered into space A and travels down the drainage tube – ultimately becoming urine. As it passes along the tube, it undergoes a variety of changes that convert it from

plasma water to urine. In any given day, about 120 quarts of filtered water are formed at point A. Obviously, if all of that became urine, you and I would have depleted our little tanks and gone into shock in no time.

Fortunately, as shown in Figure 13.4 below, the vast majority of this salt and water is reabsorbed back into the blood as it passes along the drainage tube. By the time it reaches point B, 90% of the filtered water has been reabsorbed back into the blood. This still leaves a lot of fluid that could become urine (10% of 120 quarts), and you and I would be pretty tired of running to the bathroom if we put out 12 quarts of urine in a day. Fortunately, as it passes further down the tube, another 9% is reabsorbed by point C, so that net volume of urine excreted is only 1% of the original amount filtered (or about 1200 cc or 1.2 quarts). Isn't it marvelous how the tubule reabsorbs selectively all that salt and water and leaves in the fluid only the urea and other waste products that need to be passed from the body to sustain life and prevent poisoning?

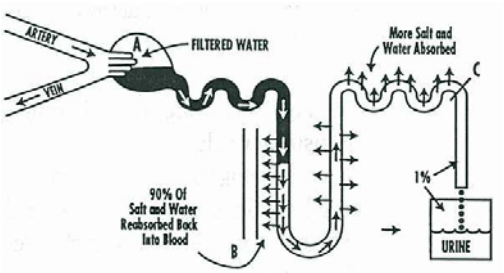


Figure 13.4

What The Kidneys Are Doing When We Eat Diet Supplements

Now, as you and I begin a low salt, low calorie diet (like diet supplements), the kidney tubule has been used to spilling 9 grams of salt into the urine daily (because you have been taking in 9 grams daily before your diet). As we said earlier, the first day of your diet, you lose 8 extra grams of salt (and 2 quarts of water). By the end of the first week, however, you are taking in 1 gram of salt and putting out one gram of salt per day. How does the kidney make this adjustment?

The first part of the drainage tube from point A to point B contains sensors that recognize the volume loss, and instead of reabsorbing 90% of the filtered water, the tubule becomes "turned on" and begins to reabsorb 95% of the filtered water. The net result is that less salt and water is delivered to the more distal parts of the tube. The portion of the tube between points A and B remains hyper absorptive and "turned on" to reabsorb increased salt for the entire time that you and I are eating a low salt diet. We remain in balance with 1 gram of salt coming in and 1 gram of salt going out. Everything remains peachy until we go out to eat Chicken a' la Pierre with 9 grams of salt. Now the "turned on tube" between point A and B did not know that you were going out for dinner. In its "turned on" state, it is just ecstatic to see that extra 8 grams of salt in the blood. The net result is that you reabsorb 2 quarts of water with 8 grams of salt and gain 4.4 pounds on the scales by the following morning. The teaching point here is that when you have been "dieting" a long time on a low salt, low carbohydrate diet, you are a setup for regain of a large amount of salt and water. I have seen a number of patients regain more than 15 pounds in 3 or 4 days – simply by increasing salt and carbohydrates in their diet. This is, of course, devastating to the person who assumes that he has lost all of his weight as fat – and is one of the major causes of failed diets in this country. It also is a major reason for tracking true fat loss and understanding your own specific metabolic rate (as we will discuss in the next chapter).

THE "PLATEAU" PHASE

The kidney tube (between points A and B) will continue to hyper absorb salt until your little tank is "full" to a predetermined set point established by the "sensor" previously described. The amount of fluid required to fill the tank varies from person to person and depends on the state of depletion before refeeding begins. In dieting patients, the fluid regained can vary from 5 to 6 pounds (3 quarts) to as much as 25 pounds (11 quarts). If the refeeding is accomplished

slowly over many weeks, the result can be a prolonged "plateau" phase in which a patient is still losing fat but not losing weight. (For example, if you had an empty 10-pound tank and began slowly increasing your dietary salt and carbohydrate, you could lose one pound of fat per week and gain one pound of fluid per week and not see a change in scale weight for 10 weeks. You talk about frustrating!! Usually, such a patient would see some positive signs such as smaller clothing or belt sizes – but this is not always the case because reexpansion of the fluid space may increase size somewhat.

The Part The Kidneys Play During The Menstrual Cycle

This brings us to the second important reason for discussing salt and water – the problem of women's menstrual cycles. In Figure 14.4, we see another nephron with its long drainage tube reabsorbing salt and water originally filtered at point A.

The reabsorption of salt and water between points B and C is mediated by a hormone called aldosterone (made in the adrenal gland). If this hormone is not present, salt and water are "wasted" into the urine. Aldosterone is a "steroid" hormone – one of a group of fatty hormones that have a profound influence on our metabolism, our ability to store fat, our protein requirements, our blood pressure, and other important functions. Almost all of these steroid hormones have the basic biochemical appearance shown in Figure 15.4. (This is a long chain of carbon atoms bound together in chains and rings.)

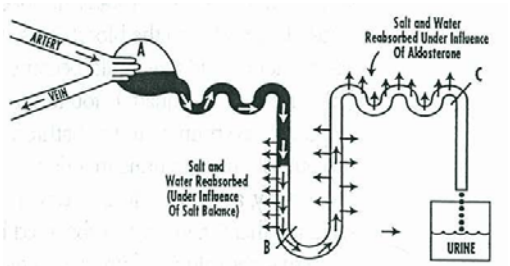


Figure 14.4

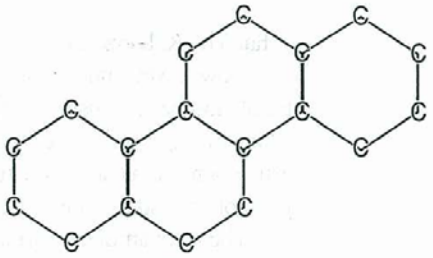


Figure 15.4

Hormones That "Confuse" The Kidneys

The significant differences in the various steroid functions are related to different biochemical side chains attached to the basic ring structure. It turns out, therefore, that aldosterone (the salt retainer) looks very much structurally like the two major female hormones – estrogen and progesterone. Each month, the blood levels of these two hormones cycle upward and downward, with the highest levels occurring just before a menstrual period. Unfortunately, the kidney tube (between points B and C) cannot tell the difference between aldosterone and progesterone. The result is often a massive reabsorption of salt and water from the kidney tube for several days just before and during a menstrual period. The "average" woman probably gains several pounds of fluid in this way, although many women gain 6 to 7 pounds or more. It all happens because of a confused kidney tube that only puts out 1 gram of salt per day while you are eating 5 grams per day. This, of course, causes a gain of one quart of fluid per day (about 2 pounds) and causes everything to be "swollen." (A good deal of premenstrual syndrome symptoms are caused by this swelling – of everything from your abdomen to your brain, ladies.)

Let me describe a typical scenario. A young woman is eating a 1-gram sodium diet made up largely of diet supplements and fruit. She is eating about 500 to 600 calories per day and loosing over 2 pounds of fat per week. Then comes her "menstrual" week and she weighs in at 2 pounds above her weight of the previous week. A sad but typical response from her swollen brain is, "I knew it. This is a lousy diet. To heck with it. It's not worth the sacrifice. I'm going to go eat." And she does. She pigs out for a couple of days and actually feels better. (There are some nutritional reasons why more food would be needed during her period.) She may puff up a little more, and then she finishes her period and gets on the scales, and lo and

behold, she is down 3 pounds. She then says something like, "Well, gee – it really doesn't make any difference whether I eat or not. Maybe my body is changing. I think maybe I'll just 'wing it' on my diet this month."

So, she wings it for a month – grazing randomly in the kitchen – and a month later she weighs 10 pounds more. I am sure that many of you who read this have experienced this, and this situation is the major cause of failed diets in America. Women do not burn as many calories as men anyway. When you throw in the problem of massive fluid gains with menses, the result is just too discouraging. Dietary planning often goes by the wayside.

Drugs That "Confuse" The Kidneys

The final section of this chapter is devoted to a discussion of some medicines that "change the little tank." The first of these are known as nonsteroidal antiinflammatory drugs. These agents – which are used for everything from headaches to arthritis to menstrual cramps – cause a large amount of salt and water to be reabsorbed into the blood from the kidney tubule (between points A and B). This causes an "overexpansion of the tank" and a typical weight gain of 2 to 3 pounds. The extra fluid in the tank remains as long as the patient is taking these pills and will be lost within a few days after they are stopped. This is important for dieters who watch the scales, but again has nothing whatsoever to do with fat loss or gain. (Such medicines also cause irritation of the stomach lining and a risk of bleeding. They should be taken only with a good understanding of potential side effects.)

Last but not least of chemicals that change the little tank are diuretics. This diverse group of agents is chemically related to sulfa antibiotics and typically poisons the kidney tube between points B and C, making it difficult for the tube to reabsorb salt and water back into the blood and causing loss of salt and water into the urine. The first day that we take a diuretic, we may eat 1 gram of salt and lose 9 grams of salt into the urine. The accompanying loss of fluid leads to a loss of several pounds. Similarly, when we stop diuretics, we may be eating 9 grams of salt and lose no salt (for several days) into the urine. This, of course, causes a gain of several pounds of weight (almost like eating salt after you have been on a low salt diet).

By now, you have heard more about salt and water and kidneys than you ever wanted – and we will not further belabor this topic in this manual. For your part, simply remember that the scales cannot be trusted to tell you much about your body fat. They do tell you that your body is changing – but they do not tell you what is changing. In Chapter 5, we will discuss how to get a better handle on how much fat is being lost – obviously much more important to you than how much salt and water are being lost.

" I Know Something Good About You"

Wouldn't this old world be better
If the folks we meet would say –
"I know something good about you!"
And treat us just that way?

Wouldn't it be fine and dandy
If each handclasp fond and true
Carried with it this assurance –
"I know something good about you!"

Wouldn't life be lots more happy
If the good that's in us all
Were the only thing about us
That folks bothered to recall?

Wouldn't life be lots more happy
If we praised the good we see?
For there's such a lot of goodness
In the worst of you and me!

Wouldn't it be nice to practice
That fine way of thinking too?
You know something good about me
I know something good about you!

Louis C. Shimon

STUDY QUESTIONS

Chapter Four – The Tank Within Us

1. A dialysis patient comes to his dialysis clinic weighing 250 pounds. He returns to his home 4 hours later weighing 240 pounds. Which of the following explains what he lost?
   a. He lost fat
   b. He lost bone
   c. He lost muscle
   d. He lost tank

2. The human body is about _____% water (by weight). (1, 10, 40, 60)

3. The water "compartment" that "makes us tick" and controls our blood pressure and pulse is _____ water. (intravascular, interstitial, intracellular, total body)

4. Another name for interstitial fluid (water) is:
   a. big tank
   b. little tank
   c. intravascular water
   d. intracellular water

5. Which of these is an interstitial fluid?
   a. saliva
   b. urine
   c. pleural fluid
   d. sweat
   e. all of the above

6. When you begin a low calorie, low salt diet, weight loss usually occurs very rapidly. The majority of this weight is nearly always _____. (fat, muscle, bone, fluid)

7. You have been on a low calorie diet for 3 months and have lost 30 pounds. You go to a wedding reception at the "Olive Garden" and eat lasagna, pizza, and Italian soup. The following day your weight has increased 6 pounds. The majority of this weight gain is _____. (muscle, fat, bone, fluid)

8. Martha eats 600 calories per day of diet supplements and vegetables for 2 weeks. Her scale weight rises from 172 to 174 pounds over this 2 weeks. She feels good and tells her doctor that she has not cheated on her diet. What has happened?
   a. Martha is lying through her teeth.
   b. Martha has lost fat and gained muscle
   c. Martha has gained fat and muscle.
   d. Martha has lost fat and gained fluid.
   e. Martha has gained muscle and lost fluid.

9. Which of these is the best explanation for Martha's problem?
   a. a menstrual period
   b. diuretics
   c. constipation
   d. diarrhea

9. Doctors who give diuretics to patients in weight loss clinics should be:
   a. shot
   b. hanged
   c. avoided
   d. all of the above

MANAGING YOUR BODY WEIGHT FOR LIFE

Chapter 5

Energy Balance Records

David M. Player, MD

Health By Design Program Manual

Chapter 5

ENERGY BALANCE RECORDS

Managing The Math Of Your Body

This fifth chapter is about record keeping – specifically the need for a special segment of the population to record data relative to nutrition, fitness, and body composition. I hear people say all of the time, "Why should I have to write down what I eat? Nobody in my family and none of my friends have to do it. It is so restrictive and time consuming." Before we get into the specific reasons for record keeping, let me focus for a second on the words "special segment" above.

I say "special segment" because I do not believe for a minute that every person in our society needs to keep a detailed record of his food intake or energy expenditure. For the majority of those who read this manual, however, record keeping is a strong ally – one of the major secrets to living life at a healthy composition. Why just the people who read this – and not everyone in the world? Remember, as we said in Chapter 2, that most of you who read this are not overweight or over fat because you ate too much. My assumption, after working with thousands of patients and dealing with obesity and its management for over 15 years, is that the majority of people who come to Health by Design are people with relatively low metabolic rates. In other words (as I will explain in more detail later) they burn far fewer calories than average at rest or with activity. As a result, they cannot eat "like an average person" without accumulating body fat. They must also be people who have the genetic capacity to be fat since not everyone can be fat – even if they eat a lot. You will remember from Chapter 2 that the average woman who comes to Health by Design burns about 8 times her body weight per day in calories. The average male Health by Design patient burns 10 times his weight. Figure 1.5 below shows this relationship – comparing patients who come to obesity clinics (like Health by Design) with others out in the world.

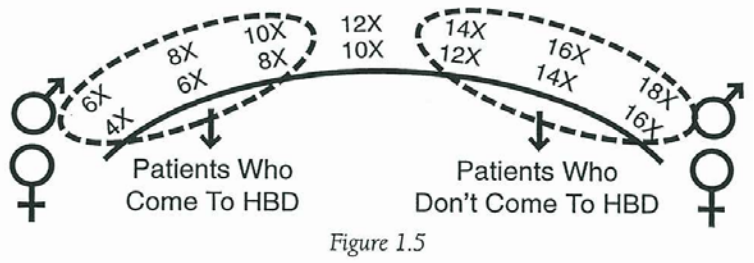


Figure 1.5

As you can see, men and women who routinely burn 14 to 16 times their body weight in calories do not come to Health by Design – or any other diet clinic. The minute they cut back on food or increase energy expenditure, they lose weight – quickly. At the other end of the spectrum, however, is the poor lady who burns only 4 times her weight per day. She comes to Health by Design – and usually has previously visited every weight-loss clinic known to mankind. She is terribly frustrated because nothing she does seems to work, and everything she eats "turns to fat."

More patients who come to Health by Design, however, are women who burn 8 to 9 times their weight daily and men who burn 10 to 11 times their weight. Remember that 100 years ago, the majority of Health by Design patients would never have been identified as fat (and would never have gone to weight loss clinics – even if they existed). They would have been busy plowing corn, or being a blacksmith, or carrying ice to the icebox, or churning butter, or doing a host of things that nobody does anymore. The result is the emergence in the late

20th century, of a group of people who are fat because they have a low metabolic rate and a sedentary lifestyle.

LOW METABOLIC RATE "ACCEPTANCE"

Genetics, aging, illness, or medication has created a significant segment of the population that is fat. As our work becomes more and more sedentary, more and more people with metabolic rates on the low end of the above curve will appear to be fat. I do not think that the problem will get better. As we invent robots to do more of our work, the problem will grow worse.

For those of us with low metabolic rates, then, there is a kind of acceptance of our "differentness" that must develop. I personally am a fat guy who, if left to my own devices, would weigh over 240 pounds. Knowing my metabolic efficiency, however, I choose to live in a certain way that lets me stay at 190 to 195 pounds. I might be better and healthier at 180 to 185 pounds, but right now I am living in a way that lets me stay at about 195 pounds. It is the acceptance of our differentness – of our genetic and metabolic uniqueness that is so difficult for us, because how we choose to live must be conditioned by this differentness. The sad problem is that as we "progress" toward a less labor-intensive, more information-based society, more of us are going to be fat and suffer the consequences.

The acceptance of "how to live" for individuals with low metabolic rates is a little like the acceptance of taking insulin for a new diabetic (or coming to dialysis for a patient with kidney failure). At first there is always anger, frustration, and resentment of the demands of "managing the disease." Later, however, there is usually acceptance of the necessity of dialysis or insulin shots, or blood sugar monitoring, and with this acceptance comes better health. Of course, for most of you who read this, the problem (obesity) is less severe than diabetes or kidney failure, but the management skills required are just as demanding. The consequences of our not managing our body composition are not so acute as a diabetic who stops her insulin or a dialysis patient who skips dialysis; however, in the long run they are just as devastating – with hypertension, diabetes, orthopedic problems, heart disease, and other lethal or morbid problems being the end result.

How To Live With It, Successfully

You say then, "Okay, Dave – so how do I have to live differently because of my metabolic rate problem? Are you going to tell me that I just have to eat less and exercise more?" These things may be part of the equation, but clearly there are some other very important fundamentals that you have got to master if you are to be successful.

1. Be Well Informed

First of all, people with low metabolic rates have got to be better educated in health issues than people with high rates. In general, we fat people have got to know more about our bodies, more about nutrition, and more about our psychologic selves – our emotional responses to our environment – if you will – about behaviors that affect body composition.

2. Accountable

Secondly, we with low metabolism need to be more accountable for health behaviors. Perhaps guys who burn 16 times their body weight in calories per day do not need to be very accountable for health behaviors, but we fat people do. To be successful in management of our body composition, we have to talk about this issue from time to time with each other and with counselors or teachers. Alcoholics Anonymous, Overeaters Anonymous, Weight Watchers, and a host of other programs are based upon the value of our talking about our problems and being accountable to others for our behaviors.

3. Acquire The Tools

Thirdly, (and most important I think) people with low metabolic rates and genetic propensity to be fat must have tools to use to help them manage the problem. It is almost like having a hypertensive patient take blood pressure pills or a diabetic use a glucometer. We fat people need to use tools to be successful. There are a number of types of tools, but the most important are diet supplements, and vitamin and mineral products (nutritional tools), fitness equipment like treadmills and pulse watches (fitness tools), and record keeping forms and nutrition software programs (behavioral tools). All of these are important – some more so to certain individuals than others. After many years of dealing with this issue, however, I feel that the most powerful of all of these tools is what I call an energy balance record.

ENERGY BALANCE – THREE ENERGY STATES

What do I mean by energy balance? Figure 2.5 below shows teeter-totters depicting the 3 possible energy balance states of human beings:

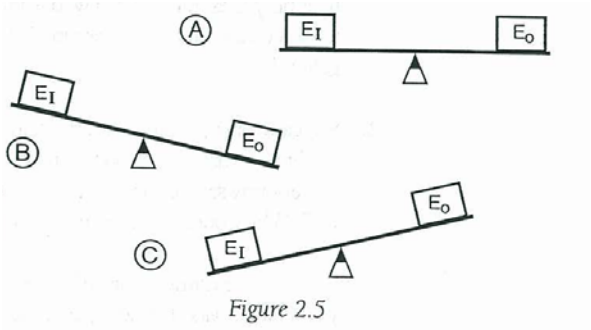


Figure 2.5

In seesaw "A", we have an individual in perfect energy balance. His energy intake (food) equals his energy output, (calories expended being alive), and he would be expected to neither gain body fat nor lose it. This is the state all of us would like to achieve (at our ideal body weight and composition).

In seesaw "B", we see a man whose cost of living (energy expenditure) exceeds his intake of energy (food). This man would be expected to steadily use up his body fat and slowly waste away. This is, of course, the state that all of you who read this expect to attain to lose body fat (and unless you are in this state, no fat loss will occur).

Drawing "C" depicts a man who is in positive energy balance. His intake of energy (food) exceeds his metabolic cost of living, and he would in this state expect to steadily gain body fat. (I have been in this state too often throughout my life.)

Maintaining optimal body composition would be so simple if we all understood these 3 energy states and knew our own personal energy requirements well enough to calculate our energy balance. Much of the rest of this text and a good deal of the time that you will spend with your behavioral educator is committed to teaching you data necessary to calculate energy balance. As I will discuss shortly, we humans are very resistant at times to learning and using such data in our daily lives. Those who do learn, however, gain a powerful ally and are statistically much more likely to maintain good body composition than those who do not understand the concepts and use them.

> *Several years ago, Health Management Resources, a large behavioral health company, looked at data on nearly 160,000 patients to determine predictors of success in weight loss and weight maintenance. After careful analysis, it was apparent that the single biggest predictor of success was a long-term change in physical activity – people who did more stuff and moved around more than they used to, stayed at lower weights than those who had not changed activity. This makes sense, of course, if we understand the above energy balance diagrams. Interestingly, the second greatest predictor of success in the HMR study was the keeping of some kind of record that let patients look at their bodies mathematically – an energy balance record. As I said above, my own experience would suggest that an energy balance record is the single most powerful management tool at our disposal. Diet supplements are powerful tools –*

so are treadmills and bicycles; but energy balance records are equally powerful. It is sad that most patients never learn to use them.

THE POWER OF ENERGY BALANCE RECORDS

What is the power of energy balance records? Why are they a predictor of long-term health and success? The list below is by no means complete – but it covers most of the answers to these questions.

1) People who keep energy balance records gain a certain freedom from worry about whether they are gaining fat, losing fat, or holding their own. Most people, when asked whether they gained or lost fat on a given day, have no idea how to answer. Patients with trustworthy EBRs know where they stand. They therefore experience a sense of freedom from guilt and worry about food – and get on with the rest of their busy lives. Most of you who read this will have experienced guilt because you ate the cheeseburger or the pecan pie – or because you failed to do a certain exercise. When you have an accurate energy balance record, the guilt is less. Having experienced this type of guilt throughout my life, I am especially appreciative of the freedom that EBRs give me.

2) Secondly, energy balance records help us to understand addictive foods. There is little doubt now that certain foods contain chemicals that make selected patients go bananas. Once they start to eat a certain food, "It's Katie Bar the Door." A previously sane intelligent human being takes a plate of brownies to her closet – and eats it all. Why would this happen? The most feasible answer is chemical addiction. We will deal with this more completely in a later chapter.)

   Last Christmas my wife bought red and green M & Ms for a party – you know the ones. They were purchased for our kids, or the neighbors, or for whoever was coming to the party. But, guess who ate them! You go it – Me!! I ate almost all of them. I thought about them while I was at work. I thought about them when I went to bed and when I awoke in the morning. I could not keep my hands out of the jar. I recorded the whole sad process in my energy balance record and came to understand that for me (at least) and many others, chocolate is a food that contains a chemical that causes addictive behavior.

There are other foods that are addictive for selected other individuals. Energy balance records help us to identify these foods and begin to make efforts to control our environments (to eliminate them or make them less readily available).

3) Thirdly, energy balance records let us look objectively at good foods that are not addictive – but which we still eat in such volumes that they destroy our ability to lose body fat. I recently reviewed my records of the past year and confirmed (what I already knew) that I ate a lot of pretzels last year. Now, pretzels are a good food. They are made of flour and water basically. So, they are a good source of carbohydrate and thus, energy for the body. What I did not know until I analyzed my energy balance records was that last year I averaged intake of over 330 calories per day of pretzels. (That is more than 3 ounces of pretzels per day). If you have not already done the math, that is over 120,000 calories of pretzels per year or 35 pounds of body fat that I did not lose. Now you may say,

"That's nice Dave, but if you hadn't eaten the pretzels, you'd just have eaten something else." – and, you might be right, but if I had eaten cut up carrots or apples, I doubt that I would have eaten 330 calories of them per day. This year, I am making an effort to decrease pretzel intake to 1 ounce per day (110 calories). (Hopefully, I will not make up the difference with M & Ms). The point again is that having a good energy balance record lets me look at "good foods" that I am overeating.

4) Fourthly, energy balance records cause exercise and physical activity to take on new meaning. Most of you who read this will not fit the classic definition of "jock." In fact, most people who have been chronically overweight for many years detest physical activity and do not spend much time with it. Believe it or not, however, when Health by Design patients begin to keep energy balance records regularly, they usually begin to increase physical activity substantially. I routinely walk 3 miles per day, and for me that is an expenditure of 390 calories. 390 calories per day is over 39 pounds of body fat per year. In other words, if I do not walk those 3 miles every day, I gain over 39 pounds this year. When you look at it this way, activity takes on a whole new dimension. I would no more miss that walking than "the man on the moon." But, my past experience would teach me that without records, exercise can become drudgery. I would do it for a short time and then discontinue because of boredom, inability to lose weight, or a host of other lousy reasons. In the short haul, exercise does not cause much weight loss, so, if you have been on a crash short-term diet, exercise does not do much for you. However, if you are on a life-change program designed to permanently change your body composition, exercise becomes a critical component. In Chapter 6, we will go into some of the specifics of activities and their impact upon body fat storage. The important point is that energy balance records stimulate physical activity and take away the potential drudgery of a daily exercise plan.

5) Finally, energy balance records are important to us because they give us an escape from failure. What do I mean by "failure"? Those of us with increased body fat will, because of our metabolic rate and genetics, spend the reset of our lives paying attention to the management of our body composition. Because of the constancy of the problem and the nature of human beings and our circumstances, there will undoubtedly be many times in the future when – for whatever reason – we decide to "blow it off." In this phase, known as the failure syndrome or lapse-relapse syndrome, patients act as if the problem does not exist. The phase may last days, weeks, months, or years and is associated with rapid gain in weight. I am sure that many of you who read this can identify with such a phase. I certainly can. It is as if we just no longer have the energy to care – and therefore do few, if any, of the procedures that are associated with success in weight management.

Whatever the cause – we have to have ways of getting out of the failure syndrome. We have to have some place to begin. I will discuss this in more detail in future chapters, but there are several procedures that we can use to allow us to escape from this awful trap – and one of the most effective of these is energy balance record keeping. When we begin to put numbers down on paper and make management of body composition a mathematical model, our focus on other important procedures often follows along, and we begin to reachieve control. It is amazing – but it works and is an extremely powerful tool! If you look at a thousand people who have successfully managed this problem over the long haul, you will find that almost all of them

have consistently used some type of energy balance record to get out of trouble and stay in control.

"Well," – you say, "if this record keeping is such hot stuff, why doesn't everyone do it?" That is a good question since you would think that anyone would want to use his most powerful tools to solve a chronic problem. The answer is that there are a number of reasons why we do not want to keep records – and believe me, I have heard them all – lots of times.

Excuse #1: No Time

The first excuse is "I didn't have time." "I was too busy to keep any records this week." This one really does not hold much water. I have been keeping simple energy balance records for a number of years, and it takes me an average of 3 minutes per day. Three minutes per day to help manage one of my most difficult personal problems is not much of a sacrifice.

Excuse #2: I Don't Know How

The second excuse is legitimate – "I don't have enough knowledge" – "I don't know enough to keep decent records." At this point in this course, you may be correct. You probably do not have enough data to keep good records (although most of you are eating mostly diet supplements and other simple foods – making record keeping easy), but our staff is committed to helping you learn the data necessary to keep good records. By the time you have finished this course, you should be an expert.

Excuse #3: Loss of Freedom

Another more common excuse is "I don't like to write down all that stuff." "It's a loss of freedom to randomly graze in the world." "I don't enjoy my food as much when I have to write it down."

Let me tell you, I enjoy food a lot. Food can be fun. But, I actually enjoy food more and feel more freedom to eat a variety of foods when I have good energy balance records. To assure my staying lean forever, I am more than happy to be accountable for records. Once you understand the mathematics, you will actually feel freer to eat more things.

Excuse #4: No Materials to Record It On

A fourth excuse is, "I didn't have anything to write them on" or "I lost my papers and didn't have anything to write on." Hey – I do not care whether you keep records on HBD forms, brown paper bags, or toilet paper. Just put your data down on something. I have heard others say stuff like, "I was in the kitchen when I ate it and my records were in the bedroom." The obvious answer is to keep notebooks in several locations and transfer the data to a permanent record later in the day.

Excuse #5: I Don't Typically Keep Records Anywhere Else

I have heard others say, "I don't keep records anywhere else – why should I keep them here?" (I guess that there really are people who do not record their bank balance in a checkbook.) Again, my answer is that if you have a major problem (obesity) and one of its most successful management tools is an energy balance record, then you would be nuts not to integrate the EBR into your daily life pattern.

Excuse #6: I Feel Guilty About What I Ate

Perhaps the most common excuse for not keeping records is "I ate too much to put it down on paper" or "I feel guilty if I have to write all that stuff down." And these things are true – we do hate to acknowledge our failures on paper. I personally hate to write down numbers when I am eating out of control, and yet I have learned that "writing it down" is the surest way for me to get out of a dietary tailspin. I can look at what I have been doing (on paper) and say,

"You know that's really stupid. Why did you eat this instead of that?" etc. etc. When people look at records and begin to talk and think like that, they usually have already begun the process of escaping from failure.

I have heard lots of other excuses for not learning to keep an EBR, but the best and most plausible one is, "I just don't want to do it." Loss of freedom to graze without accountability is a big deal, and most people who do not keep EBRs do not want to give up that freedom. I can only reiterate that something as powerful as EBRs cannot be taken lightly. If you want to manage your body composition successfully over the rest of your lifetime, you will most likely need a good system of energy balancing to guide you along and keep you out of trouble.

The remainder of this chapter, then, is an introduction to energy balancing. As you will soon see, it is a skill that requires intellect and accountability, and will require lots of practice on your part.

Now, what do I mean by Energy Balance? In Figure 2.5 we saw the three possible energy states depicted as seesaws with one or the other end heavier or lighter. Our goal for you at the present is, of course, seesaw B (Energy out exceeds Energy in). Later on, when you have achieved optimal body weight and composition, your challenge will be achieving seesaw "A" – perfect energy balance. I trust that each of you will reach your goals relative to these two seesaws.

Understanding the concept of energy balance necessitates our understanding of the individual components of the two ends of the seesaw.

RESTING METABOLIC RATE

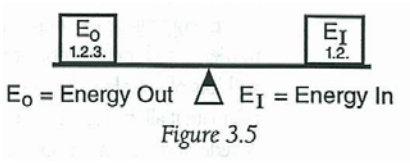


Figure 3.5

As you can see in Figure 3.5, "energy out" consists of 3 unique components. The first of these is called Resting Metabolic Rate. Resting metabolic rate is the cost in calories for you and me to stay alive all day. It is usually measured in calories per hour and varies widely from person to person. It may be measured accurately with a metabolic chart and generally accounts for about 70% of all the calories you and I burn in a day. In other words, most of the calories that you and I burn in a day have nothing to do with exercise. Some of you who read this may be burning 50 calories per hour as you read while others may be burning 70 to 80 calories per hour. Heavier people burn more calories per hour, but even with people of identical weight, resting metabolic rate can vary by as much as 1000 calories per day.

Thermic Effect Of Activity (TEA)

The second component of energy out is known as the thermic effect of activity. It makes sense to us that we burn more calories when we move around than when we are sitting in a chair. Nevertheless, for most of us, this thermic effect of movement accounts for only about 20% of all the calories we burn per day. The unique thing about this component of the energy equation is that we can change it. Resting metabolic rate is probably pretty constant if we are healthy, but the thermic effect of activity varies from day to day. We will spend more time developing this concept and its importance in Chapter 6 of this manual.

Thermic Effect Of Food (TEF)

The final component of the "energy out" portion of the equation is called the thermic effect of food or the specific dynamic action of food. When you and I put something in our mouth and it begins its 33-foot trek through our body, our calorie burning begins to rise. The process of digestion – moving food down the tube, absorbing nutrients, and using the nutrients for energy or structure development – all has a metabolic cost. This energy cost varies from

person to person but generally accounts for about 10% of all the calories we burn each day. (I wish the cost of digestion was a little greater…Wouldn't it be neat if the cost of digesting M & Ms was as great as the calories in the M & Ms?)

The total calories burned then is a combination of:

Resting Metabolic Rate	70%
Thermic Effect of Activity	20%
Thermic Effect of Digestion	10%
	100%

That is all there is! There are no other ways that human beings burn calories (expend energy). As we stated in Chapter 1, the easiest way to estimate your and my daily energy requirement (the 100% above) is to multiply our body weight by some factor. The factors unfortunately vary from person to person, but for Health by Design patients, the most accurate average factors are 8 X body weight per day for women and 10 X body weight per day for men. The major variable determining whether your factor is a 5 X body weight or 12 X body weight is your resting metabolic rate (which accounts for 70% of all the calories you burn per day). It would be wonderful if we could safely change everyone's metabolic rate so that we all burned 15 X our body weight per day (what a pig out we all could have). We will discuss metabolism later in this manual and shed some light on how we might change resting metabolic rate.

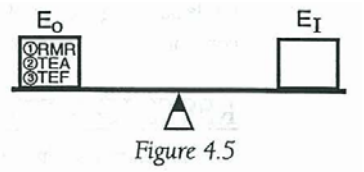


Figure 4.5

Hopefully by now, you have a good picture of the energy-out side of the seesaw.

ENERGY INTAKE

Energy intake has only one component (nutrient intake), but because the numbers of basic nutrients and their combinations are great, we will need to commit several chapters of this book and lots of your laboratory time to understanding the EI part of the equation. (EI would be easy to calculate if all we ate were diet supplements. However, when EI consists of lasagna, fettuccine Alfredo, and King Ranch casserole, the calculations become more complex. Calculating EI, however, can be made fairly simple, and I anticipate that by the time you have finished this course, you will be able to walk up to a banquet table full of various kinds of food and be able to make reasonably intelligent assessments of protein and fat content of various items – as well as their total energy values.

Before we get into the actual energy balance record forms and their use, one other important point about EO needs to be made. You and I can make a good guess at our EO and its 3 components by multiplying a factor times our body weight (8 X for women and 10 X for men for starters) per day – as long as our activity level is fairly constant from day to day. For example, almost all of my days are

Figure 5.5

the same in terms of energy expenditure. I get up, go to work, sit in my chair for 8 hours, come home, eat dinner, watch TV, and go to bed. As long as I live that way, I burn about the same number of calories every day, and I can use 9 X my body weight per day as my EO. However, if I go for a 20-mile walk on a certain day or chop wood all day Saturday, 9 X my body weight per day is no longer a good estimate of EO. It is not close to what I burn, and if I just put 9 X by body weight into my records, they will be very inaccurate. Accurate record keeping in this

situation then requires that you and I become familiar with the calorie expenditures of various types of activity so that we can add them to our basic Factor times weight in our records. In the next chapter, we will develop this concept more so that you can become adept at calculating extra exercise calorie values to add to your factor X weight. The final seesaw should look like the one below, then where EEC equals "extra exercise calories" that you and I expend over and above our basic lifestyle requirements.

I certainly hope that, at least for now, your seesaw looks like this:

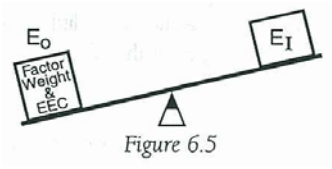


Figure 6.5

In other words, your total energy requirements (or output) are exceeding your energy intake. As long as this situation prevails, your body fat is being used up (and changed into water in your body).

How do we actually record the data?

Well – we have to have some kind of forms, as I have said before. It really makes no difference whether you use brown paper bags or pieces of scrap paper, but while you are involved in this wellness program (hopefully indefinitely) we at Health by Design will provide you with some easy-to-use forms. For me, at least, these forms have provided a kind of structure in which I can easily manage my body composition. Hopefully, they will be of help to you also.

Actually, we would like you to use one of two unique versions of the same form. One of these is called an energy balance record (EBR) and the other is called an energy balance checkbook. Both forms allow for your recording the same data, although the EBR is slightly more detailed and helpful for beginning record-keepers. Ultimately, which of these forms you use will be determined by convenience (which best fits your lifestyle). EBRs are weekly forms that fit into your Health by Design notebooks.

Energy Balance Checkbooks are designed to be used for four weeks. Their great benefit is compactness – they can easily go wherever you go – in a pocket, a checkbook, or a purse. Whichever makes the most sense to you – learn to use it faithfully and accurately. It is a major tool in the management of excess body fat.

In providing you these forms, Health by Design does not want to curb your creativity. If you can devise a better form that helps you organize the same data – do it. Many of my most successful patients have used spreadsheets and other business programs to manage their body composition. By inputting two or three pieces of data per day, a wonderful body management record can be generated. Other patients use a simple notepad purchased at their grocery store. The important thing is that you use some format and gradually develop the intellectual skills to make it accurate and easy to use. Only then will you appreciate the value of this powerful tool.

ENERGY BALANCE RECORDS AND CHECKBOOKS

In the remainder of this chapter, I would like to take you briefly through one week's data in an EBR and an EBC. This discussion is, of course, only meant to amplify what you will be learning firsthand from your behavioral health educator in your weekly individual counseling sessions. Figure 7.5 below shows a reduced-size copy of an EBR.

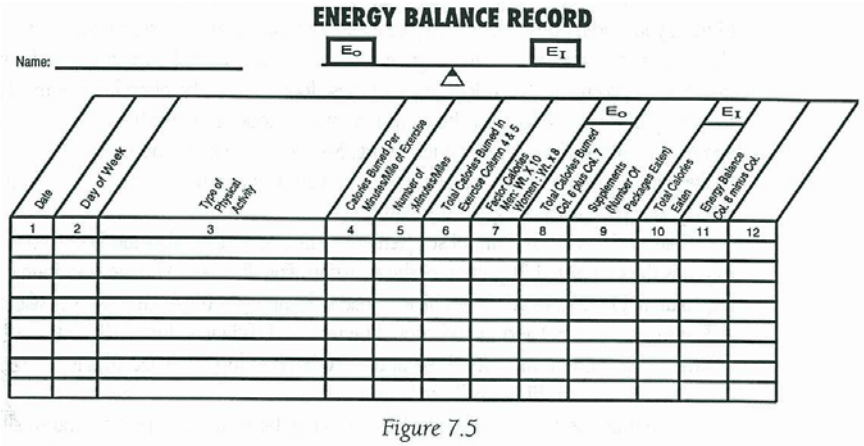


Figure 7.5

Using Energy Balance Records

Columns 1 and 2 are self-explanatory and allow you to record the day and date. Column 3 is lots wider and has a heading that reads "Type of Physical Activity." This is where you should record activity that is "out of the ordinary" for you. In other words, this is not the column for "routine" sorts of things that you and I do each day – just living. The routine "being alive" type of activity is included in your factor X weight calculation (Column 7). In Column 3, I would like you to record those things that you do "because you have decided to change how you manage your body." If you never used to walk the dog, but since starting this program you go out nightly with your pooch, put it down in Column 3.

Column 4 and Column 5 are "busy work columns" that help you calculate the number of calories that you expended doing the activity recorded in Column 3. In Chapter 6 of this manual, we will give you some data on caloric expenditure of various activities in calories per mile or calories per minute. Suffice it to say here that every activity that you and I do has some energy expenditure value (calories). The truth is that most people do the same types of activity on most days, and after a while our patients do not use columns 4 and 5 much. They simply move to Column 6 and put down their "extra exercise calories" for the day. One of the weaknesses of this form is that is allows for only one activity per day. Obviously, you may have days when you do two or three recordable activities. If you are using an EBR for your record keeping, you will need to record the "extra" exercise sessions elsewhere on the page and total them in Column 6.

Column 7 is for your "factor calories." Generally, we ask women to put 8 X their body weight and men 10 X their body weight in this column. The truth is that some women who come to Health by Design burn only 6 X their body weight per day in their routine daily lives. As we will discuss in Chapter 7, there is considerable individual variation in resting metabolic rate. For now, however, until you know more about your own unique metabolism, use 8 X your body weight (women) and 10 X your body weight (men) in Column 7.

You are now ready to total your EO for the day. Column 8 is the total of your energy expenditure for the day and is the sum of factor calories (Column 7) and extra exercise calories (Column 6). One-half of the equation that determines your daily fat loss is now complete.

Recording Your Energy Input

Columns 9, 10 and 11 deal with the EI component of the equation. Basically, these columns record the caloric value of all of the nutrients that you and I eat on a given day. Column 9 is divided into three sections, allowing you to record diet supplements and entrees purchased at Health by Design. These are very focused foods with known protein, fat, and carbohydrate contents, and we feel that they are worthy of special columns in your EI calculation. Column 10 is for your recording of the caloric value of all foods eaten over and above the items in Column 9. Most of you reading this will probably be eating predominantly diet supplements and entrees…but almost everyone involved in this program eats a small amount of fruit and vegetables in addition to his or her supplement. The caloric value of these foods should be placed in Column 10. Because there may be a number of these items with a varied caloric value, we have provided organized space on the back of the EBR for their listing. Most of you will not be able to accurately record all of the caloric data for all of the foods listed,

but your behavioral educator will go over them with you weekly, and your skills will gradually mature.

Column 11 is for the sum of supplements, entrees, and all other food consumed on a given day. It is the completed EI portion of the equation. For all of you who are attempting to lose body fat, Column 11 (EI) should always be less than column 8 (EO). True energy balance is the difference between EO and EI and should be recorded daily in Column 12. Column 12 should always be a positive number for those of us who hope to lose body fat. (If it is not positive – i.e. if EO is not greater than EI, we will not be losing fat).

It is not necessary to calculate fat loss on a daily basis – the numbers are too small (about ½ pound at best), and daily calculations amount to time-consuming busywork. However, at the end of each week (after each 7 days), it is useful to add up all of the numbers in Column 12 so that we can have a better idea of weekly fat loss. Since loss of one pound of fat requires utilization of 3500 calories, the total in Column 12 should be divided by 3500. This quotient should be placed in the box at the bottom of Column 13. It is the amount of fat loss in pounds for one week. (Hopefully, 1 to 3 pounds for most of you). There are additional columns for recording protein grams and fat grams. These are easy to do when you are eating only diet supplements, but much more complex when you are eating a variety of foods. Your videos and behavioral conferences will help you to become adept at doing these calculations – but practically speaking, you need to eat enough protein and not much fat if you hope to be successful in losing much of your body fat.

Using The Energy Balance Checkbook

The energy balance checkbook is conceptually very similar to the EBR. Figure 8.5 below shows an open checkbook (EBC) with its column headings. Each open page (top and bottom together) represents one day in the management of your body. (As I said previously, there are enough pages to record 4 weeks of data).

Column 1 is self-explanatory and again gives you opportunity to record the day and date.

Column 2 is entitled "Description of Transaction." Here, you should record either your EI events – intake of supplements, entrees, or foods, or your EO events – factor X weight or extra exercise experiences. Every event that affects energy balance should be recorded in this column. My very first "transaction" each day is input of my factor X weight (which I call a deposit). My second transaction is always my extra exercise calories (another deposit) since I walk 3 miles early each morning. Almost all of my other entries in this column are "withdrawals" or foods or supplements that I eat.

	Weight =	Factor =		Required Protein + Gr.		
Date Day	Description of Transaction		Protein	E_I (-) Food/Beverage Withdrawal	E_O(+) Factor/ Exercise Deposit	Energy Balance
	Totals For Day	Supplement Type	Protein Grams	Total Food Calories	Exercise Calories	

Figure 8.5

The third column is for recording protein grams. It is not too important when you are eating lots of diet supplements. However, when we are eating a broader diet, it is probably important to make sure that you record protein grams (since we often eat too little protein – especially when we are dieting).

The fourth column is for our recording of the calorie intake in the supplements and foods we listed in Column 2. The total calories recorded in Column 4 are your EI for that day.

The final column is for a running balance. Each day begins with a zero balance in the upper right hand box. Your factor X weight "deposit" brings this balance to a very positive number. All other entries raise or lower this running balance. Food intake lowers the balance. Every entry should change the running balance in one direction or another. Hopefully, all of you who read this and are trying to lose body fat will end each day with a very positive balance. This balance should be placed in the bottom right hand corner box. (It corresponds to the values in Column 12 of the EBR).

At the end of each 7 days, we ask patients to total the lower right hand boxes and divide the total by 3500. This again gives you a weekly fat loss value (in pounds) and this number can be conveniently recorded in the appropriate space on the back cover of the checkbook.

The back cover of the checkbook also has spaces for total supplements eaten, total food calories consumed (EI), and total exercise calories expended for each week. Recording each of these is important in that you can identify problems easily and make necessary adjustments in EI and EO. By far the most important number on the back cover, however, is that of your energy balance. This number divided by 3500 is your fat loss (in pounds) for the week.

This approach to record keeping may seem complicated at first, but as you use it, the process will go very quickly. I have now been keeping records in EBC (checkbook) for over four years and find it to be a simple and powerful tool to help me lose fat and –more importantly – to help me in preventing regain of lost fat. Hopefully, you will feel the same power as you begin to record your data.

Whether you use the EBR, the EBC, a personal notebook, or a computer-driven spreadsheet, the important thing is that you learn to use some kind of meaningful energy balance record. In our sedentary world, this record will become your most trusted ally in the war against excess body fat.

“Keep a – Goin”

If you strike a thorn or rose,
Keep a – goin’!
If it hails or if it snows,
Keep a – goin’!
Taint no use to sit an’ whine,
When the fish ain’t on your line;
Bait your hook an’ Keep a – tryin’ –
Keep a – goin’!

When the weather kills your crop,
Keep a – goin’!
Though tis work to reach the top,
Keep a – goin’!
S’pose you’re out o’ ev’ry dime,
Gittin’ broke ain’t any crime;
Tell the world you’re feeling prime –
Keep a – goin’!

When it looks like all is up,
Keep a – goin’!
Drain the sweetness from the cup
Keep a – goin’!
See the wild birds on the wing,
Hear the bells that sweetly ring,
When you feel like singing, sing –
Keep a – goin’!

Frank L. Staton

STUDY QUESTIONS

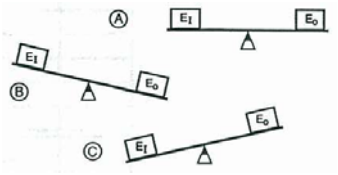
Chapter Five – Energy Balance Records

1. The main reason that most obese people in American have become fat is:
   a. They did not do enough exercise.
   b. They did not take enough diet pills.
   c. They ate too much food.
   d. They had a low metabolic rate.

2. Which of the following is true of patients with low metabolic rates who maintain lean bodies?
   a. They must starve all the time.
   b. They need to walk at least 30 miles per week.
   c. They need to be educated and use “diet tools” for success.
   d. They need to take diet pills daily.

3. Match each seesaw with the appropriate clinical state. (Put letter in blank).

   1. Gaining weight _____
   2. Losing weight _____
   3. Neither gaining nor losing _____



4. Which is the least likely consequence of keeping a good energy balance record?
   a. Freedom from guilt about eating fattening foods.
   b. Decreased time available for aerobic activity.
   c. Increasing understanding of addictive foods.
   d. More consistency in activity program.

5. Which is the most legitimate excuse for our not keeping a good energy balance record?
   a. “I didn’t have anything to write it on.”
   b. “The dog ate my records.”
   c. “I don’t know enough to keep decent records.”
   d. “I ate too much to put it down on paper.”
   e. “I just didn’t want to do it.”

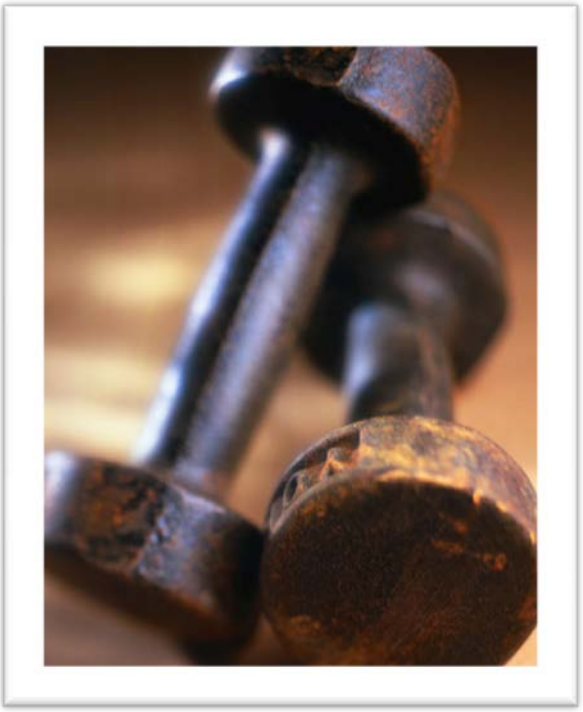
6. Which of the following is not a component of EO?
   a. Eating
   b. Thermic effect of digestion.
   c. Resting Metabolism.
   d. Exercising

7. Resting metabolic rate usually accounts for _____% of daily caloric expenditure? (10, 40, 70, 90)

8. Activity usually accounts for about _____ of daily caloric expenditure? (5, 20, 40, 70)

9. Digesting food usually accounts for about _____% of daily caloric expenditure? (10, 20, 40, 70)

10. Three 200-pound ladies are having lunch together after having an underwater weighing for body composition. Each of them has 120 pounds of lean mass. Which of the following is true of their metabolic rates?
    a. It is very close to identical in all 3 women.
    b. It will be different depending upon what they each eat for lunch
    c. It may vary from woman to woman by as much as 1000 calories per day.
    d. It will change substantially if they exercise immediately after their lunch.



MANAGING YOUR BODY WEIGHT FOR LIFE

Chapter 6

Physical Activity

David M. Player, MD

Health By Design Program Manual

Chapter 6

PHYSICAL ACTIVITY

A Powerful Ally

Welcome to Chapter 6 of this manual on managing your body composition. Hopefully by now you are gaining insight into the power of record keeping and are beginning to calculate weekly fat loss rather than relying on the scales to tell you how you are doing. This chapter is committed to enlarging your knowledge about the thermic effect of activity and how it affects your body fat stores. There are numerous misconceptions present regarding activity among patients who come to Health by Design, and this chapter will, we hope, clear up some of these.

Generally speaking, these misconceptions are of two types: first, we over-perceive what increased activity can do for us over the short-term: and second, we grossly under-perceive what it can do for us over the long haul. These misconceptions usually lead to discouragement and ultimately lead us to omit and miss out on one of our most powerful allies in the battle against fat.

ENERGY BALANCE EQUATION

Before proceeding with a discussion of activity, though, I would like to review briefly the basic energy equation and its components so as to place the thermic effect of activity in its proper perspective. Figure 1.6 shows the energy balance equation and its components.

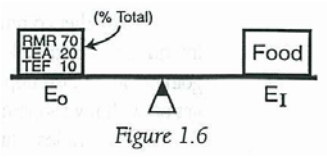


Figure 1.6

THERMIC EFFECT OF ACTIVITY (TEA)

As we have said in previous chapters, all of you were in some energy balance state prior to starting this program. For most of you, EO had, on the average, been less than EI – often for many years. The reason for this imbalance was, in most cases, not chronic overeating – although this may have been a part of the problem. The real problem, shown in Figure 2.6, is a broad variation in metabolic rate that is so responsible for many of your being obese. Since RMR accounts for 70% of all the calories that you and I burn in a day, individuals with low metabolic rates are extremely vulnerable to obesity. Resting metabolic rate varies from decade to decade, but in almost everyone, it slows down steadily as we age. This phenomenon is related partly to aging and partly to decreased muscle mass associated with inactivity. Thus, people with genetically low RMR often first get into trouble in middle age. There are a number of other factors that negatively affect RMR, including drugs, hormones, activity level, etc. We will discuss this topic in more detail in a later chapter. As Figure 1.6 shows, the other two components of EO – the Thermic Effect of Activity and the Thermic Effect of Food – account for only 30% of the calories we burn (on the average). These two components, however, differ from resting metabolic rate, in that we can control them somewhat and manipulate them (either + or -). Therefore, it is exceedingly important that we understand each of these components and how they mathematically impact the energy balance equation. (There are probably some ways that we can safely increase resting metabolic rate, but there are none medically in use at the present time. We will discuss this topic and the ways that we can increase the thermic effect of digestion in later chapters.)

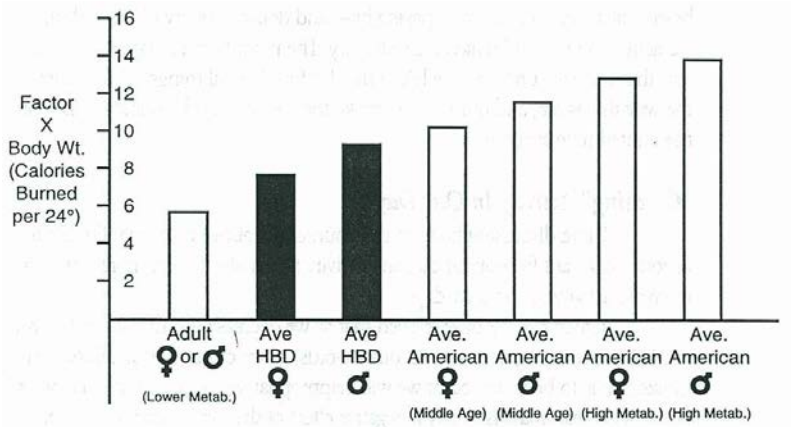


Figure 2.6

The thermic effect of activity really refers to every activity that you and I do in a day – measured in calories. Everything that we do from twitching and jerking to blinking involves a calorie expenditure. More movement burns more calories. From the beginning of time, however, human beings have been inventing things designed to decrease human work and movement and calorie burning, and movement and calorie burning. Every machine ever invented has been created to ease man's load and decrease his energy expenditure. The result of this never-ending quest is a world of machines that decrease physical labor. The unfortunate side effect of this progress has been an epidemic of obesity in human beings – especially those of us with genetically low resting metabolic rates.

The usual solution offered by weight loss experts to obese patients is that they should "move around more." I always chuckle when I hear that, because most of us – especially those who are fat – are not going to go out of our way to expend more energy. I have heard weight loss experts suggest that we take the nine flights of stairs to our office instead of riding the elevator. That might be okay once in a while, but believe me, if the elevator is easier and faster, I am probably going to take the elevator most of the time.

Another common suggestion is that we park our car 500 yards from the store that we intend to visit and walk to the store – just to burn more calories. I do not know about you, but if I am going to a store to shop, and there is a parking place close to the store, I am going to take it and get on with my shopping.

A friend of mine who runs weight loss programs asks his patients to wear small pedometers (called clickers) attached to their belts to measure their activity levels. If they move around more during the day, they get more clicks – and theoretically burn more calories. This may be okay for some folks, but the majority of us, desiring to be efficient with our time and motion, will not jump up and down and do inefficient things just to make more "clicks" per day. That sort of thing goes against the grain of human nature and human success – and everything that chronically goes against the general nature of human beings will not be successful over the long haul.

Does this mean that I do not believe in increased activity as a means of managing body fat? By no means! Increased activity is our primary ally in maintaining a new and better body composition! Clearly, increased activity is far preferable to cutting back on food all of the time. In fact, I will go so far as to say right here that if you are an overweight, middle-aged adult with a low metabolic rate who plans to manage his body fat only by cutting back on EI (food intake), your chances of being leaner than you are today, five years from now, are pretty slim.

In truth, physical activity is a vital part of management of your body composition. It is just that the activity that I am talking about probably will not involve taking nine flights of stairs or walking 500 yards to get to your grocery store from the car, because those things amount to inefficient busywork, and inefficient busywork will never cut it in the modern world. In our modern world, it seems like we are always short of time.

I recently looked carefully at my time expenditure. I suspect that for many of you, the situation is not terribly different from mine. I spend between 8 and 10 hours per day sitting at a desk and talking to people about medicine. I spend another 6 to 8 hours sleeping. This leaves another 6 to 10 hours for me to do all of my other human things. These include "honey-do's" at home, taking care of children, paying bills, working math problems with children, and doing a variety of other activities – some of which are active and some of which are sedentary. The point here is that our lives have become inactive, and that there is not much time left in the day for physical things. This really is not our fault. It is just the way things are, and our job is to make the best of it and to create opportunities for activity in the limited time available.

"Creating" Activity In Our Day

Before discussing how we can counter the above dilemma, I would like to discuss briefly three or four important facts about diet and activity that make it even more imperative that we find ways to create activity in our busy days.

Remember, in Chapter 1 that we learned that as we decrease our dietary carbohydrates and calories, our urinary urea begins to rise. In other words, as we cut back our calories on a diet, our protein intake needs to be increased – or we will inappropriately lose lean mass. Losing disproportionate amounts of lean mass is clearly a negative effect of dieting. A second and related fact is that as we decrease calorie intake, our resting metabolic rate (which was already low) will usually decrease by another 10 to 20% – depending on how low we take our calories. This is a bad hit and decreases the rate at which you and I use up our fat.

Interestingly, several research studies have now shown conclusively that this dietary-induced decrease in resting metabolic rate does not happen (or is markedly decreased) if physical activity is increased while calorie intake is decrease. Finally, other studies have shown that lean mass losses that occur as we cut back on our calories can be minimized both by increasing dietary protein (as noted above) and by increasing physical activity concomitant with the diet.

PHYSICAL ACTIVITY "COUNTERS" NEGATIVE ASPECTS OF DIETING

In other words, increased physical activity effectively counters two of the negative aspects of severely restricting food intake (low metabolic rate and loss of lean mass). It should be apparent to each of us, then, that no one should attempt to change his body composition only by changing EI. Too many negative things happen. A good plan obviously involves both a change in EI and a change in EO.

Well – if activity is so important, and we have so little time for it, how can we do it, and what should we do? Let me say, first of all, that everything you and I do burns calories. There clearly are calorie-burning benefits as well as other health-related benefits to walking upstairs instead of taking the elevator and parking your car away from the store and walking to shop. As we will discuss in a later chapter, individuals who move more, live long, have fewer injuries, sleep better, and live more vital lives.

It is, however, extremely difficult to measure the effects of this type of increased movement on body fat or weight – and since this chapter is committed to addressing the impact of activity on fat loss, I want to make sure that we do not confuse increased movement and its benefits with an activity program designed to lose fat or maintain a certain body composition.

PHYSICAL ACTIVITY PROGRAM CRITERIA

There are at least four criteria, I think, that must be met for an activity program to have a significant impact on your body composition and weight.

Criteria #1: The first of these is that an excellent program must be routine and preferably daily. It is always great for me to ask a patient how she spent her day and have an answer, "Well, I got up, bushed my teeth, went to the bathroom, walked 2 miles, showered, put on my makeup, got dressed, ate breakfast, and went to work." Nestled into those very routine activities was a 2-mile walk. It may have taken 30 minutes, but it was a routine part of daily life.

Things that are done daily or nearly every day, significantly effect fat loss.

This is not to say that playing a round of golf does not help you to lose weight. It certainly may – but for most of us, golf is not routine enough. It is lots of fun (and that, too, is important), and it is part of an active lifestyle (that is very important), but it is generally not done routinely enough to significantly change body composition.

Criteria #2: Secondly, a good weight-losing activity cannot be one that stands a good chance of hurting you. It cannot be injurious, if you plan to do it nearly daily for the rest of your life to help you maintain a different body. For instance, I love to play racquetball, basketball, tennis, and a host of other aggressive sports. If I play once or twice a week, I may get lucky and not sustain an injury. However, if I play this type of sport daily as my routine activity, the chances are that I will soon sustain an injury and probably not be able to do any activity for a few days or weeks.

Now, if you are a skinny guy with a high metabolic rate that may not be so horrible. You might lose some muscle tone, aerobic fitness, or quickness, but you probably will not gain much fat. But, if you are a fat guy like me, with a low metabolic rate, 2 or 3 weeks of inactivity without a change in food intake can be a disaster.

Several years ago, I was playing racquetball 4 or 5 times per week and maintaining a stable weight (EO and EI were balanced). I dove for a difficult racquetball shot and tore a cartilage in my knee. Two months later, and 10 pounds heavier, I restarted my activity program. This is a classic example of why those of us with low metabolic rates cannot afford injuries that disrupt our daily activity plan. Our activity must be routine – but it must also be safe.

Criteria #3: The third important characteristic of a good activity is that it cannot be too boring, or too hard, or disagreeable. The activity does not have to be the "great joy of your life," but if it is something that you are going to do nearly every day for the rest of your life, it cannot be boring, or too difficult or in any other way distasteful. American's attics are full of discarded exercise bikes, free weights, rowing machines, and other junk – largely for this reason I think. It seems doubtful to me that I would ride an exercise bike daily for many years. You might do so, but I would not. Skipping rope while wearing an 80-pound flak jacket may burn lots of calories but it is doubtful that you or I would do it routinely for very long. Therefore, you need to pick an activity that is not too hard or boring, can be done routinely, and stands a low risk of causing injury.

Criteria #4: Finally, a good activity program for weight loss or weight maintenance should be one that, relatively speaking, burns lots of calories. I have often thought how wonderful it would be if I could sit in a swimming pool with a drink and burn a lot of calories. (Actually, if you and I sit in very cold water and shiver, we do burn quite a few calories.) It seems doubtful, however, that you and I are going to sit in ice water every day for our routine activity. So, you say, "I've got to do something that's nearly daily and routine, I've got to do something that doesn't hurt me, I've got to do something that isn't too hard or boring, and I've got to burn a lot of calories. What the heck activity are you talking about?"

WEIGHT BEARING VS. NON-WEIGHT BEARING ACTIVITIES

Fitness experts generally divide physical activities into two groups – things that are "weight bearing" and things that are "non-weight bearing." (There are actually some activities that incorporate elements that are both weight bearing and non-weight bearing.)

A good example of weight bearing exercise is walking. It involves moving our bodies from place to place. Any activity that involves your moving yourself from one location to another is probably weight bearing. Most individual and team sports are weight bearing activities. Weight bearing activities generally burn quite a few calories per minute or per mile – especially when they are done by heavy people (like me).

Non-weight bearing activities are those performed while you are sitting and doing some ancillary movement. They include activities like riding exercise bikes, lifting weights, or rowing. Generally, they do not burn as many calories as weight bearing activities, unless they are done with high resistances for long periods of time.

There is probably a third category of activities that combines elements of weight bearing and non-weight bearing. These would include swimming, biking on a regular bicycle and horseback riding. In these activities, some weight is born by another structure (i.e., water, bicycle, and horse) but the participant still has to move himself during the activity. These activities are, in general, intermediate in calorie burning between weight bearing and non-weight bearing activities. For example, more calories are usually required for a 300-pound man to ride himself down the road on a cycle for 30 minutes than for the same 300-pound man to ride an exercise bike for 30 minutes. Moving one's body for ½ mile while swimming in the water does not usually require as many calories as walking the same body for ½ mile.

Ultimately, you and I have to look at the entire gamut of activities available to us and pick something that meets the four criteria previously discussed. Remember that if the activity chosen is too difficult or boring, you and I will never do it routinely. Similarly, if it takes a long time and burns too few calories, we probably will not do it long term either, since we have so little time available for activity.

The ultimate activity would be one that utilizes many muscle groups to raise lean mass and at the same time meets the criteria listed above. No single activity is perfect in this regard, although for most heavy people who come to Health by Design, the closest to meeting all of the above standards is walking.

THE BENEFITS OF WALKING

Our staff here strongly encourages long-distance walking for a variety of reasons. First of all, walking is a natural activity. We have to walk to perform life's daily activities, and we will need to do so all of our lives. If you and I will still need to walk to the bathroom when we are aged, we might as well pick walking as our daily activity for maintenance of life quality and a leaner body.

If you think about – walking can be done daily, it is inexpensive, it requires no special equipment, it does not require your driving to a club, and it usually does not cause injury. Walking can be done by almost everyone (except those with paralysis or serious injuries) and can be done for variable periods of time. It can usually be done by even the very aged.

I recently had an obese 75-year-old female patient come to Health by Design for a weight loss program. When she arrived here, she could not walk more than 50 feet without developing severe shortness-of-breath and fatigue. After two months of weight loss and daily walking on a treadmill, she was able to walk over 2 miles without stopping. I am confident that, barring serious illness, she will be walking daily for the rest of her life.

Finally, walking, relative to other types of activities, burns a lot of calories. The chart on the following pages details the calories burned per minute by a 150-pound person doing various types of activities. As you can see, walking rates high as a calorie burner. It is distance-dependent – not time dependent. Thus, an elderly person walking 2 miles in an hour at the mall burns nearly the same calories as a young person of the same weight who runs 2 miles in 15 or 20 minutes. Clearly, if we are short on time and need to burn a lot of calories, we might choose stair climbing or rope skipping. However, the average overweight person who comes to Health by Design simply will not choose these activities because they are too hard and much more likely to cause injuries.

As the activity chart reveals, each activity that you and I choose for management of our body fat has a caloric value – usually given in calories per pound of body weight per unit distance (for weight bearing activity) or calories per minute (for non-weight bearing activity). Whichever activity seems to best fulfill for you the criteria discussed on the previous pages, you need to become familiar with that activity and its caloric benefits. If you do not routinely play cricket or lift weights, do not bother learning the calorie expenditures of those activities. If you, on some rare occasion, visit England and get to play cricket, you can always look up the calories per minute per pound of body weight and record it in your records. Seriously, what you and I need to know for purposes of record keeping is the usual calories expended for the usual activities that we do over and above our routine living calories (factor X weight).

As an example – my extra activity is walking (it used to be jogging and daily tennis, until I developed injuries), so I need to be very familiar with the calories expended with walking. Walking is a weight bearing activity, so I needed to learn the calories per mile for a man of my weight. As Table 1 shows, a 150-pound man burns 100 calories per mile walking (whether he walks fast or slow). This is another way of saying that you and I burn 2/3 of our body weight in calories per mile of walking (100/150 = 2/3). I can use this formula day after day and mile after mile in my energy balance calculations.

If you are a typical patient, you would by now be doing some calculations and say something like, “Gee, Dave, I can walk about 3 miles in an hour, and that gives me 3 x 2/3 x my body weight in calories for one whole hour of walking (about 400 calories for a 200-pound person). You told me that 3500 calories is 1-pound of burned fat. You are telling me that I would have to walk for 1-hour (400 calories) for 9 days before I would use up a pound of fat?”

I do not blame you for asking that – if you are only going to change your life and walk for a week or two – you are right. It is not worth the effort or time. I can certainly think of a better way to spend 9 hours in the next two weeks.

However, if you have decided to deal with your body fat for good – for the long haul – please consider the mathematics for the same 200-pound person who walks the same 1-hour daily for a year. That is 365 days x 400 calories per day, or about 146, 000 calories per year. If you divide this by 3500 calories per pound, we find that in a year, over 40 pounds of body fat would be lost (or the gain of 40 pounds prevented – or 146,000 calories of food intake cancelled). For a skinny guy with a high metabolic rate who cannot store much fat, this probably is not a big deal, but to us fat folks who have proven our ability to store fat, it is a huge

big deal, and one of our strongest allies in the battle. This 40 pounds of loss of prevention goes on year-after-year-after-year that you and I keep walking. Perhaps you can see why I feel so strongly about the four criteria for a good activity program discussed earlier in this chapter!

"Adding On" To A Waling Program

Now- every once in a while you will see people carrying hand weights while they walk or see someone check her pulse while exercising or see people lifting weights in a health club. You should perhaps ask yourself why some would do such things – when walking by itself is certainly enough to manage your body fat. There are, however, some interesting potential benefits of these other activities, and you and I should at least understand them – so that we can make rational decisions regarding their use.

WEIGHT LIFTING

Weight lifting (and lifting hand weights to a lesser extent) is designed to increase strength, endurance, and lean mass. As you will remember from Chapter 1 of this manual, there is a linear relationship between lean mass and resting metabolic rate. Higher muscle mass and bone mass usually mean higher RMR in any given individual as shown in Figure 3.6.

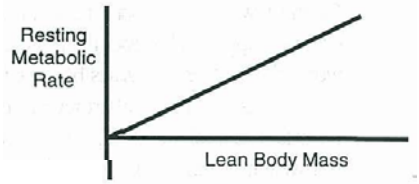


Figure 3.6

Lean mass is not the only contributor to resting metabolic rate, however. As Figure 4.6 demonstrates, individuals of the same lean mass may have vastly different metabolic rates.

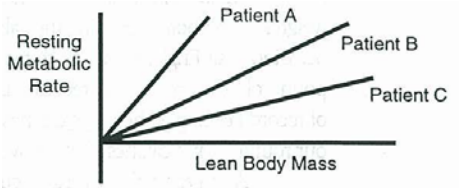


Figure 4.6

We will discuss this in more detail in a later chapter on metabolism and its controls. The important point here is that for each of us increased lean mass equals increased resting metabolic rate. Since resting metabolic rate is 70% of what you and I burn in a day, anything that we can do to increase it is a tremendous help in the war against fat. (A gain of only 2 calories per hour in resting metabolic rate results in a loss of 5 pounds of body fat pr year – year after year.)

For this reason, many wellness programs are now encouraging middle-aged and older men and women to include some weight lifting in their training programs. The time required probably is not great (10 to 15 minutes, 3 times per week), but bench pressing and similar activities strengthen and harden the upper body and raise lean mass and metabolic rate. We now have several female patients in their 70s who are lifting weights several days per week and loving it! I suspect that they are using muscles that have not been used for years and cancelling some of the loss of lean mass associated with aging (one of the major causes of decreased metabolic rate).

AEROBIC CONDITIONING

When you see an exercising person check her pulse, what is she doing? Several excellent medical studies done in good laboratories have measured something called aerobic capacity (or aerobic fitness) and have shown that it is a very strong predictor of longevity. In other words (all other factors being equal), an individual with a higher aerobic capacity will live longer than one with a lower aerobic capacity. Since living a long time and maintenance of good health are important to most of us (as well as to businesses and insurance companies), there has been an explosion of interest in recent years in the development of higher aerobic capacity.

A number of studies have shown that with proper training approaches, aerobic capacity can be increased by 30 to 50% in sedentary individuals over the course of a year (even in the elderly). We will review these papers in more detail in a later chapter, but suffice it to say here that if we can increase man's aerobic capacity, we can extend his useful and functional lifetime.

Now, let us get back to why our exercising young woman was checking her pulse during her aerobics class. It turns out that improvement in aerobic capacity occurs most rapidly and completely when the exerciser's pulse (heart rate) is maintained in a fairly narrow range during an extended period of exercise. Studies from Dr. Cooper's Aerobics Institute in Dallas and other prestigious institutions have shown that for aerobic capacity to increase substantially, the exercise pulse should be maintained at 60 to 85% of its maximal levels for at least 20 to 25 minutes – at least 3 times per week. The good guess for your maximal pulse is 220 minus your age (about 180 beats per minute for a 40-year-old adult). Your aerobic training pulse range (also called Target Heart Rate) is, therefore, 60 to 85% of your projected maximum (or 108 to 153) beats per minute for an average 40-year-old person). It is important to remember that maximal heart rate is a variable from person to person and can be changed by various medications. Thus, there is a different Target Heart Zone for every one of us – that can only be known for sure if we perform a maximal treadmill study in a physician's office. (A good guess is still 60 to 85% of 220 minus your age, however).

Calories are burned at the same rate whether you are aerobic or not – for a given workload performed for a given period of time!

It is important here that you not confuse calorie burning with being aerobic (exercising with your pulse in a certain range). In other words, a 50-year-old woman who weighs 150 pounds burns 200 calories walking 2 miles whether her pulse is 90 per minute or 140 per minute. Some studies with metabolic charts have shown that fat tissue is more likely (than protein or carbohydrate) to be the fuel used for energy when the exercise pulse is maintained low in the target heart range. Ultimately, this is not too important, however, since a calorie is a calorie – whether it comes from your fat or your sugar (glycogen) stores and energy balance is what determines how much fat you and I keep stored.

I guess that an ideal exercise experience should be one that meets the 4 criteria previously discussed and still maintains your pulse in a target heart range during much of your exercise. Unfortunately, walking (especially for young people and older ones who walk a lot) does not often get the exerciser's pulse into the target heart range. (An exception is race-walking which is, for me, a very uncomfortable experience and one that I would not do every day routinely).

This issue became very real to me, personally, several years ago when an injury (and knowledge about calories burned per mile) led to my becoming a walker rather than a runner. To my chagrin, I found that even with a brisk walk, my pulse never rose much higher than 90 per minute. I realized that I was not "aerobic" with my exercise, but I badly needed to burn the calories, and I enjoyed everything else about walking. (It was cheap, easy to do, burned a lot of calories, and did not make me hurt all over.)

One day, several weeks later, I was carrying a heavy box over a good distance and noticed that my pulse was nearly 140 per minute when I finished the work. I began to wonder whether I might be able to carry some weights while I walked (to reach an aerobic pulse). At about the same time, I found a book on the benefit of walking and running with heavy hands (others had obviously learned about this long before I stumbled upon it) and decided to add some hand weights to my training program.

To my surprise, carrying 3-pound heavy hands and lifting them in cadence when I walked, was no easy matter. The first time I tried it, I could not even finish my 3-mile walk because of arm fatigue. (I later discovered that I should have started with lighter weights.) But

when I put the weights down on that first effort, my pulse was 145 per minute. I had achieved an aerobic training-range pulse while walking.

Well, I continued to walk with those 3-pound weights, and it soon became easier and easier to complete 3 miles. Surprisingly, my pulse, which had previously been over 140 at the time of exercise, was now about 110 post-exercise. I was apparently becoming more fit, and since 3 pounds was getting easy, I moved to 5-pound hand weights. To my amazement, my pulse at the end of my first "5-pound walk" was over 140 again. I really felt the workload too, because I was much more short-of-breath. Interestingly, after 4 or 5 months of walking with those 5-pound weights, my post-exercise pulse was back down to 115 to 120 per minute (still in my aerobic range).

What was happening, of course, was that I was becoming aerobically trained. My heart and lungs were becoming aerobically trained and stronger, I was getting all the benefits of calories burned, and I was decreasing body fat content and gaining some lean mass. At the same time, my arms, shoulders, and chest were getting firmer and stronger; and I was feeling better about my appearance.

Needless to say, I was elated to find that I could walk and still get "aerobic"; and I have continued with this activity at least 3 to 4 times per week ever since. (I have actually had to increase weights to 8 pounds to stay aerobic all of the time.) You may find some other activity that is better for you, but for me, at least, walking with hand weights has become a "lifetime" experience.

The important thing, of course, is that you begin to increase activity as you begin to change your food intake. If all that you can do at first is to begin walking 20 feet once a week – do it! Begin to move more in your daily life. Even if you cannot do enough right now to add it to your records as "extra exercise calories", the small increase in movement will make you feel better and begin a pattern that will ultimately lead to more vitality and a leaner body.

CALORIE EXPENDITURE PHYSICAL ACTIVITY CHART

Walking, Running, and Stair Climbing

(Calories expended per 100 pounds body weight/minute)

Activity	Calories per Minute
Walking a 30 minute mile	2.2
Walking a 25 minute mile	2.9
Walking a 20 minute mile	3.4
Walking a 15 minute mile	4.4
Walking a 12 minute mile	5.6
Running a 10 minute mile	6.8
Running a 9 minute mile	8.4
Running an 8 minute mile	9.0
Running a 7 minute mile	10.0
Running a 6 minute mile	11.2
Stair Climbing 40 stairs per minute	6.7
Stair Climbing 50 stairs per minute	8.4
Stair Climbing 60 stairs per minute	10.2
Stair Climbing 70 stairs per minute	11.6
Stair Climbing 80 stairs per minute	13.1

WALKING: CALORIES PER MILE (VARIABLE WEIGHT)

(calculated as 0.7 cal/mile x body weight)

Body Weight	**Calories Burned/One Mile of Walking**
100 pound adult	70 calories
125 pound adult	87 calories
150 pound adult	100 calories
175 pound adult	116 calories
200 pound adult	132 calories
225 pound adult	149 calories
250 pound adult	165 calories
275 pound adult	182 calories
300 pound adult	200 calories
325 pound adult	215 calories
350 pound adult	330 calories
375 pound adult	345 calories
400 pound adult	365 calories

CALORIES BURNED PER 100 POUNDS OF BODY WEIGHT PER MINUTE
(All sports activities are recreational)

Aerobic Dancing
- Strenuous.....6.1
- Medium Intensity.....4.7
- Low Impact.....4.1
- Water Aerobics.....5.0

Badminton.....2.5
Basketball.....5.8
Bowling.....2.8
Boxing (Sparring).....5.9
Calisthenics.....3.0
Canoeing (Leisurely).....2.2
Carpentry.....2.4
Chopping Wood.....13.5
Circuit Training
- Without Weights.....4.0
- Nautilus.....4.2
- Free Weights.....3.9

Croquet.....2.2
Cycling – Outdoors
- 10 MPH (10 speed).....4.3
- 8 MPH (10 speed).....3.4
- 6MPH (10 speed).....2.5

Cycling – Stationary (50-60 rpm)
- No Tension.....2.0
- Mild Tension (50-70 watts).....5.1

Dancing
- Choreographed.....7.1
- Rock, Disco, etc.....4.2
- Square.....3.9
- Ballroom.....1.8

Fencing.....2.8
Field Hockey.....6.0
Football.....5.5
Gardening.....3.7
- Hoeing a Garden.....4.2
- Weeding a Garden.....3.3

Golf
- Walking with Bag.....4.4
- Pulling a Cart.....4.0
- Walking with a Caddie.....3.5
- Hitting & Driving Range.....2.3

Gymnastics.....2.5
Handball.....6.4
Horseback Riding
- Galloping.....5.4
- Trotting.....4.6
- Walking.....1.4

Housework
- Mopping Floors.....2.3
- Scrubbing Floors.....4.3
- Window Cleaning.....2.8

Jogging.....6.2
Judo.....8.4
Jumping Rope
- Slow.....6.8
- 60-80 per minute.....7.5
- 120-140 per minute.....8.7

Lawn Mowing (power).....3.2
Laying Brick.....2.4
Mountain Climbing.....6.9
Painting
- Outside.....3.5
- Inside.....1.5

Racquetball.....6.2
Rowing
- 1.2 MPH.....4.5
- 3.5 MPH.....6.0
- 12 MPH.....13.0

Running
- 10 minute mile.....6.8
- 8 minute mile.....9.0
- 6 minute mile.....11.2

Skating
- Roller-skating.....4.5
- Ice-skating.....3.8

Skiing
- Cross-country (moderate).....7.2
- Cross-country (slow).....5.1

Downhill (slow)……..4.4
Uphill (slow)……..…6.1
Water Skiing……..……4.7
Skin Diving……..……9.3
Soccer……6.5
Squash……..6.2
Stair-Climbing
40 stairs per minute……..6.7
60 stairs per minute……10.2
80 stairs per minute……13.1

Swimming	1 MPH	2 MPH
Crawl Stroke	4.1	7.0
Breast Stroke	4.0	8.0
Side Stroke	4.0	7.0
Back Stroke	5.0	8.8
Treading water		2.2

Tennis
Doubles……..1.9
Singles……..3.0
Volleyball……..2.1
Walking
30 minute mile……..…2.2
20 minute mile……..3.4
12 minute mile……..…5.6
Wallpapering……1.7
Weight Lifting……3.9

Exercise Machines
When using exercise machines such as treadmill or elliptical, use the calorie burn estimations the machine provides. If possible, enter in weight and age to receive a more accurate estimation.

“How Did You Die?”

Did you tackle that trouble that came your way
With a resolute heart and cheerful?
Or hide your face from the light of day
With a craven soul and fearful?
Oh, a trouble’s a ton, or a trouble’s an ounce,
Or a trouble’s what you make it.
And it isn’t the fact that you’re hurt that counts,
But only how did you take it?

You are beaten to earth? Well, well what’s that?
Come up with a smiling face.
It’s nothing against you to fall down flat,
But to lie there – that’s disgrace.
The harder you’re thrown, why the higher you bounce;
Be proud of your blackened eye!
It isn’t the fact that you’re licked that counts;
It’s how did you fight and why?

And though you be done to death, what then?
If you battled the best you could;
If you played your part in the world of men,
Why the Critic will call it good.
Death comes with a crawl, or comes with a pounce,
And whether he’s slow or spry,
It isn’t the fact that you’re dead that counts,
But only, how did you die?

Edmund Vance Cooke

STUDY QUESTIONS

Chapter Six – Physical Activity

1. Activity typically accounts for _____% of our total calorie requirements per day. (10, 20, 40, 60)

2. a. T F Dieting lowers resting metabolic rate.
   b. T F Exercise raises resting metabolic rate.
   c. T F Exercise cancels the effect of dieting on metabolic rate.
   d. T F Dieting may cause loss of lean body mass.
   e. T F Exercise cancels the effect of dieting on lean mass.

3. Which is least important regarding an exercise program designed to maintain a certain body composition?
   a. It should be done daily
   b. It should be inexpensive
   c. It should burn a lot of calories
   d. It should be done at a reputable facility
   e. It should not be too difficult

4. Which is an example of a "weight bearing" activity?
   a. Walking
   b. Exercise biking (stationary bike)
   c. Rowing
   d. Weight lifting

5. Which of the following is <u>not</u> "weight bearing?"
   a. Weight lifting
   b. Swimming
   c. Horseback-riding
   d. Cycling (regular bicycle)

6. Arrange the following in order of calories burned per mile. (least to greatest)
   _____ Horseback riding
   _____ Swimming
   _____ Walking
   _____ Rowing a boat

7. Which of the following is true of walking?
   a. It is cheap
   b. It burns a relatively large number of calories
   c. It is fairly easy
   d. It causes minimal risk of injury
   e. All of the above

8. An average man or woman, walking <u>one</u> <u>mile</u> burns _____ x his body weight in calories – whether he walks the mile slowly or rapidly. (0.3, 0.5, 0.7, 0.9)

9. A typical 150-pound woman needs to walk how far to burn up one pound of body fat?
   a. 1 mile
   b. 20 miles
   c. 35 miles
   d. 50 miles
   e. 100 miles

10. A 150-pound woman faithfully walks 2 miles per day every day in 1991. If her diet remained constant, how much body fat would she lose that year?
   a. 5 pounds
   b. 10 pounds
   c. 20 pounds
   d. 35 pounds
   e. 50 pounds

11. Which of the following is not true?
   a. For a given individual, if his lean mass increases, his resting metabolic rate will increase.
   b. Within a group of people, those with larger lean mass will burn more calories than those with lower lean mass.
   c. Resting metabolic rate drops when we lower our caloric intake.
   d. For any individual, lowering lean mass will result in lowering resting metabolic rate.

12. "Getting aerobic" means:
   a. Getting the pulse to 60 to 85% of maximal levels
   b. Joining a high impact aerobics class
   c. Breathing oxygen
   d. Achieving one's personal performance peak

13. The major value of carrying hand weights during a "fitness walk" is:
   a. Muscle mass is enhanced.
   b. More calories are burned.
   c. Aerobic state is achieved.
   d. It looks cool to do it.

MANAGING YOUR BODY WEIGHT FOR LIFE

Chapter 7

Introduction to Energy Intake

David M. Player, MD

Health By Design Program Manual

Chapter 7

INTRODUCTION TO ENERGY INTAKE

By now you should have a reasonably good grasp of Energy Output and its various components. We have explained in some detail resting metabolic rate and the thermic effect of activity. It should be apparent to you that the major cause of obesity is a low metabolic rate in an "at risk" population in a sedentary society. The equation below demonstrates this phenomenon:

As we move to the "EI" side of the equation, it would seem appropriate to discuss for a moment the component of EO that is really a part of EI (food), or Thermic Effect of Food (TEF).

Figure 1.7

THE THERMIC EFFECT OF FOOD

Whenever you and I eat, we are taking in energy, which is used either to meet the needs of EO or to store fat. At the same time, eating, digestion and metabolic breakdown of nutrients is an energy-consuming process and as such is really a component of energy expenditure. As we mentioned in previous chapters, the entire digestive process accounts for approximately 10% of the daily energy requirement of adult human beings. In other words, digestion itself has an energy cost. (Some of us fat people wish that the energy cost was greater than 10% of EO. Wouldn't it be great to be able to eat pizza all day long and burn as many caloris digesting it as were in the pizza?) The cost is not great, but it is significant, and there are facts we need to know about the metabolism of selected foods and nutrients – facts that can indeed change the percentage of daily calories burned in the digestive process – from 5% to 15% or more.

A CALORIE IS NOT A CALORIE!

It turns out that the calorie cost of digestion depends somewhat on which nutrients are eaten. Remember that protein, carbohydrates, and fat all can be used for energy or ultimately converted metabolically to fat for storage. The cost of metabolizing protein, however, is far greater than that of metabolizing carbohydrate. Similarly, the cost of metabolizing carbohydrates is considerably greater than that of metabolizing fats! Figure 2.7 below shows this more graphically.

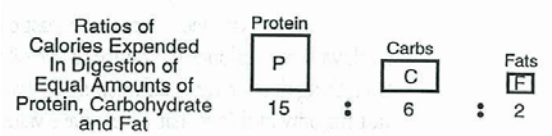


Figure 2.7

In other words, over 7 times as much energy is necessary to metabolize a gram of protein as is required to metabolize a gram of fat (a calorie is not a calorie).

Thus, a diet relatively high in protein and low in fat is going to result in a higher cost of digestion (TEF) than a diet high in fat and low in protein (even if the calories in each diet are identical). The total impact on EO may be only 100-150 calories per day, but remember that each 100 calories per day is approximately 10 pounds of body fat per year.

EATING TOO MUCH PROTEIN CAN BE A BAD THING…FOR THE KIDNEYS

Several commercial diet programs (Atkins and others) have been based on this principle – if you eat a diet high in protein, you can eat more total calories. Diets very high in protein,

however, often do not taste good unless they are mixed with fat (beef, pork, etc.). Similarly, diets very high in protein are not good for kidneys (>4 grams per Kg/day or about 2 grams per pounds/day). Therefore, an optimal diet is one that contains 1-2 grams protein per kilogram ideal body weight – or certainly a diet that matches the amount of protein broken down to put urea in our urine. Lean protein food choices often do not taste so great (tuna, egg whites), but they do raise our TEF and cause us to burn a few more calories per day (increased EO). For those of us with a low metabolic rate in this sedentary culture – every little bit counts. So – when you read about a magic diet (in the Star or National Enquirer) that promotes weight loss by "burning away those ugly fat pounds," as yourself whether the diet contains a relatively high amount of protein compared to fat or carbohydrate. If it does – the effect on weight loss will not be dramatic, but in a year, the diet could affect total weight loss by 5 to 10 pounds. We will review this and other nutrition issues in a later chapter of this manual.

As we begin talking about the EI side of the equation (food), let's take just a moment to discuss calories and what they measure. As you have by now discovered, energy expenditure and intake are both measured in calories. A calorie is the amount of heat necessary to raise 1 cc. of water 1°C. When foods are used, they release heat energy, which can be measured in calories. An understanding of body composition, therefore, requires an understanding of the calorie energy needs of the body (EO) and of the calorie intake (EI). Only as we understand the balance between these caloric values can we begin to grasp the necessary management tools and skills that will keep our muscle mass and fat mass at optimal levels.

Central to the understanding of energy values of foods is development of a measurement system that is simple and easy to learn. The system discussed in the next few pages is, I think, the simplest approach to this subject that I have ever seen. It still requires some work on your part, but the number of isolated pieces of data needed to make it work is small (very small compared to reading and memorizing calorie books), and can be learned easily by both men and women – young and old. I should know – since I have been using it on a daily basis for the past five years.

The system we use generally evaluates foods in calories per ounce. Liquid foods are discussed in calories per fluid ounce, and rarely will we use some other measurement. For the most part, we will, in our laboratories, be discussing foods in calories per ounce. Your major responsibility is being able to evaluate how many ounces a certain food weighs. This comes only through practice, and practice can be done anywhere that you and I can pick up and hold any object that has a known weight. Your nutrition laboratories will give you an introduction to this process, and you can practice it wherever you happen to be – at home, work, or school.

The chart in Figure 3.7 below outlines the two extremes in calories per ounce.

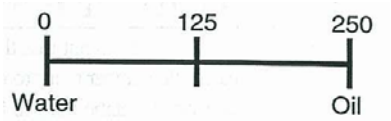


Figure 3.7

As you can see, water is the least caloric food with zero calories per ounce, while oil is the most caloric with 250 calories per ounce. Everything that we eat is between these 2 extremes in calories per ounce. The truth is that the vast majority of things that we eat have values far below the halfway point between these extremities (125 calories). (In fact, 98% of everything we eat has a value less than 125 calories per ounce). A useful average for all of our food is about 70 calories per ounce. So, if you went to a dinner and were served a casserole and did not have the foggiest idea what was in it, but guessed that you ate about 10 ounces of it, you would estimate that you ate about 70 X 10 or 700 calories of casserole, and you would not be far off.

Now, if you felt that the food had a lot of oil in it, your estimate might rise to 100 calories per ounce (toward the oil end of the scale) – while, if it had a lot of water, you might lower your estimate to 40 or 30 calories per ounce (toward the water end of the scale).

Before going further, we should perhaps review the basic building blocks in food (which we briefly discussed in Chapter 1). As you will remember, there are 4 nutrients that have caloric value:

Protein	4 calories per gram
Carbohydrate	4 calories per gram
Fat	9 calories per gram
Alcohol	7 calories per gram

Things that we call food are mixtures of the above 4 nutrients, as well as fiber and water (which do not have caloric value). As you progress through your laboratories, you will have the opportunity to evaluate (qualitatively) what is in the foods you eat and later (quantitatively) how much of the various nutrients are contained in your foods. Only by knowing the relative amounts of oil or water in a certain food will you be able to make an intelligent estimate of its energy value in calories per ounce.

At the moment, most of you are probably eating a very focused diet with the majority of nutrition coming from diet supplements. These products are made of protein and carbohydrate and contain little fat. They also contain little fiber and no water, so they are a very "concentrated" source of nutrients. While you are making a major effort to lose weight and use up your fat, diet supplements are the perfect kind of food to eat because they meet nutritional needs without any excess baggage (fats).

As you begin to add regular foods to your repertoire later in this program or several weeks from now, you will want to focus primarily on adding foods that contain mainly carbohydrate (or carbohydrate, water, and fiber). These mostly-carbohydrate foods can be divided (for teaching sake) into fruits, vegetables, and grains. For this reason – and because fruits can be added so easily and tastefully to diet supplements – the next chapter will be committed to a discussion of fruits. The two following chapters will deal with vegetables and grains. Finally, in Chapters 11 and 12 (when you are very adept at using diet supplements, fruits, and vegetables) we will proceed with a discussion of the protein and fat-containing foods (meats, eggs, and dairy products) as well as condiments, alcohol-containing foods, and other specialty items.

MANAGING YOUR BODY WEIGHT FOR LIFE

Chapter 8

The Fruits of Life

David M. Player, MD

Health By Design Program Manual

Chapter 8

THE FRUITS OF LIFE

The definition of fruit is a little hazy at times because there are a few items that cross over and could be considered either fruit or vegetable. Generally speaking, fruits grow on bushes or trees and come from the flowering bloom of the plant. There may be some exceptions like pineapples and peanuts – but for the most part, the above definition is okay. 98% of what we discuss here will be found growing on flowering bushes or trees.

Fruits can, for sake of caloric discussion, be divided into two major groups. The first group contains lots of water and some carbohydrate per ounce and encompasses most of the things that you and I would consider to be fruits – like apples and oranges. The second group contains a significant amount of oil with water and fiber and carbohydrate – and I shall, therefore, call them "funny fruits".

FRESH FRUITS

Figure 1.8 below is a reproduction of Figure 2 with common fruits added in.

As you can see, the vast majority of things that you and I call fruits give us between 5 and 25 calories per ounce with an average of 15 calories per ounce. These are the low calorie fruits that contain principally fiber, water, and carbohydrate. Because they contain an average of only 15 calories per ounce, we can eat quite a lot of them without a terribly negative influence on our energy balance. Their fiber and water content likewise makes them fairly filling so that we are not likely to eat excessive amounts. (I have rarely struggled with binging on apples!) It is true that some of them give us slightly more than 15 calories per ounce and some of them slightly less – but 15 calories per ounce is a good average and should be used in your records. The big problem for you and me is to learn how many ounces we are eating rather than splitting hairs over whether a fruit gives us 15 calories per ounce or 20 calories per ounce. For that rare individual who eats a huge amount of one kind of fruit, it would perhaps be more accurate to use the exact caloric value (i.e. 10 calories per ounce for melon or 20 calories per ounce for bananas). Most of the time 15 calories per ounce for fruit will be an excellent estimate. (Your videotape on fruits will review this in more detail).

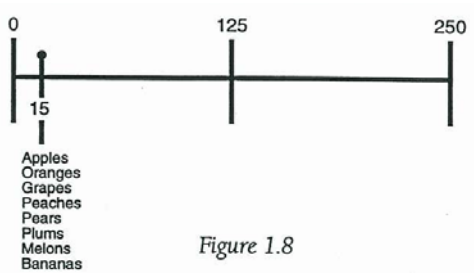


Figure 1.8

In addition to carbohydrates, water, and fiber, these fruits have a rich vitamin and mineral content. It is true that you and I can get our entire allotment of vitamins and minerals in a tablet or two per day, but fruit is an excellent natural source of these substances. For me, as a nephrologist, fruits have always been a special problem since fruit usually contains a lot of potassium, and patients with kidney failure cannot rid their bodies of potassium. When serum potassium levels rise very high, heart block and cardiac arrest can develop. Fortunately, those of us with normal kidneys do not have to worry about this, and we can eat fruit to our hearts' desire. For information's sake – 2 bananas contain the same amount of potassium as each of the 10 mEq potassium tablets that most of you are taking (while you are eating a lot of diet supplements).

FRUIT JUICES

Now, what happens to calories per ounce when you squeeze the juice out of the fruit? There is no change in calorie content because all of the calories are in the juice. The rest of the stuff is just fiber. So – most fruit juices give us 15 calories per ounce. There may be some exceptions like peach and apricot nectar, etc. that yield approximately 20 calories per ounce – but a good estimate for your records is, again, 15 calories per ounce.

Juice is a little more dangerous for dieting individuals, because it is a lot easier to drink 200 calories of juice than it is to eat 200 calories of the same fruit. (I will review the problems with drinking your calories in a later chapter.)

Remember, again, that the biggest problem is not learning calories per ounce. (You already know that most fruit gives us 15 calories per ounce.) The big problem is – how many ounces are there? To get good at ounces, you have got to practice. I have made lots of errors over the past, estimating weights – and the only way I have improved is by holding things in my hands and weighing them. Use your laboratory experiences to get good at this.

CANNED FRUITS

The discussion so far has dealt with fresh fruit and juices. What happens when we can the fruit? Here you have to begin reading labels – since fruits can be canned either in water or in heavy syrup. The calories per ounce still will not be terribly different, but a heavy syrup usually means heavy sugar, so pears canned in heavy syrup may be 20 to 25 calories per ounce. The secret for you and me is for us to read the labels. Anytime you add sugar to a low calorie item, the calories per ounce increase. (As you will see in a later lecture, adding sugar can, on rare occasions, lower the calories per ounce in some very rich foods!)

DRIED FRUITS

What else can we do to fruit besides adding water (and syrup) to it? Well – we can dry it. Removing water from fruit rapidly raises the calories per ounce. What started as a 15-calorie per ounce grape later becomes a 75-80 calorie per ounce raisin. This makes dried fruits a little more dangerous for us low-metabolic-rate folks – because we can eat 2 or 3 ounces of dried fruit for 225 calories lots quicker than we can eat 2 or 3 peaches. Remember that fiber and water are filling, and we feel more full when eating regular or canned fruit than when we eat dried fruit. Again, when we eat dried fruits, we need to be very conscious of what an ounce of dried fruit feels like – because ounces and calories can be consumed very quickly when fruit is dried.

"FUNNY" FRUITS

The second group of fruits I call "funny fruits" – because unlike the regular fruits, they all contain some oil. More oil means more calories – so we who are concerned about losing body fat need to be more careful with this group of fruits. If you do not ever eat them – do not bother learning about them. But – if you ever eat them, be conscious of the things that separate them from regular fruit.

Figure 2.8 below shows the funny fruits laid out on the basic scale along with regular fruit.

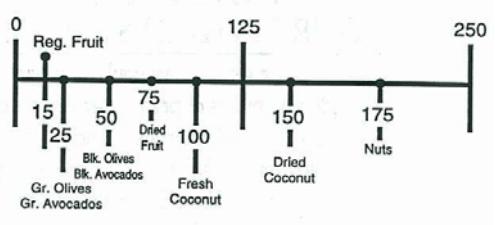


Figure 2.8

Olives

As you can see, the 4 funny fruits are olives, avocados, coconut, and nuts. Most of us run into olives from time to time – either on relish trays or as a part of

certain mixed foods like pizza, etc. As you can see, black olives have about 50 calories per ounce, while green olives are closer to 25 calories per ounce. The difference is obviously in the oil content of black olives compared to green ones.

Avocados

Avocados have a similar disparity between green and black varieties – about 25 calories per ounce for green ones and 50 calories per ounce for black ones. Practically speaking, almost all of our avocados used in South Texas are black ones – so when I eat guacamole or an avocado salad at a local restaurant, I must use 50 calories per ounce in my records.

Coconuts

The third "funny fruit" is coconut – probably not something that you and I would routinely eat as a "solo" food. We usually eat coconut on cakes, cookies, salads, etc. and (thankfully) we would be unlikely to eat several ounces of coconut at a time. But, as you can see, raw coconut has about 100 calories per ounce – because it contains a lot of oil – and when we dry it and put it in a can, it moves up to nearly 150 calories per ounce – a very rich food!

Nuts

Finally, we get to the last and best of the "funny fruits" – the nuts. Nuts, especially salted, roasted ones, are a favorite of most of us and unfortunately are a mixture of a small amount of protein and a large amount of oil. As you can see, they give us on the average about 175 calories per ounce and have, therefore, more calories than any solid food except butter and margarine. When I first learned about the calories per ounce in nuts a few years ago, I was appalled. When I think of the times that I have grabbed one or two handfuls of peanuts and eaten them in less than a minute while I walked from the kitchen to the living room – it blows me away. The danger of salty nuts is not just calories per ounce. It is how many ounces you and I can eat in a short time.

One time, over a Christmas holiday, a friend gave me a 5-pound box of cashews for a gift. If you have not done the math already, that is 14,000 calories in one 5-pound box. (About the only other thing with that many calories in that sized box is Bardahl!) Guess what I did that Christmas? I ate the whole thing, single-handedly! They were really good, but I gained the expected 4 pounds – 4 pounds of pure fat.

I have heard some patients say, "Well, I eat nuts because they are a good source of protein." It is true that nuts do have about 4 grams of protein per ounce – that is 16 calories of protein per ounce (out of 175). That leaves nearly 160 calories per ounce of pure oil. Clearly, those of us with low metabolic rates do not get to eat a lot of nuts.

CAN WE USE FRUIT AS OUR PROTEIN SOURCE?

I guess that we could, but we would end up really fat if we tried. For instance, if you and I needed 80 grams of protein per day to remain healthy and match our 24-hour urine urea, how much of the various fruits would we need to eat? It turns out that standard 15-calorie per ounce fruit contains 0 – 0.5 grams per ounce of protein. Therefore, to get our 80 grams of protein from apples, we would need to eat over 200 ounces of apple per day (or about 35 standard-sized apples) totaling 3500 calories per day. With this many apples your body would grow fat and your colon would beg for mercy.

What about "funny fruits" for protein? Well, nuts have about 4 grams of protein per ounce so that we would only need 20 ounces of nuts to get our 80 grams of protein.

Unfortunately, 20 ounces of nuts is 3500 calories per day – far above the threshold for fat storage for most of us.

So, fruits are not very good protein sources, and we should not consider that they have anything to do with protein. Fruits are mixtures of fiber, water, and carbohydrate; and it is their carbohydrate content that makes them appealing to us – because they provide energy to help run our motors. As we have seen above, they have variable carbohydrate content per ounce, but for the most part we can think of them as giving us about 15 calories per ounce (except for the "funny fruits"). Your biggest problem, then, is not knowing calories per ounce. That is pretty simple. No – the big problem for all of us is knowing how many ounces we ate. The only way that you and I can learn that is by holding the fruit in our hands, looking at it, weighing it, and lifting it again and again. In this way, we finally become adept at looking at a food and knowing what is in it and knowing how it is going to affect our bodies. Try to remember that the reason we are doing this is because we who have low metabolic rates are caught in a sedentary society and will become fatter and fatter if we do not have a good understanding of energy intake and energy expenditure.

Hopefully, this brief discussion of fruit has given you a good introduction to the energy intake side of the equation. I trust that your laboratory sessions on fruits will make the subject come alive and be practical for each of you as you approach this complex problem. (The vegetables are waiting in Chapter 9!)

“If”

If you can keep your head when all about you
Are losing theirs and blaming it on you;
If you can trust yourself when all men doubt you,
But make allowance for their doubting too;
If you can wait and not be tired by waiting,
Or, being lied about, don’t deal in lies,
Or being hated don’t give way to hating,
And yet don’t look too good, nor talk too wise;

If you can dream – and not make dreams your master;
If you can think – and not make thoughts your aim,
If you can meet with Triumph and Disaster
And treat those two impostors just the same;
If you can bear to hear the truth you’ve spoken
Twisted by knaves to make a trap for fools,
And watch the things you gave your life to, broken,
And stoop and build ‘em up with worn-out tools;

If you can make one heap of all your winnings
And risk it on one turn of pitch-and-toss,
And lose, and start again at your beginnings,
And never breathe a word about your loss;
If you can force your heart and nerve and sinew
To serve your turn long after they are gone,
And so hold on when there is nothing in you
Except the Will which says to them: “Hold on!”

If you can talk with crowds and keep your virtue,
Or walk with Kings – nor lose the common touch,
If neither foes nor loving friends can hurt you,
If you can fill the unforgiving minute
With sixty seconds’ worth of distance run,
Yours is the Earth and everything that’s in it,
And – which is more – you’ll be a Man, my son!

- Rudyard Kipling

STUDY QUESTIONS

Chapter Eight – The Fruits Of Life

1. Which of the following is a cause of obesity in American?
   a. Genetics
   b. Low metabolic rate
   c. Sedentary work force
   d. High fat diets
   e. All of the above

2. Which component of EO (energy output) accounts for the lowest output of calories on a daily basis?
   a. Thermic effect of digestion
   b. Thermic effect of activity
   c. Resting metabolic rate
   d. None of the above

3. T F The thermic effect of digestion varies depending upon the type of food ingested.
   T F Carbohydrates "cost more" to digest than fats
   T F The "cost" of digesting carbohydrates is greater than that of digesting fats
   T F The cost of digesting protein is greater than the cost of digesting fat

4. Bill eats 2000 calories of food every day. His calories are distributed as 10% protein (50 grams), 50% fat (+ 90 grams), and 50% carbohydrate (250 grams). He talks to a dietician who leaves his calories at 2000 per day – but changes the content of the diet to 20% protein (100 grams), 20% fat (45 grams), and 60% carbohydrate (300 grams). After one year on his new diet, what will be true of Bill?
   a. He will have kidney damage.
   b. He will be heavier.
   c. He will be lighter.
   d. He will be less fat.

5. When measured in calories per ounce, the calorie range of standard foods is
   a. 5-175 calories per ounce
   b. 0-150 calories per ounce
   c. 0-250 calories per ounce
   d. 20-450 calories per ounce

6. The vast majority of food that we eat is closer to the _____ end of the calorie scale. (top, bottom, middle)

7. If you are eating a casserole, and you have no idea what all is in it, you should probably estimate its calories per ounce at _____. (25, 50, 70, 100)

8. Match the following:

a.	Protein	_____	1. 7 cal.
b.	Carbohydrates	_____	2. 9 cal.
c.	Fat	_____	3. 4 cal.
d.	Alcohol	_____	4. 4 cal.

9. An average piece of fresh fruit gives us _____ calories per ounce (15, 25, 50, 75)

10. Match the following with their calories per ounce; (some answers may be used more than once – others not at all).

_____ a. apple	1.	100
_____ b. fresh coconut	2.	50
_____ c. grapes	3.	20
_____ d. black olives	4.	150
_____ e. cashews	5.	175
_____ f. peaches	6.	30
_____ g. peanuts	7.	15
_____ h. avocados (black)	8.	75
_____ i. dry coconut	9.	200
_____ j. green olives	10.	250

MANAGING YOUR BODY WEIGHT FOR LIFE

Chapter 9

Eat Your Vegetables

David M. Player, MD

Health By Design Program Manual

Chapter 9

EAT YOUR VEGETABLES

Hopefully by now you have a good grasp of fruits and their calories per ounce. Some of you may be adding fruit to your diet supplements or eating pieces of fruit as an add-on to your basic protein requirement. As I commented in Chapter 8, fruit is a nearly pure carbohydrate source and, therefore, represents a good, sweet-tasting addition to our basic protein intake. There are two other general food groups that are predominantly composed of carbohydrate – vegetables and grains. In this chapter, we will deal with vegetables, and in Chapter 10, we will get into grains.

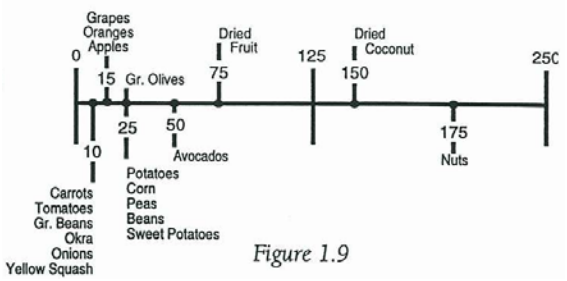


Figure 1.9

Vegetables are somewhat easier to discuss than fruits because there are no "funny vegetables." Figure 1.9 below shows vegetables superimposed on the basic calorie graph along with fruits. As you can see, vegetables can be grouped into two major categories – those with about 10 calories per ounce and those with about 25 calories per ounce. Actually, the range of vegetables is from 3 calories to about 30 calories (like fruit), but for purposes of this course, it is best to consider vegetables as giving us either 10 calories per ounce or 25 calories per ounce. Most of the 10-calorie per ounce stuff are things that we would ordinarily think of as green and leafy vegetables, while the 25-calorie per ounce things are what we would ordinarily call starchy vegetables.

Figure 2.9 below details various vegetables in the "10-calorie" and "25-calorie/ounce" groups – with specific calories per ounce (for each vegetable). As you can see, the 10-calorie items actually vary from 3 calories per ounce for lettuce and sprouts up to >12 calories per ounce for carrots and winter squash. Similarly, the 25 calorie/ounce items vary from 20 calories per ounce for green peas up to as much as 35 calories per ounce for some beans. The point is that when you are keeping records, you can use 10 calories per ounce or 25 calories per ounce as averages, and you will be pretty accurate – especially if you are eating a variety of vegetables. (It all averages out.) Only if you eat lots and lots of one kind of vegetable does it become important to be more accurate than "10 calories per ounce" or "25 calories per ounce."

Figure 2.9

Vegetables (cal/oz)

Low Calorie	High Calorie
lettuce (4)	green peas (20)
cucumber (4)	potatoes (24)
celery (4)	corn (22)
asparagus (4-6)	parsnips (23)
summer squash (6)	sweet potatoes (28)
cauliflower (6)	kidney beans (25)
cabbage (6)	lima beans (27)
green beans (7)	navy beans (33)
tomato (7)	garlic (38)
broccoli (8)	
onions (8)	

beets (8)
brussel sprouts (8)
carrots (11)
winter squash (12)
water chestnuts (14)

VEGETABLE PREPARATION

The calorie markers of 10 and 25 calories per ounce are only relevant if vegetables are steamed or cooked in water. Obviously, there are a lot of other things that we can do to them in preparation that change their caloric value. If we fry them or cook them in oil, all bets are off. Different vegetables absorb different amounts of oil – but almost all the calories per ounce need to be doubled or tripled when vegetables are fried or cooked in oil. With fruit, this is not so much a problem because we do not routinely fry fruit (at least my family does not do it). But vegetables are a different matter, and often they are battered, cheesed, fried, or sauced. In your advanced laboratory sessions, you will get to deal with various sauces and dips and the ways they change the calories in a basic food like a fruit or vegetables.

CANNED VEGETABLES

Fresh vegetables, of course, can be canned without causing any change in caloric content. Canned vegetables, like canned fruit, however, demand your attention to their labels, since during the canning procedures, caloric substances like sugar, bacon, beef oil, or butter are often cooked with the vegetables. The effect on total caloric value is not as great as that of frying or cooking in oil, but it is still a good idea for us to check labels before assigning canned vegetables to the 10 calorie or 25 calorie groups.

VEGETABLE JUICES

Finally, vegetables – like fruit – may be made into juice. As you will remember, fruit remains at 15 calories per ounce – whether it is in its natural form or juiced. Vegetables, however, usually have water and seasonings added as they are juiced – lowering the calories to about 5 per fluid ounce. Tomato juice, V-8, or other vegetable juices are, therefore, a better refresher for us low-metabolic-rate folks than their higher calorie cousins, the fruit juices.

Basically, all vegetables contain fiber, water, carbohydrate and protein – and by far the predominant caloric component is carbohydrate. Vegetables in their natural state contain only a trace amount of oil, and this, of course, keeps their calorie content generally low.

WHAT ABOUT VEGETARIANS?

The protein content of vegetables, although not very great, is very important, however, because some individuals (and some cultures) have decided to avoid meat and to get their nutrition totally from vegetables and fruits. Such individuals are (as you know) called vegetarians. Vegetarians obviously can be healthy and – depending upon how their vegetables are prepared – may have a low total dietary fat intake. Their biggest nutritional problem however is getting enough total protein into their diet.

Many vegetarians that I have seen have relatively low serum albumin levels, and serum albumin levels are an important index of health. Over the years of recorded history, societies that ate meat (higher protein) have been stronger and more dominant than those that ate predominantly vegetables. Typical vegetables contain only a tiny amount of protein per ounce and calorie intake from carbohydrates will probably be substantial by the time protein needs have been reached. This is, of course, an even more important problem in those of us with low metabolic rates who must get all of our needed protein in a small enough number of calories to

prevent fat gain. I have several relatively obese vegetarian friends who are a testimony to this problem.

CAN VEGETABLES BE OUR SOURCE OF PROTEIN?

Related to the protein problem is the fact that no single vegetable contains all of the amino acids that we need for human protein synthesis. Vegetables – as distinct from meats, dairy products, and eggs – are said, therefore, to contain "incomplete protein." Thus, if you and I choose to become vegetarians, we need to eat at least 2 (and probably 3 or more) types of vegetables – (or more correctly – vegetables plus grains or nuts) or we would slowly become protein malnourished and ultimately die of some infection or other immunologic disease. In practice, this is not much of a problem since most vegetarians eat a variety of protein sources. Their biggest problem is the protein/calorie dilemma discussed above. Practically speaking, most vegetarians overcome their protein/amino acid problems by eating eggs or dairy products and, therefore, becoming lacto or ovo/lacto vegetarians.

Let's look more closely at how a vegetarian can get adequate protein. The typical 10-calorie per ounce vegetable gives us about ½ gram of protein per ounce. Now, if I need to eat 80 grams of protein per day for optimal nutrition and I decide to do it with carrots, I would have to eat 160 ounces of carrots per day to get all of my protein. That is 10 pounds of carrots per day!! Let me tell you – if I ate 10 pounds of carrots per day, I would be as yellow as a pumpkin and I would probably never get far from the bathroom. In addition, that 10 pounds of carrots would amount to nearly 1600 calories per day (160 x 10 cal/oz) – and if you are a 50-year-old woman (with a low metabolic rate) who only burns 1300 calories per day, you would store 300 calories per day and slowly grow fatter.

Now, if we move to the starchy vegetables, things may be worse or better for protein – depending upon what we eat. Corn still has only ½ - 1 gram of protein per ounce – but has 25 calories per ounce. So, if corn is your protein source, you would still require close to 160 ounces of corn or nearly 4000 calories to be in protein balance.

Beans are a better protein food because they contain 1½ to 2½ grams of protein per ounce with about 30 calories per ounce. Therefore, if I need 80 grams of protein per day and all of my protein comes from beans, I would still need about 60 ounces of beans (or 1800 calories per day) to achieve good protein nutrition. Believe me, if I ate that many beans, I would have to live alone – far from cultured society!

Hopefully by now, you can begin to see the dilemma. It is true that we can get all of the protein we need by eating rice and beans, but the carbohydrate content of these foods is sufficiently high that middle-aged people with low metabolic rates actually grow fat while getting just adequate protein nutrition. Remember – as we discussed in Chapter 2 – that this problem becomes even worse when we cut back on our calories and try to lose weight. When we eat fewer calories, our protein requirements rise (urine urea goes up) and we have even more problem getting adequate protein nutrition with vegetables.

The big problem, of course, is not calories per ounce – it is "how many ounces did I eat?" This, as I have said before, can only be learned as you hold food, weigh it, hold it again, and answer questions about it. As you practice, it will get easier and easier. (It is more appropriate for you to pick up your green beans in a Health by Design nutrition lab than to pick them up at your local restaurant! I have drawn the ire of my wife for doing this. So, practice in your labs to gain the needed skills.)

Hopefully, this has been a helpful introduction to the second group of carbohydrate foods that can be easily added to diet supplements to create a well-balanced diet. Vegetables – as distinct from fruit – may be prepared hot with broth and seasonings and offer a good contrast to the cold, sweet taste of diet supplements. They are, then, often my choice for carbohydrate additions to my basic protein nutrition. (Beware! The grains are waiting in Chapter 10)

“Drop A Pebble in the Water”

Drop a pebble in the water: just a splash, and it is gone;
But there is a half-a-hundred ripples circling on and on and on,
Spreading, spreading from the center, flowing on out to the sea.
And there’s no way of telling where the end is going to be.

Drop a pebble in the water: in a minute you forget,
But there’s little waves a-flowing, and there’s ripples circling yet,
And those little waves a-flowing to a great big wave have grown,
You’ve disturbed a mighty river just by dropping in a stone.

Drop an unkind word, or careless: in a minute it is gone;
But there’s half-a-hundred ripples circling on and on and on.
They keep spreading, spreading, spreading from the center as they go,
And there’s no way to stop them, once you’ve started them to flow.

Drop an unkind word, or careless: in a minute you forget;
But there’s little waves a-flowing, and there’s ripples circling yet,
And perhaps in some sad heart a mighty wave of tears you’ve stirred,
And disturbed a life was happy ere you dropped that unkind word.

Drop a word of cheer and kindness: just a flash and it is gone;
But there’s half-a-hundred ripples circling on and on and on,
Bearing hope and joy and comfort on each splashing, dashing wave
Til you wouldn’t believe the volume of the one kind word you gave.

Drop a word of cheer and kindness: in a minute you forget;
But there’s gladness still a-swelling, and there’s joy a-circling yet,
And you’ve rolled a wave of comfort whose sweet music can be heard
Over miles and miles of water just by dropping one kind word.

James W. Foley

STUDY QUESTIONS

Chapter Nine – Eat Your Vegetables

1. Vegetables differ from fruits (in the Health by Design model) in that:
   a. vegetables are much higher in calories
   b. vegetables cannot be made into juice
   c. there are no funny vegetables
   d. vegetables may be canned

2. Which of the following is not found in large quantities in vegetables?
   a. oil
   b. carbohydrate
   c. fiber
   d. water

3. Vegetarians typically have to eat a lot of food to get enough:
   a. fat
   b. protein
   c. carbohydrate
   d. alcohol

4. There are 8 essential amino acids necessary for construction of human proteins: Which of the following does not contain all 8 of these?
   a. potatoes
   b. cottage cheese
   c. round steak
   d. milk
   e. pork spare ribs

5. Vegetables may be divided into two groups that contain how many calories per ounce?
   a. 10 calories and 15 calories
   b. 15 calories and 25 calories
   c. 10 calories and 25 calories
   d. 15 calories and 30 calories

6. Match the following:

1.	green beans	_____	a.	10 calories/oz
2.	peas	_____	b.	15 calories/oz
3.	carrots	_____	c.	20 calories/oz
4.	potatoes	_____	d.	25 calories/oz
5.	tomatoes	_____	e.	40 calories/oz
6.	corn	_____		
7.	beets	_____		
8.	zucchini	_____		

MANAGING YOUR BODY WEIGHT FOR LIFE

Chapter 10

Grains…And The Foods Made From Them

David M. Player, MD

Health By Design Program Manual

Chapter 10

GRAINS…AND THE FOODS MADE FROM THEM

Understanding And Managing The Unlimited Varieties

By now, I hope that you have a good working knowledge of fruits and vegetables and their calorie categories. These are, as we have seen, simple carbohydrate foods that can be easily added to diet supplements or other lean protein choices to create an excellent low-calorie diet. If you eliminate the funny fruits (with their high and variable calories), all of the other fruits can be recorded as 15 calories per ounce, while all vegetables are either 10 calories per ounce or 25 calories per ounce. That is about as simple as it can be made. All you and I have to do is to be able to categorize the vegetables correctly (starchy or non-starchy) and to know how many ounces we are eating. The latter takes practice – both in our nutrition labs and at your home. Remember that only as we understand what is in food can we hope to balance our EI/EO equations and stay lean.

In this chapter, we move on to the third major group of carbohydrate foods, the grains – and things made from grains. Actually, some grains (or things that many people think of as grains) were included with the vegetables – specifically corn and beans. In this chapter, we will be dealing with foods made from wheat, oats, rice, cornmeal (and sugar or honey).* Perhaps a

*Sugar and Honey are not grains – but are often added to grains and, therefore, need to be understood as they influence calories of grain foods.

better title for this chapter is "Staples and foods made with staples." The reason that grains, sugar, and honey are lumped together is that all of them begin at about 100 calories per ounce. We rarely eat them "straight" at 100 calories per ounce, however. Most of the time, we add water or oil or other substances to the basic staple item and, thus, significantly change the calories per ounce. One hundred calories per ounce is, of course, much more than are contained in any of the fruits and vegetables, so what we add or subtract from the grain items (and how much we eat) are very important.

WATCH WHAT YOU ADD TO GRAINS

Figure 1.10 shows a basic EI chart showing the staple grain items and sugars plotted at = 100 calories per ounce.

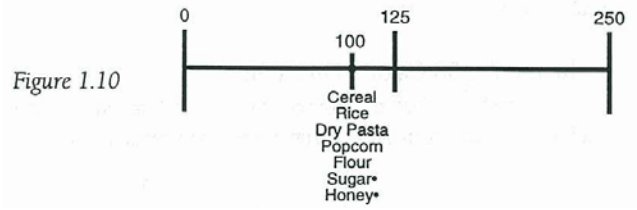


Figure 1.10

Figure 2.10 below shows what happens when we add water and/or fiber to the basic staple:

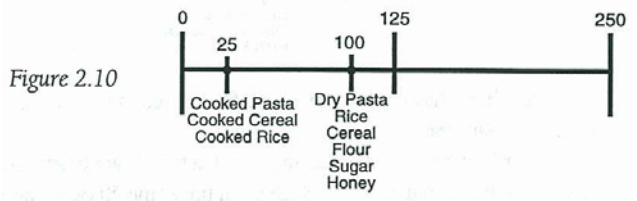
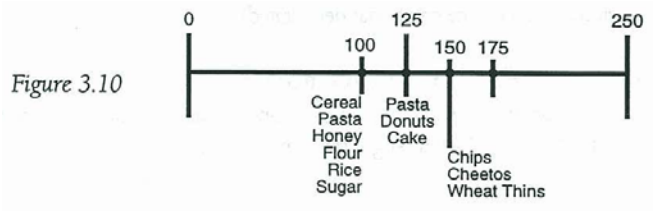


Figure 2.10

Figure 3.10 below shows what happens when we add oil to a basic staple:



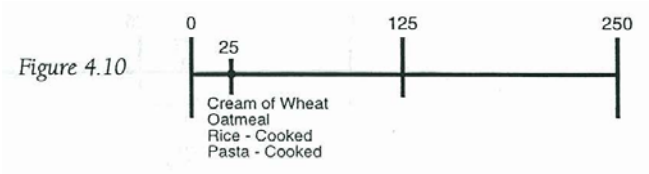
Obviously, whether one adds oil or water to a basic staple makes a big difference in calories per ounce. Those of us with low metabolic rates, then, need to develop a system for evaluating foods made from grains or sugars – with an emphasis upon how the staple item was changed to produce a finished grain product.

THE SIX LANDMARKS OF GRAINS

For me as a middle-aged male physician – any food system needs to be very simple. Grains are a little more complicated than fruits and vegetables (because we can make so many different foods out of grains and sugars). Remember, however, that the modifications depend upon whether more oil or more water is added to the staple, and that the calories per ounce vary either side of 100 calories per ounce (depending upon what is added). I like to think of grain items in 25-calorie increments - varying from as low as 25 calories per ounce to as high as 150 calories per ounce. There are, therefore, 6 landmarks or signposts for grain items: 25, 50, 75, 100, 125, and 150 calories/ounce. There is no need to get any more complicated than this. Your and my job is to learn and remember one or two foods at each marker – generally foods that we eat often. Once we have learned a "classic food" at each level, other less-commonly-eaten foods can be easily categorized with the common ones.

Landmark #1: 25 Calorie/Ounce Items

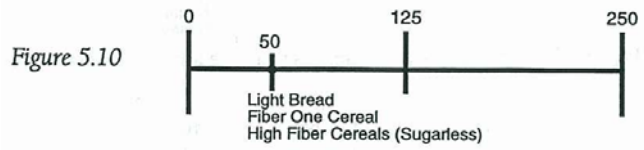
Figure 4.10 again shows a basic chart with only 25 calorie/ounce grain items.



For me, the prototype 25 calorie-per-ounce food is pasta. I like to eat it. It has no fat. It is fairly filling and gives me good energy levels. Pasta – whether spaghetti, linguini, vermicelli, or fettuccine – is my 25-calorie/ounce food. I eat the other items sometimes, but my 25-calorie marker is pasta.

Landmark #2: 50 Calorie/Ounce Items

Figure 5.10 shows the basic chart with 50 calorie-per-ounce items featured. As you can see, this chart is easy, because there really are only three grain items that reside at 50 calories per ounce.

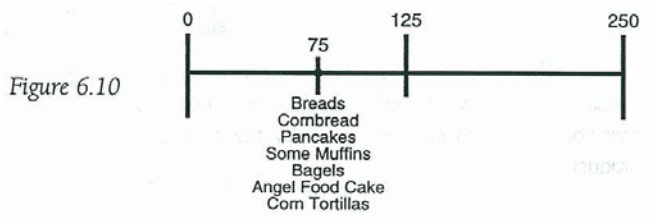


Light bread has a little more air and fiber mixed in than regular bread so its calories are lower than regular bread.

Fiber One and other cereals made with artificial sweeteners and high fiber can get calories down to 50-60 per ounce, so I include them under the 50-calories/ounce yardstick (marker). I cannot think of any other grain items that are 50 calories per ounce (unless you include the spaghetti that you ate last week that has become somewhat dehydrated).

Landmark #3: 75 Calorie/Ounce Items

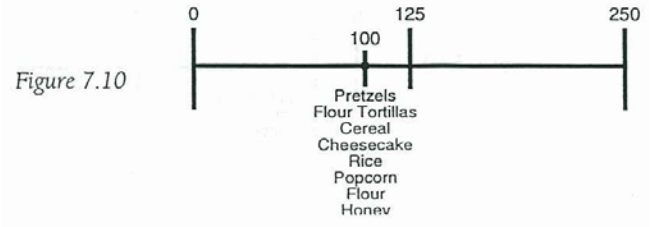
Figure 6.10 shows the 75 calorie-per-ounce grain items – usually products that are made with milk, flour and a little sugar – but almost no oil.



These items tend to be a little dry, and we therefore usually add something to them (sauces, fruit, jelly, syrup, spreads, etc.) – all of which raise the calories per ounce. But basically, they are low-calorie grain items because they contain no oil. My own prototype food at this calorie level is regular bread – since I eat some of it every day as a part of a sandwich. You may eat pancakes or corn tortillas every day and need to make these your representative 75-calorie food. A few items (like muffins) may float between 75 and 100 calories per ounce – depending upon their oil content. In this case, you and I just have to have some intuition concerning what went into the making of the muffin. A rough guideline goes like this: If it tastes good and slides down easily, it probably has close to 100 calories per ounce. If it tastes yucky and takes 10 minutes to chew, it is probably closer to 75 calories per ounce. Seriously, it is difficult to know how much oil was added to make a certain kind of muffin or other grain item. When in doubt, always use the higher number of calories per ounce in your records.

Landmark #4: 100 Calorie/Ounce Items

Figure 7.10 shows the 100 calorie-per ounce items plotted on the basic graph.



As we have said before, 100 calories per ounce is the level of staples like cereal, flour, sugar, honey, rice, popcorn, etc. Most of these are things that we do not eat by themselves, but we mix them with other stuff to improve their taste. Mixing them with other stuff usually changes their calories per ounce – often to levels above 100 calories/ounce. There are, however, a few 100-calorie items that you and I would sit and eat (without much modification) at the kitchen

table. The prototype food for me is breakfast cereal. I eat cereal quite a lot because it is easy to fix and tastes good. So – when I think 100 calories per ounce, I think cereal. Someone elsewhere in South Texas might say that his prototype 100-calorie food is flour tortillas. Although both foods are 100 calories/ounce, you and I are probably more likely to eat 1 to 2 ounces of breakfast cereal (for 100 to 200 calories) than we are to eat 1 to 2 ounces of flour tortillas (for 100 to 200 calories). This is, of course, because an average flour tortilla weighs 1½-2 ounces – and who eats just one flour tortilla?? I cannot begin to tell you how many times I have eaten 3, 4, or even 5 flour tortillas during a Mexican meal – while I would rarely eat more than 2 ounces of breakfast cereal at a time. (Flour tortillas also contain lard or oil while most cereals have almost no oil.) The teaching point again is that knowing the exact calories per ounce is not as important as knowing how many ounces you ate. We should all, however, have a good idea which foods that we eat frequently are at each calorie level – especially when we eat things that are 100 calories per ounce or more. As you can see, cheesecake really has only about 100 calories per ounce (often less). The problem with cheesecake is that it is heavy – a tiny piece weighs a lot – so calories mount up quickly.

Landmark #5: 125 Calorie/Ounce Items

Figure 8 shows the 125-calorie per ounce items laid out on the standard scale.

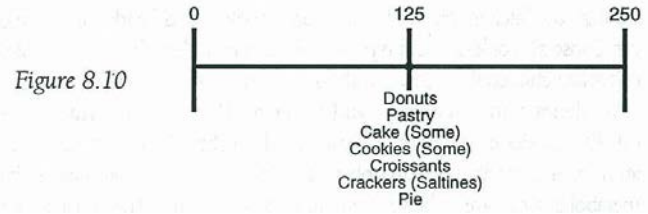


Figure 8.10

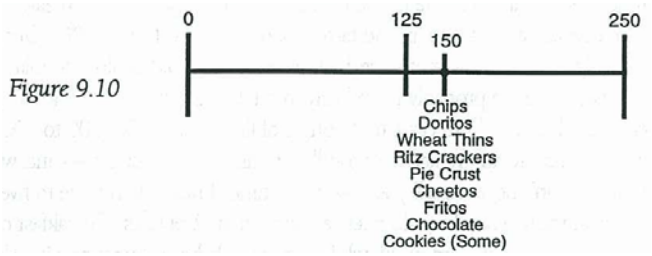
As you can see, 125 calories/ounce includes some good-tasting stuff. The reason that these foods are so appealing is that they all contain oil, margarine, or butter – mixed with one of the basic staples. There is something about mixing oil with sugar and flour that gives extra pizazz to foods – and unfortunately, such foods become calorie-dense at 125 calories/ounce or more – depending upon how much oil is added (or how much water was subtracted). Doughnuts and Danish rolls are my prototype foods at 125 calories/ounce. I do not eat very many of them (because of my low-metabolic rate), but I have a really good idea of what 3 ounces of donut looks like. Lumping all of these items at 125 calories per ounce is rather simplistic, since the specific recipe used is such an important issue. The more butter or oil used in preparation, the higher the calories per ounce. For instance, some cakes are only about 100 calories/ounce, but by the time you add the icing (which contains butter or margarine), the calories have risen to 125 per ounce. Some cakes (like German Chocolate and carrot cakes) are unique because of their very rich icings, and may – because of the icings and nuts – reach values of 135-140 calories per ounce. Pounds cake contains more oil than other cakes, and even without icing may be 135-140 calories/ounce. For your and my records, however, 125 calories/ounce is a nice average and is probably very accurate – unless you are eating lots and lots of a single item that is above or below this level. If you are eating 5 ounces of carrot cake (140 calories/ounce) every day – you had probably better use 140 calories/ounce in your records.

Landmark #6: "The Biggies" at 150 Calorie/Ounce

Finally, we come to the biggies – the grain items that reach 150 calories per ounce. Obviously, to take a staple 100-calories/ounce item and get it up to 150 calories per ounce, you have to add a lot of oil. In addition, however, you need to dehydrate it somewhat so that the

milk or water in the recipe has been removed. This process, of course, makes the item more dense and raises the calories per ounce (since added water – at zero calories per ounce – always lowers the calories per ounce in any food to which it has been added). Subtracting the water from an item made out of flour, sugar, and oil raises the calories, then.

Figure 9.10 below shows the 150-calories/ounce items laid out on the standard scale.



As you can see, there are some really great tasting things in this list. Many of them tend to be addictive foods – eating a little bit leads to eating a lot because of our sensory responses to chemicals or combinations of chemicals in the foods (We will discuss this in more detail in a later chapter.) For this reason as well as because of their high caloric content, these foods cannot be eaten very often by those of us with low resting metabolic rates.

My two prototype foods at this level are chips and cookies – because I have eaten lots and lots of these items throughout my life. (If I had known what was in them and had understood my unique metabolism better, I might not have eaten quite so many.) One of the problems with this type of food – besides the addictive issue discussed above – is the volume of them that can be eaten quickly. I can eat 4 or 5 ounces of chips in no time (and have many times). Think of the times that you have walked through the kitchen, grabbed a half-dozen cookies, and headed to some other room or out to the car. Those six cookies could typically be downed in less than five minutes. If they are fairly rich chocolate chip cookies – made with lots of butter - at 150 calories/ounce, you would have packed away 900 calories in five minutes – and still be ready to eat more. Think how long it would take you to eat 900 calories of apples – or 900 calories of zucchini. (We would probably not be able to do it in an hour – possibly could not physically do it at all.) The point here is that those of us with low metabolic rates have to be very careful with these items. They have a tremendous potential to stimulate addictive eating behaviors, and they can be consumed quickly and in high volumes – probably because they contain so little water and, therefore, do not take up much space in our stomachs and intestines in spite of their very high caloric energy content.

Hopefully, the above discussion has given you an organized approach to items that we commonly eat that are made out of grains and staples. They are more complex calorically than fruits and vegetables – but understandable if you keep it simple and always ask yourself how the particular grain item was prepared – specifically, how much oil was added. As always, the most important thing to know is how many ounces you ate. Splitting hairs over whether a certain item is 90 calories per ounce or 105 calories per ounce really is not that important if you are keeping records of your energy balance.

CAN PASTA BE OUR PROTEIN SOURCE?

Finally, we should ask (as we did with fruits and vegetables) whether our grain items can be used to provide our daily protein requirement. You who like pasta might say, Dave, I would like to eat lots of pasta on my diet. Can I get my protein in pasta? It turns out that most grain items, after they are cooked or refined, have about 1 gram of protein per ounce. Wet pasta (at 25 calories per ounce) contains less than one gram of protein per ounce. Therefore, if your 24-hour urine urea study suggests that you need 80 grams of protein per day, you would need over

80 ounces of wet pasta to achieve your goal (nitrogen balance). If you have not yet done the conversion, 80 ounces is about 5 pounds of wet pasta. That is a lot of pasta. I would be so packed out with pasta that I would be lucky to get out of my chair.

Breakfast cereals may contain 2 to 3 grams of protein – but even 2 big bowls of Special K or Wheaties would only give us 8 to 10 grams of protein – a far cry from what we need in a day. By the way, if you did your calculations, you found that 80 ounces of wet pasta was 2000 calories of pasta – an amount far greater than most of us with low metabolic rates can eat and still lose (or maintain) our current body fat. I hope that you are getting the idea that grains are not a prominent protein source. Actually whole grain may have 3 grams of protein per ounce before we start messing around with it. However, by the time it is refined, wetted, oiled, and cooked, that protein has been diluted out, and we have to eat a "ton of ounces" to meet our protein requirements.

Someone once asked me whether he could get all of his protein with potato chips. Since chips contain less than one gram of protein per ounce and 150 calories per ounce, I showed him that an 80-gram protein requirement could be met with about 5 pounds of potato chips (or 12,000 calories per day of potato chips). Clearly, potato chips are not a good dietary protein source (unless you chop wood all day in the north woods). Even then, the amino acid content of grains is not balanced enough to meet all of our needs, and we would be unable to make certain vital body proteins if all we ate was pasta, or cereal, or chips.

In the next chapters we will finally get into those foods that have good protein content – namely dairy products, meats, and eggs. For now, most of you will be using diet supplements as your primary protein source and adding small amounts of 15 calorie/ounce fruits or 10 calorie/ounce vegetables for extra carbohydrate. Grains are an excellent carbohydrate source, but for those of us with low metabolic rates who are trying to lose body fat, they pose a dilemma. They contain a relatively large number of calories per ounce, and are often cooked with oil or butter. In addition, they can be eaten quickly in high volumes and can thus be very destructive to someone who is trying to use up his extra body fat. They are certainly a part of good nutrition for all of us, but those of us with low metabolic rates must eat them carefully and be able to estimate fairly closely both calories per ounce and – more importantly – numbers of ounces eaten.

“Tell Him So”

If you hear a kind word spoken
  Of some worthy soul you know,
It may fill his heart with sunshine
  If you only tell him so.

If a deed, however humble,
  Helps you on your way to go,
Seek the one whose hand has helped you,
  Seek him out and tell him so!

If your heart is touched and tender
  Toward a sinner, lost and low,
It might help him to do better
  If you’d only tell him so!

Oh, my sisters, oh my brothers,
  As o’er life’s rough path you go,
If God’s love has saved and kept you,
  Do not fail to tell men so!

Unknown

STUDY QUESTIONS

Chapter Ten – Grains…And The Foods Made From Them

1. Staple grain items typically give us about _____ calories per ounce. (25, 50, 75, 100)

2. When oil is added to staple/grain items, calories per ounce may rise as high as _____. (50, 75, 100, 150)

3. When water is added to staple/grain items, calories per ounce may drop to as low as _____. ((25, 50, 75, 100)

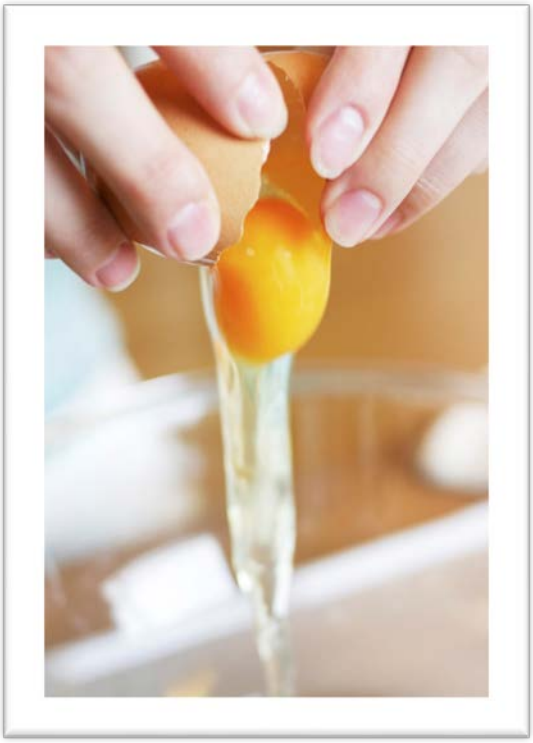
4. Removing water from an item _____ its calories per ounce. (raises, lowers)

5. The majority of the calorie content in grain items is _____.
   a. fat
   b. carbohydrate
   c. protein
   d. alcohol

6. There are 8 essential amino acids necessary for construction of human proteins. Which of the following does not contain all 8 of these amino acids?
   a. cottage cheese
   b. Wheaties
   c. round steak
   d. eggs
   e. chicken fried steak

7. Match the following:

1.	potato chips	a.	25 cal/oz
2.	flour tortillas	b.	50 cal/oz
3.	wet pasta	c.	75 cal/oz
4.	oatmeal	d.	100 cal/oz
5.	pancakes	e.	125 cal/oz
6.	Danish rolls	f.	150 cal/oz
7.	Ritz crackers	g.	175 cal/oz
8.	breakfast cereal	h.	200 cal/oz
9.	light bread		
10.	donuts		
11.	corn tortillas		



MANAGING YOUR BODY WEIGHT FOR LIFE

Chapter 11

Things from Cows and Chickens

David M. Player, MD

Health By Design Program Manual

Chapter 11

THINGS FROM COWS AND CHICKENS

A Protein Source

Until now, our discussion of EI (energy intake) has centered on foods that are composed principally of carbohydrate, fiber, and water. As we have seen, none of these foods are particularly good protein sources. They are good energy sources and taste pretty good, but they do not do a good job of replacing our urea nitrogen losses. By now, all of you who are reading this should have collected a 24-hour urine for urea and know that each day (especially when you are cutting back on calories), you are losing 6 to 12 grams of nitrogen in your urine, sweat, and stool. This nitrogen must be replaced with dietary protein, (there is no nitrogen in carbohydrate or fat) and as we have seen, it is extremely difficult to replace this lost nitrogen with fruits, vegetables, and grains.

In this chapter, we will begin to look at foods that contain abundant protein. These are foods that must be eaten if we are to maintain healthy structure and biochemical function. Unfortunately, many of these high protein foods also contain abundant amounts of fat. This, of course, makes them particularly dangerous for those of us with low metabolic rates who are living in a sedentary culture. As we approach them, therefore, we must be cautious and very educated as to the relative amounts of protein and fat that are present in a given food. Only in this way can we hope to maintain ideal body composition and healthy tissues.

As you read this, most of you will have been eating the majority of your protein/nitrogen in the form of diet supplements. These products contain a variety of nutrients, but their basis is a mixture of egg whites and a predigested dairy protein called caseinate. These palatable mixtures can meet all of our daily protein requirements in a very small volume, with minimal fat and low carbohydrate load. In a sedentary world, such protein sources are ideal and allow us to meet our protein needs with a small total calorie intake. This is, of course, especially important for those of us who require few calories to meet our energy needs (low metabolic rate), whether the problem be genetic or acquired. Diet supplements may be convenient and excellent nutritionally, but we as humans will often have opportunity and desire to consume other protein sources as well. This chapter, then, will cover dairy products and eggs – the two sources of protein in most good diet supplements – and important potential protein sources for all of us.

FLUID OUNCES VS. WEIGHT OUNCES

Dairy products are somewhat more difficult to discuss than fruits, vegetables and grains because they are so diverse in fat content and come to us in both liquids and solids. One of the first things you and I will notice about them is that they are often measured in gallons, quarts, pints, cups, and fluid ounces - in other words - in volume rather than weight measurement. Now, if you are talking about very “liquidy” stuff like skim milk, a fluid ounce is a weight ounce (one fluid ounce of water weighs one weight ounce). However, if you are talking about ice cream or yogurt or whipped cream, one fluid ounce will undoubtedly weigh less than one weight ounce. If the container label records the product’s calories per fluid ounce, the calories per weight ounce will be greater (ice cream or whipped cream) because a “filler substance” (air) causes an ounce to take up more space.

This principle is similar to that discussed in Chapter 3 when we talked about human beings (of different muscle, bone, and fat composition) who take up different amounts of space (volume) in the underwater tank in spite of their having identical weights. Ice cream, skim milk, and whipping cream all have different densities because of their different fat, water, and air content. It is a little confusing, but as you use these foods in your laboratories, I think that you

will get good at understanding the principle. Practically speaking, you and I need to know what 2 fluid ounces of ice cream or skim milk, or whipped cream looks like in a bowl or glass. When you and I eat 4 weight ounces of Haagen Dazs ice cream, we are eating 15-20% more calories than the calories per ounce on the label would suggest (fluid ounces).

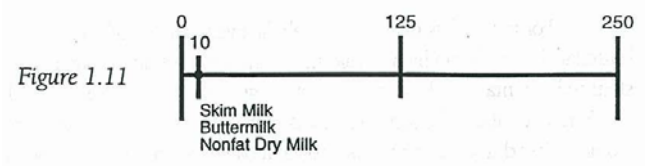
WHAT DOES "LOWFAT" MEAN?

Now that we have beaten that topic to death, there are a couple of other "rules" about dairy products that make them interesting and a little confusing. At your grocery stores, you will frequently see dairy products that are labeled "light" or lite", while others are labeled "low fat." These products are very different – both in fat content and nutritional value. Low fat dairy products are always made from skim milk (milk from which the natural butter fat has been removed). As such, low fat products are always lower in fat grams and fat content than similar products made with whole milk.

"Lite" or "light" products, however, may be made with either skim milk or whole milk (regular fat content), but may also contain lots of air or water whipped in and, therefore, contains few calories per ounce. They also, of course, contain less protein and carbohydrate per ounce, and may therefore be somewhat of a "nutritional rip-off" – especially if they cost more (which they usually do). Most of us would prefer not to pay our hard-earned dollars for water or air – two commodities that usually are very inexpensive.

Dairy products – like fruits, vegetables, and grains – can be organized into groups of multiples of 5, 10, 25, and 50 calories. For purposes of record keeping and organization, we can (as we did with grains) pick out a "prototype food" that we eat more often – and categorize less-commonly-eaten foods under this main item in each calorie group. As with grains, dairy items begin at very low levels of calories per ounce, and may rise to very high levels of calories per ounce. As you might expect, the variable that changes the calories per ounce is "how much oil is added" to the basic protein and carbohydrate of the food to give it its final calorie content?

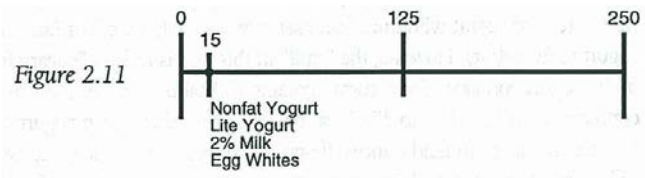
Figure 1.11 below shows the basic calorie graph with the lowest calorie dairy item plotted in its place.



Milk

As you can see, skim milk is the lowest calorie dairy item. You and I can buy skim milk in cartons or bottles at our store and it gives us only about 10 calories per ounce. Reconstituted nonfat dry milk would provide the same number of calories (10 calories per fluid ounce.) (Dry milk without water actually is 100 cal/oz.) Buttermilk is really a misnomer since it contains no butter and little fat. I have never acquired much of a taste for it, however, so I never think about its calories per ounce.

Figure 2.11 shows items that provide 15 calories per ounce.



Yogurt

My prototype food here is probably low-fat regular yogurt, although I occasionally drink 2% milk. Milk all tastes about the same to me, and since an 8 ounce glass of skim milk gives us only 80 calories and an 8 ounce glass of 2% milk provides 120 calories, I would rather drink the calories in skim milk and save the other 40 for some solid, better-tasting food. The "lite yogurt" might taste a little better to me than the regular low-fat yogurt, but it bugs me that I am getting ripped-off nutritionally and financially by the manufacturer (because of the added air and water in "lite" stuff, so I usually cannot bring myself to buy the lite yogurt. (I know that by now you think that I am a little nuts and pretty cheap!)

Eggs

Eggs are generally found in the dairy section of your grocery, although cows have little in common with chickens (except that they are both usually raised on a farm). We will, therefore, include eggs and egg whites in this chapter's foods. Eggs, like dairy products, are combinations of protein and fat, and they are, therefore, appropriate to this discussion anyway. As you can see, egg whites give us about 15 calories per fluid ounce – when eaten by themselves without the yolks. I know that most of you who read this are not wild about egg whites, but they are a "pure protein" food and have a perfect amino acid content for human beings. Many of our patients here at Health by Design, therefore, buy them in bulk and make egg-white omelets or mix them with diet supplements. When eaten in this way, they give us about 15 calories per ounce. A typical medium whole egg (with the yolk given to the dog or thrown away) will yield a little over 1 ounce of egg white (15 to 20 calories).

Figure 3.11 below shows the usual scale with whole milk listed as the only 20 calorie per fluid ounce item.

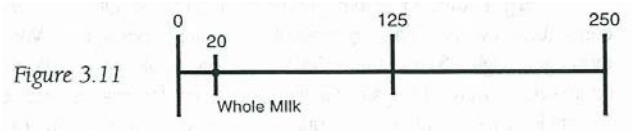


Figure 3.11

For most of us, with low metabolic rates whole milk (containing all of the native butterfat) is simply too high in calories to drink as a routine protein choice. A 10-ounce glass of skim milk containing 10 grams of protein gives us 100 calories while the same 10 ounce glass of whole milk contains the same 10 grams of protein but gives us 200 calories of energy. Personally, I would rather drink the skim milk and eat a bag of pretzels for the other 100 calories.

Frozen Yogurt

At 25 calories per ounce, we find a variety of dairy items (see figure 4.11 below) – the prototypes for me are regular yogurt with fruit or frozen yogurt. Frozen yogurt is an excellent dessert substitute for regular ice cream, since some varieties taste nearly as good as ice cream but contain little fat and as little as one-third the calories of high-fat ice creams. Frozen yogurt, however, (as we will discuss later) cannot really be compared with cottage cheese and the other dairy items listed at 25 calories per ounce when it comes to protein content. Frozen yogurt contains very little protein, but it sure tastes great and is very satisfying. This type of dairy dessert is really, then, a carbohydrate food (sugar) and varies from as low as 20 calories per ounce for the "no fat" varieties to as many as 30 calories per ounce for those containing a gram or two of fat per ounce. For your records – call all frozen yogurt 25 calories per ounce, and you will not be far off, over the long haul. In the case of regular yogurt with fruit, fruit itself provides only 15 calories per ounce (and could not raise low-fat yogurt to 20 calories per ounce).

However, the "fruit" in this case is really a "sugary fruit syrup" in the bottom of the yogurt container. Since sugar contains 100 per ounce, it raises the low-fat yogurt in the container from 15 calories per fluid ounce to 25-30 calories per fluid ounce. Remember that frozen yogurt and low-fat yogurt with fruit are measured in fluid ounces. If you weigh these on a scale (solid weight measurement), you will underestimate your calories (5 weight ounces of frozen yogurt at 25 calories per fluid ounce is really 7 fluid ounces).

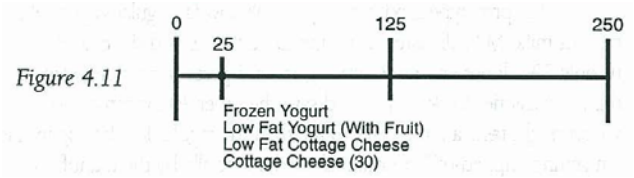


Figure 4.11

Low-fat cottage cheese is made with skim milk, so it is included here at 25 calories per ounce. Regular cottage cheese is made with whole milk so that it usually gives us 30 calories per ounce. In fact, regular cottage cheese (3-4% butterfat) is really the only dairy product that consistently gives us 30-35 calories per ounce. Personally, I think that the low-fat variety tastes just as good so I would rather save the calories in the high fat stuff and eat a few extra ounces of frozen yogurt later in the day.

At 50 calories per ounce, we have just a few dairy items. The prototype for me is soft regular ice cream – the not very expensive brands. I do not eat as much ice cream as I used to (because of the availability of frozen yogurt), but when I eat it, I usually call it 50 calories per ounce. Remember that 50 calories per ounce is only accurate for frozen custard and inexpensive ice creams. The expensive brands (Blue Bell, Haagen Dazs, etc.) contain more fat and often give us 75-80 calories per ounce. Figure 5.11 below shows a few of the other 50-calorie-per-ounce foods.

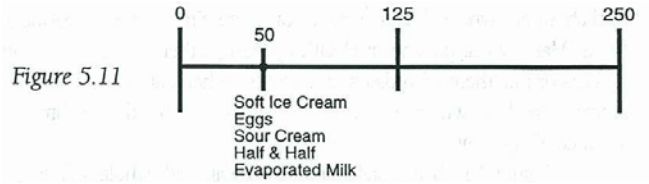


Figure 5.11

Eggs in their liquid form give us about 50 calories per ounce. Of course, we do not eat eggs by the ounce (unless we are eating egg casseroles at church suppers, etc.). We eat eggs by the egg, and most eggs weigh 1½ to 2 ounces. So a whole egg usually gives us 80-100 calories – depending upon its size. However, if you are at a neighbor's house for breakfast and are served a pile of eggs (scrambled), you could take an educated guess at 50 calories per ounce. The other items (sour cream, half & half, and evaporated milk) I do not eat very often, so I do not pay much attention to their calories per ounce. If you eat a lot of them – learn them. Otherwise, do not waste your brain cells. (You need them to remember more important things).

Cheese

At 75 calories per ounce, the primary dairy product is low-fat cheese. These cheeses (like Mozzarella) are made with skim milk and, therefore, give us fewer calories than their whole-milk-produced cousins – the regular cheeses. This gets confusing because there are also some "light" cheeses at 75 calories per ounce. These products (like those "lites" previously

discussed) may contain more air or water, thus diluting out the protein, fat, and carbohydrate in the regular cheese. The result is a product of less nutritional quality per dollar – but, nevertheless, a 75-calorie per ounce dairy product! For your records, the prototype foods at 75 calories per ounce are low-fat cheeses or light cheeses. Remember that cheeses are measured in weight ounces rather than in fluid ounces, so you can weigh a portion of cheese on a small scale and be accurate.

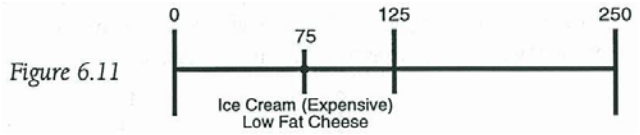


Figure 6.11

Figure 6.11 above shows these items plotted on the regular scale. The important thing to remember here is that a little bit goes a long way. At 75 calories per ounce you can accumulate a lot of calories quickly. In your laboratories, you should concentrate on knowing how one or two ounces of Mozzarella cheese looks and feels.

100 calories per ounce is the domain of cheese. Almost all cheese made with whole milk gives us about 100 calories per ounce. We with low metabolic rates need to be very careful with high-fat cheeses. They are salty and taste great and slide down pretty easily. Some patients eat cheese addictively and need to treat it as a "no-no" because of this addictive potential. As you can see in Figure 7.11 (below), there really is not much difference between processed cheese, cream cheese, and solid cheese. They all give us about 100 calories per ounce – and can give us lots of nutrition quickly.

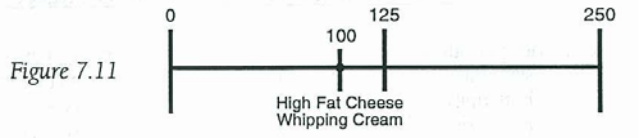


Figure 7.11

Stick To Non-Dairy Toppings

The other important 100-calorie per ounce dairy item is whipping cream. Like eggs, it appears in various calorie categories – depending upon how we eat it. In its natural state, it gives us 100 calories per ounce. However, when it is whipped, one ounce of whipping cream becomes 2 fluid ounces of whipped cream (because of retained air). When one ounce of whipping cream is mixed with one ounce of skim milk, we get "half & half" at 50 calories per fluid ounce. Just remember that whipping cream is a high fat food and can get us low-metabolic-rate folks in big trouble fast. Thank goodness for the non-dairy toppings like "dream whip" that taste much like whipped cream but contain little if any fat. Such items can taste pretty good at only about 15 calories per fluid ounce. Cool Whip and other non-dairy whipped toppings typically give us about 25 calories per fluid ounce – very similar to whipped cream. They differ only in convenience – Cool Whip comes "ready to eat" while whipping cream must be whipped in your kitchen.

At 125 calories per ounce, we see only one dairy item – sweetened condensed milk. This stuff is really dehydrated, sweetened milk. The sugar actually "lowers" the calories per ounce since sugar gives us 100 calories per ounce. So this is thick, sweet milk – typically used in baking (I do not routinely drink it for breakfast). As I have said before, if you do not routinely drink or eat it, do not worry about computing it. I include it here for completeness (and to fill in the gap between 100 and 150 calories per ounce). Figure 8.11 below shows this food on the usual graph.

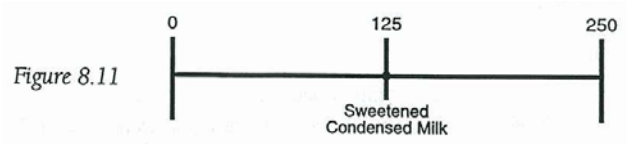


Figure 8.11

Above 125 calories per ounce, we get into some foods that are variations of margarine and butter. Butter and margarine both give us 200 calories per ounce and would be like pure oil at 250 calories per ounce were it not for added water that brings the calories down to 200 per ounce. At 150 calories per ounce, then, we see only one food – light or whipped margarine or butter. As you have probably guessed by now, the calories per ounce have been reduced by whipping in air (just like the story with whipped cream). Figure 9.11 below shows these relationships. As you can see, there are not any 175 calorie per ounce items, so above 100 calories per ounce, all we have is sweetened condensed milk at 125 calories per ounce, light or whipped butter at 150 calories per ounce, and butter or margarine at 200 calories per ounce. These items give us 200 calories per ounce – whether they come in a stick, a tub, or a bag – and those of us with low metabolism need to be very careful with all of these foods.

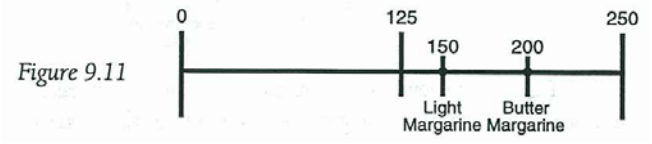


Figure 9.11

At this point, it is appropriate to discuss protein content of these various dairy products since dairy protein is a major nitrogen source for many of us. Figure 10.11 below shows the entire group of dairy products organized by calorie groups. Beside each item is a parenthesis that contains the usual grams of protein per fluid ounce of these products.

Figure 10.11

Dairy Product (Protein values in grams per ounce)

10 calories per ounce		50 calories per ounce	
Skim milk	(1)	Soft ice cream	(0.5)
Buttermilk	(1)	Eggs	(3.5)
Nonfat dry milk	(1)	Sour cream	(1)
		Half & half	(1)
15 calories per ounce		Evaporated milk	(2)
Nonfat yogurt	(2.5)		
Light yogurt	(2.5)	75 calories per ounce	
2 percent milk	(1)	Ice cream – rich	(0.5)
Egg white	(3)	Low fat cheese	(7)
20 calories per ounce		100 calories per ounce	
Whole milk	(1)	High fat cheese	(7)
Regular yogurt	(2.5)	Whipping cream	(2)
		Cream cheese	(2)
25 calories per ounce			
Frozen yogurt	(0.5)	125 calories per ounce	
Low fat yogurt w/fruit	(2.5)	Sweetened condensed milk	(3)
Low fat cottage cheese	(3.5)		
Regular cottage cheese		150 calories per ounce	
30 cal/oz	(3.5)	Margarine	(0)
		Butter	(0)

SO, WHAT'S YOUR BEST CHOICE?

As you can see, we begin with skim milk at 1-gram protein per fluid ounce. This is obviously (along with other items made from skim milk) your best buy in grams of protein per calorie. An 8-ounce glass of skim milk gives you 8 grams of protein for only 80 calories. (The only food better than this is our own diet supplement at about 11 grams of protein per 80 calories.) 2% milk and whole milk and chocolate milk all give us 1 gram of protein per ounce, but the calories provided are obviously higher than those of skim milk. Low fat yogurt gives us about 2½ grams of protein at only 15 calories per fluid ounce. Regular yogurt gives the same 2½ grams of protein at 20 calories per ounce. Low-fat cottage cheese is a good protein buy at 3½ grams of protein per ounce at only 25 calories per ounce. Regular cottage cheese likewise gives us 3½ grams of protein per ounce, but is higher in calories at 30 calories per fluid ounce. As I commented earlier, frozen "yogurt" is really a sugar food and contains only ½ gram of protein per ounce at about 25 calories per ounce. It is not a good protein buy (but it sure tastes great). Ice cream really is not much better, however, at only ½ - 1 gram of protein per ounce in 50-80 calories per ounce. I would not consider ice cream to be a great protein source. In fact, if you needed 80 grams of protein per day to match your urea output, you would have to eat 80 ounces of Haagen Dazs to do it. (If you have not done the math yet, that is 6400 calories of Haagen Dazs, or close to 2 pounds of stored fat on your buttocks.)

Cheese is a good protein source at 7 grams protein per ounce. The low-fat cheeses like mozzarella are a better calorie buy at only 75 calories per ounce. The high fat cheeses give you the same 7 grams protein in 100 calories per ounce. Cream cheese is a protein "rip-off" – giving us only 2 grams of protein per ounce in spite of giving us the same 100 calories per ounce as the high fat solid cheeses. Obviously, we know where the other calories come from if they do not come from protein. That is right – cream cheese contains more grams of fat per ounce than

regular cheese. Calories provided per ounce are the same, but protein grams per ounce are much lower in cream cheese.

Whipping cream contains 2 grams of protein per ounce, but at 100 calories per fluid ounce, it is not a good protein "buy". Sweetened condensed milk gives us 3 grams of protein per ounce, but at 125 calories per ounce, we would need to eat about 3500 calories to get our daily protein needs from this food. Butter and margarine contain no protein. They are dairy products, but they contain only the fat from the milk – none of the protein part.

Eggs, as I have said before, are unique and are included with dairy products but, in fact, have nothing to do with cows. Egg whites are pure protein and give us about 15 calories per ounce. A whole egg, however, usually weighs about 2 ounces – one of which is "whites" (3½ grams of protein) and one of which is yolk (3½ grams of protein, 7 grams of fat). A whole egg, therefore, usually gives us about 7 grams protein and 7 grams fat – quite a lot of protein for only 80 –90 calories – but too much fat to eat for an "everyday" source of protein.

In summary, dairy products and eggs are mixtures of protein, fat, and carbohydrate in varying proportions. They are potentially very nutritious foods and may form the basis for nitrogen balance (protein nutrition) for many people, especially ovo-lacto vegetarians. Nevertheless, they are also potentially high sources of fat and can give us large numbers of calories quickly. Although they are more difficult to learn than fruits, vegetables, and even grains, they can be organized into calorie groups in multiples of 5s and 25s as we have done above. The important things for you to remember are to pick a prototype food that you are most likely to eat at each level and to avoid wasting time memorizing calorie and protein values for things you never eat. Remember also, as in the other chapters, that you are much more likely to mess up on numbers of ounces or fluid ounces than you are on calories per ounce. Practice in your nutrition labs and in your homes. You will be surprised at how easy it becomes after you have worked with these interesting foods for a while.

“A Psalm of Life”

Tell me not, in mournful numbers,
Life is but an empty dream! –
For the soul is dead that slumbers,
And things are not what they seem.

Life is real! Life is earnest!
And the grave is not its goal;
Dust thou art, to dust returnest,
Was not spoken of the soul.

Not enjoyment, and not sorrow,
Is our destined end or way;
But to act, that each tomorrow
Find us farther than today.

Art is long, and Time is fleeting,
And our hearts, though stout and brave,
Still, like muffled drums, are beating
Funeral marches to the grave.

In the world’s broad field of battle,
In the bivouac of life,
Be not like dumb, driven cattle!
Be a hero in the strife!

Trust no Future, howe’er pleasant!
Let the dead Past bury its dead!
Act, - act in the living Present!
Heart within, and God o’erhead!

Lives of great men all remind us
We can make our lives sublime,
And, departing, leave behind us
Footprints on the sands of time.

Footprints, that perhaps another,
Sailing o’er life’s solemn main,
A forlorn and shipwrecked brother,
Seeing, shall take heart again.

Let us then be up and doing,
With a heart for any fate;
Still achieving, still pursuing,
Learn to labor and to wait.

Henry Wadsworth Longfellow

STUDY QUESTIONS

Chapter Eleven – Things From Cows And Chickens

1. Typical diet supplements contain:
   a. carbohydrate and protein
   b. carbohydrate and fat
   c. protein and fat
   d. protein and alcohol

2. Skim milk contains:
   a. carbohydrate and protein
   b. carbohydrate and fat
   c. protein and fat
   d. protein and alcohol

3. Cheeses typically contain:
   a. carbohydrate and protein
   b. carbohydrate and fat
   c. protein and fat
   d. protein and alcohol

4. Dairy products differ from grains, fruits, and vegetables in that they:
   a. Are measured in “fluid” rather than “weight” ounces
   b. Contain much more protein per ounce
   c. Contain more fat per ounce
   d. Come from cows
   e. All of the above

5. The sign at the yogurt shop says “low-fat yogurt – 20 calories per ounce.” The clerk fills up a “small” cup, which on the scale weighs 5 ounces. What can be said about the calories in the cup?
   a. 100 calories
   b. less than 100 calories
   c. more than 100 calories
   d. more than 200 calories

6. When whipping cream is “whipped”, its calories per ounce _____. (rise, drop, remain the same)

7. “Low-fat” dairy products are made with _____ milk. (whole, skim)

8. “Lite” dairy products are made with _____ milk. (whole, skim)

9. Which is true of “lite” dairy products?
   a. They are made with skim milk.
   b. They are a better nutritional value than “low-fat” dairy products.
   c. They are a nutritional rip-off.
   d. They are higher in protein than “low-fat” products.

10. Dairy products vary in calories per fluid ounce between what two extremes?
    a. 25 and 250 per ounce
    b. 10 and 200 per ounce
    c. 20 and 150 per ounce
    d. 0 and 250 per ounce

11. Match the following:

a.	5	_____	1.	butter
b.	10	_____	2.	regular cottage cheese
c.	14	_____	3.	Blue Bell ice cream
d.	20	_____	4.	skim milk
e.	25	_____	5.	low-fat milk
f.	30	_____	6.	whole milk
g.	50	_____	7.	frozen yogurt
h.	75	_____	8.	sweetened condensed milk
i.	100	_____	9.	regular cheese
j.	125	_____	10.	low-fat cheese
k.	150	_____	11.	eggs
l.	200	_____	12.	whipped margarine
		_____	13.	chocolate milk

MANAGING YOUR BODY WEIGHT FOR LIFE

Chapter 12

The “Meat” of the Book

David M. Player, MD

Health By Design Program Manual

Chapter 12

THE "MEAT" OF THE BOOK

More Protein Possibilities

In the past 3 chapters, we have dealt with items that consist mainly of carbohydrates (fruits, vegetables, and grains) and items that consist of mixtures of protein and fat (dairy products and eggs). In this chapter, we shall complete our look at the major components of energy intake with a discussion of meats. Keep in mind our basic balance diagram as you think about these foods:

Throughout this course, almost all who read this will be attempting to create an imbalance between EO and EI – such that EO is always heavier than EI. Our diagram has to look like this if we hope to lose body fat:

The one component of EO that varies with our diet is the thermic effect of food on digestion. This component demands that you and I maintain a constant good protein intake if our metabolism is to remain good – and fat loss is to occur at a constant rate. (See Chapters 2, 3, and 4 of this manual.) For most of you, protein intake has for most of this course consisted of caseinate/egg white diet supplements. These excellent foods provide high-biologic-quality protein in a palatable form – with few total calories. The last chapter and this one expand our protein possibilities to a broad variety of dairy products and meats – often excellent sources of dietary nitrogen (protein). The problem (as we saw last chapter) is that these excellent proteins often arrive at our plates with an abundance of fat – making it difficult, if not impossible in a sedentary world, to lose (or even maintain) body fat. Our challenge, then, is to understand these protein sources and their preparation so well that we can selectively eat them and still lose body fat – if we desire.

It has been observed by some historians that societies that eat more meat have been more dominant and have held sway over societies that were vegetarian or were relegated to eating non-meat protein choices. Whether this is true or not, meats have been the major protein source of our nation over its 200-year history. I assume that this will continue to be true on into the foreseeable future.

THE THREE CHARACTERISTICS OF MEATS

Whenever we consider calories or grams of protein or fat in a certain meat, there are 3 basic characteristics of the meat that must be considered. These include:

1. The grade of the meat
2. The cut of meat
3. The trim of meat

Grade – How "Good" Is It?

For purposes of assessing "quality," meat has been graded as either choice, select, or prime. The truth is that this grading process rates the fat content of the meat. In the past – when taste was the only issue of importance – the fatter the meat, the better quality and more expensive was the meat. Thus, the lowest fat and cheapest beef or pork was called "select". Meat with a somewhat higher fat content was called "choice". Finally, the fattest and most expensive meats were called "prime". A general guideline is that "choice" meats give us 10 more calories per ounce than "select" meats, and "prime" meats give us 10 more calories per ounce than "choice" meats. This extra 10-20 calories per ounce is, of course, 1 to 2 extra grams of fat per ounce in the more expensive and higher grade meats. Typically, you and I can buy choice and select meats at our grocers, but prime meats are more often sold at restaurants. During the past decade, more emphasis has been placed on the raising of leaner varieties of hogs, sheep, and cattle. I suspect that the definitions of select, choice, and prime may change somewhat as we low-metabolic-rate folks seek to eat lower fat meats. The important point in this chapter is that we will be mainly discussing calories per ounce for the leaner grades of meat found in groceries and markets. Remember, however, that if you go to a restaurant and eat a big prime rib, you will need to raise your calories in your records for that meat by as much as 20 calories per ounce – simply because you chose high fat "prime" meat.

Cut – Where Did It Come From?

The second important characteristic of meats is their cuts. In other words, what part of the animal did this piece of meat come from? Did it come from shoulder or ribs, or leg, or loins, or butt? This is important since, as a rule, if the animal used the muscle more, it will be leaner. Leg or shoulder meat will be leaner in general than butt or rib meat. Sedentary muscles may contain enough fat to require us to raise the calories per ounce in our records by 10 to 20 calories. Thus, a prime rib roast may give us 30 to 40 more calories per ounce than a choice loin roast, (20 calories per ounce for prime versus choice and 10 to 20 calories per ounce for rib versus loin meat). Now, if you are talking about a 12-ounce piece of meat, you could be describing the difference of as much as 400 to 500 calories. As you can see with meats, both the grade and cut can strongly influence total calorie content.

Trim – How Much Fat Can Be Seen?

The third major characteristic of meat that needs to be known before we can accurately estimate its calories is something called trim. Trim refers to visible fat in a piece of meat. Some people think that the best part of a steak is that nice piece of fat running through the seams between lean pieces. The truth is that this visible fat is nothing more than "hardened" oil at 250 calories per ounce, and those of us with low metabolic rates and lots of stored fat do not need to eat much oil. Meat needs to be classified as with trim or without trim (fat still left on) before we can accurately assess calories per ounce. In the remainder of this chapter as we discuss calories per ounce in various pieces of meat from various animals, we will be referring to choice or select grade, a defined cut from a known location on the animal, and a piece of meat that has had all visible fat removed, and has been cooked.

GROUPING MEATS BY CALORIE/OUNCE

As in our past discussions of fruit, vegetables, grains, and dairy products, meats can be organized in groups with calories between 25 and 150 calories per ounce. Meat calories are, therefore, more simple to learn than those of dairy products – since there are no very low calorie or very high calorie per ounce meats. As with the previously discussed foods, it is important that you and I pick out a prototype food at each calorie level – and organize less-commonly-eaten foods under our more-commonly-eaten prototype.

Figure 3.12 below shows the 25-calorie per ounce meats organized on a standard food scale.

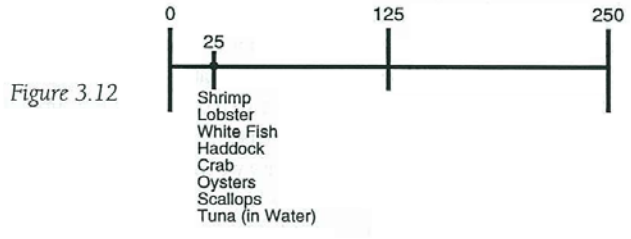


Figure 3.12

Seafood

As you can see, there are a lot of really good items at 25 calories per ounce. My prototype is shrimp – because I love it. The other stuff is all pretty good, however, and all of us would be well off if we used these items as a major source of dietary protein. Unfortunately, many people have allergies to seafood proteins, and these meats are also reasonably expensive. Nevertheless, they are readily available in our culture, contain almost no fat, and are a great idea for those of us with low metabolic rates. Some people would shun shrimp or lobster because of their cholesterol content (and it is true that they do contain some cholesterol), but their overall fat content is exceedingly low, and dietary fat is much more important than dietary cholesterol anyway. (We will discuss this more in a later chapter). As we will see with other meats, our big calorie problem for these foods comes in preparation of the meat rather than in the meat itself. Shrimp often becomes Shrimp Creole and lobster becomes Lobster Thermidor. Whitefish ends up floating in a beurre blanc sauce, and tuna becomes tuna pot pie. The simple meats – without sauces – however, can be prepared in excellent ways so that we can eat them at 25 calories per ounce.

Figure 4.12 shows a group of meats that comes to our palates at about 50 calories per ounce.

Figure 4.12

Turkey And Chicken Breast

As you can see, there are a few surprises at 50 calories per ounce. My prototype foods are turkey and chicken breast, which I eat almost daily. They are generally less expensive than the seafood items, and are usually available in "fast food" and other restaurants. I call them 50 calories per ounce, although, in fact, they probably are somewhat lower on the average. Again, preparation can be critical. A chicken-fried chicken sandwich at Wendy's has lots more calories

than a grilled hamburger at the same restaurant. Some of the "fattier" fishes also give us about 50 calories per ounce. Salmon, fresh tuna, and other darker fishes contain more oil, and therefore give us higher calories. As we will see later in this chapter, almost all common meats give us identical grams of protein per ounce. If this is true, and meat is a mixture of protein, fat, and non-caloric fiber, the only difference from one type of meat to another is its fat content.

Tuna

Tuna is interesting because it is readily available to most of us in several caloric forms. Fresh tuna at a fish market is a fairly fat fish and gives us about 50 calories per ounce. However, when it is canned and squeezed so that its oil is removed and the meat is placed in salty water, the calories come down to about 25 to 35 per ounce. Tuna canned in oil, however, retains its original value of 50 calories per ounce.

Lean Beef Round Steak And Canadian Bacon

I was surprised (when I began studying about these things) to find some beef and pork items at 50 calories per ounce. Lean beef round steak and Canadian bacon both give us about 50 calories per ounce. (Although some animals store more fat than others, there are specific cuts of meat from almost all animals that are quite lean and give us their good protein content in few calories).

Wild Game

Wild animals are all very physically active and, as a result, tend to have low amounts of fat stored in their meat. Here in south Texas it is common to have venison, rabbit, or javelina served in restaurants. These items give us about 50 calories per ounce at basal levels. As with other lean meats, however, they tend to be a little dry and chewy and as a result, are often prepared with fats in sauces and stews (to make them more palatable). When prepared simply, however, they are as low in calories as chicken or turkey.

Figure 5.12 below shows items that huddle around 75 calories per ounce.

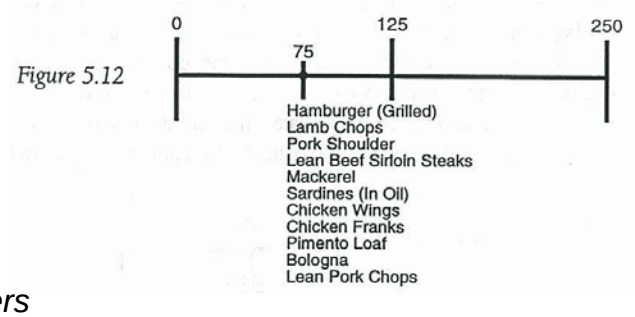


Figure 5.12

Grilled Hamburgers

My prototype food at this level is grilled hamburger – because it is so commonly available and relatively inexpensive. Obviously, different grades and compositions of hamburgers are available at our grocery stores. Ground round has fewer calories than ground chuck. Ground turkey has a few less calories than ground round. Overall, however, ground meat gives us about 75 calories per ounce after it has been grilled. As you can see, most of the common "beef items' like steaks and roast come to us at about 75 calories per ounce (depending upon grade, cut, and trim).

Luncheon Meat

Bologna, chicken franks, and lunchmeat give us about 75 calories per ounce. However, do not think of them as being comparable to sirloin steak or lamb chops in nutrition.

Lunchmeats generally contain more water and inert "fillers" than regular meats. Their protein content, therefore, gets diluted out by water and other stuff making them a "bad buy" nutritionally (like some "light" dairy products). (We will talk more about protein contents shortly.) I will not let this fact keep me from enjoying an occasional hot dog at a ball game, but as a rule, these lunchmeat items are not a good deal – either in protein content or calories.

THE "GRAZING" FOODS

At 100 calories per ounce, there really are not a lot of meat items; however, there are some fun foods like ribs in this category, and we with low metabolic rates need to be very careful around them. Figure 6.12 below shows the 100-calorie items plotted on a basic scale.

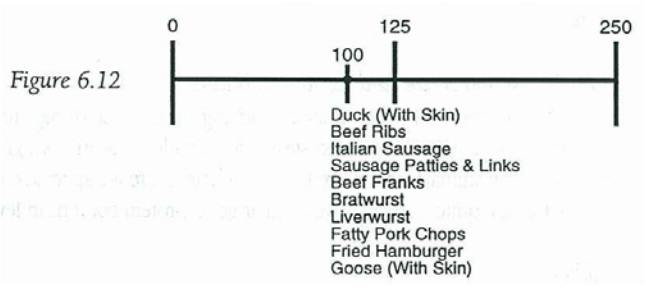


Figure 6.12

These items are "dangerous" for me because I can eat so many ounces quickly and because they are so many calories per ounce. They tend to be salty – and (as we will discuss in a later chapter) salty, oily items often create addictive eating patterns (as we discussed earlier with Cheetos, Fritos, and chips). They also tend to be on hors d'oeuvre tables at parties where we "lose our guard" and eat large amounts of food quickly and randomly (this is known as grazing food) and can give us lots of fat grams and calories quickly. Isn't it interesting that all fowl is not low in calories? Although turkey and chicken breast are great foods – both in protein per calorie and protein per unit cost – duck and goose (with skin) are very high fat and high calorie foods. The presence of skin over the meat for chickens, ducks, and geese significantly raises the fat content and calories of these birds.

At 125 calories per ounce, we see even fewer meat items. Figure 7.12 shows these "high calorie meats."

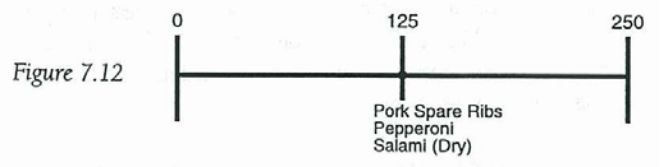


Figure 7.12

Salami And Pepperoni

These again are often snack items and can give us lots of fat calories quickly. Salami and pepperoni should give us the same calories as regular sausage, but they have had more water removed, and in their dehydrated state, give us more calories per ounce than regular sausages.

Finally, all by its lonesome, at 150 calories per ounce, we find bacon.

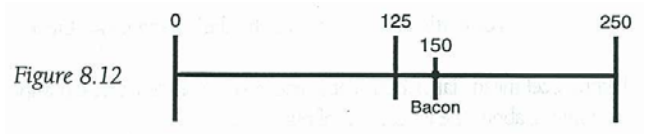


Figure 8.12

Bacon

Bacon, before cooking, has very little lean meat, and is one of the few meat items that give us fewer grams of protein per ounce than other meats. Nevertheless, its salty taste and oil content make it appealing to many people, and for much of the past century it has been a mainstay of a "good" American breakfast. (A tradition not unlike a good cigarette and a good cup of black coffee after breakfast.) I will admit that bacon tastes good, and that I can eat 5 or 6 strips quickly; but for the most part, those of us with low metabolic rates should avoid bacon because of its high fat content.

HOW MUCH PROTEIN IS IN MEAT?

It turns out that the meat of a variety of animals gives us a consistent 7 grams of protein per ounce. So whether you are eating beef or turkey or pork or chicken or salmon or venison steaks, you are eating about 7 grams of protein per ounce. The exceptions to this rule are luncheon meats and bacon. As we noted earlier, wieners, bologna, and similar products contain substantial amounts of water and other fillers. These non-nutritional substances dilute out the protein and fat content somewhat and lower the protein per ounce to an average of about 5 grams. Thus, 10 ounces of beef yields 70 grams of protein while 10 ounces of beef franks gives us only 50 grams of protein. This is important knowledge for mothers who send their children off to school with bologna sandwiches each day and to those of us with low metabolic rates, who are trying to keep our protein high and our calories relatively low. Bacon is an even worse example of this same phenomenon since the "diluting" substance is not water or fiber – but fat. As we noted above, bacon gives us 150 calories per ounce, but gives us at the same time only 5-6 grams of protein per ounce.

In general, meat is an excellent food and a good protein source. If we use good judgment regarding its fat content and its preparation, a good share of our dietary protein can come from meat. Several interesting anecdotes will help you and me to remember which meats are fatty and which are leaner.

In general, if the animal from which we get our meat moves around more, or is wilder, its meat will be leaner (fat content lower).

Animals like rabbits and deer, therefore, have very lean meat. It may not taste as good as prime rib, and we often add fat things to venison to make it slide down better (venison sausage, etc.). The point for you and me to remember is that more active animals and the more active muscles of nearly all animals will give us leaner meat.

Another interesting tidbit about meat relates to its color.

For fish and birds, the whiter the meat, the lower the calories.

White fish and shrimp have lower calories than salmon or mackerel. Similarly, white meat of chicken is much lower in calories than dark meat.

For cattle and wild game, however, the story is exactly the opposite.

For these animals, the darker the meat, the leaner the meat.

Lighter beef means fatter beef. These anecdotes perhaps are not too important, but they at least keep us thinking about the fat content of our meats.

Many of our patients have asked us how to estimate fat grams in dairy products and meat. With dairy products, fat grams vary so widely and are changed so much by dilution with air and water (light products) that we simply have to read labels. The complexity arises because dairy products contain all 3 major nutrients (protein, carbohydrate, and fat). Meat, however, contains only fat and protein (not much carbohydrate), making estimation of fat grams in meat pretty easy. If you know that all kinds of meat (except hot dogs and bologna) give us 7 grams of protein per ounce – and you know how many calories per ounce are in a certain cut of meat, you can easily estimate fat grams.

Remember that each gram of protein gives us 4 calories, and each ounce of meat gives 7 grams of protein. Each ounce of meat, therefore, gives us 28 calories from protein. If you know that the meat in question is chicken breast with 50 calories per ounce, 28 calories of the 50 are coming from protein, and the other 22 calories are coming from fat. Since fat gives us 9 calories per gram, 22 calories is about 2½ grams of fat (from one ounce of chicken). Pork spare ribs at 125 calories/ounce would still give us 7 grams of protein or 28 calories, but the difference (125 – 28 = 97 calories) is all fat in the ribs (or about 11 grams of fat). There are some rough guidelines for total daily fat gram intake – with different levels depending upon what expert you read. Pritikin diet experts recommend no more than 15 to 20 grams of fat per day. The American Heart Association diet recommends no more than 30% of total calories as fat (on a 2000 calorie diet, this would be 600 calories of fat or about 70 grams per day). Obviously, "recommended" fat grams are quite variable – and I believe that "tolerance" of fat varies significantly from person to person and in individuals at different ages. For our patients at Health by Design, our goal is a moderate approach to all things with general avoidance of most foods that are known to contain a lot of fat. Diet supplements contain almost no fat, and low fat dairy products and lean meats (those less than 50 calories per ounce) contain so little fat that if we eat these items for our protein (and do not eat salad dressings, margarine, or mayonnaise) we will be eating 30 grams (or less) of fat per day. (We will spend more time on this stuff in a later chapter.)

For now, learn a prototype food for you at each calorie level, and concentrate on meeting your daily protein needs (based on your 24-hour urine urea) in a low-fat way. Use your nutrition labs to get good at weights and calorie values for meats. In this way, you will not feel anxious or uneducated as you eat meat at various restaurants or dinners – at home or on the road.

“The Sin of Omission”

It isn’t the thing that you do, dear,
It is the thing you leave undone
That gives you a bit of heartache
At setting of the sun.

The tender word forgotten,
The letter you didn’t write,
The flowers you didn’t send, dear,
Are your haunting ghosts at night.

The stone you might have lifted
Out of a brother’s way;
The bit of kindly counsel
You were hurried too much to say;

The loving touch of a hand, dear,
The gentle, winning tone;
But you had no time nor thought for
With troubles enough of your own.

Those little acts of kindness,
So easily out of mind,
Those chances to be angels
Which we poor mortals find –

They come in night and silence,
Each sad, reproachful wraith,
When hope is faint and flagging,
And a chill has falls on our faith.

For life is all too short, dear,
And sorrow is all too great,
To suffer our slow compassion
That tarries until too late;

And it isn’t the thing you do, dear,
It’s the thing you leave undone
That will give you a bit of a heartache
At the setting of the sun.

Margaret E. Sangster

STUDY QUESTIONS

Chapter Twelve – The "Meat" Of The Book

1. When considering calories or grams of protein or fat in a piece of meat, which is least important for us to consider?
   a. the grade of meat
   b. the cut of meat
   c. the trim of meat
   d. the weight of meat

2. Which grade of meat denotes the highest fat content?
   a. select
   b. prime
   c. choice
   d. regular

3. In general, choice beef contains about _____ calories per ounce (5, 10, 20, 30) _____ (more, less) than prime beef.

4. Meat from which part of an animal would be expected to give us the highest calories?
   a. ribs
   b. shoulder
   c. legs
   d. tongue

In each of the following, eliminate the one, which does not belong with the other three:

5. a. chicken breast
   b. fresh tuna
   c. venison
   d. shrimp

6. a. white fish
   b. shrimp
   c. crab
   d. tuna in oil

7. a. venison
   b. turkey breast
   c. hamburger
   d. Canadian bacon

8. a. bologna
   b. duck with skin
   c. sirloin steak (lean)
   d. hamburger

9. a. Italian sausage
   b. bacon
   c. sausage patties
   d. fatty pork chops

10. a. pepperoni
    b. salami
    c. goose
    d. bologna

11. a. chicken franks
    b. chicken wings
    c. lamb chops
    d. rabbit

12. a. pork spare ribs
    b. duck with skin
    c. pepperoni
    d. bacon

In the following questions, eliminate the item that has a different protein content per ounce than the other three:

13. a. shrimp
    b. sirloin steak
    c. bologna
    d. chicken

14. a. pork spare ribs
    b. duck
    c. bacon
    d. white fish

15. True or false;
    For fish and fowl, the lighter the meat, the higher the calories.

16 True or false;
    For cows, the darker the meat, the higher the calories.

MANAGING YOUR BODY WEIGHT FOR LIFE

Chapter 13

Liquid Nutrition

David M. Player, MD

Health By Design Program Manual

Chapter 13

LIQUID NUTRITION

Water…And Other Things

No discussion of energy intake could be complete without a special look at things we drink that contain calories and give us energy. Many of you have been drinking the majority of your nutrition (as diet supplements) for a number of weeks – and this type of drinking is obviously both necessary and appropriate for all of us. For most people, however, liquid intake is for the purpose of meeting the body's water needs – needs that are critical to life. The problem for those of us with low metabolic rates and increased body fat is that the water is still necessary for life, but the stuff that is dissolved in the water may not be necessary – and, in fact, may be detrimental to our health or our weight management program.

I cannot begin to recount the number of patients who I have seen grow fatter and fatter on nutrients dissolved in water (beer, cokes, shakes, juice, wine, punch, bourbon, Kool-Aid, and various mixed drinks). It is true that the nutrients are usually sugar or alcohol and not oil (the nutrient that makes some solid foods high in calories), but even with sugar and alcohol, the calories can add up quickly when we drink them. This brief chapter is then a discussion of things that we drink and the ways that they affect our energy balance.

As noted above, the most significant reason that we drink liquids is related to our need for water rather than need for nutrition. Water needs are variable from person to person and depend upon ambient temperature, activity, nutrient intake, and other factors. All of us with normal kidneys, however, need a minimum of about 750 cc of water (about 1½ pints) per day to keep up with the moisture losses in our sweat, urine, and respiration. As food intake increases, the number of tiny metabolic byproducts of digestion in our blood increases also, and our need for water further increases. Of course some solid foods contain water, but few of them contain enough water (free of solids) to meet our water needs. Therefore, we must drink each day to stay alive. I know that this seems elementary to most of you who read this, but most of us never think very much about why we need to drink. We just drink when we are thirsty and count on our pituitary glands and kidneys to keep us in balance. Obviously, in most of us, these two organ systems do a marvelous job, and as long as we have access to water, we stay in good health – regard less of how much solid stuff we eat.

SOFT DRINKS

As I commented above, the problems for us low-metabolic-rate folks occur when we drink the water that we need to cover our thirst, and the water contains stuff that gives us calories.

Consider several examples of this that I have seen recently.

The daughter of one of my colleagues went to a large Texas university and began to drink cokes at night to help stay awake. It turns out that cola drinks (and nearly all commercial soft drinks) have a great deal of caffeine added to them to give the drinker the "boost" to his central nervous system expected with caffeine. As we all know, once we become accustomed to our daily load of caffeine, we feel "cruddy" and get headaches when we do not get it. My young college friend, therefore, began to be accustomed to several hundred milligrams of caffeine each night to allow her to study until well after midnight. This amounted to about 64 ounces of coke each night and clearly met her water and caffeine needs. Unfortunately, it also

gave her over 800 calories of sugar each night and led to a rapid gain in weight. (If you have not done the math yet, that is nearly 85 pounds last year (because her factor x weight calories went up as she became heavier). Can you imagine that!! 65 pounds of body fat were gained – all because of coke intake. She has tried to drink diet cokes – but cannot stand their taste. I suspect that not only the caffeine, but also the sugar in the coke contributes to her "high" at night. Unfortunately, the sugar has made her fat and she will have to work for months to get her body back into shape.

Diet drinks have probably made the above story less common over the past 20 years, but even these beverages may negatively affect health and metabolic rate and negatively impact body composition. The point, of course, is that when we drink stuff that contains sugar – whether we drink it for the sugar, the caffeine, or for the water, we risk being grossly in positive energy balance and gaining body fat. I suspect that my colleague's daughter would have been much better off had she kept a big glass of ice water by her desk and drunk 2 or 3 cups of coffee (if she needed the caffeine) to stay awake.

BEER AND OTHER ALCOHOLIC BEVERAGES

A second example of liquid calories is, of course, drinks that contain alcohol as well as carbohydrates dissolved in water.

I recently visited with an obese middle-aged attorney who wanted to lose weight. He wanted to know how much he needed to exercise to get down from 300 pounds to 200 pounds. When we looked carefully at his diet, we discovered that he was averaging between 6 and 8 cans of regular beer each night (along with the snack foods that went with it). What he did not realize was that his beer intake accounted for 900 to 1200 calories per day, and that eliminating the beer alone – without changing any other food or activity behavior – would result in a weight loss of nearly 100 pounds during the next year. Thankfully, he has made this adjustment well (as well as several other changes), and his weight is down nearly 30 pounds already in the first 2 months. Just as in the case of the collegian above, he was drinking his calories and growing fatter and fatter. He is learning to drink water and iced tea for thirst and to make beer something he drinks in moderation at an occasional party or dinner.

As we discussed in chapter one, alcohol is a unique, water-soluble chemical that can be metabolized by human beings and utilized for energy at a rate of 7 calories per gram. Unfortunately, alcohol is an addictive chemical that is "nutritious" – much like sugar or chocolate. For some individuals, at least, alcohol exposure leads to addictive behavior – and because it is dissolved in water, it can be absorbed in high volumes. At 7 calories per gram, energy intake can mount up quickly, and EI can exceed EO – even though you have not "eaten" anything.

COFFEE AND TEA

A further example of our "drinking our calories" is found in those who drink large amounts of coffee or tea. Although some drink these liquids straight, others add caloric substances to them. These include half & half at 50 calories per ounce, sugar at 15 calories per teaspoon, and non-dairy creamer at 11 calories per teaspoon. For the individual who drinks only one cup of coffee per day, this is unimportant. However, for the person who drinks 10 to 12 cups of coffee daily, these substances can provide lots of calories.

The point of all of this is that we can need water (thirst), but end up drinking water that contains dissolved stuff that has nutritional value. Except for the diet supplements that you are drinking at present and milk and other dairy liquids, none of the usual things that we drink contain any protein. If they contain calories (like the drinks we just discussed), the calories will

be either carbohydrate or alcohol. The carbohydrates would probably better be eaten in grains, fruits, or vegetables (with fiber and other nutrients) than as simple sugars in cold drinks. I can drink 200 calories of apple juice lots faster than I can eat 200 calories of apples. If you are a skinny guy with a fast metabolic rate, this will not make any difference. However, if you are a typical Health by Design patient with a low metabolic rage, it can be very important.

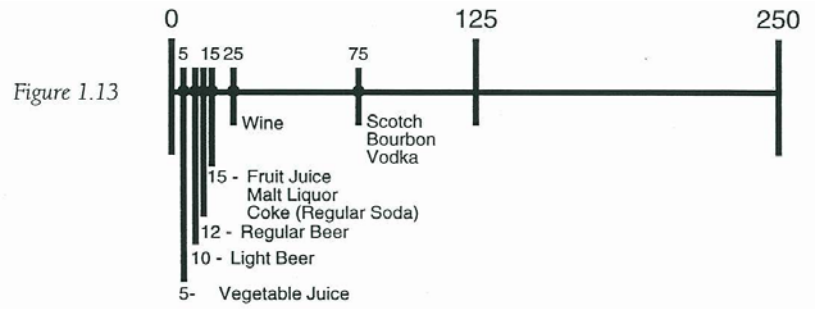


Figure 1.13

In figure 1.13, you see the typical food scale with which you are now very familiar. As you can see, the calorie range for drinks is not great. The biggest problem as always is not calories per ounce – but rather how many ounces did I drink? In your beverage labs, you should have a good opportunity to estimate ounces in several types of drinks and then see what 4, 6, 8, 10, or 16 ounces looks like. Only in this way can you and I learn to keep accurate records and begin to be accountable for what we drink and how much of it.

Remember: When you are thirsty, never drink something that gives you calories of energy.

Drink water for thirst. Once thirst has been relieved with water, then ask yourself whether you still want the coke, or beer, or juice. The chances are that you will be more likely to avoid the high calorie item when you are not thirsty. As you have found out by now, if you eat your supplements before you go out to dinner, hunger will be relieved and you will generally eat more sensibly when you go out. Similarly, if you drink water or tea when you are thirsty, you will be less likely to drink a lot of high calorie beverages. As we have said before – learn to eat your calories – not drink them.

“Where There’s A Will There’s A Way”

We have faith in old proverbs full surely,
For Wisdom has traced what they tell,
And Truth may be drawn up as purely
From them, as it may from “a well.”

Let us question the thinkers and doers
And hear what they honestly say;
And you’ll find they believe, like bold wooers
In “Where there’s a will there’s a way.”

The hills have been high for man’s mounting,
The woods have been sense for his axe,
The stars have been thick for his counting,
The sands have been wide for his tracks.

The sea has been deep for his diving,
The poles have been broad for his sway,
But bravely he’s proved in his striving,
That “Where there’s a will there’s a way.”

Have ye vices that ask a destroyer?
Or passions that need your control?
Let Reason become your employer,
And your body be ruled by your soul.
Fight on, though ye bleed in the trial,
Resist with all strength that ye may;
Ye may conquer Sin’s host by denial;
For “Where there’s a will there’s a way.”

Have ye Poverty’s pinching to cope with?
Does Suffering weigh down your might?
Only to call up a spirit to hope with,
And dawn may come out of the night.
Oh! Much may be done by defying
The ghosts of Despair and Dismay;
And much may be gained by relying
On “Where there’s a will there’s a way.”

Should ye see afar that worth winning,
Set out on the journey with trust;
And ne’er heed if your path at beginning
Should be among brambles and dust.
Though it is but by footsteps ye do it,
And hardships may hinder and stay,
Walk with faith, and be sure you will get through it;
For “Where there’s a will there’s a way.”

Eliza Cook

STUDY QUESTIONS

Chapter Thirteen – Liquid Nutrition

1. Which of the following must be consumed daily for survival?
   a. protein
   b. carbohydrate
   c. fat
   d. water

2. The minimum water that healthy human beings can consume and remain in a "hydrated" state is:
   a. 3 quarts per day
   b. 2 quarts per day
   c. 1 quart per day
   d. 1 pint per day

3. Which is the most common reason for drinking fruit juice?
   a. addiction
   b. thirst
   c. pleasant taste
   d. need for calories

4. Which is the most common reason for drinking beer on a hot day?
   a. addiction
   b. thirst
   c. pleasant taste
   d. needs for calories
   e. desire to get smashed.

5. Which is the most common reason for drinking coffee in the morning?
   a. addiction
   b. thirst
   c. pleasant taste
   d. need for calories
   e. stimulant effect

6. A businessman drinks 10 cups of coffee each day and uses one teaspoon of sugar and one teaspoon of creamer in each cup. How many calories does he drink with his coffee in a day?
   a. 20
   b. 50
   c. 100
   d. 250

5. Match the drink with its calories (calories per ounce)

_____a.	wine	1.	0
_____b.	beer (regular)	2.	70
_____c.	grape juice	3.	100
_____d.	vodka	4.	25
_____e.	V-8 juice	5.	10
_____f.	scotch	6.	5
_____g.	regular coke	7.	12
_____h.	coffee	8.	15
		9.	20

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