Physiology of Nutrition:
What You Should Know About Your Diet

Sharon Milian, RN

Sharon Milian: My purpose here is to wrap things together in a concise way, so that we can each work to find our own *personal balance,* based on our *metabolic rate, health history and lifestyle.*

I have quite a few years in the health field, as an orthopedic nurse and later, in home health care. One of our duties was to teach patients about their prescribed diets. I found that a lot of people were *confused or intimidated by food labels* and didn't really know what their personal daily allowances should be.

Also, over the years I have *experimented and collected information* on diet topics, published papers and used myself as a guinea pig, keeping weight and calorie logs and analyzing my ups and downs. I call myself a 'foodie', which is a good new word meaning someone who likes anything pertaining to cuisine, whether it's for study, collecting, and cooking and eating foods, or one who tries to buy the best quality.

I have collected a lot of good information over the years, and interviewed some famous diet experts like Robert Atkins. Of the other diet authors I will discuss, I have either interviewed them or been to their lectures, or someone I know has had dealings with them. Also I question my own doctors every time I see them.

But what good is knowledge if it's not shared? That's why I'm here today. Also, as a journalist I was taught to strive for accuracy. The information I want to give you is backed up with the most reliable sources I could find. I am not endorsing any one program. I am sharing the information about some of them, and what I know to be true about the way our bodies absorb and use nutrients.

Introduction

If there's one thing I learned as a nurse, it's that no two people are alike. Maybe someday when they clone us, we'll all be the same, but for now, we are individuals. We are unique and we all have to find our own *personal nutritional balance* to maintain optimal health.

Today's consumer is a savvy consumer. There is such a wealth of information out there: the Internet, cable TV, access to medical information health care facilities, books and other media and of course, friends and family. Not only do consumers have information at their fingertips, but retail stores will follow the demands of the consumer, and begin stocking foods that are popular to a certain diet. My grocery store has *Weight Watchers* products, *Atkins* and other low carb fare, *South Beach Diet components,* and the latest in natural medicines, including rows and rows of dietary supplements. My favorite restaurants offer low fat, carb and calorie selections.

Yet, it seems like the more we know, the more there is to know. Has anyone seen the latest *food pyramid*, presented by the *U.S. Dept. of Agriculture*? It's divided equally, with no recommendations for amounts of each food. They give plenty of guidelines on how to figure your own nutritional requirements. But essentially, you're on your own. If you look at food labels, there can be confusing information. Just what's in your canned soup and crackers?

One thing I want to point out here is that the *best tool* that we have right now, to help us decide what's good for us, is the *Food and Drug Administration (FDA).* The FDA regulates all our pharmaceuticals and the food products we consume. All of our health professionals, pharmacists and food producers must comply with their standards. The *abstracts* from articles from the FDA's 2006 science forum are listed on the website. All of their research uses *scientific method*. While most of our older drugs and food additives have been tested extensively, today some new drugs can be *approved in only six to 36 months*, as a result of the FDA streamlining its *approval process* over the past few years. This is partly as a result of the need to approve *new vaccines quickly*. The FDA does not regulate many nutritional supplements. Doctors can't be sure where they have come from if they are not regulated. So they won't usually order them, unless it's one approved by the FDA.

Importance must be placed on using the recommended amounts and limiting artificial additives and over-processed foods when possible. Just as we cannot use some ingredients of products like fragrances until they have been refined, it's the same way with *food additives* that may be harmful in large amounts but are safe when used in minute amounts.

Chemicals emitted by a company that leaves toxins in the environment, though not for agricultural purposes, are in a *different category* and would not be regulated by the FDA, but rather, a company such as a plumbing contractor would be required to list

each substance that is potentially toxic. In my brother's company, they had to list all their supplies like PVC pipes in a hazards book, to comply with *Environmental Protection Agency* standards, even though it is unlikely anyone would ever try to eat them.

Other countries, like Great Britain, may have a similar agency, but with different sets of standards. Great Britain, for example, will not buy beef from the United States because it is given *hormones.* However, on a recent news documentary it was stated that it is estimated that about 30% of beef in the United Kingdom is enhanced illegally. Here, almost all of our beef and poultry are given hormones. It is just too profitable stop the process. Who would buy a *skinny chicken?* So keep that in mind, when we talk about food additives later, and I will talk about hormones some more.

Also, a good source for health information and statistics is the *Centers for Disease Control, and the World Health Organization (WHO).* I also like *Web MD* for consumer medical news and the *PDR online* as a reliable Internet source, and *Medline* and *Medscape.* Sometimes the information we see on the Internet is not from a reliable source. Just about anyone can post something on the Internet and call it a fact.

Physicians in this country are governed by standards set by the *American Medical Association*, and of course the state's board from which they are licensed.

Here is one very important statistic from the CDC. *Heart disease accounted for the greatest number of deaths in men and women of all races*, but since women live 5 years longer, their heart attacks came five years later although they are affected almost equally as far as cause of death. So today I will be spending some time talking about the importance of prevention of obesity and subsequent conditions that can lead to heart disease.

Why are we fat?

Is the food industry to blame? Partly, says Yale obesity expert Dr. David Katz. Food companies aggressively *peddle food to people who don't need it*. But it's the *consumer's responsibility* to learn what's in their food and what not to bring home. Also, historically, doctors did not learn or teach nutrition until recently.

Food is so plentiful, that car seats and strollers are now adding snack and cup holders. We are teaching our children that *constant munching is okay*. Katz also said that a variety of flavors will cause overeating, such as a loaded baked potato or a "salad" bar. *(St. Petersburg Times)*

Besides, our digestive systems have taken a battering. Without good digestion, we can't properly absorb the foods we eat. So it's just not eating too much but digesting too poorly. We will look at this more in a few minutes.

A panel of experts from around the world came up with some other reasons why we're fat. *Sleep deprivation, even temperatures (no extremes) fewer smokers, medications, older birth moms, genetic influences and mating with other fat people* are all reasons why we are heavier. But we are fortunate here. We can choose what we put into our bodies as easily as we can choose our next president.

How does one sort it all out? I can talk for an hour and go through all these books, and I'm still just be *scratching the surface.* The best place to start is at the beginning, when food is eaten and energy is expended. We'll look at body chemistry, that is, the *organic* substances that are present in the body and how they interact with one another, along with the carbonates like carbonated water that do not occur naturally and must be excreted, and the oxides like sulfur dioxide, used as a preservative for dried fruits.

The Furnace (slide 2)

"Think of your body as a furnace," says Dr. Peter Miller, of Hilton Head Metabolism Diet. Newer versions of this book are currently in bookstores. Dr. Miller is a psychiatrist who works with behavioral problems at the Medical University of South Carolina. I interviewed him through e-mail. In his book, he says,

"Fat people don't (always) eat more than thin people. But they do not burn as much fuel (calories) as they should."

"Your basal metabolism is stimulated when you eat, when the climate changes, and when you exercise. It's like a thermostat turning up the furnace automatically in response to the fuel coming in, drops in temperature and increased energy demand."

"People who suffer from metabolic suppression have two problems. First, they are usually at the lower end of the average range for basal metabolism. Second, their thermostats are defective. Minimal calories burned…no periodic increases in BMR."

Exercise should be 20 minutes after eating. By doing this, Dr. Miller believes you would get a double whammy effect, the eating itself acting as a metabolic stimulator. It is my preference to eat the meal 20 minutes AFTER you exercise and get the same effect. The body will continue to have increased metabolic rate for 3 to 4 hours after exercise, and the same is true after eating.

I asked Dr. Miller if exercising before eating would be the same effect. Here is his response:
"Exercise prior to a meal also increases metabolic rate to give you the double whammy. Some people, like yourself, prefer to do it this way and it works just as well."

Burning newspaper is like sugar. Burning a log is like a protein. Burning fat is like a treated, long-burning log.

Office workers have a problem raising their metabolism if they don't eat breakfast, don't exercise, overeat at lunch and then sit down all day.

(see handout for figuring BMR and calorie needs.)
Factors that influence BMR: size, sex, body type. How do you figure your BMR?

I will come back to this diet later when we talk about the various diets.

Yo yo dieting (slide 3 of self)

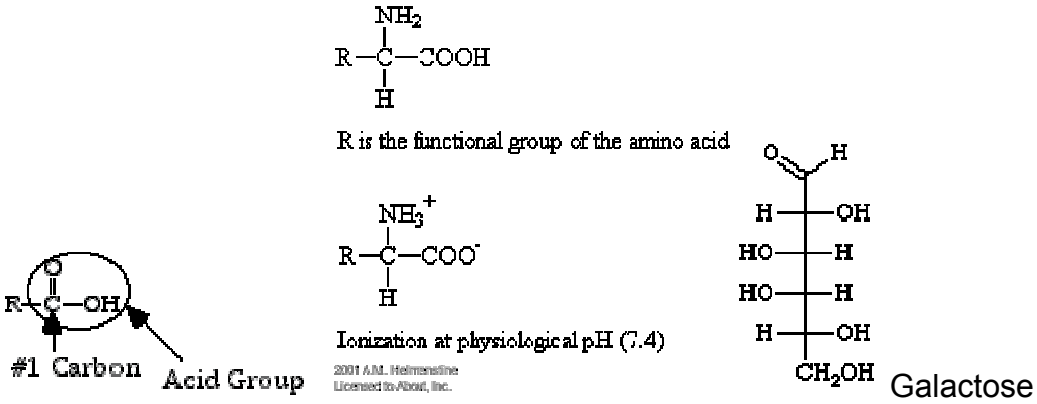
And changes in body weight through the lifespan

Part 1: The Cell (slide 4)

What is *cellular metabolism?* Does everyone know what a cell is? while I am not going to discuss all the parts of the cell, I want you to pay particular attention to the cell wall. This is where exchange of nutrients takes place. Our bodies are made of all types of cells. They differentiate between various parts of the body, where they perform various functions, like structure, enzyme production, protection and so on.

(slide 5,6)

The three *nutritional components* that make up our foods are molecules of carbohydrate, protein and fat; most foods are combination. Milk, for example, has fat, protein and sugar (lactose).



http://class.fst.ohio-state.edu/fst601/Lectures/LIPID.htm

There are various ways to model a *molecule*, by 3d, numbers and connecting diagrams. For example, H_20 is representing an oxygen molecule with two empty spaces. Those spaces are looking to bond with something, and fill those empty slots. Hydrogen fits the bill, giving its two electrons to the oxygen and forming a *water molecule.* The loose ends of the molecules that are present throughout the body, those with a *positive or negative charge*, are always reacting to other molecules and *making and breaking bonds.*

Sometimes oxygen can be released as a free radical. Antioxidants (like vitamin C) "neutralize free radicals by donating one of their own electrons, ending the electron-'stealing' reaction."

The interstitial fluid

After the cells take in nutrients, they *metabolize* them and *release wastes* out of the cell into the interstitial spaces, to be taken up by the *lymph*.

If we eat and retain *too much sodium*, the interstitial fluid gets too full of water, waste and toxins. Cells become spread too far apart to get efficient nutrient/waste exchange. There are people walking around with an extra 8,000 mg of sodium in their bodies.

Potassium is necessary to facilitate the "pump", since there is *no circulatory pump for the lymph.* We must use the motions of exercise, breathing and external motion like massage, to speed that process along. Most of our diets are deficient in potassium and overabundant in sodium. So, the balance needs to be restored.

Molecules need to get into the cells. They enter the cells from the *interstitial fluid* where they have come from the circulation. Tiny capillaries drop off nutrients, into the interstitial fluid, across which there is a labyrinth of *lymphatic capillaries* as well. The bath of interstitial fluid flows around each of the cells it nourishes. (Think of a view of planted fields from an airplane, with irrigation around squares of the field. The irrigation ditches are the interstitial spaces.) Also think of *pollution* that might be present in these ditches, waste material and chemicals that have come from the fertilizers or the environment. Compare that with your interstitial fluid, which may have inhaled *chemicals from the environment,* or *ingested them in medicines,* and which may contain an excess of waste material.

There are certain conditions that must be present for this to happen. The individual molecules must be broken down into the simplest sugars, or *glucose*, and from the building blocks of a protein, *or amino acids*, and fatty acids from fats. Enzymes and ATP are necessary to *produce energy* needed to move the molecules into and out of the cells. ATP is produced when chains of amino acids, called polypeptides, are broken down. Once absorbed into the cells, amino acids may be formed into proteins or degraded to form other compounds.

Tolerance to glucose diminishes with age. If a middle-aged person has excess belly fat, he is predisposed to insulin resistance, which can lead to diabetes. Insulin resistance occurs when "the normal amount of insulin secreted by the pancreas is not able to unlock the door to cells. To maintain a normal blood glucose, the pancreas secretes additional insulin. In some cases (about 1/3 of the people with insulin resistance), when the body cells resist or do not respond to even high levels of insulin, glucose builds up in the blood resulting in high blood glucose or type 2 diabetes." (Stanford)

While the glucose and amino acids enter the cells and are used for *fuel and building tissue, 90 percent of the* fats we consume are *stored in the fat cells*.

(Slide 7, fat cells)
(Slide 8, cells of the skin)
(Slide 9, muscle cells versus fat cells)

Fatty acids, however, are essential for cellular functions and maintaining the cell wall. That is why a small amount of *monounsaturated* fats in the diet is desirable. Fats are also abundant in many foods. When a fatty acid is metabolized, however, *oxidation* occurs. This is a natural process, but if there is too much oxidation, there will be *tissue damage* and aging. That is why we see *antioxidants* as being a desirable component of foods. When a fat is heated to extreme temperatures, and especially when it is re-used like in a french-fry bin, the molecule is *mutated* and does not metabolize properly.

Fatty tissue, or adipose tissue, contains fat cells, plus *fibrogen and collagen,* a gummy substance that give us our elasticity. Collagen is naturally found in foods like strawberries. The adipose tissue also has *blood vessels embedded*. On women with a *cellulite* problem, the outer skin is soft and the underlying fat tissue appears as lumps. That's because of the fat tissue being held together by a *fibrous network,* and the fat is bulging out between the fibers. Aging decreases elasticity by breaking down those fibers.

Cholesterol

Cholesterol is a *lipid* that is either produced by the liver or ingested in the food. Only about 25 percent comes from the food. The two types of cholesterol that we need to be concerned with are *low density lipoprotein (LDL) and high density (HDL).* The lipid is attached to a protein for transport, giving it the name lipoprotein. The resulting molecule, if small, becomes the low density type. These molecules are small enough to enter the lining of the arteries. When that happens, white blood cells or *monocytes* are called to the area because of inflammation. As a result you have the monocytes entering the lining also, causing a rough spot that catches particles like platelets and allows a *plaque* to form. This is the disease process known as *atherosclerosis*, the beginning of heart disease.

It is important to keep the LDL levels low, by avoiding saturated fats and increasing the HDL with monounsaturated fats like olive oil and salmon. Exercise also helps and general weight reduction, but if it is inherited you may be fighting a losing battle. In that case, *statin* drugs may be necessary. Many doctors are prescribing them as a preventive measure for people with borderline high LDL levels. Eating more soy, fish with Omega 3, nuts, beans, fruits and vegetables, olive oil and whole grains will help in reducing cholesterol. Some people may need to do all of those things. Supplements include fish oil capsules, red yeast rice, pectin and beta sitosterol. Soy and walnuts also help lower cholesterol. Plant fiber acts to bind itself around the lipoproteins, which in turn sends it to be evacuated from the body.

An acceptable combined level of cholesterol is no more than 200, but some doctors recommend less than 150 or even 130. An indicator of future heart disease and diabetes is an HDL less that 50 for women, and 45 or men.

Monounsaturates and polyunsaturates

These are fats that have health benefits. Monounsaturated fats are found in *olive oil and nuts.* Polyunsaturates are found in some *vegetable oils* including safflower and corn, and in *fish*. These both *raise the good HDL and lower the bad LDL* cholesterol levels.

Trans Fats (handout)

Trans Fats are the bad guy in today's food industry. They are largely found in our *processed* foods and margarines. They are produced when an oil is *hydrogenated* and *heated*. They can't be utilized like other fats because of the chemical changes that have occurred, but instead *lower our levels of good HDL and raise the bad LDL*. As of January, 2006, food labels must include trans fat content. But at present there is no requirement for restaurants to reveal trans fat levels in their foods. Trans fats should be avoided by all means, and substituted with mono and polyunsaturated fats.

Trans fats are banned in Denmark. *Wendy's* is the only restaurant that is effectively changing its frying oils this year in *6,000 of its restaurants*, to *exclude trans fats.* McDonald's claimed to be planning the same thing three years ago, but never did, says *Consumer Affairs Online.*

Saturated fats

These are found mostly in animal sources such as butter, red meat and cheese. Eggs yolks also contain saturated fat, although their vitamins are so important that a few eggs a week is acceptable. Saturated fats also *lower the good HDL and raise the bad LDL. (*Harvard Public Health)

LIPIDS:

The general name for fats. Lipids include triglycerides, phospholipids and sterols. Cholesterol is the best known of the sterols. The two kinds of lipids in foods that most affect heart disease are dietary fat (triglycerides, saturated and unsaturated) and dietary cholesterol. About 95 percent of the lipids in foods and in our bodies are triglycerides.

LIPOPROTEINS:

In the blood, cholesterol attaches to protein molecules of different densities to be carried through the blood vessels by special types of proteins, called lipoproteins. The amounts and types of lipoproteins are an important indicator of your heart disease risk.

Low-density lipoprotein, LDL, is commonly termed "bad" cholesterol, because an excess of cholesterol carried by them can lead to the build up of plaque in the arteries. High LDL levels (above 160mg/dl) increase heart disease risk because they keep cholesterol in blood circulation and carry it to the arteries to be deposited. Excess body fat and a diet high in saturated fat tend to increase LDL levels. LDLs are not found in food, only in the body.

High-density cholesterol, HDL, is considered "good" or protective cholesterol, because they carry cholesterol away from the arteries to the liver to be excreted from the body. Individuals with high HDL levels (above 35mg/dl) have a lower risk of heart disease. Regular exercise helps to increase HDL levels. HDLs are not found in food, only in the body.

Saturated fat, found mostly in foods from animals and some plants, is the main dietary cause of high blood cholesterol. The recommended amount of saturated fat depends on the amount of calories you use each day. To find that number, multiply your body weight in pounds by 15 (if you're active). This means if you weigh 200 pounds, you expend about 3000 calories (200 x 15) calories in an average day. If you're physically inactive, multiply your weight by 13 to find the calories you expend.
http://www.cholesterollowdown.org/adjust_your_diet/Fat_Facts.html

MONOUNSATURATED FATS:

Monounsaturated fats typically remain liquid at extremely low temperatures. These fats are also found in vegetable oils such as olive oil, peanut oil and canola oil.) Monounsaturated fat lowers total blood cholesterol by lowering LDL cholesterol without lowering HDL cholesterol. Research as shown that substituting monounsaturated fat for saturated fats (and polyunsaturated fats) reduces blood cholesterol levels without affecting the HDL levels. Too much of any of these fats will increase dietary fat intake, and excess body fat may increase cholesterol levels and the potential to increase body fat.

OMEGA-3 FATS:

Some types of fish contain unique polyunsaturated fats called Omega-3 fatty acids. These fatty acids seem to make blood platelets less likely to clot, thus decreasing risk of artery blockage and heart attacks. Fish with high amounts of Omega-3 include salmon, albacore, tuna, mackerel, sardines, herring and rainbow trout.

POLYUNSATURATED FATS:

Polyunsaturated fats are usually liquid at room temperature. Polyunsaturated fats are found in vegetable oils such as corn oil, safflower oil, soybean oil, and sunflower oil. Polyunsaturated fats are also present in fish and fish oils, which help to decrease triglyceride levels. Polyunsaturated fats lower LDL cholesterol and total cholesterol but they also lower HDL cholesterol (remember HDL cholesterol is the good stuff).

Therefore, this fat should be limited to a certain degree. Too much of any of these fats will increase dietary fat intake, and excess body fat may increase cholesterol levels and the potential to increase body fat.

HYDROGENATED FATS:

Hydrogenated/Partially hydrogenated. Unsaturated fat that has hydrogen added to make it saturated. Hydrogenation turns liquid vegetable oils into solid fats. For instance, soybean oil is "hydrogenated" to become a solid vegetable shortening. Also, hydrogenated vegetable oil may be added to margarine to make it solid at room temperature and easier to spread. Hydrogenation also helps increase product shelf life. On the label, the term "hydrogenated" is listed before a blend of fats and oils. For example: "Hydrogenated vegetable oil (contains the following: soybean, cottonseed, palm oil)."

Trans Fats: result of heating hydrogenated fats. These fats are unhealthy because they lower HDL and raise LDL. they mutate and are unable to be assimilated properly when overheated or re-used. They are banned in Denmark. Most processed foods and fast foods contain trans fats, except for Wendy's.

http://www.dietsite.com/dt/diets/HeartHealthy/fatdictionary.asp#HYDROGENATED%20FATS:

Part 2: The systems (slide 10)

The digestive system; hunger and satiety process; digestion begins in the mouth; *peristalsis and villi;* the amazing *liver; it detoxifies, regulates digestive processes, controls cholesterol production. W*hat happens to the *cholesterol* and other nutrients while in the intestines, and *reuptake* in the circulatory system. The intestines are tough, the entire system can handle just about anything we put in, sorting out toxins and anything that is valuable for fuel and nutrients, then discarding the waste. People can have sections of their colons removed and live fairly normally.

Constipation is often caused from lack of fiber and sluggish digestion, some drugs like codeine and lack of exercise and hydration.

Diverticulitis often occurs as a result of the above, when fecal material is pushed into a pocket formed on the intestine. These pockets can get inflamed and cause pain, nausea and sometimes, fever.

High fiber is recommended to avoid both of these conditions, and to assist in removal of cholesterol. *Yogurt* can be used to stimulate the digestion by *assisting normal flora* of the bowel. Fiber can also act as a preventative to colon cancer. (notes from high fiber diet, Dr. Chaudry) shoot for 20- 30 grams a day. For a 1200 calorie diet, I think 15 grams is adequate. Some cereals like fiber one have 12 grams. Oats have 4, rice krispies has none, or maybe one. Other whole grain cereals have about 4, with whole

grain breads having 2. fruits have 2 each serving. Meats and dairy products do not have fiber.

The *satiety center* in the brain will respond about 20 minutes after eating, because of the spike in blood sugar. A bulimic can wait until this center is alerted, then expel the food and still be full. But who wants to do that?

The lymph capillary system; (Slide 11)
(Unclear) how it moves with our motion; importance in removing fluids and waste; gravitational pull; sodium and potassium movement; massage, esp. in swimming pool or Jacuzzi

The endocrine system; hormonal influences in weight due to *glucocorticoids* released or withheld during stress; how diet affects *moods*, by eating chocolate, drinking alcohol, or by *missing vitamins*; importance of estrogen; spiking of insulin. *Serotonin* is important for moods, *endorphins* (happy hormones) are released when exercising, *flavenoids* (antioxidants) are found in strawberries.

Enzymes and the hunter-gatherer blood type theory (slide 12)
Our ancestors were *hunters and gatherers*. When berries were plentiful, they ate those, and when they killed an animal, they feasted for days on that. Their systems developed *enzymes* that worked for one food or another. Those enzymes are meant to be used with raw, unprocessed or simply cooked and preserved foods, and when we eat too many refined foods, our bodies *simply store* them. *Older blood types such as the O's* have more of a tendency to store than utilize those refined foods. Our grandparents told us stay away from too much starch if we wanted to lose weight they were right.

There are many enzymes, either produced by the body or ingested, which act as catalysts to speed the digestive process or other body functions. Each digestive enzyme is specific to a certain type of food. Pineapples, papayas and mangoes have natural digestive enzymes. Papaya has *papain;* like mango, it works especially on proteins like meat. Pineapple has *bromelain,* an enzyme which helps digest many foods. If you put meat and pineapple together, pretty soon the meat will get soft. There's the proof that it helps you get rid of those meat proteins that are stuck in your digestive system for a minimum of 6 hours (fish). Other digestive enzymes are *lipase,* which is necessary to digest lipids (fats) and *sucrase* (for sucrose or sugar). An enzyme is needed to digest *galactose,* for example, to change it to the usable glucose, even those the molecules have the same elements, only in reverse. (slide) *Make sure your fruit is ripe!* It will be sweeter and tastier, but also will not h ave chemicals that can make your mouth sore. So, as Jimmy Buffett would say, shake the hand of the mango man.

Herbs are a natural source of nutrients, oregano being the highest in antioxidants; other herbs are also used medicinally. Foxglove (digitalis) poppy (opiates) St. John's Wort (for depression) and aloe (for burns) red yeast rice (from which the statin drugs are derived, to control cholesterol) are just a few plants that are used for medicinal purposes. I enjoy learning about and using herbs, but it is another huge subject.

Combination theory (slide 13)
Judy Mazel, (the Beverly Hills Diet) came up with her combination theory as a result of years of obesity. She learned about enzymes, and how they work on specific foods and how they will interfere with each other or override the other's actions, when two of the wrong foods are put together. Suzanne Somers also used this theory in her famous books. Somers earned an honorary PhD for her work as a fitness Guru. Both of their diets will make you lose weight. The Beverly Hills diet is very difficult to follow and should only be done for one month. Some days you can only eat certain fruits, other days only proteins.

From a book by Suzanne Somers, who has an honorary PhD, *"Energy level highs and lows cause us to eat way more than our appetites require. The reason we feel artificially hungry is that the extra insulin in the blood inhibits the body from producing another hormone, serotonin, which is what makes the brain realize that the stomach is full. Your brain thinks, 'Not enough insulin? Not enough fuel in the blood. We need to eat!' if there's no sugar to turn to for quick energy sources, the body looks to your fat reserves."* Somers restricts what she calls "funky foods", the starches, sugars and starchy and fatty vegetables and nuts, and also caffeine and alcohol, for the first phase. Level two is for maintenance, once the weight is lost.

There is also the cellulite *ten-day fruit and vegetable cure,* perfected by Nicole Ronsard. This is one of my favorite purges. It restores the balance of sodium and potassium, causing water and waste to be eliminated, taking toxins with it and leaving your cottage cheese thighs a little smoother.

Ronsard says in her book *Beyond Cellulite* (1992), "This *congestive buildup* (fat, water and wastes in the tissues) is at the very root of the cellulite problem and only by removing this *tissue sludge* can we make a difference in the external appearance." This condition that Ronsard coined as "cellulite" is actually fat tissue that has become apparent in women, but it can also be present in men. It layers where our clothes cut off circulation day after day, like above the collar and belt in men, and above and below the bra and belt for women.

She says that the foods that best sustain the body with maximum nourishment and minimum wastes are the *complex carbohydrates* such as fruits, vegetables, whole grains and legumes. These are also *potassium-rich foods*, and potassium increase will correct the sodium excess and eliminate water and wastes.

Water, she says, is the ultimate purifier. It *flushes out the toxins and wastes* and bathes the cells. But fresh water, but not the water that's been trapped in our bodies. It's like a stagnant creek that suddenly gets spring rains and is allowed to flow freely.

While the minimum requirement has always been 5 fruits and vegetables a day, some doctors and nutritionists are opting for seven or more. If you count them, it's an easy

thing to count. A serving is *one-half cup* of most fruits except the melons would be one cup, and the same with vegetables, the leafy ones like lettuce being *one cup* servings.

The portions are unlimited in Ronsard's diet. (I like that idea. You can also eat whenever you want, although the system must adjust after each meal so it is not good to eat continuously, but it's better to wait a couple of hours.) The method works like this:

Fruits, vegetables, nuts and seeds the first day.
The second day, fruits only.
The third day, fruits, vegetables, whole grains and legumes, with yogurt.
Continue alternating every other day, the foods on day one with the foods on day three.

The effects of fasting
Our grandparents told us not to miss meals. They were right. Going too long without food will trigger a *starvation-avoidance response* and lower the metabolism. Once this occurs, the body will *not reverse itself* as easily. In fact, it becomes much harder to bring the BMR it back up to what it was before you fasted. It's the body's way of protecting itself. The day after fasting, maybe you don't feel hungry, but your metabolism has been slowed.

Female Athlete Triad: *anorexia, athletic, amenorrhea* causes *osteoporosis*. *Sally Field* is a good example. If a woman does not have fat to store estrogen, she will lose bone much sooner. A 50-year-old woman with this condition may have the bones of a 70-year-old.

Part 4: In your lab

Ions: sodium and potassium, important electrolytes, catalyst

From *Medline*:
"Electrolytes are *minerals* in your blood and other body fluids that carry an *electric charge.*

- It is important for the balance of electrolytes in your body to be maintained, because they *affect the amount of water in your body, blood pH, muscle action, and other important processes.*
- You *lose electrolytes when you sweat*, and these must be replenished by drinking lots of fluids.
- Electrolytes exist in the blood as acids, bases, and salts (such as
  - Sodium,
  - Calcium,
  - Potassium,
  - Chlorine,
  - Magnesium, and
  - Bicarbonate)

  and can be measured by laboratory studies of the blood serum."

- *Calcium* is the most abundant mineral in the human body (about 2.85 pounds in the average person).
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- "From WebMD: According to a recent study in mice, a diet that includes low-fat dairy products can aid weight loss.
- Researchers say this is because calcium stored in fat cells plays an important role in fat storage and breakdown.
- Current recommendations encourage men to consume 1,000 mg to 1,200 mg of calcium per day and women to consume 1,000 mg to 1,300 mg daily."

 When *blood volumes run low*, the *body extracts it from the bones*, but this may take more time than competition allows.

 A *constant blood calcium level* is required for
  - A normal rhythmic *heartbeat*,
  - Healthy *nerve transmission*, and
  - Strong *muscle contractions*.
 A *deficiency* in blood calcium levels *during endurance events* may produce
  - *High blood pressure*,
  - *Muscle cramps* and
  - *Weakness.*
 During *exercise*, energy is produced by the *conversion of fatty acids and amino acids* with enzymes, which are calcium-dependant. Because fatty acids are such an important fuel during endurance exercise, providing 60-65% of your energy needs when exercise goes beyond two hours in length, having adequate calcium available to efficiently convert them into energy is crucial…"

"*Magnesium* accompanies *calcium* in an ideal ratio of *1:2*.
 When calcium flows into working *muscle* cells, the muscle *contracts*, then, when calcium leaves and magnesium replaces it, the muscle *relaxes*.
 Deficiency of magnesium contributes to
- *Muscle cramps*,
- Tremors,
- Sleep disturbances, and
- In some cases, convulsive disorders.

 Many enzymatic reactions necessary for *fuel conversion to muscular energy* occur in the presence of adequate magnesium. Simply put, if the body doesn't have a sufficient supply of magnesium, energy production is compromised..."

Potassium

 "Potassium is the chief cation (positively charged ion) within all muscle cells, necessary for maintaining the *lowest optimal concentration* and *balance of sodium.*
 Potassium *deficiency* symptoms are
- Nausea,
- Vomiting,
- Muscle weakness,

- Muscle spasms,
- Cramping, and
- Rapid heart rate…

 Too much potassium is hard on the stomach and can cause severe stomach distress..."

Sodium

 "Sodium is the chief cation (positively charged ion) outside the cell.
 American dietary practices cause the average person to carry 8000 mg. excess sodium in the extra-cellular tissues.
 During endurance events, 3-4 hours are necessary to deplete the 'excess' of this mineral. Deficiency may begin to occur after 4 hours, which may produce symptoms of abnormal heartbeat, muscle twitching, and hypoventilation.
 However, if sodium is replaced at the same rate as depletion it overrides all the mechanisms involving *Aldosterone*, a hormone that *causes the body to conserve electrolytes*.
 If you want to throw a wrench into your body's very *intricate way of regulating electrolyte balance*, if you want to see your hands, feet, wrists, ankles and other body parts *retain water* and *swell up*, *indiscriminately dumping copious [large] amounts of sodium in your system* can make this a real possibility..."

Chloride

 "Chloride is the relative anion (negatively charged ion) that must accompany sodium in the extra-cellular tissues.
 This mineral is absolutely necessary in maintaining the osmotic tension in both blood and extra-cellular fluids. It's a somewhat complicated process but to put it in the simplest terms, think of osmotic tension as being the *proper balance and consistency of body fluids and electrolytes*.
 We believe 180-360 mg/hr as part of the sodium chloride (a.k.a.: sodium) mixture is an adequate replacement amount without overriding the functions of aldosterone in regulating and conserving proper sodium and electrolyte levels."

http://www.causeof.org/electrolytes.htm#PreventionElectrolytesWhatAre

Medline Plus: Medical Encyclopedia: Electrolytes

Calories
To review, a calorie measures the heat that is necessary to raise the temperature of 1 kilogram of water one degree C. there are 4 calories per gram of carbohydrate and protein, and 9 calories per gram of fat. There are 3,500 calories in a pound of body weight. If a person ate 500 calories less per day or burned 500 calories more per day, for seven days, he would lose one pound per week.

(Handout)

How to figure your calorie needs; your BMR. Weight charts, what is your appropriate weight?

To prevent heart disease and insulin resistance, pear versus apple; ratio of waist to hip should be less than .8 for women and less than 1 for men. Waist should be less than 35" for women and 40" for men.

CDC: Men and women have equal numbers of heart attacks, but women's come 5 years later and they live five years longer. Abdominal fat determines risk of heart disease because the fat from the abdomen is converted faster than that of the hips and thighs.

Food additives (slide 14 on toxins)

Natural vs artificial
If you look at the FDA's website, you will find a list of hundreds of food additives. This includes coloring, gums, cellulose, esters and many others. These additives are listed as the ones that are generally recognized as safe, or GRAS. There is a difference in food additives or things that are deliberately added to the food when it is grown, such as pesticides, and chemicals that may be present in the food accidentally, as a result of pollution or runoff from chemical wastes. These substances are only regulated or reviewed by the Environmental Protection Agency.

Esters

You may have heard of polyester fabric from the 60's. This is another use of a simple ester. Naturally occurring in foods like bananas, they are imitated synthetically, just like bottled vitamins are imitated from naturally-occurring ones.

This is information on esters from an online tutorial:

"Esters are compounds formed from the reaction between alcohols and acids. The word 'ester' alone now signifies by common usage that the acid is an organic acid, but inorganic acids can also form esters - ATP is an example well-known to biology students, being a phosphate ester.

Esters in the food industry

"Esters are widely used for flavourings; many are 'nature-identical', that is synthetic versions of the esters present in the fruit. Fruit flavours are very complex, though, often arising from many different compounds, some of which are present in small quantities."

http://www.ausetute.com.au/esters.html

MSG the ingredient of concern is the sodium. The glutamate is naturally occurring in abundance, in our foods. The glutamate is what gives them their distinctive flavor. My son calls MSG "Makes Stuff Good." From MSG facts website: "MSG is a flavor enhancer which has been used effectively for nearly a century to bring out the best flavor of foods. Its principal component is an amino acid called glutamic acid or glutamate. Glutamate is found naturally in protein-containing foods such as meat, vegetables, poultry and milk. The human body also produces glutamate naturally in large amounts. The muscles, brain and other body organs contain about four pounds of glutamate, and human milk is rich in glutamate, compared to cow's milk, for example. Foods often used for their *flavoring qualities,* such as tomatoes and mushrooms, have high levels of naturally occurring free glutamate."
http://www.msgfacts.com/facts/msgfact01.html

Aspartame
It's been tested 26 times in 23 years and *deemed safe*, the most tested substance available today. Made of *2 amino acids* (normally present in abundance) and maltodextrin (short and sweet sugar, absorbs easily, extracted from potato starch, breaks down into glucose). I asked my doctor and other doctors who also thinks it is safe. Documentation to the contrary is given on the internet and involves people who drank as much as 24 diet sodas a day, then were complaining of digestive disturbances. Remember that carbonated water and caffeine can cause discomfort. Some experts have also said that aspartame produces so much sweetness that it can spike your insulin. But that is in theory as it has not been proven.

Caffeine
It stays in your body for up to a year. It acts as a stressor.

Part 5: the furnace burns (handout)

Let's go back to the furnace, and the basal metabolic rate (BMR)How high is your metabolic rate? There are very few methods to use that are simple enough to measure it, so that it's seldom done except in clinical setting. You just go by your height and weight, age and sex. There is a formula to figure it out. (*handout)* Larger, taller people and males more than females have a higher BMR.

How is food used? Remember, it is broken down to glucose, fatty acids and amino acids. and amino acids. What happens when we lose weight? The *fat is metabolized* when sugar is withheld and exercise is increased. After the food is digested, and the energy used, the *waste products* are given off. This happens through increased perspiration, respiration, and excretion from bowel and bladder. The lymph nodes are the storage compartments for

Fat tissue works with liver as a storage compartment for vitamins, hormones and toxins

Estrogen storage: must have fat to store hormones. Female athlete triad: athlete, anorexia, amenorrhea.

Refined starches: even though they may be cheaper, you will pay for it in health care later.

The pyramid, (Slide 15)

Food labels; how to read them (Slide 16) (Handout)

Calories from fat: how many should we have? (Slide 17) (How much fat slide)

Part 6: The right balance

What to look for in food labels; how to plan your own regimen Slide 18, 2000 calorie diet Slide 19, How much for me?

The other diets:

Atkins, South Beach=initial 2 weeks no carbs, high protein, liberal fats.
Beverly Hills, Sommers, Cellulite=fruits alone, carbs and veggies, protein, veggies and fats in combination.
Zone, Weight Watchers, Nutrisystems, Hilton Head=balanced diet, smaller controlled portions, low fat
Rice Diet: Duke University=no salt, rice only with a little vegetable, fruit later, meat last
Portion control is Dr. Chaudry's advice for weight loss.

Hilton Head Metabolism Diet, (Slide 20)

South Beach Diet, (Slide 21)
Dr. Arthur Agatson, a cardiologist: "I began counseling my patients on the low-fat, high carbohydrate diet advocated by the American Heart Association…often, there was an initial modest improvement in total cholesterol with mild weight loss. This invariably was followed by a return of cholesterol to its previous level or higher, along with a return of the lost weight."

"One side effect of excess weight is an impairment of the hormone insulin's ability to properly process fuel, or fats and sugars. This is called insulin resistance. As a result, the body stores more fat than it should, especially in the midsection."

He also says that this is because our bodies have been conditioned to store fat in times of famine, but now there is only feast. Also, with manufacturing, we have lost much of our fiber, making metabolism change for the worse. Once those bad carbs are eliminated, the insulin resistance starts to clear up on its own.

"The main problem I have with the Atkins diet is the liberal intake of saturated fats. There is evidence that immediately following a meal of saturated fats, there is dysfunction in the arteries, including those that supply the heart muscle. So the lining is

predisposed to constriction and clotting. So imagine, eating a meal that's high in saturated fat can trigger a heart attack."

Weight Watchers (Slide 22)

Portion control and guesstimation (slide 23)

Keeping a daily log (slide 24)

Motivation is a powerful force. If you find you are annoyed by chipper people who have a lot of energy, with a little motivation you can become that chipper person. Exercise releases energy and also, the happy hormones, endorphins. It leaves you refreshed and revitalized, even though it may seem a monumental effort at first. Get up and go!

"But don't go to that refrigerator," Denise Austin, my exercise guru, often says.

Exercise. The most important thing you can do, whether or not you are trying to lose weight. Muscle tissue burns more calories than fat tissue. Just to review, the pound of fat contains 3,500 calories. If we exercise enough to *burn up* 500 calories a day (tennis or aerobics for one hour, walking for an hour and a half) that equals a pound a week lost. Add that to your decreased calorie diet and you've knocked off two pounds.

Keep mind over matter. *Breathing* is the key, rhythmic with the type of exercise you are doing. Remember the songs we used when jumping rope? We may not have music to listen to, but we can think of our own tunes. Try talking, counting or singing for a special oxygen boost. Warm up using the short movements first. *Warm up* for five minutes. This is very important! Even trained athletes can injure muscles and tendons if they are not used to an exercise and fail to warm up.

Remember, muscle tissue burns more calories than other tissue. The long and strong muscles, those of the upper arms and thighs, and the buttocks, burn the most. So use them. Squats are a great way to make a difference.

Your metabolism will continue to be high for a few hours after exercising, too. To begin, use all the muscles in *short* movements. Then begin *longer* movements. Finally, use strengthening after about 10-20 minutes of aerobics. Be careful not to overextend. Listen to your body. If you have not taken a walk in years, don't try to walk several miles the first day, but work your way up. Don't lift more weight than is comfortable for you. The repetitions are more important than the amount of weight you use. I have a set of weights but sometimes if I'm on the first floor of my house, I grab a couple of jars of spaghetti sauce or peanut butter for a couple of pounds each.

Stick with your program by doing something that's convenient, fun and fits into your lifestyle. Nothing you do with your time is more important! If you have kids or people to take care of, see to their needs and then try to include them in your exercise routine. It

only takes a few weeks to lose the muscle tone you have gained by working out every day, so keep it up and you will see results.

Stretch it all out at the end. *Cool down* for at least 5 minutes by stretching the muscles you have used.

Remember, exercise boosts the *immune system*, relieves *stress* and improves *mood.*

Final Note (slide 25)

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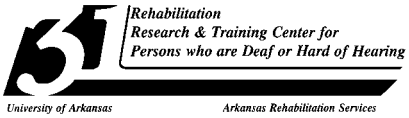
Biographical

Sharon Millan is a Florida-licensed RN, who following her hearing loss had to give up active patient car and returned to college to obtain a degree in journalism. Since then she has published extensively in health journals and newspapers, usually about health and fitness or deaf-related issues. She has also become certified in gerontological nursing (care of the elderly) and as a water aerobics instructor. Currently she is working for a national company that writes and scores standardized tests for high school students and is currently working on a diet and fitness book.

Sharon has been a member of ALDA Suncoast since 2000, and its secretary since 2002. She is now on the board as member-at-large.



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Douglas Watson and Carolyn Piper

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Welcome

1

"Think of your body as a furnace."

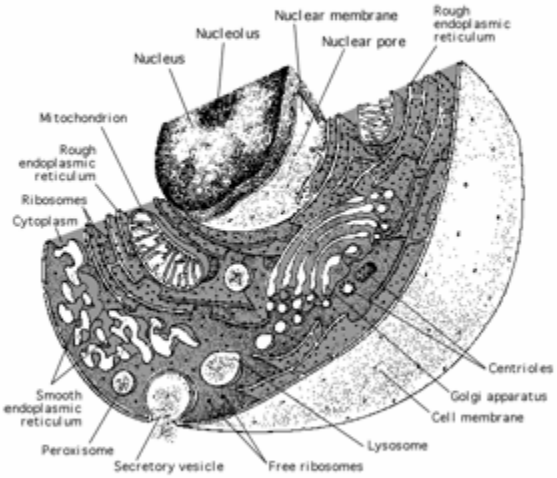
Dr. Peter M. Miller

2

Weight changes

3

The Cell



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In active transport, molecules move from a region of lower concentration to a region of higher concentration. As this process does not naturally occur, the cell has to use energy in the form of ATP to make active transport occur.

Cell Chemistry

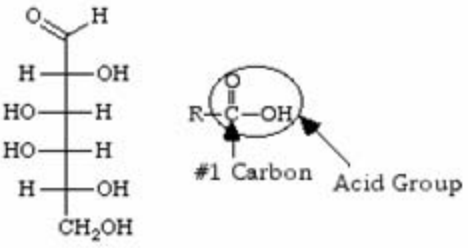
Many organic and inorganic substances dissolved in cells allow necessary chemical reactions to take place in order to maintain life. Large organic food molecules such as proteins and starches must initially be broken down through the life process of **digestion** in order to enter cells.

Organic Molecules and Digestive End Products	
Organic Molecule	Digestive End Product(s)
carbohydrates	simple sugars (glucose)
proteins	amino acids
lipids (fats)	fatty acids and glycerol

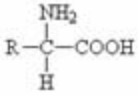
5 http://images.google.com

Carbs, Fats and Proteins

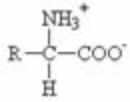
become glucose, fatty acids and amino acids



•Galactose



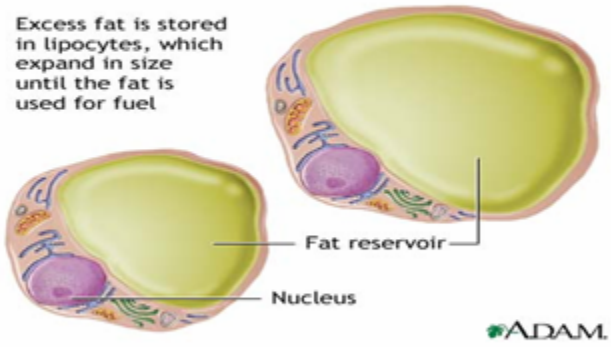
R is the functional group of the amino acid



Ionization at physiological pH (7.4)

6 http://class.stonybrook.edu/ese501/Lectures/LIPID.htm

Fat Cells



http://www.besthealth.com/besthealth/bodyguide/reflexkhtml/lymp_sys_kh.htm#capillary

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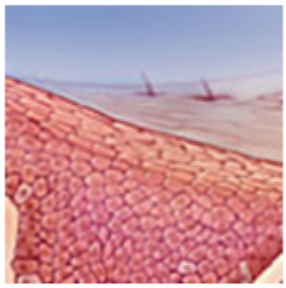
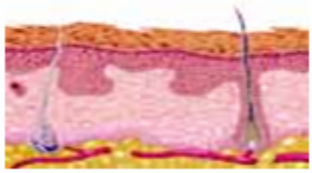
Cells of the skin





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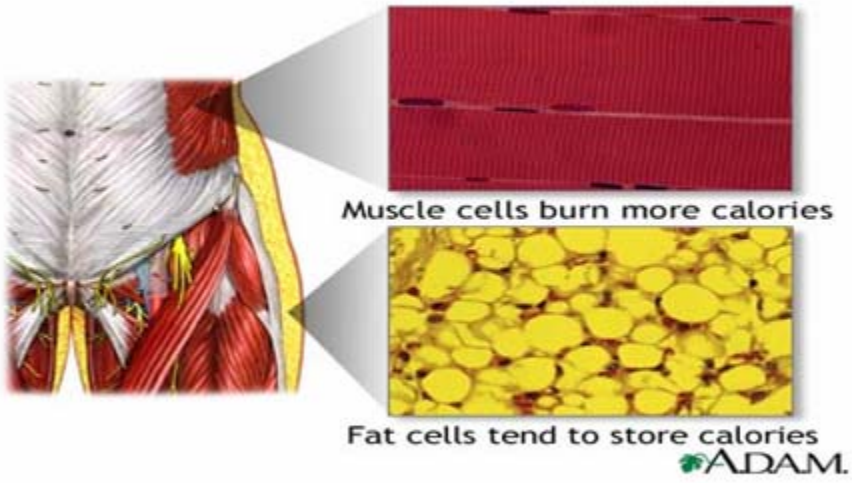

http://www.besthealth.com/besthealth/bodyguide/reflexlink/lymp_sys_gn.html#capillary

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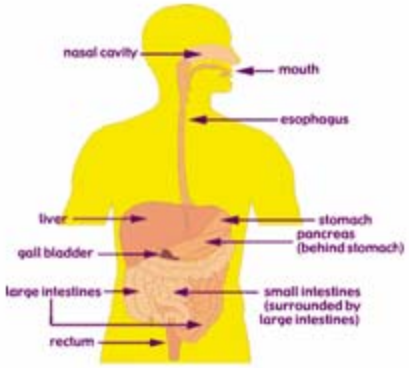
The digestive system



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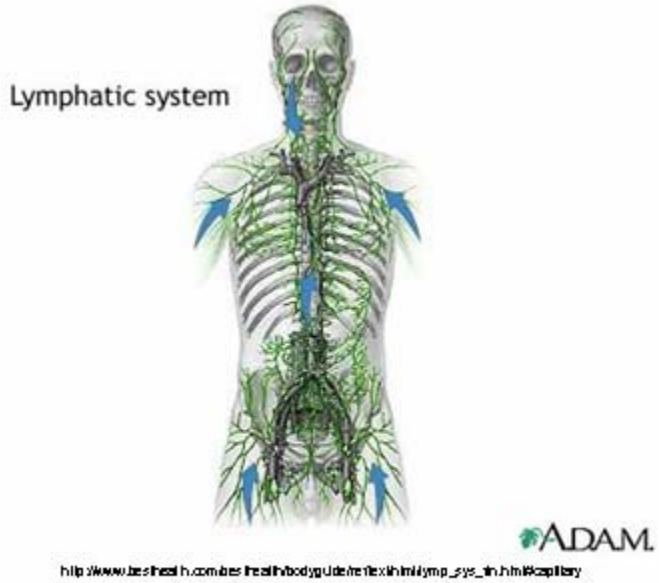

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Enzymes

12

Combination method

fruits in the morning
vegetables and carbs through day
proteins, dairy, fats and vegetables in the evening
next morning, start with fruit

13

What Toxins Are

- Caffeine
- Dyes
- Nitrites
- Alcohol
- Drugs
- Pesticides
- Pollution

What Toxins Aren't

- Aspartame
- Hormones in animals; manure causes changes in fish reproduction
- Genetically engineered food

14

The New USDA Pyramid

15

Nutrition Facts

Serving Size 1 potato (148g/5.3oz)

Amount Per Serving	
Calories 100	Calories from Fat 0
	% Daily Value*
Total Fat 0g	**0%**
Saturated Fat 0g	**0%**
Cholesterol 0mg	**0%**
Sodium 0mg	**0%**
Potassium 720mg	**21%**
Total Carbohydrate 26g	**9%**
Dietary Fiber 3g	**12%**
Sugars 3g	
Protein 4g	

Vitamin A 0%	• Vitamin C 45%
Calcium 2%	• Iron 6%
Thiamin 8%	• Riboflavin 2%
Niacin 8%	• Vitamin B_6 10%
Folate 6%	• Phosphorous 6%
Zinc 2%	• Magnesium 6%

*Percent Daily Values are based on a 2,000 calorie diet.

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Nutrition Facts

Serving Size 3 cookies (34g/1.2 oz)
Servings Per Container About 5

Amount Per Serving	
Calories 180	Calories from Fat 90
	% Daily Value*
Total Fat 10g	**15%**
Saturated Fat 3.5g	**18%**
Polyunsaturated Fat 1g	
Monounsaturated Fat 5g	
Cholesterol 10mg	**3%**
Sodium 80mg	**3%**
Total Carbohydrate 21g	**7%**
Dietary Fiber 1g	**4%**
Sugars 11g	
Protein 2g	

Vitamin A 0%	• Vitamin C 0%
Calcium 0%	• Iron 4%
Thiamin 6%	• Riboflavin 4%
Niacin 4%	

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

How much is too much fat?

Saturated fat, found mostly in foods from animals and some plants, is the main dietary cause of high blood cholesterol. The recommended amount of saturated fat depends on the amount of calories you use each day. To find that number, multiply your body weight in pounds by 15 (if you're active). This means if you weigh 200 pounds, you expend about 3000 calories (200 x 15) calories in an average day. If you're physically inactive, multiply your weight by 13 to find the calories you expend.

http://www.cholesterollowdown.org/adjust_your_diet/Fat_Facts.html

Calorie Level	Total Fat 30% or less (grams)	Saturated Fat less than 10% (grams)	Saturated Fat less than 7% (grams)
1200	40 or less	less than 13	less than 9
1500	50 or less	less than 17	less than 12
1800	60 or less	less than 20	less than 14
2000	67 or less	less than 22	less than 16
2200	73 or less	less than 24	less than 17
2500	83 or less	less than 28	less than 19
3000	100 or less	less than 33	less than 23

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How much for a 2,000 calorie diet?

- 20-30 grams of fiber
- 2,400 mg of sodium
- 3,500 mg of potassium

No more than:

- 65 gm total fat (30% of total calories, 65x9=585)
- 300 gm carbs (50-60% of total calories, 300x4=1200) (100 gm from whole grains)
- 120 gm protein (15-20% of total, 120x4=480)
- Total: 480+585+1200=2265 calories

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How much for me?

- 1,200 calories a day for age and height
- For weight loss, no more than 20% of calories from fats, or 200 cal. If one gram of fat has 9 calories, then 20 grams of fat would have 180 calories.
- If the RDA for sodium is 2,400 mg for a 2,000 calorie diet, then mine would be about half of that.

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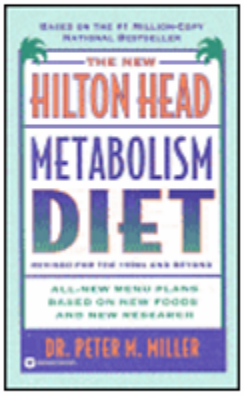
Dr. Miller's Metabolism Diet



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Dr. Agatson's South Beach Diet

21

Weight Watchers

- Point System: fats, calories and fiber; set number of points per day

- Old exchange system (on lowest level):
- 2 fats (tsp)
- 2 fruits
- 2 milks
- 4 proteins (oz.)
- 3 carbs (servings)
- 3+ vegetables

22

What is a serving size?

Here are some guidelines from the old Weight Watchers method:

Fruits: Berries ½ cup, except Strawberries, 1 cup
Dried, ¾ ounce
Apples, pears, oranges, 1 small
Grapes or cherries, 12 large
Banana, ½
Watermelon, honeydew, cantaloupe, 1 cup

Starches: Bread, 1 slice
Buns or bagels, ½
Grains, rice and pasta, ½ cup cooked
Cold cereal, ¾ cup
Popcorn, 2 cups popped, plain
Corn, ½ cup or 1 small ear
Potatoes, yams, peas, beans, 3 ounces or ½ cup

Proteins: all meats, 1 ounce cooked plain
Hard cheese, one ounce
Soft cheese like cottage, 1/3 cup
Egg, 1 plain

Milk: Nonfat, ½ cup
Yogurt, nonfat ¾ cup
Low-calorie pudding, ½ cup

Fat: Avocado, olives, 1 ounce
Oils, mayonnaise, peanut butter, 1 tsp

Vegetables: all but high starch, ½ cup

23

Daily Nutritional and Exercise Log

Ex 18 F Cal	Ex 19 F Cal	Ex 20 F Cal	Ex 21 F Cal	Ex 22 F Cal
Fa				
Fr				
M				
P				
S				
V				

24

Final Note

Good nutrition and a healthy exercise program are not just temporary measures to help you lose weight. These routines must last a lifetime. My prescription for good health:

5 fruits and vegetables a day
3 whole grains a day
4 ounces of lean meat a day
2 servings of low fat milk or yogurt a day
Two teaspoons of fat a day
At least 30 minutes of exercise 5 times a week

25