



Nutrition

Online Book

Eating healthy has never been easier than it is today, but it has also never been more difficult. Thanks to innovations in technology and transportation, fresh fruits and vegetables are available year-round. Leaner meats and meat alternatives are easily accessible. Manufacturers offer reduced-fat, reduced-sugar, and reduced-sodium products for almost any meal, snack, or dessert. Even fast-food restaurants and convenience stores carry food items that are lower in fat and higher in nutritional value.

The problem is that myths and misconceptions plague the health and fitness industry; many people are unaware of, or have been misled about, how to achieve all the many benefits of good nutrition. In principle, eating well and making wise food choices is not difficult. All we need to do is eat a wide variety of foods that supply the appropriate amounts of essential nutrients without overeating those nutrients that can be potentially harmful, such as saturated fat, cholesterol, sodium and sugar. Still, eating right proves extremely difficult for many of us. However, the Global Health and Fitness (GHF) Nutrition program will show you how you can improve your nutrition and make an amazing difference in the way you look, act, and feel.

Eating a well-balanced diet is easier when you have a clear understanding of each of the six nutrients that are so vital to the human body. These nutrients all play different-- yet very important-- roles in nutrition.

Three of the six, the energy nutrients, provide energy for the body and thus yield calories. They are carbohydrates, proteins, and fats. The amount of energy a food has depends on how much carbohydrate, protein, and fat it contains. Food energy, both in its consumption and expenditure, is measured in terms of calories. Fat is a very concentrated source of calories; it has more than twice the calories of carbohydrates or protein. One gram of fat contains nine calories, whereas one gram of either carbohydrates or protein contains only four calories.

The other three vital nutrients are water, which is by far the most abundant nutrient (60 percent of the

body) and a major part of almost every cell and tissue; vitamins, which serve as helpers, making it possible for other nutrients to be digested, absorbed, and metabolized; and minerals, which help the body's metabolic process, assisting proteins and vitamins to carry out their important functions. Although water, vitamins, and minerals do not provide energy, they have very specific and vital roles in nutrition that cannot be substituted or compromised.

In the GHF Nutrition program, you'll learn about the different kinds of fat and their roles in nutrition: How much cholesterol you need in your body and how to reduce high-risk levels. Why fat makes us fat. Our program also offers guidelines and easy-to-follow recommendations for keeping dietary fat and cholesterol at an optimal level.

You'll learn about protein and its role in nutrition: How to figure out the recommended daily protein intake for your body weight and training intensity as well as the average amount of protein-rich foods you should consume to meet your recommended daily requirement. You'll also read about some dietary problems and consequences of consuming too much protein.

You'll find out all about the role of carbohydrates in nutrition. Guidelines for how many carbohydrates (simple, complex, and fiber) you should consume daily and examples of foods rich in each. Since fiber is so important to our health, yet often missing, you'll get easy-to-follow strategies for increasing your daily fiber intake, lists of foods rich in fiber, and the amounts of each to consume to meet your daily requirement.

Next, you'll receive important information about the two classes of vitamins and minerals, including antioxidants, and their roles in nutrition, what foods are rich in each of the vitamins and minerals, the recommended daily allowance of each, and what happens if you consume too much or too little.

Finally, you'll learn water's vital importance in nutrition, ways of monitoring your hydration level, very important guidelines for consuming water daily, and during and after exercise.

GHF offers a personal, practical approach to health and fitness for all levels of experience. Our program integrates weight management, nutrition, cardiovascular exercise, strength training, and flexibility training into individually-tailored plans to help you develop and maintain a body full of energy and free from unnecessary injury and disease. With GHF, you'll adopt gradual, realistic changes into your life that will make healthy eating and activity a permanent pleasure. That's the

Fat

Fats in the body provide many services that are hard to do without. Perhaps, most importantly, fat provides energy. Our body fat has an unlimited storage capacity, and fat supplies more than half of the body's ongoing energy needs during rest. Glycogen is the storage form of glucose and is the body's principal energy source, but it does not have an unlimited storage capacity like fat does. Fat also serves

other roles in the body. A layer of fat tissue beneath the skin, insulates the body from extremely cold temperatures. A pad of fat beneath the kidneys protects them from damage during the activities of daily living.

Triglycerides

There are three kinds of fats in your body, each with a role in nutrition. The first, triglycerides, are found both in animal and plant foods. Most of the fat consumed in the average diet is in the form of triglycerides. This is also the form in which almost all of the fat in your body is stored. Triglycerides can either be saturated or unsaturated (monounsaturated or polyunsaturated), depending on their chemical structure.

Phospholipids

The second kind of fats is phospholipids, compounds that mix fat with water, making them important in the structures of cell membranes. Phospholipids allow the passage of fat-soluble substances, including vitamins and hormones, in and out of cells. The best known member of the phospholipid family is lecithin, which can be found in oatmeal, soybeans, cauliflower, peanuts, eggs, milk, and chocolate. Many studies have suggested that lecithin may provide other health benefits, ranging from improving memory to preventing liver damage from alcohol.

Cholesterol

The third category of fats is cholesterol, which comes from animal products. The body has problems both transporting fats and digesting them. Fats are not soluble in water, so our body provides special "vehicles" to transport them, called lipoproteins. They are low density lipoproteins (LDL) and high density lipoproteins (HDL).

LDL Cholesterol

The LDLs contain large amounts of cholesterol and are responsible for depositing cholesterol in the artery walls, potentially leading to deadly diseases such as heart disease and strokes. For this reason, they are called "bad cholesterol". They are the ones people talk about when stating the importance of cutting down cholesterol. Levels of LDL cholesterol that are 160 mg/dl and above are classified as high risk LDL. LDL cholesterol can be lowered by exercising (strength training and cardiovascular exercise), decreasing body fat stores, decreasing saturated fats and/or replacing saturated fats in diet by monosaturated and polyunsaturated fats, and by decreasing the overall percentage of fat calories.

HDL Cholesterol

HDL, or high density lipoproteins, contain more protein than cholesterol. These HDL are responsible for removing cholesterol from the cells in the arteries and transporting it back to the liver for removal from

the body. Studies show that people with high levels of HDL have reduced chances of heart disease. Thus, HDL is known as "good cholesterol". HDL cholesterol below 35 mg/dl is considered a risk factor for heart disease. Several factors have been found to increase HDL. A recent study showed that those who ran just eight miles a week (two miles a day four times a week) saw an increase in HDL cholesterol which thus decreases the risk of disease.

Desirable total blood cholesterol are those less than 200 mg/dl. Those with a blood cholesterol of 240 or greater are at risk for heart disease and should consult a physician and decrease fat, saturated fat, and cholesterol in their diets while implementing a safe and effective exercise program. Those with cholesterol levels between 200-239 mg/dl should also consult a physician and take preventative measures to help get cholesterol at more desirable levels.

The average person has 30-40 billion fat cells, which fluctuate widely in size depending on the amount of fat they contain. Each of us is born with a genetically predetermined capacity to produce fat cells, which makes up our body fat. As we mentioned earlier, the primary role of fat in our bodies is to be a reserve for energy. The problem is that most of us consume more energy (calories) than we expend. When this happens, our predetermined fat cells not only increase in volume, they also multiply. Fat cells expand to their outer limits, and when significant weight gain takes place, they divide forming new fat cells. And once a new fat cell is created, it's yours for life. This is the primary reason it is difficult to lose weight once you have gained it. A person with more predetermined fat cells has greater difficulty maintaining lower body weight than a person with fewer fat cells. So the last thing you want to do is gain more fat cells. Once you've got them, you can't get rid of them. This does **not** mean that it is impossible to become lean, however. Implementing the weight management principles we discuss in the GHF Weight Management component can help you shrink these fat cells to an optimal level.

While a fat cell's main function is storing energy for future use, it also serves as a buffer that keeps excess blood sugar or glucose and fat out of the bloodstream. But when fat cells are ballooned up, they can no longer prevent harmful substances from entering circulation. By continuing to take in more energy than you use, you fill up the new fat cells and even more fat and sugar return to your blood stream. This causes more insulin to be produced, which causes your body to make even more fat cells.

Kinds of Fat

One important fact to understand is that not all dietary fat is created equally. While all kinds of fat yield nine calories per gram, and can cause an increase in body fat stores if you eat them in excess, some are better for you than others.

Saturated Fat

The first type of fat we'll discuss is saturated fat, it is the worst kind for you. These fats are found in all foods that come from animal sources such as meat, eggs, butter, milk, cheese, and creams. Saturated fat is also found in oils such as coconut and palm kernel. Saturated fats are the worst kind fat because they

increase LDL cholesterol and pose the highest risk for heart disease and cancer.

Monounsaturated Fat

The second type of fat is monounsaturated. They are found primarily in nuts and vegetable oils, such as olive and canola oil. These are often referred to as good (better) fats because studies have shown that they help reduce blood cholesterol levels and protect against heart disease. An example is omega three fatty acids.

Omega three fatty acids have been shown to reduce blood cholesterol and triglyceride levels for improved cardiovascular health and decreased risk of heart disease, particularly atherosclerosis. These omega three fatty acids are found in fish and other marine animals. Exactly how much we need to eat to receive benefits is still unknown, but the American Heart Association suggests two to three fish meals a week. In addition to being an excellent source of omega three fatty acids, fish contains many valuable nutrients and is much leaner than most other animal protein sources and rich in many vitamins and minerals.

Polyunsaturated Fat

The next type of fat is polyunsaturated. This type of fat contains the essential nutrient linoleic acid and comes from plants, such as sunflower and corn oils. Like monounsaturated fat, it also tends to reduce blood cholesterol levels.

Hydrogenated

The last type of fat is hydrogenated, which is liquid oils that have been chemically altered to a semi-solid state. Margarine and vegetable shortening are prime examples. Hydrogenated fat tends to clog arteries, which also makes them "bad" fats, like the saturated fats.

A factor in determining whether a fat is more saturated than another is its hardness at room temperature. Chicken fat, for example, is softer than pork fat, which is softer than beef fat. So, of the three, beef fat is the most saturated and chicken fat is the least saturated. Polyunsaturated fats melt more easily. Generally speaking, vegetable and fish oils are rich in polyunsaturates, whereas the harder fat, such as animal fats, are more saturated. Remember palm kernel, coconut, and palm oils are saturated even though they are of vegetable origin.

Fat and Cholesterol Guidelines and Recommendations

Of all the nutrients, fat is most often implicated as a contributing factor to various diseases, such as diabetes, cancer, hypertension, and atherosclerosis. Again one of the most important changes you could make to your diet is to limit your intake of total fat, saturated fat, and cholesterol.

We recommend that your total fat intake should not exceed 25 percent. Saturated and hydrogenated fats should contribute less than 10 percent of the day's total energy intake. Those of you who want to adjust your dietary intake need to know where fats are found in foods. Fats are in meats, dairy products, oils, and foods that oils come from such as olives, and a few fruits and vegetables. An ounce of lean meat supplies about 50 percent of its calories from fat. An ounce of high-fat meat, such as sausage, acquires about 75 percent of its calories from fat. Many meats are thought of as protein-rich foods but actually contain more fat than any other nutrient. Therefore, an excess consumption of meat often causes increases in excess body fat and increases the risk of disease. As a general rule, any meat from a cow or a pig is fattening (unless you purchase extra lean varieties) and high in saturated fat.

If you enjoy eating meat, try turkey, chicken, or fish. When eating chicken or turkey, it is best to eat the white breast meat and avoid eating the skin which is high in fat and cholesterol. The GHF Weight Management component is loaded with great ideas for reducing the amount of fat when buying and cooking your favorite meats.

Dairy products are almost all high in fat unless you purchase low-fat or nonfat products. Try replacing whole milk dairy products with the low-fat and/or nonfat varieties. Going from 2 percent milk to nonfat may be a difficult adjustment and unrealistic for many. So, try going smaller steps at a time, from 2 percent to 1 percent or regular sour cream to low-fat sour cream. A recent study found drinking one cup of 2 percent milk a day for a year is equivalent to eating more than 12 sticks of butter. Dairy products can be killers if you don't take preventative measures to cut down the fat.

Animal fats found in meat and dairy products for the most part have high proportions of saturated fats. Fruit and vegetable fats, however, provide a higher proportion of polyunsaturated fats, with the exception of palm kernel, coconut, and palm oils, these are high in saturated fat. Almost everyone knows that butters, creams, and oils are high in fat, but many people are surprised to discover that some fruits and vegetables, and all nuts, are high in fat. Fruits and vegetables high in fat include avocados and olives, which are almost pure fat. Anything fried such as french fries, fried wontons, fried fish, contain an abundance of fat. In addition, many baked goods are high in fat: pie crusts, pastries, muffins, doughnuts, danish sweet rolls, cookies, and cakes. You should try to choose low-fat baked goods made with oils low in saturated fat or reduced amounts of fat. Please refer to the GHF Weight Management component for great ways of reducing the amount of fat in your favorite foods when shopping and cooking.

Cholesterol is found in foods from animals. Even foods without much total fat can contain cholesterol. We recommend that your daily cholesterol intake not exceed 300 milligrams (mg). The following is a list of common foods that contain cholesterol. The largest amount of cholesterol comes from organ meats: brains contain 1,700 mg and liver and kidneys contain between 300 and 400 mg. Other meats such as veal, lamb, pork chops, chicken, beef and hot dogs all contain between 50-150 mg. Some seafoods also contain a considerable amount of cholesterol; shrimp contains 165 mg and lobster, clams, fish fillets, and oysters all contain between 50 and 60 mg.

One large egg yolk contains a whopping 210 mg while the egg white contain zero. This is why we

suggest in the GHF Weight Management component that when cooking or baking with eggs, try to use a three to one egg white to whole egg ratio. This will cut the amount of fat and cholesterol by 75 percent. Milk products are the next highest in cholesterol. Whole milk products, including yogurt and cheese, contain 30-35 mg of cholesterol. Low fat milk products contain only 14-22 mg of cholesterol and nonfat only 4 mg. One teaspoon of butter contains 11 mg whereas margarine contains zero. Whipping cream contains 20 mg of cholesterol, and sour cream and half-and-half contain 6 mg of cholesterol.

As a general rule, anyone wanting to reduce both saturated fat and cholesterol could accomplish this by selecting fish, poultry without skin, turkey, and extra lean varieties of beef and pork; and by choosing fruits, cereals, and legumes; and limiting oils, egg yolks, and fried foods. Those of you who use milk, eggs, and cheese could shift to low/nonfat varieties, while limiting butter and margarine.

Reducing the amount of fat in your diet does not require starvation or even deprivation. It requires eating fat in moderation and making smart day-to-day choices. There's nothing wrong with a high-fat meal once in a while. You just have to balance it with low-fat meals. Refer to the GHF Weight Management component for easy-to-follow recommendations for reducing total fat, saturated fat, and cholesterol in your diet, without sacrificing flavor and feelings of satisfaction.

Protein

Protein's primary role is to build and repair tissues, hormones, and enzymes. Almost everyone knows that protein is the material of muscle tissue. In fact many people equate more protein as more muscle. Many people eat more than enough, often at the expense of other important nutrients. An understanding of the quality and quantity people need will help shed light on protein being only one, although an important one, of the nutrients needed in proper amounts for a balanced diet.

We'll first discuss amino acids in relation to proteins. Many people confuse the two or believe they are synonymous. Amino acids are the building blocks of proteins. A protein is a chemical compound that contains the same atoms as carbohydrates and fats, which are carbon, hydrogen, and oxygen--but protein is different in that it also contains nitrogen atoms. These carbon, hydrogen, oxygen and nitrogen atoms are arranged into amino acids, which are linked into chains to form proteins. There are 22 amino acids important to human nutrition. Nine of these are essential amino acids, meaning the body cannot make them. Instead they need to be provided in the diet. The body can produce the other 13. The role of protein in food is not to provide our bodies with proteins directly, but to supply the amino acids from which the body can make its own proteins. When we eat a diet that supplies each essential amino acid in adequate amounts, our body supports protein synthesis.

The following chart lists the amino acids, including the nine essential amino acids, that make up proteins in human nutrition.

Amino Acids	
Essential Amino Acids	Other Amino Acids
Histidine	Alanine
Isoleucine	Arginine
Leucine	Asparagine
Lysine	Aspartic acid
Methionine	Cysteine
Phenylalanine	Glutamic acid
Threonine	Glutamine
Tryptophan	Glycine
Valine	Proline
	Serine
	Tyrosine

To make protein, cells must have all the needed amino acids available simultaneously. Therefore, the first important characteristic of protein in our diet, with respect to protein, is that it should supply at least the nine essential amino acids for the synthesis of others, to make proteins. If one amino acid is supplied in an amount smaller than needed, the total amount of protein that can be synthesized from others will be limited. It is impossible to produce a partial protein. Only complete ones can be made. A diet that contains an imbalance of amino acids is a diet containing poor protein quality. When the body attempts to use the amino acids supply from such a diet, it wastes many amino acids. In the absence of one, it can't use the others and it has no place to store them.

Each food has its own characteristic amino acid balance, and when foods are combined, they almost invariably supply plenty of essential amino acids. In countries where protein is scarce and/or only one protein rich food is eaten regularly, the quality of that particular food's protein is crucially important to people's health and particularly important to children's development.

A complete protein is one that contains all of the essential amino acids in about the same amount the human body requires--and it may or may not contain all of the other amino acids the body can make. People generally associate complete protein with such foods as meats and eggs, but not with plant foods. Generally, proteins derived from animal foods such as meat, fish, poultry, eggs, and milk are a complete source of protein. Those derived from plant foods such as vegetables, grains, and beans vary more than meat and dairy. If you derive most or all of a day's food energy from rice and/or potatoes, you will obtain

all of the needed essential amino acids. In addition, when two plant proteins, each containing the amino acids that the other lacks, are eaten at the same meal, they can make up an acceptably complete protein.

However, completeness is not the only issue with respect to protein quality. For the highest quality, proteins must not only be complete but also digestible, so that the sufficient numbers of amino acids reach the body's cells to permit them to make the proteins they need. Although the proteins of rice and potatoes are of high quality, perhaps the best form of protein comes from eggs. Egg protein tends to be retained in the body, which indicates that it is utilized with little waste. In fact, egg protein has been designated the reference protein for the purpose of measuring protein quality.

To summarize, for the body to use proteins with maximum efficiency, they must contain the essential amino acids, must be digestible, and must be consumed with sufficient energy from other sources, such as complex carbohydrates, so that amino acids will not be used for energy, but rather to help build and repair muscle tissue. They must also be accompanied by the vitamins and minerals needed to facilitate their use, and must be received by a healthy body able to use them.

Figuring out your Protein RDA

One of the most common questions asked about protein is: For my age, sex, weight, and exercise program, how much protein should I consume daily? Competitive athletes, or people in heavy strength training, may need 15-20 percent of their calories from protein, while non-training people require only about 12-15 percent of their total calories from protein. The reason those who strength train (weight lift) require more is that during intense weight- lifting sessions they may have a decrease in protein stores because their muscles are using this protein to help rebuild muscle tissue.

There is a formula for figuring out your specific protein recommended daily allowance (RDA). You must first convert your weight from pounds (lbs) to kilograms (kg). Take your weight in pounds and divide the number by 2.2. Generally for adolescents and non strength training individuals .8 to 1.0 gram of protein per kg of body weight is used. So you would multiply your weight in kg by .8 to 1.0 to get the amount of protein in grams per day. Those adults involved in a heavy or intense weightlifting program should consume about 1.5 grams protein per kg of body weight. And those on a light to moderate weightlifting program require about 1.0 to 1.3 grams per kg of body weight. For example, someone who weighs 150 pounds and is on a three day per week beginning general fitness strength training program (light to moderate) would obtain their daily protein intake by first converting their body weight into kilograms: $150 \text{ pounds} \div 2.2 = 68 \text{ kg}$. Multiply 68 kg. (body weight) by 1.2 (grams of protein/body weight in kg.). He should be consuming about 82 grams of protein daily.

As briefly mentioned before, foods that are a good source of protein are dairy products and meats. A cup of milk provides 8 grams of protein. An ounce of average meat yields about 9 grams. Beans, rice, potatoes also provide a good amount of protein. Unfortunately, most foods high in protein such as dairy products and meats, are also high in fat. Try to eat red meat in moderation and select lean ones labeled top sirloin, extra lean, or select for example instead of meats labeled choice or select. When cutting back

on red meats try lean white meats such as chicken, fish, and turkey. These have a lot less fat and just as much protein. When eating dairy products, choose low-fat or nonfat products. These can also be very high in fat if you don't choose low or nonfat products. As mentioned earlier, eggs are a great source of protein, but the yolks of the egg are very fattening and also high in cholesterol. There is good news however: The whites do not add any fat and contain most of the protein. Again, when cooking or baking with eggs, try to cut down on the yolks by using three whites to one whole egg.

Many people wonder if they get enough protein in their diet. Consider: A single ounce of meat delivers about 7-10 grams of protein, and the RDA for an average sized person is only about 50-80 grams a day. To illustrate this point, suppose your recommended or estimated protein intake is 70 grams a day. This would divide into three meals (although GHF recommends four to six smaller meals--refer to the GHF Weight Management component) 20 grams at breakfast, 25 grams at lunch, and 30 grams at dinner. Three eggs (1 whole egg and 2 egg whites), hash browns (only 1 tbs. of olive oil added), and one glass of milk (nonfat) would meet the recommended amount for breakfast. A large salad with only three ounces of cut up chicken or cheese would be more than enough for lunch. Burritos with black beans, and rice with steamed vegetables would suffice for dinner.

If you have an adequate food intake, you will more than likely have an adequate protein intake. The only way to decide if you are getting enough protein in your diet is to first decide at what intensity you are weightlifting. Then use the formula given to approximate your protein RDA. Then try adding up the total grams of protein you consume in a typical day. If your estimated protein intake falls short, you may want to make an effort to consume more protein-rich foods or consider supplementing with a high quality protein supplement.

Although protein has a very important role in human nutrition, too much can be harmful to the body. If you want to decrease body fat you will find it very difficult if you consume too much protein. Protein-rich foods are often fat-rich foods and contribute to obesity and the accompanying risks. For the best results in decreasing or maintaining levels of body fat, eat a diet that provides adequate protein, minimal fat, and enough energy from carbohydrates. The higher a person's intake of protein-rich foods, such as meat and milk, the more likely it is that fruits, vegetables, grains and other beneficial foods that are often limited, will be crowded out of the diet, making their diet inadequate in other nutrients.

If you consume too much protein, more than the body needs, you will either convert it to fat or it will be excreted from the body. In addition, other problems can occur from taking an excessive amounts of protein, such as dehydration, damage to both the liver and kidneys, and the promotion of calcium excretion, which depletes the bones of their chief mineral. Although those involved in an intense weightlifting program require more protein, they can meet these requirements by eating a well-balanced diet.

Carbohydrates

The primary role of carbohydrates in human nutrition is to supply energy for the body. Carbohydrates do

a great job of filling you up, so you crave less fat. Fat, remember, provides more than twice the calories of carbohydrates. In addition, carbohydrates burn fastest of all the body's energy sources and aren't easily converted to fat. Carbohydrates are important not only for physical activities, but also for those who want to maintain high levels of energy. Carbohydrates are the best choice for fueling your system and promoting a healthy heart.

There are two kinds of carbohydrates, simple and complex. Carbohydrates are in a wide variety of foods, including fruits, vegetables, grains, dairy products, etc. Regardless of their sources, all carbohydrates get broken down to a simple molecule of sugar called glucose, which is the form of energy most preferred by the body. There are three types of carbohydrates that are converted to glucose: monosacharides, disaccharides, and polysaccharides. The monosacharides and disaccharides are known as the simple carbohydrates, and the polysaccharides are known as the complex carbohydrates.

After these three different forms of carbohydrates are broken down into glucose, it then enters the bloodstream where it is made available to all cells of the body. When glucose levels rise, the body responds by releasing a hormone called insulin into the blood. Phillips and Johnston, authors of *Think Light!: Breaking Free from the Diet Prison* (Speaking of Fitness, Inc., 1994) do a great job of explaining insulin and its role in the body. They describe insulin as a "glucose doorman" that travels around the body opening cell doors so glucose can enter and do their jobs, which is maintaining proper blood-sugar levels. Without the help of insulin to open the cell doors, the glucose molecule is just too big to enter the various cells of the body. Inadequate amounts of insulin causes improper metabolism of both glucose and fats, leading to decreases in energy production, and too often, diabetes.

Simple Carbohydrates

Simple carbohydrates cause a rapid increase in blood glucose, typically leading to an overproduction of insulin. When simple carbohydrates are consumed in large quantities the blood gets so full of insulin, that blood glucose levels start to drop. In other words, a sugar high is soon followed by a sugar crash or a drop in energy.

Another problem with consuming too many simple carbohydrates and having elevated glucose and insulin levels, is the effect on the body's fat cells. Fat cells are the storage spaces for body fat. When we increase body fat stores, our fat cells increase in size. When insulin and glucose levels are elevated, fat release decreases and fat storage increases, resulting in larger fat cells. We reduce body fat by eating healthy and exercising, which causes our fat cells to decrease in size by releasing fat stores.

The simple carbohydrates, monosacharides and disaccharides, make up sugars and other sweet tasting substances. Each have three forms of sugars. The monosaccharids consist of glucose, fructose, and galactose, while the disaccharides consist of maltose, sucrose and lactose. These sugars add sweetness to food, which makes it appetizing. They are neutral to health unless they are consumed in excess.

Moderate consumption of sugar, about 5-10 percent of total food intake, is not in any way dangerous to

healthy human beings. However, it can be associated with many other factors that are harmful: obesity, the displacement of needed nutrients, and tooth decay. Most simple carbohydrates contain little amounts of vitamins, minerals and fiber. This is why candy, soda, cakes, and cookies are often called "empty calories," calories with little or no nutritional value.

If you decide to limit the sugar you eat, it is important to recognize that all caloric sweeteners including fructose, honey, and many others are sugars too. The sugar amount may or may not be revealed in food products ingredient list. But if you look at the ingredients, and one of the many forms of sugar is the first ingredient, you'll know that this is the primary source of substance in that product, and thus does not provide a good source of nutrition. Also, be on the look out for several different forms of sugar listed separately, such as corn starch, sucrose, corn syrup. Even though sugar is the main ingredient of the product, it may not appear first or even second on the ingredient label, but may be included several times throughout the list in different forms. The following is a list of other forms of sugars that you should be aware of when reading labels: brown sugar, confectioners sugar, corn sweeteners, turbinado, raw or white sugar, molasses, maple sugar, maltose, levulose, lactose, invert sugar, honey, high-fructose corn syrup, granulated sugar, fructose, galactose, glucose, and dextrose.

Because these simple carbohydrates add sweetness to foods and because eating delicious foods is one of life's great pleasures, do not deprive yourself of them but rather consume them in moderation. Most health and medical experts agree that reducing simple carbohydrates and increasing complex carbohydrates in the diet, greatly benefits ones health. Carbohydrates (complex and simple) should contribute 55-65 percent of your total daily calorie or energy intake. Simple carbohydrates should represent only 10 percent or less of your total daily calories.

Unfortunately, Americans consume only about 45 percent of their calories from carbohydrates. A diet lower in sugars and higher in complex carbohydrates and fiber is almost always lower in fat, lower in calories, higher in energy, and higher in vitamins and minerals. These factors, working together, contribute to a lower rate of obesity, cardiovascular disease, diabetes, cancer, and tooth decay.

Complex Carbohydrates

Complex carbohydrates, even in their original form, are already similar to a simple molecule of glucose. Therefore, once consumed they rapidly turn into glucose and quickly enter the blood stream providing energy for the body.

Most all fruits and vegetables are rich in complex carbohydrates. For example, carrots, dates, beets, turnips, corn, squash, peas, apples, raisins are all great sources of complex carbohydrates. Grains are also loaded with complex carbohydrates. Grains include cereals, breads, oatmeal, rice, crackers, and bagels. Another important source of complex carbohydrates is the legume family, which consists of a variety of beans, peas, and lentils. These legumes are not only rich in complex carbohydrates but also fiber and protein. Other great sources of complex carbohydrates include, potatoes, pasta, nuts, and yams. Milk, yogurt, and meats also contribute carbohydrates.

As mentioned before, 55-65 percent of your total daily calories should come from carbohydrates, and at least 50 percent should be the complex kind. Most people should consume between 350-450 grams of carbohydrates per day. Most of this should come from foods rich in complex carbohydrates, with accompanying fiber; some would be the naturally occurring sugars of fruits, vegetables, and milk; and only 10 percent or less should come from other sugars.

Fiber

Americans eat an average of 10 to 20 grams of fiber per day, which is well below what most health and medical experts recommend, between 25-35 grams of fiber per day. Fiber plays a very important role in nutrition and is very beneficial to many aspects of health. The first is weight management. A diet rich in fiber can help promote fat loss if fiber foods replace fats and sweets. This is possible because fibrous foods offer fewer calories per gram (4 calories/gram) than fats (9 calories/gram), they are not easily converted to fat, and also have the ability to expand to up to 10 times their weight and size in the stomach. Thus, they make you feel full and satisfied for a longer period. Fiber gives you an edge on weight management, not only by satisfying your appetite, but also by slowing down calorie absorption and keeping energy levels up.

A high-fiber diet also helps with many areas of digestion such as constipation and diarrhea, hemorrhoids, appendicitis and diverticulosis. It also reduces the risk of cancer, particularly colon cancer. There is also strong evidence that a high fiber diet lowers cholesterol levels, thereby reducing the risk of heart disease. Fiber also positively effects the insulin response on glucose concentrations. Therefore, high-fiber diets are beneficial in helping obesity, heart disease, and adult-onset diabetes.

Two Kinds of Fiber

Not all fibers have similar effects. There are two different kinds of fiber and both are important. The difference is their food sources and how they affect the body. Foods containing water-insoluble fiber such as wheat bran, wheat germ, whole grains, cracked wheat bran, brown rice, are not digested and add bulk to the diet. They are stool-softening fibers and improve bowel regularity because they tend to accelerate food through the intestines. Soluble fibers such as foods in the legumes family, seeds, raw and dried fruits, and raw and cooked vegetables become gel-like substances during digestion and delay the time food goes through the intestines and thus help to keep glucose levels regulated and help to lower blood cholesterol levels.

A high-carbohydrate, low-fat diet will usually increase your daily fiber consumption since many complex carbohydrates are high in fiber. This involves eating more fruits, vegetables, legumes and grains and fewer high fat foods that most people are accustomed to eating. In order to get 25-35 grams of fiber a day, it is important to make conscious effort to include high fiber foods in almost every snack or meal you eat.

Recommendations for Increasing Fiber and Complex Carbohydrate Intake

The following are suggestions for increasing your daily fiber and complex carbohydrate intake.

- Select cold cereals with at least 4 grams of fiber per serving. For example, Kellogg's Complete Bran Flakes® (5 grams), Kellogg's All Bran with Extra Fiber® (14 grams), General Mills Fiber One® (13 grams), and Nabisco Shredded Wheat with Bran® (4 grams).
- Whole grain oatmeals are also great sources of fiber and complex carbohydrates.
- Choose whole grain or buckwheat pancakes and waffles.
- Get in the habit of eating whole grain breads, bagels and muffins with at least 3 grams of fiber.
- Try mixing fruits with your favorite foods. For example, add a banana or chopped dates to yogurt or cereal.
- Whole grain bagels, rolls, crackers, and muffins are also excellent snacks.
- Always keep fruits and vegetables in convenient places for snacks.
- Chili (vegetarian or turkey), baked beans, and lentil soup are excellent sources of fiber.
- Incorporate dried beans, such as kidney beans, into main dishes. They are great in soups and casseroles.
- Try whole grain pasta instead of regular noodles.
- Use brown rice, millet, or kashi instead of white rice.
- Replace meat with vegetable dishes two to three nights a week.
- Add vegetables and high-fiber cereals to burgers, meatloaf, etc.
- Experiment with whole wheat flour instead of white flour in recipes.
- Try adding oat bran and wheat germ to breads, cakes, cookies, muffins, etc.
- Top desserts with high fiber cereal for added fiber, flavor, and crunch.

Carbohydrates and Proteins Together

As mentioned, the body needs carbohydrates that can be converted to glucose to provide energy. Again, protein's primary role is to build and repair tissues, hormones, and enzymes. Protein also helps to sustain the energy provided by the carbohydrates. It is important to balance meals and snacks with carbohydrate-rich and protein-rich foods together. A meal with carbohydrates alone often results in one becoming hungry sooner because glucose levels shoot up and then crash down afterwards. This can leave you feeling tired, hungry, and weak. If even a small amount of protein is included you will not only stay full longer, but glucose levels will stay more consistent and you will feel energized for a longer period.

It is important that you understand how protein and carbohydrates interact with each other. Each food nutrient is broken down at different times. Carbohydrates are digested in about two hours. Proteins take longer to digest, and when the two are combined or eaten together, protein actually slows down digestion of carbohydrates, and energy from carbohydrates is released more slowly. It actually slows down the release of glucose from carbohydrates into the bloodstream. Thus, eating protein-rich foods with carbohydrate-rich foods stabilizes the glucose, that could otherwise lead to hunger. This keeps us feeling energetic and satisfied until the next meal. In addition, when carbohydrates are used as energy, they spare

proteins from being used as energy so they can be used to build and repair tissues. For example, a meal only rich in carbohydrates, such as soup, bread, and salad would result in a period of hunger soon after the meal. On the other hand, a balanced lunch which includes a protein source such as a turkey and a low-fat cheese sandwich with soup, will provide and sustain energy.

Water

Water is a crucial part of all of the human body, yet we seldom think of its vital importance. Our bodies can only survive a few days without it. Body fluids, made up mostly of water, bring to each system all the required ingredients and carry away the body's waste in the form of urine. Water is also necessary for many chemical reactions in the body. It can act as a lubricant around joints and protect sensitive tissues and organs, including the spinal cord, eyes, and the amniotic sac in pregnancy from shock. Water also aides the body's temperature regulation and serves as a solvent for vitamins, minerals, and amino acids, glucose and many other small molecules. It is absolutely essential to stay well-hydrated throughout the day. You should drink at least eight glasses of water a day. This will not only prevent dehydration and keep energy levels high, it will curb you appetite. When we have an energy slump or a food craving, we generally reach for food when it's really water we need. Refer to the GHF Weight Management component for additional benefits and recommendations for maintaining a steady state of hydration.

Guidelines for Water and Exercise

For optimal performance, water must be replaced before, during, and after exercise. Most people rely on thirst as an indicator for their level of hydration. However, thirst is not an accurate indicator of how hydrated someone is. Water loss during exercise can be monitored by one of two methods. Weigh yourself before and after the exercise session. For each pound of body weight lost, drink two cups (16 ounces) of water. The second way is to check the color of your urine. A dark color means you're dehydrated. You should drink at least one to three cups of water. A pale yellow or no color means that you are at a steady state of hydration.

There are three important guidelines for fluid replacement when exercising. The first and perhaps most important guideline is to consume 4-7 ounces of water, which is about a 1/2-3/4 cup every 10-15 minutes during the exercise session. Second, is to consume cold water because they empty from the stomach most quickly. If the exercise session is less than 90 minutes, then water is the best choice for fluid replacement. If the exercise session lasts longer than 90 minutes and is continuous, then you may want to drink a sports beverage because muscle glycogen has probably depleted and the body needs a source of carbohydrates for energy. However, sports drinks should not exceed a sugar concentration of more than 9 percent. Those drinks that do have a sugar concentration of more than 9 percent lengthen the time it takes water to empty form the stomach, which causes dehydration. The body's water cannot be considered separately from the minerals dissolved in it. You can drink pure water but in the body, the water mixes with minerals to become fluids in which all essential life processes take place.

Vitamins and Minerals

The Recommended Dietary Allowances (RDA's) for most vitamins and minerals have been established by the Food and Drug Administration (FDA) as a point of reference for consumers to help show how a specific food fits into a healthy diet. However, RDA is now commonly referred to as the Daily Value, or the Recommended Daily Dosage. For vitamins and minerals that have an "official" RDA, we have given the latest information available; for those that don't have a designated RDA, we have given the dosage most commonly recommended by health and medical professionals. Either way, each vitamin and mineral RDA will be referred to by GHF as the Recommended Daily Dosage (RDD).

It is important to understand that the RDD's listed are usually the minimum requirements given to help define the safe and adequate intake to help fight nutritional deficiencies. RDD's are not meant as a cure or treatment for disorders and do not cover special nutritional needs--each individual's requirements differ. Many vitamins and minerals, particularly antioxidants, have been shown to help fight infections and diseases. For this reason, many nutritional and health experts recommend doses several times greater than the RDD--these values will also be given.

Antioxidants play a key role in fighting free radicals, a form of oxidation that can weaken cells and wear down natural defenses. Free radicals are atoms or molecules that have one or more unpaired electrons and will search for healthy cells to steal electrons. This causes other cells to become free radicals and continues like a wild game of tag, eventually causing tissue and organ damage. This can deteriorate our natural defenses. Antioxidants have the ability to give up extra electrons to neutralize free radicals without becoming one themselves and thus assist in cell health while fighting cell damage, sickness, and disease.

Vitamins

Vitamins are organic substances found in all living things. Vitamins differ from the energy nutrients: carbohydrates, fats, and proteins. They don't provide energy for the body, but they do assist enzymes with energy production, growth and healing. Perhaps the only characteristics vitamins share with the energy nutrients are that they are vital to life and they are available in foods.

Water-Soluble Vitamins

The water-soluble vitamins are carried in the bloodstream, excreted in the urine, needed in frequent, small doses, and unlikely to be toxic, unless taken in unusually large quantities. The water soluble vitamins include C and the eight B vitamins, each having an important role in nutrition. Vitamin advertisements have many believing that vitamins give you energy. They don't. Remember, the only nutrients that give you energy are fats, proteins, and carbohydrates. It is true, however, that without B vitamins you would lack energy. Moreover, B vitamins serve to help enzymes release energy from carbohydrates, protein, and fats.

Thiamin (B1)

Thiamin or B1 occupies a special site on the nerve cell membrane and plays a pivotal role in the energy metabolism of cells. Consequently, processes in nerves and in their responding muscles depend heavily on thiamin. Thus, it is essential for keeping energy levels high and stress low. Thiamin also helps the body burn carbohydrates more efficiently, which is a big plus for those on a weight management program. The RDD for thiamin is .5 mg/1,000 kcal/day. This means if you consume an average of 3,000 calories (kcal) daily, the RDD for thiamin would be 1.5 milligrams (mg). Many experts recommend taking as much as 25 mg daily to gain the above benefits.

Foods rich in thiamin are pork, sunflower seeds, green peas, black beans, and wheat germ. You can meet your RDD by eating single servings of these foods, and many other common foods you eat on a daily basis can contribute some thiamin. Not enough thiamin in your diet can cause beri beri, a nutritional deficiency, but is very uncommon. Thiamin can be toxic but only if taken by injection.

Riboflavin (B2)

Riboflavin, like thiamin helps enzymes release energy from nutrients needed in every cell of the body. Riboflavin, therefore, assists in metabolizing proteins and fatty acids. Like the thiamin RDD, riboflavin is stated in terms of milligrams per 1,000 calories of food and the RDD is 1.2 to 1.7 mg/day. Many experts recommend taking 25 milligrams daily. Infants, children, and pregnant women's needs rise rapidly because the body is undergoing a time of active growth. Riboflavin is commonly found in meats, vegetables such as mushrooms, and milk products. Since riboflavin is water soluble, low/nonfat dairy products contain more riboflavin. Vegetarians who don't consume milk products can get enough riboflavin in dark vegetables or brewers yeast. No one disease is associated with riboflavin deficiency, but a lack of it can cause cracks and redness near the corners of eyes and lips.

Niacin (B3)

Niacin participates in many metabolic activities and has great cholesterol-lowering abilities. The RDD for Niacin is stated in equivalents, reflecting the body's ability to convert the amino acid tryptophan to niacin. Niacin is a unique vitamin in that the body can make it from this amino acid. The RDD is 20 mg daily. Meat, poultry, and fish contribute much of the niacin consumed by most people. About half of most people's niacin comes from enriched breads and cereals. Mushrooms, asparagus, and green leafy vegetables are among the richest vegetable sources, and they can provide an abundant amount of niacin to those who eat generous amounts. The Niacin deficiency disease pellagra can lead to dermatitis, diarrhea, and dementia, but is very unusual because it occurs in diets lacking either niacin or the amino acid tryptophan. Niacin in large doses (more than 100 mg) dilates the capillaries and causes a tingling effect known as the Niacin Rush.

Pantothenic Acid (B5)

B5 is part of coenzyme 4, which is used in energy metabolism and seems to help with stress and alleviate symptoms of allergies and stress-related exhaustion. B5 is widespread in foods. Meat, fish, poultry, whole grain cereals, and legumes are particularly good sources. Most diets provide an adequate intake -- B5 deficiencies are rare. Symptoms involve a general failure of all the body's systems. There doesn't seem to be a toxicity level. The RDD for B5 is 10 mg. Many experts advise as much as 100-200 mg daily.

Pyridoxine (B6)

Vitamin B6 is essential for a healthy nervous system and is a part of more than 60 enzyme reactions. B6 also battles PMS. Don't skip this supplement if you're on the pill because the pill depletes B6. Vitamin B6 assists coenzyme A so that the body can synthesize nonessential amino acids when amino groups are available. Vitamin B6 can be found in meats, fish, poultry, potatoes, and a few other green vegetables such as spinach and broccoli and fruits such as watermelon and bananas. When people are B6 deficient they experience vague symptoms such as weakness, irritability, and insomnia and in extreme cases, impaired motor functions and convulsions. Large doses of B6 can cause nerve damage starting with lost sensations in the hands, numbness in the feet and inability to work. The RDD for B6 is 2.0 mg for men and is 1.6 mg for women. Although, many experts recommend as much as 50 mg daily. More than 100 mg daily could be toxic.

Cobalamin (B12)

B12 works with folate to assist cell division in protein synthesis. Too little of B12 may lead to fatigue, anemia, and even depression. Vitamin B12 also maintains the sheath that surrounds and protects nerve fibers and promotes their normal growth. In addition to these two primary roles of vitamin B12, bone cell activity and metabolism seem to depend on its presence. Vitamin B12 is found almost exclusively in meat and other products from animals. Anyone who eats a reasonable amount of meat or dairy products is guaranteed an adequate intake. Vegans should eat soy milk, meat replacements, or yeast to get their requirements. Many vegans show signs of B12 deficiency and supplements may be necessary. The RDD for B12 is about 2 to 6 micrograms/day. But to achieve the benefits mentioned above, 10-50 micrograms daily is often recommended. B12 deficiencies can also lead to anemia and can cause paralysis of nerves and muscles. B12 does not seem to be toxic.

Biotin

Biotin plays an important role in carbohydrate, fat, and protein metabolism. As a conductor for several key enzymes, it participates in many reactions, including fatty acid breakdown. Biotin is widespread in foods. Those who consume a wide variety of foods are not at risk for deficiencies. The RDD for biotin is .3 mg (300 micrograms). Biotin deficiencies and toxicities are rare in humans.

Folate

Folate, also known as folic acid or folacin, is vital to healthy cell division and tissue regeneration. Studies have shown it to shield cells from viruses that trigger cancer. Research also shows that daily doses help halt, and even in some cases, reverse development of precancerous cervix cells in women taking the pill while preventing birth defects during pregnancy. Folate is especially abundant in green vegetables such as spinach, asparagus, and turnip greens. Meats and milk products are notable for their folate contents. Folate deficiencies are due to inadequate intakes of these foods and is probably the most common of all vitamin deficiencies. The most common folate deficiency is anemia, which impairs cell division and protein synthesis, the process critical to growing tissues. Anemia is especially common among pregnant women. The RDI for Folate is .4 mg (400 micrograms). The need for folate rises considerably during pregnancy. The recommendations for pregnant women are considerably higher than for other adults.

In summary, the meat and meat alternative group provides thiamin, niacin, pyridoxine, and cobalamin. The milk and milk products group stands out for riboflavin and cobalamin. The fruits and vegetable groups excel for folate. The cereal and bread group provides thiamin, riboflavin, and niacin. A diet that offers a variety of foods from each of the food groups will provide the minimum RDIs. But please remember, the RDI is only set at a level to help prevent nutritional deficiencies. Vitamin and mineral supplements may be necessary to meet the higher levels mentioned.

Vitamin C

Vitamin C plays many roles in nutrition. The first, and perhaps most important role is that it is an antioxidant. Vitamin C is shown to be the most effective antioxidant in water-based solutions. When they concentrate in the blood, they can greatly decrease the incidence of free radicals before they can attack and cause oxidative damage to cells. Not only does vitamin C fight free radicals, it also helps to regenerate and work synergistically with vitamin E. Vitamin C has also been shown to reduce the risk of heart disease, high blood pressure, and cancers of the mouth, esophagus, stomach, cervix, endometrium, rectum, breast, lung, and cataracts. This powerhouse not only helps fight disease but also fights viruses, boosts the immune system, and protects against pollution. Researchers at UCLA recently concluded that just 300 to 400 milligrams each day might lengthen life by six years. And because vitamin C aids in metabolizing excess alcohol, it can be the perfect hangover remedy. Manufacturers often add vitamin C to their food products not just for nutritional value but also to protect important nutrients in their foods. Vitamin C also helps operate the metabolism of several amino acids.

The RDI for vitamin C is 60 mg/day. High doses are often recommended for antioxidant protection. Many experts recommend as much as 500 to 1,000 mg daily. With an inadequate intake, the body's vitamin C pool size dwindles and latent scurvy begins. Signs of vitamin C deficiency are scurvy, bleeding gums, and bruising. Most people who eat a diet rich in fruit and vegetables are not at risk for deficiency. Those who are stressed, have a fever, exercise extensively, or live in highly polluted areas should consume larger doses. Vitamin C toxicity does not seem to be a big concern and is very rare. However, symptoms include nausea, abdominal cramps, diarrhea, headache, fatigue, and insomnia.

Fruits and vegetables in the diet guarantee a good dose of vitamin C. When people think of vitamin C, they think of oranges. But there are many other great sources such as other citrus fruits, dark green

vegetables, cantaloupes, strawberries, peppers, tomatoes, papayas, and mangos. A single serving of any of these provides more than 30 milligrams of vitamin C.

Fat-Soluble Vitamins

The four fat-soluble vitamins we will discuss play many specific roles in the growth and maintenance of the body, affecting the health and function of eyes, skin, digestive system, lungs, bones, teeth, nervous system, and blood. The fat-soluble vitamins A, D, E, and K differ from the water-soluble vitamins in several ways. They are found in the fat and oily parts of foods. Because they are insoluble in water, they require bile for digestion and specific proteins for transport. Fat-soluble vitamins tend to move into the liver and adipose tissue and remain there, rather than being regularly excreted like water-soluble vitamins. Fat-soluble vitamin storage in the body makes it possible to survive for days, weeks, or even months without eating foods containing them; thus the risk of toxicity is greater than it is for water-soluble vitamins.

Vitamin A and Beta Carotene

Vitamin A is the most versatile vitamin because of the many roles it serves in the body. It promotes good night vision, healthy skin and growth of the body tissues. Other roles include improving immunity to disease and resistance to infections such as colds and sore throats. It may also help protect the lungs against pollution. Vitamin A helps to maintain the stability of cell membranes and helps to manufacture red blood cells. Thus, when vitamin A levels are low, mucous membranes are more vulnerable to infection.

Beta Carotene is another antioxidant that helps fight infections and disease. This vitamin precursor helps convert to vitamin A in the body. It has important functions that cannot be supplied by vitamin A. Beta Carotene has shown to lower the risk of heart disease, stroke, cancer of the mouth, cervix and lungs. It may also help slow the development of cataracts. Foods rich in vitamin A are meats, primarily liver and dairy products such as milk, cheese, butter, and creams. Foods rich in Beta Carotene are dark green leafy vegetables such as spinach, broccoli, and asparagus and yellow and orange fruits such as carrots, cantaloupe, and sweet potatoes.

The RDD for vitamin A is 5,000 International Units (IUs) although many health and medical professionals recommend taking about 7,500 IUs a day for antioxidant protection. There is currently no RDD established for Beta Carotene, but most experts recommend taking 10,000 to 12,500 IUs daily. Taking more than 10,000 IUs of vitamin A or much more than 15,000 IUs of beta carotene could be toxic. Other symptoms of toxicity are dryness and itching of skin and joint pain. Night blindness is one of the first signs of a deficiency. Other signs include cessation of bone growth and anemia.

Vitamin D

Vitamin D is different from all other nutrients in that the body can synthesize it with the help of sunlight.

Given enough sun, it's possible that you don't need vitamin D at all in the foods you eat. Vitamin D promotes normal bone mineralization and is a member of large bone-making and bone-maintenance team made up of nutrients including vitamins A and C and minerals including calcium and magnesium. Foods containing vitamin D are primarily foods from animals such as fish, liver, eggs, and milk. But unless they are fortified, they are not likely to meet the RDA--so one way to meet your vitamin D needs is to synthesize it yourself with the help of sunlight. Vitamin D deficiency causes rickets, a bone disease in children and osteomalacia in adults. The RDA for vitamin D is 200 to 400 IUs, and if you live in a sunny climate, you probably won't need the higher recommended level of 300-400 IUs. People living in northern areas and those who don't eat animal products should probably take a supplement. Just as vitamin D deficiencies depress calcium absorption, result in low blood calcium levels and abnormal mineralization of bone, an excess can cause abnormally high concentrations of calcium, which can form stones in the body.

Vitamin E

Vitamin E is an antioxidant like vitamin C, but is fat-soluble. This vitamin may reduce the risk of heart disease and stroke because it helps prevent the oxidation of polyunsaturated fats. One of the most important places in the body in which vitamin E exerts its antioxidant effect is the lungs, where the exposure of cells to oxygen is the highest. Remember, antioxidants such as vitamin E help to combat free radicals that are trying to oxidize and damage healthy cells. About 60 percent of the vitamin E comes directly from grains and other wheat and grain products such as wheat germ. Vitamin E deficiencies and toxicities are not as common or serious as others such as vitamin A and D deficiencies. The RDA for vitamin E is 8 to 10 IUs a day. Because of vitamin E's antioxidant benefits and rare toxicity, many experts recommend 300-500 IUs daily.

Vitamin K

Vitamin K seems to act primarily in leading off blood clotting and working with vitamin D for healthy bones and thus may help to prevent osteoporosis. Foods containing vitamin K are green leafy vegetables, milk and meats, eggs, cereals, and fruits. The RDA for vitamin K is one microgram per kg of body weight or about 60-80 micrograms daily. Vitamin K deficiency is seldom seen but in some extreme cases can cause hemorrhaging. Toxicities are also not common but can result when water-soluble substitutes for vitamin K are prescribed, especially to infants or to pregnant women. Symptoms include hemolysis, jaundice, and brain damage.

Minerals

Minerals are inorganic atoms or molecules, even smaller than vitamins. Minerals are in the fluids of the body, and help with many essential roles in nutrition, but they are not metabolized nor do they provide energy. Minerals are elements, whereas the other five nutrients are all compounds. This means the minerals cannot be rearranged or lose their identity when they are cooked, like vitamins can. Minerals, although small, play very important roles in nutrition that cannot be compromised. Minerals fall into two

categories: major minerals and trace minerals. Listed below is an overview of the major and trace minerals.

Major Minerals

The major minerals, also known as macrominerals, influence the body's fluid and acid-base balance, contribute to the structure of tissues and bones, and play a variety of other specific roles in the body. When you consider the functions minerals perform, you can appreciate their importance to humans.

Sodium

Sodium is an electrolyte that maintains normal fluid and acid-base balance while assisting in nerve-impulse transmission. Diets rarely lack sodium and therefore no "official" RDA has been set, although the estimated RDD is 500 milligrams per day. The average sodium intake is about 4 to 6 grams/day, or 10 to 15 grams of salt (5 grams of salt is about 2 grams sodium), which is equivalent to two to three teaspoons a day. The American Heart Association recommends limiting sodium intake to 2 to 3 grams daily (2,000 to 2,500 mg daily) and people with hypertension should limit intake to two grams per day. To restrict sodium intake cook with only small amounts of added salt and add little or no salt to food at the table. Cut down on salty foods such as smoked meats, potato chips, pretzels and popcorn, processed cheese, other processed foods, canned and instant soups, and condiments such as catsup and mustard.

Chloride

Chloride is also an electrolyte that maintains normal fluid balance and proper acid-base balance. Hydrochloric acid, found in the stomach, is necessary for proper digestion. Chloride is never naturally lacking in the diet. It is found in food as part of sodium chloride and other salts. Food sources are salt, soy sauces, and processed foods. The RDD for chloride is approximately 750 mg. Although chloride deficiency and toxicity are very rare, symptoms of toxicity are vomiting and deficiency symptoms are muscle cramps and loss of appetite.

Potassium

Potassium is another electrolyte that maintains normal fluid- and acid-base balance and facilitates many reactions, including the making of protein. Potassium supports cell integrity and assists in the transmission of nerve impulses and the contraction of muscles, including the heart. When people think of potassium they think of bananas, but all whole foods serve as good sources of potassium like fruits and vegetables, peaches, pears, and spinach and also members of the legume family such as lima and pinto beans. It's hardly ever necessary to take potassium supplements; deficiencies are very rare. Potassium is rich in a wide variety of foods. The RDD for potassium is 1,600 to 2,000 mg/day.

Calcium

Ninety-nine percent of the body's calcium is stored in the bones. The other 1 percent is in the blood and body fluids. Calcium is the primary mineral of bones and teeth and is also involved in normal muscle contraction. Calcium is also essential in proper nerve functioning, blood clotting, blood pressure, and immune defenses. Along with magnesium, calcium works to calm the nervous system, combat PMS, relax muscles and prevent osteoporosis. The RDD for calcium is 700 to 1,000 mg/day; more for pregnant or lactating women and for the elderly. Significant food sources are milk and milk products, small fish like sardines, tofu, greens, and legumes. Deficiencies result in growth stunts in children and bone loss or osteoporosis in adults, primarily women. Toxicities usually aren't a problem because excess calcium is simply excreted from the body.

Phosphorus

Phosphorus is a principal mineral in bones and teeth and is found in every cell. It is also important in energy transfer and serves as a buffer system that maintains the acid base balance. Animal protein, such as meats and dairy products, is the best source of phosphorus. The RDD for Phosphorus is about 800 to 1,200 mg/day. Deficiencies are unknown, and toxic levels are highly unlikely.

Magnesium

Magnesium is also involved in bone mineralization, the maintenance of teeth, and the building of proteins. Magnesium is involved in normal muscle contraction, bone mineralization, the building of protein, and transmission of nerve impulses. Food sources are legumes, grains, dark green vegetables, and nuts. The RDD for men is 350 mg/day and 280 mg/day for women. Lack of magnesium has been linked to chronic-fatigue syndrome. Deficiencies may also cause weakness and confusion. Toxicities are not known.

Sulfur

The body does not use sulfur by itself as a nutrient-- but assists with other nutrients such as thiamin and certain amino acids. Sulfur helps with the body's detoxification process. There is no RDD for sulfur, and no deficiencies are known. Only when people are deficient in protein will they lack sulfur, which is uncommon. Sources of sulfur are protein-rich foods such as meats and dairy products.

Trace Minerals

Our body requires trace minerals in very small quantities-- a well-balanced diet usually provides the required amounts. Minerals function in very similar ways, assisting the many enzymes with various functions. Although they are small in quantity, they perform some vital roles which no other nutrients do. A deficiency in any of these can be fatal and an excess can be deadly.

Iron

Iron is vital to cellular respiration, the process by which cells generate energy. Iron is a part of the protein hemoglobin, which carries oxygen in the body. It also makes oxygen available for muscle contraction and is essential for the utilization of energy. Sources of food rich in iron are red meats, fish, poultry, shellfish, eggs, legumes, and dried fruits. Because so much of the body's iron is in the blood, iron deficiencies are greatest whenever blood is lost and this is why adequate iron intake is so important for women. Blood loss during menstruation can lead to the iron deficiency anemia. The RDD for women during possible childbearing years is 15 mg/day. Post menopausal women and men's RDD is 10 mg/day.

Zinc

Zinc is active everywhere in the body, as a cofactor for more than 70 enzymes that perform specific tasks in the eyes, liver, kidneys, muscles, skin, bones, and male reproductive organs. Part of many enzymes, it is associated with the hormone insulin and is thus involved in making genetic material and is crucial to cell division and repair as well as a healthy immune system. Zinc is also found in protein foods such as meats, fish, poultry, and dairy. Zinc deficiencies occur most often in pregnant women, young children, the elderly and the poor. The symptoms can include growth retardation such as dwarfism. Zinc can be toxic if consumed in large enough quantities and in fact doses of two to three times the RDD can lead to degeneration of the heart muscle. The RDD for men is 15 mg/day and is 12 mg/day for females.

Iodine

Iodine is a component of the thyroid hormone thyroxin, which helps to regulate growth development and metabolic rate. Food sources are iodized salt, seafood, and many plant foods. The estimated RDD for Iodine is 150 micrograms/day; 175 micrograms during pregnancy and 200 micrograms during lactation. Both deficiencies and toxicities are rare but can cause an enlargement of the thyroid gland.

Copper

Copper is necessary for the absorption and the use of iron in the formation of hemoglobin and helps to form the protective coverings of nerves. The most significant sources are grains, nuts, organ meats, and seeds. The estimated RDD for copper is 1.5 to 3.0 mg/day. Copper's toxicity symptoms include vomiting and diarrhea-- but intakes must be at least 10 to 15 mg. Larger amounts can cause anemia and bone changes, but that is very rare. Copper deficiency is also very rare.

Maganese

Maganese cooperates with and assists many enzymes, helping to facilitate dozens of different metabolic processes. Maganese is widely distributed in many foods, and deficiencies are unheard of. The estimated RDD is 2.5 to 5.0 mg/day. Toxicity symptoms are rare but can cause nervous system disorders.

Floride

Fluoride is an element involved in the formation of bones and teeth and helps make teeth resistant to tooth decay. Fluoride is consumed by drinking water, and the estimated RDI for Fluoride is 1.5 to 4.0 mg/day. Both deficiency and toxicities are rare, but symptoms are susceptibility to tooth decay. The most common toxic symptom is a discoloration of teeth.

Chromium

Studies have shown that chromium makes gaining or preserving muscle and losing fat easier because it helps regulate insulin production, which affects fat levels. It also helps to stabilize blood-sugar levels. Significant food sources are meat, fats, and vegetable oils, which are all high in fat. This is one reason why chromium is such a popular supplement. The estimated RDI is 50 to 200 microgram/day. Deficiency is unlikely given the small amount required and its presence in a variety of popular foods. Toxicity is unknown.

Selenium

Selenium works with vitamin E to help fight the oxidation of cells, and is therefore considered an antioxidant. Studies show that a healthy supply of this may increase resistance to environmental toxins, even cancer. Foods rich in selenium are seafood, meats, and grains. The RDI for men is 70 micrograms/day and for women is 55 micrograms/day, although many health professionals recommend up to 200 micrograms/day. Very high doses of selenium are toxic and can cause loss of hair and nails and lesions of the skin. Selenium deficiencies are rare but can cause a diabetes-like condition or an inability to use glucose normally.

Molybdenum

Molybdenum is a facilitator with enzymes in many cell processes. Deficiencies and toxicities are unknown. An estimated RDI is about 75 to 250 micrograms/day.

Importance of Combining Strength Training, Cardiovascular Exercise, and Flexibility Training with Your Good Nutrition Program

By now you have probably realized that good nutrition should be an important part of your lifestyle. In addition to good nutrition, there are three (four including weight management) other important aspects of overall health and fitness: strength training, cardiovascular exercise, and flexibility training.

Implementing all five components of health and fitness may seem overwhelming at first, but making small simple changes over time in each of these areas will drastically improve how you think, look, act and feel. In addition, improving any one of the five aspects of health will complement and thereby make improvements in other aspects of your health. For example, improving your nutrition not only increases your energy level, it will also make improvements in your weightlifting and cardiovascular performance.

Note: Please refer to each specific component for further detailed information on each of the other four aspects of health and fitness.

Strength Training

Strength training is exercise that uses resistance--for example, weights--to strengthen and condition the musculoskeletal system, improving muscle tone and endurance. Physiologically, the benefits of consistent strength training include an increase in muscle size and tone, increased muscle strength, and increases in tendon, bone, and ligament strength. Strength training has also been shown to improve psychological health as well, by increasing self-esteem, confidence and self-worth. These improvements have a great influence on our physical performance, metabolic efficiency, physical appearance and risk of injury.

One of the biggest mistakes people make when starting an exercise and nutrition/weight management program is not including a strength training program with their cardiovascular exercise and low-fat eating regimen. This is unfortunate because when we cut calories without exercise, we can lose muscle as well as fat. Many do not choose to do strength training because 1) they mistakenly think they are going to make their body big and bulky, and 2) they do not realize how beneficial and important strength training is in a weight management program. Refer to the GHF Strength Training component for more information on a safe and effective strength training program.

Cardiovascular Exercise

As you will learn, it's important to train all your muscles. But many people miss the one muscle that is perhaps the most important to the body: the heart. It is very important that your heart and lungs be trained so they can help you fight the many health problems associated with heart disease. And there's a bonus: you will rev your metabolism and burn fat in the process. Weightlifting may get your heart beating faster and make your breathing heavy, but it does not get your heart rate up to the consistent, higher training level that is so important for keeping your cardiovascular system healthy.

Building your cardiovascular system is a lot like building any other muscle or muscle group. The exercises that improve your heart's ability to pump blood and your lungs' ability to provide oxygen are what we call cardiovascular exercises, like fast walking, jogging, cycling, swimming, or using the rowing machine or stairstepper. Sports such as basketball, soccer, hiking, and tennis are also considered cardiovascular in nature.

Cardiovascular exercise is any repetitious activity that elevates and keeps your heart rate at 50-100 percent of its maximum. You should do some form of cardiovascular exercise at least three times a week, for at least 20 minutes per session, at intensities of 55-80 percent of your maximum heart rate. Although strength training programs need at least one day of rest between training specific muscle groups, cardiovascular workouts can be done on both your strength training days and your days off.

This form of exercise usually does not cause microtrauma or any temporary damage (good) to muscles, like strength training does, so we encourage you to train cardiovascularly at least three to five days a week. Before doing this, we strongly recommend reviewing the GHF Cardiovascular Exercise component for important principles, guidelines, and safety precautions. Remember, strong muscles are worthless if your heart and lungs are not powerful enough to let you use those muscles.

Flexibility Training

Flexibility is one of the key components of a balanced fitness program. Without flexibility-training (stretching), you are missing an important part of overall health. Flexibility prevents injury, increases your range of motion, promotes relaxation, improves performance and posture, reduces stress and keeps your body feeling loose and agile. The range of motion for any joint is defined primarily by the elasticity of the muscles and tendons attached to it. So the point of stretching is to make your muscles loose and elastic so your joints can bend as smoothly and widely as possible. Unused muscles actually become shorter and tighter over time, limiting your ability to move freely.

There is absolutely no evidence that people lose flexibility as they gain muscle--as long as they stretch and practice proper exercise technique. Refer to the principles and guidelines sections of the GHF Flexibility Training component for further instructions on a safe and effective flexibility training program with specific stretches for each muscle group. We will teach you how to integrate safe and effective flexibility-training into your exercise program.

Take Action

We hope you have found the information in this component helpful. You now have the knowledge and tools (GHF Healthy Recipes) to achieve the results you desire and the benefits of good nutrition your body deserves. Your greatest challenge, however, is not learning why excessive amounts of fat makes you fat or its food sources; it's not figuring out how much protein you should consume daily or the RDD and food sources of vitamin E. Nor is it deciding how much water you should drink daily and during exercise. The greatest challenge facing you at this moment is deciding whether you are willing to take action and make time for yourself and make good nutrition a priority.

Including proper nutrition and healthy eating into your busy schedule will be an adjustment. We understand that change is difficult for many people. However, if you have the willingness to work through the initial emotional discomfort as you move step-by-step through the GHF Nutrition program, you will find the confidence, commitment and determination that will ease the way.

When you begin achieving improvements in energy and physical and psychological performance, the excitement and fun you experience will make the change well worth the effort. Action creates motivation! Good luck: We hope you enjoy all the wonderful benefits of our GHF Nutrition program.