Nutrients

There are *seven* groups of nutrients which the human body needs to stay healthy - Protein, Carbohydrates, Fats, Vitamins, Minerals, Roughage (Dietary Fiber), and Fluid (water). Also, see the Recommended Dietary Allowance Of Nutritional Elements

1. Protein

There is a popular misconception that meat is the only real source of protein, and thus that a vegetarian diet is inherently unhealthy due to a lack of protein. It is impossible to stress how untrue this is.

First of all, the Recommended Daily Allowance of protein is not as high as one might think, and many people - vegetarian or not - eat more protein than their bodies actually need. The approximate RDA of protein is only 47 grams for women and 54 grams for men.

Secondly, there are many protein-rich vegetarian and vegan foods. The only problem is that vegetable sources of protein, with the exception of soybeans, are not complete proteins, so you need to eat more than one in order to get the complete protein.

Vegan sources of protein

- Cereals and grains - wheat, rye, corn...
- Leafy green vegetables, including spinach
- Legumes - beans, lentils, peas, peanuts
- Nuts - almonds, walnuts, cashews...
- Seaweed - kelp, spirulina...
- Seeds - sesame, sunflower...
- Soy products - tofu, tempeh, soy milk...
- Vegetables - Brussel sprouts, new potatoes, yuca

Ovo-lacto sources of protein

- Eggs
- Cheese
- Milk
- Yogurt

As long as vegetarians (and everyone else, for that matter) eat a wide variety of foods, they will easily manage to eat enough protein - not to mention other nutrients.

If you want to be absolutely certain that you are getting enough protein, you should eat food combinations which form a complete protein, such as:

- Legumes + seeds
- Legumes + nuts
- Legumes + non-dairy milk
- Grains + legumes
- Grains + non-dairy milk

Note that these combinations don't necessarily have to be eaten at the same time; you can eat one several hours after the other and still benefit from the complete protein.

As you can see, there are plenty of vegetarian sources of protein, so the next time some "carnivore" says your diet is unhealthy, you'll know how to respond.

2. Carbohydrates

Carbohydrates are sometimes also called carbs or carbos, and your body can make them. Carbs come in two different types: sugars and starches. Sugars are called **simple carbohydrates**. They are called simple because your body digests them quickly and easily. Simple carbs are usually sweet tasting, like cookies, candy, soda, and other sugary foods. And some foods from nature - like many fruits - are sources of simple carbohydrates.

Starchy carbohydrates are called **complex carbohydrates**. These carbohydrates take longer to be digested than simple carbohydrates do. Complex carbs are found in foods like bread, noodles, and rice, and in lots of tasty veggies.

Why Do We Need Carbohydrates?

Carbohydrates have an important job: giving all the cells in your body the energy they need! When you eat foods with carbohydrates in them, your body breaks them down into two different types of fuel.

For energy that you'll use right away, your body takes those carbs and turns them into **glucose**. Glucose is carried in your blood to all the cells in your body, and gives you energy. It powers every part of your body. Glucose lets you run, jump, think, blink, breathe, and more. Want to swim up and down the coast? Or just make a tiny piece of toast? Whatever you do, as long as you're using your body, you need the great power of glucose. Have you ever felt hungry and found it kind of hard to think? That's because you were running out of glucose, and your brain needed more fuel.

But your cells can only use so much glucose at one time. So when there is glucose left over that can't be used right away, your cells save it. This leftover glucose is stored in your liver and muscles, and is called **glycogen**. The glycogen that doesn't fit into your liver and muscle cells is turned to fat.

Glycogen hangs out until it's needed, and is then released for quick energy when you're exercising. Your body decides to release the power from either glycogen or fat depending on the type of sport or activity you're doing, and how long you're doing it. If you're sprinting or doing another quick exercise, your body calls on glycogen for energy. But if you are exercising for a long time, your body turns to its "reserve tank" of fuel for energy: fat.

Deficiency Of Carbohydrates

When a person is on a carbohydrate-free diet, protein is used as energy source but the excessive breakdown of proteins to sugars can lead to excessive ketones being formed in the liver and in strict studies these people exhibited the same symptoms as those on a starvation regimen.

Symptoms include abnormal fat metabolism, breakdown of body protein, increased sodium excretion, loss of energy and fatigue. It has been found that small amounts of carbohydrates, between 50 to 100 g, can prevent these symptoms.

3. Fats

"How many fat grams does that have in it?" How many times have we had this line rammed down our throats over the last few years? Too many!

Some people will mow the word 'fat' completely out of their diet and end up looking like Uncle Fester in the process. This article explains why fat is one of the essential ingredients to a healthy diet…

There are so many different fat terms - saturated fat, polyunsaturated fat, monounsaturated fat, etc. How did that little three-letter word blow up into a seven-syllable word? Scary, isn't it? However, that three-letter word plays a very significant, very vital part in our diet and overall level of health and fitness.

Most health associations and organizations recommend that you get no more than 30% of your calories from fat. Generally, people are more concerned about getting too much fat into their diet rather than not enough.

Although too much fat in the diet isn't healthy, too little fat can have some very serious consequences.

Fats and oils are a concentrated source of energy and are necessary for good health and fitness. These are some of the side effects that can occur when too much fat is trimmed from the diet:

- hair can fall out faster than fleas off of a turkey's back;
- if one is lucky and manages to keep their hair, odds are that it will lose luster and sheen;
- nails can become so brittle, or so hard and curly that they can be used as next year's Christmas ribbon;
- without fat, vital organs will lack cushion;

Fats make up part of all body cells, help us maintain body temperature, and even delay hunger pangs.

Fats in the form of monounsaturated fat help raise levels of protective HDL cholesterol. Some of the foods that are a good source for monounsaturated fat are the almond and the avocado.

Polyunsaturated fat is valued for its ability to help lower total cholesterol. Safflower oil has the highest amount of polyunsaturated fat of all the common varieties of oil.

Saturate or Not

Fatty acids are saturated when they are loaded or saturated with all the hydrogen atoms they can carry, such as those in meats, dairy products and certain tropical oils such as coconut, palm and palm-kernel oils. Fatty acids with two or more pairs of hydrogen atoms missing, like the main fats in corn, soybean and other vegetable oils as well as in fish oils are polyunsaturated.

Since changing even a single atom in a molecule can profoundly affect the chemical properties, saturated and unsaturated fats have very different effects on health. Saturated fats have been associated with raising blood cholesterol levels, which accumulates on the artery walls and eventually restricts blood flow – especially to the heart. A high saturated diet is also linked to obesity and certain cancers.

Monounsaturated (from the likes of olive oil) and polyunsaturated fats (from plants and fish) can actually reduce blood-cholesterol levels by spurring the liver to clear cholesterol from the blood. Omega-3 fatty acids help to protect the heart against cardiovascular disease by inhibiting the formation of blood clots, lowering triglyceride levels and stopping the plaque growth that narrow the arteries leading to the heart. To effectively increase body stores of EPA and DHA (omega-3 main components), it is recommended to consume fatty fish, soybeans, and flaxseed regularly.

Fatty Acid Balance

The American Heart Association recommends maintaining a fatty-acid balance of 1 : 1 : 1 (saturated : polyunsaturated : monounsaturated) fatty acids. Although studies are still being conducted to better define the best fatty acid balance for optimal health, it is known that the ratio of omega-6s to omega-3s in the body is important. While the ideal ratio is believed to be 5:1, the ratio in the typical Western diet has shifted to the range of 10:1 to 40:1. Such a skewed ratio could have life-threatening consequences such as heart abnormalities as well as promoting inflammatory diseases such as rheumatoid arthritis and asthma.

The omega imbalance is probably due to an excessive intake of commercial vegetable oils and a limited intake of fish. The trend began in the 1960’s when Americans were advised to replace foods high in saturated fats and cholesterol with polyunsaturated fats. At the same time, more processed foods, low in omega-3 fatty acids, were being manufactured and consumed.

Currently, there is no US dietary guideline for omega-3s, but many experts consider 3 grams daily a reasonable amount. As further research is carried out, new information on fatty acids and their effects is sure to follow.

4. Vitamins

There are two types of vitamins: **fat-soluble** and **water-soluble**. When you eat foods that contain **fat-soluble** vitamins, the vitamins are stored in the fat tissues in your body and in your liver. They go and wait around in your body fat until your body needs them. Fat-soluble vitamins are happy to stay stored in your body for awhile - some stay for a few days, some for up to six months! Then, when it's time for them to be used, special carriers in your body take them to where they're needed. Vitamins A, D, E, and K are all fat-soluble vitamins.

Water-soluble vitamins are different. When you eat foods that have water-soluble vitamins, the vitamins don't get stored as much in your body. Instead, they travel through your bloodstream. They like to travel quickly, compared with the fat-soluble vitamins, which like to hang around. And whatever your body doesn't use comes out when you urinate. So these kinds of vitamins need to be replaced often, since they don't like to stick around! This crowd of vitamins includes vitamin C and the big group of B vitamins - B1 (thiamin), B2 (riboflavin), niacin, B6 (pyridoxine), folic acid, B12 (cobalamine), biotin, and pantothenic acid.

The Fat Soluble Vitamins - A, D, E, and K

In recent years we've heard nutritionists extol the virtues of low-fat diets. However, some fat is necessary for the body to absorb certain vitamins such as A, D, E, and K. Fat is absorbed in the small intestine. For people who have Crohn's disease fat absorption is a particular problem. A small intestine that has undergone surgery to remove diseased sections or is inflamed could impair the ability to absorb fat and the fat-soluble vitamins.

Vitamin A

Your mother may have told you to eat your carrots because they are good for eyesight. Don't look now, but your mother was right. Vitamin A, also known as beta-carotene or retinol, is not only important for vision but also for bones, skin and reproductive organ growth, hormone creation, and tissue repair.

Vitamin A also helps the body fight infection in at least two ways. Lymphocytes are white blood cells that fight off infection in the body. Lymphocytes need vitamin A to function properly and protect the body from harmful infections. Vitamin A is also important for maintaining the linings of the eye, mucous membranes, and the respiratory, urinary, and intestinal tracts. These linings work to prevent bacteria and viruses from entering the body and causing infections.

Deficiencies in vitamin A can cause night blindness, hinder bone growth, increase susceptibility to infection, and cause rough skin. Diarrhea, inflammation in the small intestine, and malabsorption of fat can all contribute to a loss of vitamin A. Symptoms of deficiency include night blindness, dry skin, and increased infections such as colds, flues, pneumonia, and bronchitis.

Healthy adults can have up to one year's worth of vitamin A stored in the liver (which explains the high content of vitamin A in animal liver), while children may have only a few weeks' worth. Therefore, children with IBD may need close monitoring during bouts of inflammation and diarrhea. Too much vitamin A can be toxic, so supplements should be used with care.

Vitamin A can be found in many foods, but these in particular have significant amounts:

- Carrots
- Sweet potatoes
- Spinach
- Cantaloupe
- Kale
- Red Peppers
- Broccoli
- Mangos
- Apricots

Vitamin D

Vitamin D, calciferol, is a fat-soluble vitamin. It is found in food, but also can be made in your body after exposure to ultraviolet rays from the sun. Vitamin D exists in several forms, each with a different activity. Some forms are relatively inactive in the body, and have limited ability to function as a vitamin. The liver and kidney help convert vitamin D to its active hormone form.

The major biologic function of vitamin D is to maintain normal blood levels of calcium and phosphorus. Vitamin D aids in the absorption of calcium, helping to form and maintain strong bones. It promotes bone mineralization in concert with a number of other vitamins, minerals, and hormones. Without vitamin D, bones can become thin, brittle, soft, or misshapen. Vitamin D prevents rickets in children and osteomalacia in adults, which are skeletal diseases that result in defects that weaken bones.

Food Sources

Fortified foods are the major dietary sources of vitamin D. Prior to the fortification of milk products in the 1930s, rickets (a bone disease seen in children) was a major public health problem in the United States. Milk in the United States is fortified with 10 micrograms (400 IU) of vitamin D per quart , and rickets is now uncommon in the US.

One cup of vitamin D fortified milk supplies about one-fourth of the estimated daily need for this vitamin for adults. Although milk is fortified with vitamin D, dairy products made from milk such as cheese, yogurt, and ice cream are generally not fortified with vitamin D. Only a few foods naturally contain significant amounts of vitamin D, including fatty fish and fish oils.

Exposure To Sunlight

Exposure to sunlight is an important source of vitamin D. Ultraviolet (UV) rays from sunlight trigger vitamin D synthesis in the skin. Season, latitude, time of day, cloud cover, smog, and suncreens affect UV ray exposure. For example, in Boston the average amount of sunlight is insufficient to produce significant vitamin D synthesis in the skin from November through February. Sunscreens with a sun protection factor of 8 or greater will block UV rays that produce vitamin D, but it is still important to routinely use sunscreen whenever sun exposure is longer than 10 to 15 minutes. It is especially important for individuals with limited sun exposure to include good sources of vitamin D in their diet.

Vitamin D And Osteoporosis

It is estimated that over 25 million adults in the United States have, or are at risk of developing osteoporosis. Osteoporosis is a disease characterized by fragile bones. It results in increased risk of bone fractures. Having normal storage levels of vitamin D in your body helps keep your bones strong and may help prevent osteoporosis in elderly, non-ambulatory individuals, in post-menopausal women, and in individuals on chronic steroid therapy.

Researchers know that normal bone is constantly being remodeled (broken down and rebuilt). During menopause, the balance between these two systems is upset, resulting in more bone being broken down (resorbed) than rebuilt. Estrogen replacement, which limits symptoms of menopause, can help slow down the development of osteoporosis by stimulating the activity of cells that rebuild bone.

Vitamin D deficiency, which occurs more often in post-menopausal women and older Americans, has been associated with greater incidence of hip fractures. A greater vitamin D intake from diet and supplements has been associated with less bone loss in older women. Since bone loss increases the risk of fractures, vitamin D supplementation may help prevent fractures resulting from osteoporosis.

In a group of women with osteoporosis hospitalized for hip fractures, 50 percent were found to have signs of vitamin D deficiency. Treatment of vitamin D deficiency can result in decreased incidence of hip fractures, and daily supplementation with 20 mcg (800 IU) of vitamin D may reduce the risk of osteoporotic fractures in elderly populations with low blood levels of vitamin D. Your physician will discuss your need for vitamin D supplementation as part of an overall plan to prevent and/or treat osteoporosis when indicated.

Vitamin K

Vitamin K is used for the body to regulate blood clotting. A deficiency in vitamin K can result in bruising or, in rare cases, bleeding. The relationship between vitamin K deficiency and the onset of osteoporosis is an ongoing debate in the medical community. The National Institutes of Health maintain that currently, there is not enough information to either prove or disprove this theory.

Vitamin K is unusual because it is actually made inside the body. The "good" bacteria in the large intestine actually synthesize vitamin K for use by the body. About 80% of vitamin K needed is made in this way. The other 20% must come from food sources. If the "good" bacteria in the intestine is wiped out by antibiotics or affected by diarrhea, vitamin K production may be decreased. Vitamin K can be toxic in large does, and supplements should be used with care. Those taking the prescription drug Coumadin (Warfarin sodium) should not take vitamin K from supplements or food sources.

Vitamin K is found in various foods including:

- Cabbage
- Cauliflower
- Spinach And Other Green Leafy Vegetables
- Cereals
- Soybean

Vitamin E

Vitamin E has eight different forms, each with it's own purpose in the body. The form that is most often used by our bodies is alpha-tocopherol.

Vitamin E in the form of alpha-tocopherol is an antioxidant that removes free radicals from the body. Free radicals are a natural result of the metabolic process (the use of glucose by the body for fuel). If not removed from the body, free radicals can cause damage to the cells in the body. This cell damage may contribute to cancer or heart disease. The use of vitamin E to prevent these chronic illnesses is still being studied.

People who don't absorb fat well in their intestines are at risk for a deficiency of vitamin E. If fat is passing through the intestines unabsorbed, it often results in greasy looking stools and/or diarrhea.

Too much vitamin E in the body is associated with very few health risks, but the long-term effects of vitamin E supplementation are still unknown.

Vitamin E can be found in both natural and fortified foods, including:

- Wheat Germ Oil
- Almonds
- Safflower Oil
- Corn Oil
- Peanuts

Before starting any program of supplements, talk to your doctor. Vitamin deficiencies are rare in the United States as most people get all the vitamins they need from food.

Water Soluble Vitamins

Water-soluble vitamins consist of members of the vitamin B complex and vitamin C. They are generally found together in the same foods with the exception of B_{12} which is present only in meat and dairy foods. The others are found in whole grain cereals, legumes, leafy green vegetables, and fruits. The water-soluble vitamins generally function to assist the activity of important enzymes such as those involved in the production of energy from carbohydrates and fats. They are often referred to as "cofactors". Other roles may be defined with further research. The water-soluble vitamins are not stored to a great extent in the body so frequent consumption is necessary. When present in excess of the body's needs, they are excreted in the urine. Because they are readily excreted, they are generally non-toxic, although symptoms have been reported in some individuals taking megadoses of niacin, vitamin C or pyridoxine. The lack of water soluable vitamins most greatly affects tissues that are growing or metabolizing rapidly such as skin, blood, the digestive tract and nervous system. These molecules present in fruit, vegetables and grains are all unstable in the presence of heat so that processing and cooking methods can greatly affect the amount of vitamin actually available in food.

Vitamin B Complex – The vitamin B complex is traditionally made up of 10 members (listed below) that differ in their biological actions, although many participate in energy production from carbohydrates and fats. They were grouped together into a single class because they were initially isolated from the same sources, liver and yeast.

Thiamine (Vitamin B_1) is important for energy metabolism and in the initiation of nerve impulses. A deficiency of thiamine causes a condition known as beriberi. In certain parts of the world where the diet consists largely of polished rice, this condition is frequently seen. In these countries, a deficiency in mothers can cause a deficiency in infants and may lead to death. In the US, thiamine deficiency is most commonly seen in alcoholics, although it can occur in the presence of several diseases. Pregnancy increases thiamine requirements slightly and when a pregnancy is associated with a prolonged period of vomiting and/or poor food intake, thiamine deficiency may result.

The major symptoms of the deficiency are related to the nervous system (i.e. sensory disturbances, muscle weakness, impaired memory) and the heart (i.e. shortness of breath, palpitations, and heart failure). Wernicke's syndrome is a serious complication of alcoholism and thiamine deficiency that may manifest as impaired muscle coordination, impaired ability to move the eyes, and marked confusion. It may lead to Korsakoff's psychosis, a chronic disorder in which memory and learning are impaired.

Thiamine is used to treat thiamine deficiency. There are many unproven uses of thiamine including a treatment for poor appetite, canker sores, motion sickness, poor memory, fatigue and as an insect repellant. The RDA for women over 18 years is 1.1 mg; for pregnant women, 1.4 mg; for lactating women, 1.5 mg; and for men over 14 years, 1.2 mg.

Riboflavin (Vitamin B_2) is important in promoting the release of energy from carbohydrates, fats and proteins. It also aids in maintaining the integrity of red blood cells. Riboflavin deficiency can occur most frequently in people with long-standing infections, liver disease, and alcoholism. A sore throat and sores at the corners of the mouth are generally the first symptoms of a deficiency. This can be followed by a swollen tongue, seborrheic dermatitis, anemia and impaired nerve function. These manifestations are commonly seen in other diseases, including many vitamin deficiencies. The RDA for women over 18 years is 1 mg; for pregnant women, 1.4 mg; for lactating women, 1.6 mg, and for men over 14 years, 1.3 mg.

A deficit of cellular energy metabolism may play a role in migraine headaches. A recent study indicated that high-dose (400 mg/day) riboflavin was effective in decreasing the frequency of migraines. Further studies are needed to confirm this effect. High dose riboflavin can cause a yellow-orange fluorescence or discoloration of the urine.

Nicotinic acid (Niacin, Vitamin B_3) is important for the release of energy from carbohydrates and fats, the metabolism of proteins, making certain hormones, and assisting in the formation of red blood cells. Niacin deficiency causes pellagra, a condition that affects the skin (dermatitis), GI tract (i.e. diarrhea, nausea, vomiting and swollen tongue) and nervous system. (i.e. headache, depression, impaired memory,

hallucinations and dementia). Frequent causes of a deficiency include a poor diet, isoniazid therapy (used in the treatment of tuberculosis) and carcinoid tumors. Rarely a deficiency can occur in the presence of hyperthyroidism, , cirrhosis, pregnancy or lactation.

Dietary niacin and niacin formed within the body from the amino acid tryptophan are converted to niacinamide. Niacinamide (nicotinamide) is the biologically active form of niacin and it may be preferred as a supplement because it lacks the flushing effects of niacin. The RDA for women over 14 years is 14 mg; for pregnant women, 18 mg; for lactating women, 17 mg; and for men over 14 years, 16 mg.

Niacin is used for the treatment of niacin deficiency but at large doses is also used to treat high cholesterol and triglycerides. High doses should only be taken under the supervision of a physician because there is a risk of developing serious side effects such as liver dysfunction. There are also several medical conditions that may be worsened by its use at the high, therapeutic doses. It can cause the release of histamine resulting in increased gastric acid, therefore it is generally not used in the presence of an active peptic ulcer. Large amounts can also decrease uric acid excretion, possibly precipitating a gout attack in people predisposed to this condition, and it can impair glucose tolerance, interfering with blood sugar control in diabetics. In the treatment of high cholesterol the simultaneous use of niacin withdiabetes mellitus drugs that inhibit cholesterol formation, known as the HMG-CoA reductase inhibitors (i.e. Lipitor®, Baycol®, Mevacor®, Zocor® and Pravachol®) increases the occurrence of serious muscle disorders.

Due to common side effects (flushing, nausea, dizziness, itching, low blood pressure), many people do not tolerate high doses of niacin, even though some may lessen in intensity with continued usage.

Pyridoxine (Vitamin B_6) is necessary for the proper function of over 60 enzymes that participate in amino acid metabolism. It is also involved in carbohydrate and fat metabolism. A deficiency in adults mainly affects the skin (seborrhea-like lesions around the eyes, nose and mouth), mucous membranes, peripheral nerves and blood forming system. Convulsive seizures may also occur. Deficiencies can manifest in people with kidney disease, cirrhosis, alcoholism, impaired gastrointestinal absorption (malabsorption), congestive heart failure and hyperthyroidism.

The RDA for pyridoxine in women from 19-50 years of age is 1.3 mg; women over 50 years, 1.5 mg; for pregnant women, 1.9 mg; for lactating women, 2 mg; for men 14 to 50 years of age, 1.3 mg; and for men over 50 years, 1.7 mg. Prolonged doses in excess of 200 mg. per day have been associated with neurotoxicity. Pyridoxine may be effective in lowering high levels of homocysteine, a risk factor for heart disease, decreasing the symptoms of premenstrual syndrome, as an adjunct to other treatments for improving behavior in autism, and for reversing some of the side effects of flurouracil in cancer patients. It is also used in treating some metabolic disorders.

Several drugs can increase the pyridoxine requirement, such as hydralazine, isoniazid and oral contraceptives. Simultaneous use of pyridoxine with amiodarone can increase the risk of drug-induced sensitivity to sunlight, and pyridoxine can decrease the effects of phenytoin and phenobarbital.

Pantothenic acid (Vitamin B_5) is the precursor to coenzyme A that is vital for the metabolism of carbohydrates, the synthesis and degradation of fats, the synthesis of sterols and the resultant steroid hormones, and the synthesis of many other important compounds. A deficiency has not been seen in humans on a normal diet because it is so widely distributed in foods, however it is often included in multivitamin preparations.

There is insufficient information to establish RDAs for pantothenic acid. The Committee on Dietary Allowances provides provisional recommendations for adults of 4 to 7 mg. per day.

Folic acid (Vitamin B_9) plays a major role in cellular metabolism including the synthesis of some of the components of DNA. It is necessary for normal red blood cell formation and adequate intake can reduce damage to DNA.

Folic acid deficiency is a common complication of diseases of the small intestine that interfere with the absorption of folic acid from food and the recycling of folic acid from the liver back to the intestines.

Alcoholism can result in folic acid deficiency. Folic acid activity can also be reduced by several drugs including large doses of nonsteroidal anti-inflammatory drugs (NSAIDs), methotrexate, trimethoprim, cholestyramine, isoniazid, and triamterene. The simultaneous ingestion of folic acid supplements may, in theory, interfere with the effectiveness of methotrexate cancer treatments, however their combined use in the treatment of rheumatoid arthritis and psoriasis has resulted in lessened side effects from methotrexate.

Although the anemia that results from folic acid deficiency is not distinguishable than that resulting from B_{12} deficiency, folic acid deficiency is rarely associated with neurological abnormalities (see Vitamin B_{12}). Excessive doses of folic acid may mask the anemia that results from B_{12} deficiency, preventing diagnosis of the deficiency and allowing progression of neurological damage.

Adequate folic acid intake is associated with a reduced risk of neural tube birth defects. It is recommended that all women of childbearing age consume at least 400 micrograms of folic acid each day. Folic acid supplements are also used to lower elevated homocysteine levels, a known risk factor for heart disease. Recent studies have suggested that folic acid supplements may be effective in lowering the risk of colon cancer. Topical folic acid formulations are used for gingival hyperplasia that result from phenytoin therapy and for gingivitis associated with pregnancy.

The RDA for folic acid for adults over 13 years, 400 micrograms; for pregnant women, 600 micrograms; and lactating women, 500 micrograms.

Vitamin B_{12} (Cyanocobalamin) is important for the proper functioning of many enzymes involved in carbohydrate, fat and protein metabolism, synthesis of the insulating sheath around nerve cells, cell reproduction, normal growth and red blood cell formation. It is essential for proper folic acid utilization. A deficiency results in anemia, gastrointestinal lesions and nerve damage. Many drugs can interfere with the absorption of vitamin B_{12} including drugs commonly used to treat ulcers (such as cimetidine, omeprazole), and drugs used to treat seizures (such as phenytoin and phenobarbital).

A protein called intrinsic factor is secreted by the stomach and is required for vitamin B_{12} absorption from the lower part of the small intestine. Signs of B_{12} deficiency often occur in the presence of adequate B_{12} intake, but result from impaired absorption. Conditions that are associated with this include some gastric surgeries, pancreatic disorders, bacterial overgrowth or intestinal parasites, and damage to the intestinal cells.

The RDA for vitamin B_{12} for adults is 2.4 micrograms; for pregnant women, 2.6 micrograms; and for lactating women, 2.8 micrograms. Approximately 10 to 30% of people over 50 years of age have difficulty absorbing food-bound vitamin B_{12}, so they should eat foods fortified with the vitamin or take a supplement.

Vitamin B_{12} and folic acid have a close relationship. A deficiency in either one results in abnormal synthesis of DNA in any cell in which cell division is taking place. Tissues such as the blood forming system are most severely affected, therefore an early sign of deficiency of either vitamin is a type of anemia termed megaloblastic anemia.

Choline is traditionally not a vitamin, however it was identified as part of the vitamin B complex and has several important functions. Choline is a component of many biological membranes and fat transport molecules in the blood. It is able to stimulate the removal of excess fat from the liver. Choline serves as the precursor to many substances including a the transmitter of the parasympathetic nervous system, acetylcholine. Some athletes use choline to delay muscle fatigue because acetylcholine is involved in muscle contraction, but this effect has not been proven. A deficiency is uncommon except among people receiving long-term IV nutrition. It is added to infant formulas to approximate the amount found in human milk.

The Daily Reference Intake (DRI) is 550 mg for adult males and lactating females; 425 mg for adult females; and 450 mg for pregnant females. Oral choline supplements have not been proven to be effective in treating memory loss, Alzheimer's disease, dementia and schizophrenia.

Inositol is an important part of cell membranes and is part of a signaling mechanism that transmits information from the outside to the inside of cells. Some evidence suggests it participates in the movement of fat out of the liver and intestinal cells, and that it may reverse desensitization of serotonin receptors, however this remains to be confirmed. Although it may be effective in treating panic disorders, depression and obsessive-compulsive disorders, these uses remain to be verified.

A dietary need for inositol has not been established, probably due to its production by gut bacteria, the existence of tissue stores following absorption from food, and possible synthesis in some organs. It may be added to infant formulas to approximate the content of human milk.

Biotin has an important role in carbohydrate and fat metabolism. It can be synthesized by gut bacteria and recycled. A deficiency rarely occurs in humans. If raw egg whites are consumed in large quantities, a biotin deficiency can occur. Signs of a deficiency include dermatitis, muscle pain, loss of appetite, slight anemia, an inflamed tongue, and weakness. There is no RDA for biotin.

Vitamin C (Ascorbic Acid) has many important functions in the body. It is a powerful antioxidant, protecting against oxidative damage to DNA, membrane lipids and proteins. It is involved in the synthesis of numerous substances such as collagen, certain hormones and transmitters of the nervous system, lipids and proteins. It is necessary for proper immune function, a fact that has led many to use vitamin C to prevent or treat colds, although this has not been supported by current studies. It may, however, shorten or reduce the severity of a cold.

Vitamin C deficiency causes scurvy that is characterized by capillary fragility resulting in bruising and hemorrhaging, inflammation of the gums, loosening of the teeth, anemia and general debility that can lead to death. The RDA for adults 15 years and older is 60 mg; for pregnant women, 70 mg; and for lactating women in the first six months, 95 mg decreasing to 90 mg for the second six months. There may be increased vitamin C requirements for people taking estrogens, oral contraceptives, barbiturates, tetracyclines, aspirin and for cigarette smokers. Large doses of vitamin C can interfere with many laboratory tests. Side effects from large doses include nausea, vomiting, heartburn, abdominal cramps, headache and diarrhea.

Diets containing 200mg or more of vitamin C from fruits and vegetables are associated with a lower cancer risk, particularly for cancers of the colon, lung, mouth, esophagus and stomach. The consumption of dietary supplements have not been shown to have the same effect. It may block the formation of N-nitrosamines, cancer-causing agents from certain foods. Ascorbic acid alone does not appear to prevent heart disease, however the combined use with vitamin E may reduce the risk of heart disease.

5. Minerals

Minerals are the basic building blocks of all things, both living and non-living. Their functions in our bodies are critical and are essential for good health.

The body utilizes over 80 minerals for maximum function. Because our plants and soils are so nutrient depleted, even if we eat the healthiest foods, we are not getting all the minerals we need. **Evidence of mineral malnutrition** are various minor and serious health conditions such as **energy loss, premature aging, diminished senses, and degenerative diseases like osteoporosis, heart disease, and cancer.**

In many cases, these could be prevented with proper mineral supplementation.

The more you learn about the benefits of minerals, the more you will be able to take charge of your own health!

Every living cell depends on minerals for proper structure and function. Minerals are needed for the formation of blood and bones, the proper composition of body fluids, healthy nerve function, proper operation of the cardiovascular system, among others. Like vitamins, minerals function as co-enzymes, enabling the body to perform its functions including energy production, growth and healing. Because all enzyme activities involve minerals, they are essential for the proper utilization of vitamins and other

nutrients. Nutritionally, minerals are grouped into two categories: bulk or essential minerals, also called macro-minerals, and trace minerals or micro-minerals. Macro-minerals such as calcium and magnesium are needed by the body in larger amounts. Although only minute quantities of trace minerals are needed, they are nevertheless important for good health. Micro-minerals include boron, chromium, iron, zinc, and many others.

Three basic classifications of minerals exist. They are "metallic minerals," "chelated minerals," and "colloidal minerals."

Metallic minerals are found in their pure elemental form or as salts such as sodium chloride and zinc sulfate. They are the most commonly used form in nutritional supplements, especially for the essential minerals, because larger amounts are indicated. They are generally the least expensive form of minerals but their primary disadvantage is that **their degree of absorption is the least of all three forms**. Although they have their place, metallic minerals do not represent the full spectrum of all the trace minerals that are known to be of value in human nutrition.

Chelated minerals are the next step up the ladder in so far as the body's ability to assimilate. The term "chelate" originates from a Greek word that means "claw." In this process, be it either in the laboratory or in nature itself, a metallic mineral is "chelated" with an amino acid. The amino acid actually surrounds the metallic mineral like a claw and thereby helps to solubilize it, making the "mineral chelate" more bio-available or useful to the body. Examples of chelated minerals are the magnesium aspartate (magnesium chelated with the natural aspartic acid) and chromium picolinate (chromium chelated with picolinic acid). In many cases, **chelated minerals are about 40% more efficient in regards to absorption and assimilation into the body than metallic minerals**.

Colloidal minerals are those that occur in nature in the colloid state. That is, they are minute particles that either are or can be easily dispersed in a medium such as water. In that they are made up of such small particles, there is a major increase in surface area giving them greater exposure to the liquid or solvent they are to be distributed in. This results in increased solubility, bio-availability, absorption, and usefulness to the body. **Plant-derived colloidal minerals provide the best of all forms of minerals** not only because of this increased solubility but also because they are associated with natural plant tissue. This gives them all the advantages of chelated and metallic minerals and more!

6. Roughage (Dietary Fiber)

Roughage helps food to be processed, so that it can pass easily through the digestive system. Also referred to as dietary fiber, roughage is that portion of plant-related foods (such as fruits, legumes, vegetables and whole grains) that cannot be completely digested. Besides the accepted benefits of fiber in reducing cancer and serious health concerns, studies have shown that fiber markedly decreases mycotoxicity. Fiber acts like a sponge, soaking up acids from the body. It also works like a broom, cleaning out the intestines.

What is the difference between insoluble and soluble fiber?

Soluble fiber forms a gel when mixed with liquid, while insoluble fiber does not. Insoluble fiber passes through your digestive tract largely intact. Both types of fiber are important in the diet and provide benefits to the digestive system by helping to maintain regularity. Soluble fiber has some additional benefits to heart health.

What are some good sources of soluble fiber?

Soluble fiber is found in oats, peas, beans, certain fruits, and psyllium (pronounced sil'e-um). Psyllium is a grain that is found in some cereal products, in certain dietary supplements, and in certain bulk fiber laxatives. Read labels carefully to check for the addition of psyllium.

What are the benefits of soluble fiber?

In additional to the digestive system benefits mentioned above, soluble fiber has been scientifically proven to reduce blood cholesterol levels, which may help reduce your risk of heart disease. In fact, the Food and Drug Administration recently authorized food companies to use a health claim for soluble fiber from both

psyllium and oats. For example, the new claim for psyllium states, "Soluble fiber from foods with psyllium husk, as part of a diet low in saturated fat and cholesterol, may reduce the risk of heart disease."

Overall, how much fiber should I eat and how much soluble fiber do I need?

Americans should eat 20-35 grams of fiber each day, including both soluble and insoluble fiber. The average American currently eats 12-17 grams of fiber a day. Only about $^{1}/_{4}$ of this is soluble fiber; therefore, the average American is eating only 3-4 grams of soluble fiber--below the recommended amount of 5-10 grams. Eating 3 grams a day of soluble fiber from oats or 7 grams a day of soluble fiber from psyllium has been shown to lower blood cholesterol levels.

Elevated levels of blood cholesterol may increase your risk of heart disease. Your doctor is familiar with your family history and other possible risk factors, can assess your overall health, and help you set goals to reduce your risk, including reducing cholesterol.

Food	Portion	Fiber	Soluble	Insoluble
Fruits				
Apple	1 Medium	2.9	0.9	2.0
Orange	1 Medium	2.0	1.3	0.7
Banana	1 Medium	2.0	0.6	1.4
Vegetables				
Broccoli	1 stalk	2.7	1.3	1.4
Carrots	1 large	2.9	1.3	1.6
Tomato	1 small	0.8	0.1	0.7
Potato	1 medium	1.8	1.0	0.8
Corn	2/3 cup	1.6	0.2	1.4
Grains				
All-Bran	1/2 cup	9.0	1.4	7.6
Oat Bran	1/2 cup	4.4	2.2	2.2
Cornflakes	1 cup	0.5	0	0.5
Rolled Oats	3/4 cup cooked	3.0	1.3	1.7
Whole-wheat Bread	1 slice	1.4	0.3	1.1
White Bread	1 slice	0.4	0.3	0.1
Macaroni	1 cup cooked	0.8	0.5	0.3
Legumes				
Green Peas	2/3 cup cooked	3.9	0.6	3.3
Kidney Beans	1/2 cup cooked	6.5	1.6	4.9
Pinto Beans	1/2 cup cooked	5.9	1.2	4.7
Lentils	2/3 cup cooked	4.5	0.6	3.9

7. Fluid

Your body is approximately 70 percent water, and water is the environment within which all of your other nutrients function. Dehydration, or the loss of body water, can disturb cardiovascular function, cell metabolism, and temperature regulation. In general, dehydration leading to body weight losses of only 2 percent may lead to decreases in aerobic endurance capacity.

The body must continuously be in a proper state of hydration. Because 2.5 liters of water is lost each day through normal bodily functions, this must be replaced. There are two major issues that emphasize the need to keep the body adequately hydrated with water of the best quality, content, and structure so it can maintain homeostasis. First, the water we put in our body must be able to prevent toxins and chemical substances from accumulating and creating destructive influences on cells. Water must bring all minerals and nutrients required for cell metabolism, and remove any substances that can damage the cell. It must also be able to protect cell walls from damage and invasion. Second, since water is involved in every function of the body, it must act as a conductor of electrochemical activity, such as neurotransmission, by moving water from one nerve cell to another smoothly and effectively.

Water vs. Coke

Water

- 75% of Americans are chronically dehydrated. (Likely applies to half world population)
- In 37% of Americans, the thirst mechanism is so weak that it is often mistaken for hunger.
- Even MILD dehydration will slow down one's metabolism as much as 3%.
- One glass of water will shut down midnight hunger pangs for almost 100% of the dieters studied in a U-Washington study.
- Lack of water, the #1 trigger of daytime fatigue.
- Preliminary research indicates that 8-10 glasses of water a day could significantly ease back and joint pain for up to 80% of sufferers.
- A mere 2% drop in body water can trigger fuzzy short-term memory, trouble with basic math, and difficulty focusing on the computer screen or on a printed page.
- Drinking 5 glasses of water daily decreases the risk of colon cancer by 45%, plus it can slash the risk of breast cancer by 79%, and one is 50% less likely to develop baldder cancer

Are you drinking the amount of water you should every day?

COKE

- In many states (in the USA) the highway patrol carries two gallons of Coke in the truck to remove blood from the highway after a car accident.
- You can put a T-bone steak in a bowl of coke and it will be gone in two days.
- To clean a toilet: Pour a can of Coca-Cola into the toilet bowl and let the "real thing" sit for one hour, then flush clean. The citric acid in Coke removes stains from vitreous china.
- To remove rust spots from chrome car bumpers: Rub the bumper with a rumpled-up piece of Reynolds Wrap aluminum foil dipped in Coca-Cola.
- To clean corrosion from car battery terminals: Pour a can of Coca-Cola over the terminals to bubble away the corrosion.
- To loosen a rusted bolt: Applying a cloth soaked in Coca-Cola to the rusted bolt for several minutes.
- To bake a moist ham: Empty a can of Coca-Cola into the baking pan, wrap the ham in aluminum foil, and bake. Thirty minutes before the ham is finished, remove the foil, allowing the drippings to mix with the Coke for asumptuous brown gravy.
- To remove grease from clothes: Empty a can of coke into a load of greasy clothes, add detergent, and run through a regular cycle. The Coca-Cola will help loosen grease stains. It will also clean road haze from your windshield.

For Your Info

- The active ingredient in Coke is phosphoric acid. Its pH is 2.8. It will dissolve a nail in about 4 days. Phosphoric acid also leaches calcium from bones and is a major contributor to the rising increase in osteoporosis.
- To carry Coca-Cola syrup (the concentrate) the commercial truck must use the Hazardous material place cards reserved for Highly corrosive materials.
- The distributors of coke have been using it to clean the engines of their trucks for about 20 years! Now the question is, would you like a glass of water or coke?

RDA - Recommended Dietary Allowance Of Nutritional Elements

RDA, or known by its full name, the Recommended Daily Allowance, is busy being revised and will be called the Dietary Reference Intake (DRI) and is a collaborative effort between the USA and Canada.

Until publication of the new DRI, we herewith refer to the old RDA schedule, with some of the new DRI worked in, as a point of reference only.

Ratings For:

- fat soluble vitamins,
- water soluble vitamins,
- minerals and other nutritional elements.

The RDA represents the establishment of a nutritional norm for planning and assessing dietary intake, and are the levels of intake of essential nutrients considered to be adequate to meet the known needs of practically all healthy people.

These figures were first published in 1943 and have been updated and expanded as data became available.

When introducing the new revision of the RDA in 1974, Dr. Alfred E. Harper, the then Chairman of the Committee on Dietary Allowances, Food and Nutrition Board said "...However requirements differ with age and body size; among individuals of the same body size owning to differences in genetic makeup; with the physiologic state of individuals - growth rate, pregnancy, lactation; and with sex. .."

With this in mind, herewith the tables as they stand at the moment:

Fat Soluble Vitamins*

	Age	Energy	Protein	Vitamin A		Vitamin D		Vitamin E		Vitamin K
		k. cal	*g*	*IU*	**ug RE*	*IU*	**ug*	*IU*	**mg TE*	**ug*
Children	4-6	1,800	30/24	2,500	500	400	5	9	7	-/20
	7-10	2,400/ 2,000	36/28	3,300	500	400	5	10	7	-/30
Males	15-18	3,000	54/59	5,000	1,000	400	5	15	10	-/65
	19-24	3,000/ 2,900	54/58	5,000	1,000	400	5	15	10	-/70
	25-50	2,700	56/63	5,000	1,000	-	5	15	10	-/80
	50+	2,400	56/63	5,000	1,000	-	10	15	10	-/80
Females	15-18	2,100	48/44	4,000	800	400	5	12	8	-/55
	19-24	2,100	46/46	4,000	800	400	5	12	8	-/60
	25-50	2,000	46/50	4,000	800	-	5	12	8	-/65
	50+	1,800	46/50	4,000	800	-	10	12	8	-/65

* first figure refers to the old RDA listing while the second figure refers to the newer DRI listing

Water Soluble Vitamins*

	Age	Ascorbic Acid	Folacin / Folate	Niacin	Riboflavin	Thiamine	Vitamin B6	Vitamin B12
		mg	*mcg*	*mg*	*mg*	*mg*	*mg*	*mcg*
Children	4-6	40/45	200/75	12	1.1	0.9	0.9/1.1	1.5/1.0
	7-10	40/45	300/100	16/13	1.2	1.2/1.0	1.2	2.0/1.4
Males	15-18	45/60	400/200	20	1.8	1.5	2.0	3.0/2.0
	19-24	45/60	400/200	20/19	1.8/1.7	1.5	2.0	3.0/2.0
	25-50	45/60	400/200	18/19	1.6/1.7	1.4/1.5	2.0	3.0/2.0
	50+	45/60	400/200	16/15	1.5/1.4	1.2	2.0	3.0/2.0
Females	15-18	45/60	400/180	14/15	1.4/1.3	1.1	2.0/1.5	3.0/2.0
	19-24	45/60	400/180	14/15	1.4/1.3	1.1	2.0/1.6	3.0/2.0
	25-50	45/60	400/180	13/15	1.2/1.3	1.0/1.1	2.0/1.6	3.0/2.0
	50+	45/60	400/180	12/13	1.1/1.2	1.0	2.0/1.6	3.0/2.0

* first figure refers to the old RDA listing while the second figure refers to the newer DRI listing

Minerals and others*

	Age	Calcium	Phosphorous	Iodine	Iron	Magnesium	Zinc	Selenium	Fluoride
		mg	*mg*	*ug*	*mg*	*mg*	*mg*	**ug*	**mg*
Children	4-6	800	800/500	80/90	10	200/130	10	-/20	-/1.1
	7-10	800	800	110/120	10	250	10	-/30	-/3.2
Males	15-18	1200/1300	1200/1250	150	18/12	400/410	15	-/50	-/3.8
	19-24	800/1000	800/700	140/150	10	350/400	15	-/70	-/3.8
	25-50	800/1000	800/700	130/150	10	350/420	15	-/70	-/3.8
	50+	800/1200	800/700	110/150	10	350/420	15	-/70	-/2.9
Females	15-18	1200/1300	1200/1250	115/150	18/15	300/360	15/12	-/50	-/3.1
	19-24	800/1000	800/700	100/150	18/15	300/310	15/12	-/55	-/3.1
	25-50	800/1000	800/700	100/150	18/15	300/320	15/12	-/55	-/3.1
	50+	800/1200	800/700	80/150	10	300/320	15/12	-/55	-/3.1

* first figure refers to the old RDA listing while the second figure refers to the newer DRI listing - age groups have also been changed on certain nutrients to range from 9-13, 14-18,19-30,31-50, 51-70 and 71+ - figures above merely for illustration and information.

Please be advised that these tables above must not be used to treat or diagnose - they are merely brought to you for information, in order to give you a better understanding on the dynamics involved, and the changing importance of vitamins and nutrition as well as their importance in maintaining optimum health