# Remedies from God's Book of Nature™

## THE MIDNIGHT BLUE PAPERS

## A BRIEF DISCUSSION ON PROPER NUTRITION

### ORIGINS OF THE TOTAL PLANT-BASED VEGETARIAN DIET

Our Creator, in His great wisdom, provided a wide variety of foods both for us to enjoy and to keep us healthy. In the book of Genesis, the Lord specified the diet for man as follows; "And God said, Behold, I have given you every herb bearing seed, which [is] upon the face of all the earth, and every tree, in the which [is] the fruit of a tree yielding seed; to you it shall be for *meat*." {*Gen. 1:29*} This was the **original** diet. After the fall of man, vegetables were added to the diet; "Thorns also and thistles shall it bring forth to thee; and thou shalt eat the herb of the field". {*Gen. 3:18*} We understand, biblically, that our diet was **designed** to consist of fruits, vegetables, nuts, and grains. However, the flood of Genesis **seven** destroyed all plant life on the planet. God then permitted man to eat the flesh of *clean* animals to supplement the divine established diet as a *temporary* solution.

"These foods, prepared in as simple and natural a manner as possible, are the most healthful and nourishing. They impart a strength, a power of endurance, and a vigor of intellect, that are not afforded by a more complex and stimulating diet." {*CDF 81.2*} "The grains, with fruits, nuts, and vegetables, contain all the nutritive properties necessary to make good blood." {*CDF 396*}

There should be a variety of colors of fruits and vegetables: all the red, green, white, purple and yellow foods represented on the plate, including grains and lots of legumes, which contain fiber and other nutrients that the body needs. In terms of variety, this should be done over a course of each week, not at the same meal. "It would be much better to eat only two or three different kinds of food at a meal than to load the stomach with many varieties." {*CDF 110*} It is better to eat a variety of foods but within the same family. The cells of our body require the different foods groups in order for it to be well nourished. A total plant-based diet gives sufficient protein, carbohydrates, fats, vitamins, and minerals for excellent body function.

### A DEFINITION OF FOOD

From a clinical point of view, a *food* is defined as any substance consumed to provide nutritional support for the body. It is usually of **plant** or **animal** origin, and contains essential nutrients, such as carbohydrates, fats, proteins, vitamins, or minerals. The substance is ingested by an organism and assimilated by the organism's cells in an effort to produce energy, maintain life, or stimulate growth.

There is a distinct difference between fruits and vegetables, and how each is digested. We are counseled that fruits and vegetables should not be ingested in the same meal in their whole food forms. Food combinations of different **kinds** of foods eaten together are likely to cause indigestion. A *fruit* is a whole food that contains seeds. A *vegetable* is a whole food that does not contain seeds. For example; avocados, tomatoes, and string beans are traditionally viewed as culinary vegetables when in fact they are botanical fruits. There are fruits and vegetables that must be cooked, and those that can be eaten raw. Tomatoes can be eaten raw or cooked; string beans are usually cooked or can be juiced for medicinal purposes. A traditional, yet ill-advised, combination of fruits and vegetables would be a raw salad consisting of lettuce, bell peppers, tomatoes, avocados, and onions. The lettuce and onions are vegetables; the bell peppers, tomatoes, and avocados are fruits. Within these two basic groups are also subgroups such as root- and course vegetables.

EXAMPLES OF NUTRIENT-DENSE WHOLE FOODS

| | | |
|---|---|---|
| Soybeans | Broccoli | Cous Cous |
| Lentil Beans | Cauliflower | Avocado |
| Almonds | Apples | Barley |
| Cashews | Pineapples | Quinoa |
| Brown Rice | Potatoes | Kiwi |

EXAMPLES OF NUTRIENT-COMPROMISED FOOD-LIKE REPLACEMENTS

| | |
|---|---|
| Potato/Corn Chips | Soft/Energy Drinks |
| French/Freedom Fries | Hamburgers/Hotdogs |
| Donuts/Pastries | Candy/Energy Bars |
| Cakes/Pies | Liquid Meals (Unbalanced) |
| Drugs (non-prescription) | Alcohol (any form) |

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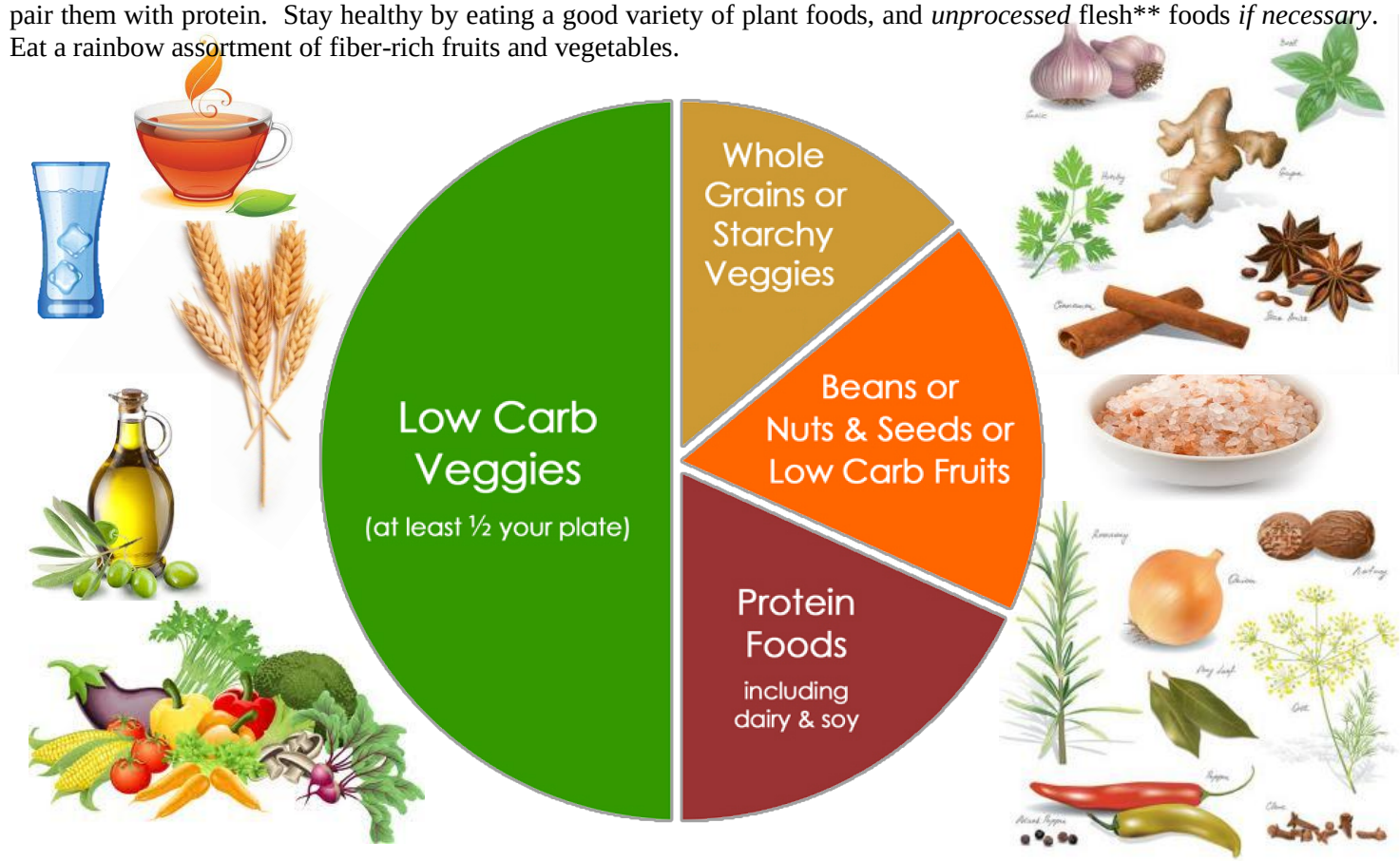
## The Plate Method Approach to Healthy Eating

The following details the commonly used Plate Method (or the Healthy Eating Plate) as modified to meet the guiding principles of biblical healthy eating. Keep this method in mind for meal planning and your overall approach to daily eating. Also, remember to spread your carbs throughout the day, choose high-fiber carbohydrate-rich foods, and always pair them with protein. Stay healthy by eating a good variety of plant foods, and *unprocessed* flesh** foods *if necessary*. Eat a rainbow assortment of fiber-rich fruits and vegetables.




### Low Carb Vegetables

**At least 1 – 3 cups** of kale, spinach*, all leafy greens/lettuces*, broccoli, cauliflower, artichoke, celery*, asparagus, cabbage, beets, carrots, or radishes.

### Whole Grains & Carbohydrate-rich "Starchy" Vegetables

**No more than ¼ – ½ cooked cup** of barley (pearl, ok; hulled better), steel cut oats, bulgur wheat, popcorn (stove-popped), wild rice, quinoa, buckwheat groats/kasha, wheat berries, sweet potato/yams, peas, corn, parsnips, turnips, or squashes/pumpkin.

### Beans, Nuts, & Seeds; Low Carb Fruits

**About ¼ – ½ cup**, **depending on carb count** of lentils, soybeans (including edamame), black beans, and/or all beans and legumes. **About ¼ cup** of almonds, macadamias, brazil nuts, peanuts, and/or all nuts and seeds (and unsweetened nut butters). **About ½ – 1 cup**, **depending on carb count** of melons, raspberries/blackberries, strawberries*, plums, citrus fruits, avocado, cucumber, okra, bell pepper*, green beans, sugar snap peas, and/or chili peppers.

### Protein Foods (including dairy & soy)

**About 3 – 6 oz. (3 oz. is about the size of a deck of cards)** of whole, unprocessed, clean land animal flesh** (free range, pasture-raised), fish** (preferably oily, cold-water species; wild caught), eggs** (free range or organic), tofu, mushrooms**, yogurt (unsweetened, full fat), cheese** (full fat), and/or cottage** cheese (4% milk fat), legumes, nuts, and/or seeds.

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* These fruits and vegetables are on the Environmental Working Group's "Dirty Dozen" list for pesticides. Choose organic whenever possible.

** These items, as well as vegetarian meats, are included as part of a ***transitional*** diet.

## An Abbreviated Nutrition Guide

The following is a brief discussion on the main components of food, nutrients, and other substances necessary for a healthy diet.

### Fluids

Clean and safe drinking water is an essential component of a healthy diet. It is important to find out if your local water is safe enough to drink from the tap. If not, filtered water or bottled spring water is your best drinking water sources. The amount of water you need depends on "your size, activity level and the weather." As a rule of thumb, use the following formula for determining your daily *minimum* water requirements:

Body Weight ÷ 2 = $H_2O$ ounces

After you've determined the minimum ounces needed, you can further divide that amount into manageable goals. For example, a female who weighs **150** pounds would require a minimum of **75** ounces of water per day. Since she prefers to use half-liter bottles, let's calculate the number of bottles needed. These bottles can store **16.9** ounces of water each. The quotient of the calculation is **4.43** ounces. This goal can be accomplished by drinking **4.5** half-liter bottles of water.

To determine how often to drink the minimum amount that you've calculated, observe your schedule. Analyze how many hours a day you are awake, then divide the number of ounces to be consumed by that amount of hours.

$H_2O$ ounces ÷ Waking Hours = Amount To Drink Hourly

If you labor in the sun, if the temperature rises above optimal for your area, if you are ill, or if your body requires greater filtration, the amount of water consumed should increase.

### Protein

A *protein* is defined as a group of complex organic macromolecules that contain carbon, hydrogen, oxygen, nitrogen, and usually sulfur and are composed of one or more chains of amino acids. Proteins are fundamental components of all living cells and include many substances, such as enzymes, hormones, and antibodies, which are necessary for the proper functioning of an organism. They are essential for the growth and repair of tissue. Proteins are part of every cell, tissue, and organ in our bodies. These "body" proteins are constantly being broken down and replaced. The protein in the foods we eat is digested and converted into amino acids that are later used to replace these proteins in our bodies. Think of amino acids as the building blocks. There are **20** different amino acids that join together to make all types of protein. Some of these amino acids can't be made by our bodies, these are known as *essential* amino acids. It's *essential* that our diet provide these.

In the diet, protein sources are labeled according to how many of the essential amino acids they provide. A **complete** protein source, sometimes called *high quality proteins*, is one that provides all of the essential amino acids. For example, flesh foods like meat, eggs, and cheese are considered complete protein sources.

An **incomplete** protein source is one that is low in one or more of the essential amino acids. **Complementary** proteins are two or more incomplete protein sources that together provide adequate amounts of all the essential amino acids. For example, rice contains low amounts of certain essential amino acids; however, these same essential amino acids are found in greater amounts in dry beans. Similarly, dry beans contain lower amounts of other essential amino acids that can be found in larger amounts in rice. Together, these two foods can provide adequate amounts of all the essential amino acids the body needs.

#### Examples of Foods with Protein

Legumes, nuts, seeds, tofu (soybeans), grains, some vegetables, some fruits and *alternatively* flesh foods.

## Fiber

*Dietary fiber*, sometimes called roughage, is the indigestible portion of food derived from plants. Fiber and resistant starch are not digested in the small intestine, but have many positive effects. There are two (2) main components:

**Soluble fiber** dissolves in water. It is readily fermented in the colon into gases and physiologically active byproducts, and can be pre-biotic and/or viscous. Soluble fibers tend to slow the movement of food through the system. Fermentable insoluble fibers mildly promote stool regularity, although not to the extent that bulking fibers do, but they can be readily fermented in the colon into gases and physiologically active byproducts.

Examples of Foods with **Soluble** Fiber
Legumes (i.e. peas and soybeans), oats, barley, fruits (i.e. berries and apples), certain vegetables (i.e. broccoli and carrots), root vegetables, nuts, Psyllium seed husks.

**Insoluble** fiber does not dissolve in water. It can be metabolically inert and provide bulking or pre-biotic, metabolically fermenting in the large intestine. Bulking fibers absorb water as they move through the digestive system, easing defecation. Insoluble fibers tend to accelerate the movement of food through the system.

Examples of Foods with **Insoluble** Fiber
Whole grain foods, wheat bran, legumes, nuts, seeds, vegetables (i.e. green beans, celery, and cauliflower), some fruits (i.e. avocado), skins of some fruits (i.e. grapes and tomatoes).

Plant foods contain both types of fiber in varying degrees, according to the plant's characteristics. Dietary fibers can act by changing the nature of the contents of the gastrointestinal tract and by changing how other nutrients and chemicals are absorbed. Some types of soluble fiber absorb water to become a gelatinous, viscous substance and is fermented by bacteria in the digestive tract. Some types of insoluble fiber have bulking action and are not fermented. **Lignin**, a major dietary insoluble fiber source, may alter the rate and metabolism of soluble fibers. Other types of insoluble fiber, notably resistant starch, are fully fermented.

## Fat

*Fats* consist of a wide group of compounds that are generally soluble in organic solvents and generally insoluble in water. Chemically, fats are triglycerides: tri-esters of glycerol and any of several fatty acids. Fats may be either solid or liquid at room temperature, depending on their structure and composition. Although the words "oils", "fats", and "lipids" are all used to refer to fats, in reality, fat is a subset of lipid. The term **oils** is usually used to refer to fats that are liquids at normal room temperature, while the term **fats** is usually used to refer to fats that are solids at normal room temperature. The term **lipid** is used to refer to both liquid and solid fats, along with other related substances, usually in a medical or biochemical context. The word "oil" is also used for any substance that does not mix with water and has a greasy feel, such as petroleum (or crude oil), heating oil, and essential oils, regardless of its chemical structure.

Fatty acids are the basic chemical units in fat. They may be *saturated*, *polyunsaturated*, *monounsaturated*, or *trans fats*. These fatty acids differ in their chemical compositions and structures, and in the way in which they affect your blood cholesterol levels, according to the following:

**Saturated fat** is used by the liver to manufacture cholesterol. It has been shown to raise blood cholesterol levels, particularly the LDL or "bad" cholesterol level which can increase your risk of heart attack and stroke. On average saturated fat should comprise no more than 10 percent of your daily calorie intake. It can be found in meats, butter, cocoa butter, coconut, and palm oils.

**Polyunsaturated fats** do not appear to raise blood cholesterol levels. Examples include safflower, sunflower, corn, vegetable, and soybean oils.

**Monounsaturated fats** do not seem to increase bad cholesterol levels and may help boost HDL or "good" cholesterol in the blood. Increased HDL levels have been linked to a lower risk of heart disease. Examples include olive and canola oils.

**Trans fats**, by-products of hydrogenation, are a chemical process used to change liquid unsaturated fat to a more solid fat. Structurally similar to saturated fat, trans fatty acids may have a great impact on raising total and LDL cholesterol levels. These should be avoided as much as possible. Examples include stick margarine and fats found in commercially prepared cakes, cookies, and snack foods.

## CHOLESTEROL

*Cholesterol* is a lipid fat is originally produced by the liver and is found in each cell of every animal's body. Although most cholesterol is made in the liver and other tissues, some can also be found in plants and fungi. Cholesterol is essential for the function of a normal body. Cholesterol is essential to the formation of bile acids, vitamin D, progesterone, estrogens (estradiol, estrone, estriol), androgens (androsterone, testosterone), mineralocorticoid hormones (aldosterone, corticosterone), and glucocorticoid hormones (cortisol). Cholesterol is also necessary to the normal permeability and function of the membranes that surround cells. A diet high in *saturated* fats tends to ***increase*** blood cholesterol levels, whereas a diet high in *unsaturated* fats tends to ***lower*** blood cholesterol levels. The treatment of elevated cholesterol involves not only diet but also weight loss, regular exercise, and medications.

Cholesterol is typically categorized in terms of **lipids** and **lipoproteins**. *Lipids* are a group of naturally occurring molecules that include fats, waxes, sterols, fat-soluble vitamins (such as vitamins A, D, E, and K), monoglycerides, diglycerides, triglycerides, phospholipids, and others. The main biological functions of lipids include storing energy, signaling, and acting as structural components of cell membranes. A *lipoprotein* is a biochemical assembly that contains both proteins and lipids, bound to the proteins, which allow fats to move through the water inside and outside cells. The proteins serve to emulsify the lipid molecules.

The three most common and easily recognizable areas in cholesterol monitoring are *low-density lipoprotein*, *high-density lipoprotein*, and *triglycerides*.

**Low-density lipoprotein** is a lipoprotein of blood plasma that is composed of a moderate proportion of protein with little triglyceride and a high proportion of cholesterol and that is associated with increased probability of developing atherosclerosis. Its *function* is to transport fat molecules into artery walls. Studies have shown that higher levels are associated with health problems, including cardiovascular disease.

**High-density lipoprotein** is a lipoprotein of blood plasma that is composed of a high proportion of protein with little triglyceride and cholesterol and that is associated with decreased probability of developing atherosclerosis. Its *function* is to remove fats and cholesterol from cells and transport it back to the liver for excretion or re-utilization. Higher native HDL levels are correlated with better cardiovascular health.

**Triglycerides** are the form in which most fat is stored in the body. Body fat is almost entirely made up of triglycerides, and fats are mostly transported in the blood in this form as well. Its function is to enable the bidirectional transference of adipose fat and blood glucose from the liver.

## SUGAR

Sugar is the generalized name for a class of chemically-related sweet-flavored substances, most of which are used as food. They are carbohydrates, composed of **carbon**, **hydrogen** and **oxygen**. There are various types of sugar derived from different sources. Simple sugars are called *monosaccharides* and include *glucose* (also known as *dextrose*), *fructose* and *galactose*. The table or granulated sugar most customarily used as food is sucrose, a *disaccharide* (in the body, sucrose hydrolyses into fructose and glucose). Other disaccharides include *maltose* and *lactose*. Sugars are found in the tissues of most plants, but are only present in sufficient concentrations for efficient extraction in sugarcane and sugar beet.
Since the latter part of the twentieth century, it has been questioned whether a diet high in sugars, especially refined sugars, is bad for human health. Sugar has been linked to obesity, and suspected of, or fully implicated as a cause in the occurrence of diabetes, cardiovascular disease, dementia, macular degeneration and tooth decay.

The pen of Inspiration teaches us that sugar is not good for the stomach. It causes fermentation and thus clouds the brain and brings peevishness into the disposition. {*CDF 327*} It clogs the system, affects the brain directly and sugar when largely used, is more injurious than meat. {*CDF 328*}

Chemically-different substances may also have a sweet taste, but are not classified as sugars. Some are used as lower-calorie food substitutes for sugar described as artificial sweeteners. Natural sweeteners have several nutrients in them as well as fiber, unlike crystalized sugar, which is stripped of nutrients, causes tooth decay and is destructive to the cells in the inner lining of the blood vessels.

#### Examples of Foods as Natural Sweeteners

Honey, maple syrup, dates, raisins, molasses, banana, cane juice.

## Carbohydrates

A *carbohydrate* is a component of food that supplies energy (calories) to the body; one of the three macronutrients (along with proteins and fats). The sugars and starches in foods supply energy to the body in the form of glucose, which is the preferred fuel for your brain and nervous system. This energy in turn is mostly used for normal body functions such as heartbeat, digestion, breathing, and body movement. Three broad categories of carbohydrates are sugars (also called *simple carbohydrates*), starches (also called *complex carbohydrates*), and fiber. The classification depends on the chemical structure of the food, and how quickly the sugar is digested and absorbed. Except for fiber and resistant starch, carbohydrates cause more and faster blood glucose rises than the other macronutrients.

Simple carbohydrates have one (single) or two (double) sugars. Complex carbohydrates have three or more sugars.

Examples of single sugars from foods include:

- Fructose (found in fruits)
- Galactose (found in milk products)

Double sugars include:

- Lactose (found in dairy)
- Maltose (found in certain vegetables and in beer)
- Sucrose (table sugar)

#### Simple Carbohydrates

Simple carbohydrates are simple sugars with a chemical structure that is composed of one or two sugars. They are refined sugars that have very little nutritional value to the body, and therefore, it's advisable that their consumption be limited to small quantities. In comparison to complex carbohydrates, simple carbohydrates are digested by the body more quickly, because they have a very simple chemical structure.

There are two types of simple carbohydrates: *monosaccharides* and *disaccharides*. Monosaccharides consist of only one sugar, and examples include fructose, galactose and glucose. Disaccharides consist of two chemically-linked monosaccharides, and they come in the form of lactose, maltose and sucrose.

#### Examples of Foods with Simple Carbohydrates

Simple carbohydrates that contain vitamins and minerals occur naturally in fruits, milk and milk products, and vegetables. Simple carbohydrates are also found in processed and refined sugars such as candy, non-diet carbonated beverages, syrups, and table sugar. Foods that contain simple carbohydrates include products with white flour, chocolate, fruit juice, cake, jam, biscuits, honey, molasses, and packaged cereals. Honey is also a double sugar. But unlike table sugar, it contains vitamins and minerals. Refined sugars provide calories, but lack vitamins, minerals, and fiber. Such simple sugars are often called "empty calories" and can lead to weight gain. Also, many refined foods, such as white flour, sugar, and white rice, lack B vitamins and other important nutrients unless they are marked "enriched." It is healthiest to get carbohydrates, vitamins, and other nutrients in as natural a form as possible – for example, from fruit instead of table sugar.

#### Complex Carbohydrates

Complex carbohydrates consist of a chemical structure that is made up of three or more sugars, which are usually linked together to form a chain. These sugars are mostly rich in fiber, vitamins and minerals. Due to their complexity, they take a little longer to digest, and they don't raise the sugar levels in the blood as quickly as

simple carbohydrates. Complex carbohydrates act as the body's fuel, and they contribute significantly to energy production.

Similar to simple carbohydrates, complex carbohydrates are divided into two categories: *oligosaccharides* and *polysaccharides*. Oligosaccharides consist of a small number of monosaccharides, which does not exceed **10**. They are important in the absorption of certain minerals and the formation of fatty acids. Polysaccharides are often made up of a large number of monosaccharides and disaccharides. Examples of polysaccharides include cellulose, dextrin, glycogen and starch.

Complex carbohydrates have a higher nutritional value than simple carbohydrates. It may be confusing to differentiate simple and complex carbohydrates due to the fact that complex ones contain certain elements of simple ones. Nevertheless, differentiating the two should not be a problem since their chemical structures are very different, and therefore, they can be distinguished by their nutritional properties.

#### Examples of Foods with **Complex Carbohydrates**

Complex carbohydrates are commonly found in vegetables, whole-meal bread and cereals. Examples of foods that contain complex carbohydrates include spinach, yams, broccoli, beans, zucchini, lentils, skimmed milk, whole grains and many other leguminous plants and vegetables.

## Vitamins

Your body needs **13** different vitamins to grow and develop properly. You can get vitamins from eating fresh fruits and vegetables or, *alternatively* from vitamin supplement pills. Each vitamin helps with certain functions. For detailed information on vitamins, including food sources, simply request a fact sheet from your MM/LE. In brief, the functions of these are as follows.

#### Vitamin **A** (Beta-Carotene, Retinol Palmitate)

Helps maintain healthy teeth, skeletal and soft tissue, and promotes good vision.

#### Vitamin **$B_1$** (Thiamine)

Helps convert carbohydrates into energy and is essential for the functioning of the heart, muscles, and nervous system.

#### Vitamin **$B_2$** (Riboflavin)

Needed for normal cell function, growth, and energy production.

#### Vitamin **$B_3$** (Niacin)

Assists in the functioning of the digestive system, skin, and nerves, and important for the conversion of food to energy.

#### Vitamin **$B_5$** (Pantothenic Acid)

Essential for the metabolism of food. It is also plays a role in the production of hormones and cholesterol

#### Vitamin **$B_6$** (Pyridoxine)

Helps form red blood cells and maintain brain function; plays an important role in the proteins that are part of many chemical reactions in the body.

#### Vitamin **$B_7$** (Biotin)

Necessary for cell growth, the production of fatty acids, and the metabolism of fats and amino acids. Assists in various metabolic reactions involving the transfer of carbon dioxide. It may also be helpful in maintaining a steady blood sugar level. Often recommended as a dietary supplement for strengthening hair and nails.

VITAMIN **B9** (FOLATE)
Works with vitamin $B_{12}$ and vitamin C to break down, use, and create new proteins, helps form red blood cells; needed for the production of DNA, which controls tissue growth and cell function.

VITAMIN **B12** (COBALAMIN)
Like the other B vitamins, is important for metabolism. It also helps form red blood cells, and maintains the central nervous system.

VITAMIN **C** (ASCORBIC ACID)
An antioxidant that promotes healthy teeth and gums. It helps the body absorb iron and maintain healthy tissue. Necessary for the growth and repair of tissues, and to form collagen, a protein used to make skin, scar tissue, tendons, ligaments and blood vessels which promotes wound healing.

VITAMIN **D** (SUNSHINE VITAMIN, HORMONE)
It is made by the body after being in the sun. Helps the body absorb calcium, which you need for the normal development and maintenance of healthy teeth and bones; regulates the amount of calcium and phosphorus in the blood, and is very important in the prevention of chronic diseases.

VITAMIN **E** (TOCOPHEROL)
An antioxidant that plays a role in the formation of red blood cells and helps the body use Vitamin K.

VITAMIN **K**
Usually not listed among the essential vitamins, but without it blood would not stick together (coagulate). Some studies suggest that it is important for promoting bone health.

## SALT

Salt is a mineral substance composed primarily of sodium chloride (NaCl), a chemical compound belonging to the larger class of ionic salts; salt in its natural form as a crystalline mineral is known as rock salt or halite. Salt is present in vast quantities in the sea where it is the main mineral constituent, with the open ocean having about **35** grams of solids per liter, a salinity of **3.5**%. The tissues of animals contain larger quantities of salt than do plant tissues; therefore the typical diets of nomads who subsist on their flocks and herds require little or no added salt, whereas cereal-based diets require supplementation.

Salt is essential to making good blood. The best salt to use would be one that has iodine and other trace minerals. Iodine is essential for proper functioning of the Thyroid gland which regulates the metabolic rate and hormones in the human body. Use of Iodine would prevent Thyroid related illness such as hyperthyroidism, hypothyroidism, goiter, overweight, extreme fatigue, depression etc.

Some people avoid the use of salt because they are hypertensive, but moderate use of salt is essential for everyday use. It should be noted that **60**% of people who do not use salt have high blood pressure. Salt therefore is not the culprit here. However, do note the World Health Organization recommends that adults should consume less than **2,000** mg of sodium (**5** grams of salt) per day.

The cruciferous family (cabbage, broccoli, cauliflower, kale, brussel sprouts) contains a chemical called goitrin that reduces the production of thyroid hormones, such as thyroxine. Obtain Iodine from seaweed vegetable – Kelp or Dulse or salt containing iodine. The following items hinder iodine from being absorbed: Fluoride, chlorine, cassava, corn.

## Minerals

At least **18** minerals are essential in human nutrition. Your body needs minerals to build strong bones, create hormones and regulate your heartbeat. Minerals help release the energy from food and improve brain functioning, which can help you think more clearly and make wiser decisions. Minerals are found in the earth, passed along to plant life, and then consumed in the diet for the nourishment of tissues. And, as such, they are an essential part of a healthy diet. They are classified as either **major** minerals, which include the electrolytes, or **trace** minerals. These minerals are stored in muscles and bones and delivered to tissue cells through blood **circulation**. They work together **synergistically** and must be chemically balanced in the body; if one is deficient or out of balance, it can affect all the others, often resulting in illness. If zinc, for example, is present at high levels, calcium levels will be reduced because the two minerals compete for absorption. Similarly, too much calcium will deplete magnesium, and so on. Deficiency in one nutrient occurs less often than deficiency in several nutrients. A child suffering from malnutrition will likely be deficient in a variety of nutrients. Deficiencies in one nutrient do occur, however, such as in populations living in iodine-poor regions, and in iron deficient persons who lose excess iron by abnormal bleeding. All uncorrected mineral deficiencies can affect body functions, produce symptoms, and result in illness. For detailed information on vitamins, including food sources, simply request a fact sheet from your MM/LE.

### Major Minerals

Major minerals are simply defined as those which are required in larger amounts in the body. The recommended daily allowance of the major minerals varies from hundreds of milligrams to thousands of milligrams per day. These major minerals include Calcium (Ca), Phosphorus (P), Magnesium (Mg), Potassium (K), Sodium (Na), Chlorine (Cl), Iron (Fe), and Sulfur (S). In brief, their functions are as follows.

**Calcium** is the most abundant mineral in the body and is essential for strong bones and teeth, healthy gums, and bone growth and mineral density in children. Calcium helps regulate the heart rate and nerve impulses, lower cholesterol, prevent atherosclerosis, develop muscles, and prevent muscle cramping. Calcium is an important component of blood clotting. Calcium and phosphorus are closely related minerals that should be balanced. About **99**% of calcium and **85**% of phosphate occur in the skeleton as crystals of calcium phosphate. Both nutrients occur in a variety of foods such as milk, eggs, and green, leafy vegetables. Calcium deficiency due to lack of dietary calcium occurs only rarely and is often due to vitamin D deficiency, because vitamin D is required for efficient absorption of dietary calcium. Significant depletion of calcium stores can lead to osteoporosis.

**Phosphorus** helps form bones and teeth, supports cell growth, and regulates heart muscle contraction and kidney function. Phosphorus converts food to energy and supports the utilization of vitamins. Deficiency is rare because phosphate is plentiful in plant and animal foods and is efficiently absorbed from the diet. Phosphorus is closely related to calcium and the two minerals should be in balance with each other and with magnesium. Deficiency in one will affect all and will ultimately have an unwanted effect on body function. Calcium and phosphorus are stored in the bones as crystals of calcium phosphate. Milk, eggs, and green, leafy vegetables are rich in calcium and phosphate.

**Magnesium** assists in the utilization of calcium and potassium, and functions in enzyme reactions to produce energy. Magnesium protects the lining of arteries and helps form bones. It helps prevent cardiovascular disease, osteoporosis, and some cancers. By acting with vitamin B6, magnesium can help prevent or dissolve calcium oxylate kidney stones, the most common kind of stones. Dietary magnesium deficiency is uncommon, but may occur in chronic alcoholics, persons taking diuretic drugs, and as a result of severe, prolonged diarrhea.

**Potassium** is important for a healthy nervous system and a steady heart rate, helps to prevent stroke, and, with sodium, is critical in maintaining fluid balance. Potassium, an electrolyte, must be balanced with sodium. Potassium deficiency is usually associated with sodium deficiency and both are associated with dehydration stemming from excessive losses of body fluid.

**Sodium** and potassium are electrolytes that must be balanced in the body. Sodium deficiency (hyponatremia) is a serious deficiency, arising most often after excessive losses of body fluid (dehydration) during prolonged and severe diarrhea or vomiting. Since most people get more than enough salt in the diet, potassium may be needed to balance it.

Together, these minerals control fluid balance through a mechanism called "the sodium/potassium pump." Prolonged imbalances in sodium and potassium can contribute to heart disease.

**Chlorine** mainly occurs in compound form with sodium or potassium, and is widely distributed throughout the body in the form of *chloride*. It is needed, along with sodium, for the production of hydrochloric acid (stomach acid). Without HCl, minerals cannot be properly absorbed and proteins cannot be digested. Chlorine is also involved in fluid and electrolyte balance, and liver function. It helps regulate the balance of acid and alkali in the blood and maintains pressure that causes fluids to pass in and out of cell membranes until the concentration of dissolved particles is equalized on both sides. It stimulates the liver to function as a filter for wastes and helps clean toxic waste products out of the system. It helps keep joints and tendons in youthful shape and aids in distributing hormones. Chlorine is used to treat diarrhea and vomiting.

**Iron** is needed for hemoglobin formation in the blood. Hemoglobin enables the red blood cells to fill with oxygen and carry it to the cells. It is also needed for myoglobin, the type of hemoglobin in muscle tissue, and the production of many enzymes. It is needed for growth, energy productions, and immune protection.

**Sulfur** is an acid-forming mineral, found in all body tissues. It is needed for the formation of four amino acids: Cysteine, Methionine, Glutathione, and Taurine. It is needed for healthy hair, skin, and nails; and utilization of oxygen by the body. It disinfects the blood, protects cell protoplasm, helps the body resist bacteria, stimulates bile secretion, and protects against harmful effects of pollution and radiation. It is used in the manufacture of collagen, a special protein which strengthens skin.

### TRACE MINERALS

These are needed in very small amounts; yet are extremely vital to physical function. Needs are usually easily met by consuming a varied, balanced diet. The richest source is consistently found in sea plants like seaweed. These trace minerals include Iodine (I), Selenium (Se), Zinc (Zn), Copper (Cu), Manganese (Mn), Silicon (Si), Fluorine (F), Chromium (Cr), Molybdenum (Mo), Cobalt (Co), Lithium (Li), Germanium (Ge), Boron (B), and Vanadium (V). In brief, their functions are as follows.

**Iodine** helps promote healthy physical and mental development in children. A deficiency during pregnancy can cause serious birth defects. Iodine is required for thyroid gland function and metabolizing fats. Iodine is needed to make thyroid hormone, thyroxine, which has a variety of roles in human embryo development. Thyroxine is almost pure iodine. Thyroxine (*T3* is the most active form) regulates very much of the total functions of the body, including metabolism, energy production, body weight, heat, etc. Deficiency in adults can result in an enlarged thyroid gland (goiter) in the neck. Iodine modulates the effect of estrogen on breast tissue.

**Selenium** is an important antioxidant that works with vitamin E to protect the heart and liver, the immune system, and may help prevent tumor formation. Premature infants are naturally low in selenium with no known serious effects.

**Zinc** is important in the growth of reproductive organs and regulation of oil glands. Zinc is required for protein synthesis, immune system function, protection of the liver, collagen formation, and wound healing. A component of insulin and major body enzymes, zinc helps vitamin absorption, particularly vitamins A and E. Deficiency is rare.

**Copper** helps form healthy bones, joints, and nerves as well as hemoglobin and red blood cells. Copper contributes to healing, energy production, taste, hair and skin color. It is essential in forming collagen for healthy bones and connective tissue, and helps prevent osteoporosis. Except in osteoporosis, copper deficiency is rare, although dramatic changes in copper metabolism occur in two serious genetic diseases, *Wilson disease* and *Menkes' disease*.

**Manganese** is essential for metabolizing fat and protein, regulating blood glucose, and supporting immune system and nervous system function. Manganese is necessary for normal bone growth and cartilage development. It is involved in reproductive functions and helps produce mother's milk. Along with B vitamins, manganese produces feelings of well-being. Deficiency can lead to convulsions, vision and hearing problems, muscle contractions, tooth-grinding and other problems in children; and atherosclerosis, heart disease, and hypertension in older adults.

**Silicon** helps form bones and connective tissue, nails, skin, and hair. Silicon is important in preventing cardiovascular disease.

**Fluorine** is needed for bone and tooth formation. As an internal antiseptic, it protects against infections.

**Chromium** is required for maintaining energy levels. Chromium helps metabolize glucose and stabilize glucose levels. It helps the body manufacture and use cholesterol and protein.

**Molybdenum** is found in bones, kidneys, and liver. Only extremely small amounts are needed to metabolize nitrogen and promote proper cell function. Molybdenum is present in beans, peas, legumes, whole grains, and green leafy vegetables. A diet low in these foods can lead to mouth and gum problems and cancer.

**Cobalt** is part of the vitamin $B_1$, (two molecules). It is therefore necessary for synthesis of this anti-pernicious anemia vitamin. If there is enough cobalt in the system, the body can make its own $B_{12}$. Working with $B_{12}$, cobalt is needed to make healthy hemoglobin molecules.

**Lithium** is needed for the metabolism of sodium, and its transport to the nerves and muscles. Important in the proper functioning of the autonomic (involuntary) nervous system. It alters and normalizes the rhythmic cycling of the brain and helps to even out the mood.

**Germanium** helps improve the delivery of oxygen to tissues and remove toxins and poisons from the body. Germanium gives garlic its natural antibiotic properties.

**Boron** is required for healthy bones, brain function, alertness, and the metabolism of major minerals such as calcium, phosphorus, and magnesium. Deficiencies are rare except in aging, when supplementation may help absorb calcium. A deficiency in boron is associated with vitamin D deficiency. Boron supplements can improve calcium levels as well as vitamin D levels, and can help prevent osteoporosis in postmenopausal women by promoting calcium absorption.

**Vanadium** is vital to cell metabolism, and helps reduce cholesterol and form healthy bones and teeth. Vanadium functions in reproduction. Deficiencies may be associated with heart and kidney disease and reproductive disorders. Vanadium deficiency may be associated with infant mortality.

## Bibliographical References

The following are a few of the resources used to create and maintain this document.


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## Over-All Notes

## Freehand Notes