

Chapter 5. The Major Macronutrients



The 4 Macronutrients

Sometimes it is confusing trying to figure out how carbohydrates, proteins, fats, vitamins, minerals, fiber, calories and all of the other nutritional components fit into an overall eating plan or diet. The following sections will help to clear up some of that confusion.

There are four major macronutrients that the cells of your body require every time you eat – they balance biochemically and hormonally, to generate energy, communicate with other cells, and to keep the body and mind healthy. Incidentally, there are four macronutrients that reside in every cell in the human body:

Carbohydrates, which come primarily from plants, e.g. land vegetables, fruits, grains, sea vegetables; and, from man-made processed foods, e.g. bread, cereal.

Proteins, which come primarily from animals and plants, e.g. fish, nuts, seeds, beans, eggs, chicken, beef, turkey, vegetables.

Fats, which come primarily from animals and plants, e.g. olive oil, flaxseed, nuts, fish, meat, dairy; and, from man-made processed foods, e.g. margarine, potato chips, French fries, store-bought baked goods.

Liquids, which come primarily from plants and the earth, e.g. water, tea, raw juice; and, from man-made beverages, e.g., soda, coffee, bottled juice.

The following section provides an overview of each of these macronutrients, including some examples of each.

Carbohydrates

The primary purposes of carbohydrates are to provide energy, enhance immune function, and support cellular communications. Carbohydrates are converted into energy so that cells can function and do their jobs effectively. Carbohydrates also help cells to communicate with each other, and help to modulate the immune system (for protection) and the endocrine system (for hormonal balance).

There are two major types of carbohydrates:

Complex carbohydrates (oligosaccharides, polysaccharides): are found in large chains of saccharide molecules in plant foods, e.g. land/sea vegetables, fruits, whole grains. They take more time to metabolize, providing a steady release of glucose into the bloodstream and a sustained level of energy throughout the day (from meal to meal).

Simple carbohydrates (monosaccharides, disaccharides): include glucose, mannose, galactose, fucose, xylose, and fructose, lactose, sucrose. They support immediate energy production by metabolizing very quickly in the bloodstream.

Note: Recent research has identified *essential* monosaccharides (glyconutrients) that are the building blocks for chains of saccharide molecules, or glycans. They combine with proteins and fats to create glycoforms, the structures on cell surfaces that cells use to communicate with each other. These saccharides, which support the immune and endocrine systems, include: mannose, glucose, galactose, xylose, fucose, N-acetylglucosamine, N-acetylgalactosamine, and N-acetylneuraminic acid. The primary sources of these saccharides (glyconutrients) are mushrooms, fungi, seaweed, aloe vera, saps, gums, herbs, and seeds; the secondary sources are vegetables, fruits, legumes, and grains.

Calorie Size of a Carbohydrate:

Every gram of a carbohydrate provides 4 calories of energy. For example, an apple contains about 25 grams of carbohydrates, which is equal to about 100 calories. But, don't forget that an apple does have about 1 gram of plant protein, so the total calories of an apple are 104 (100 + 4).



There are four major types of protein:

Plant/Non-animal: nuts, seeds, beans, lentils, whole soy foods (tofu, tempeh, miso), blue-green algae (e.g. spirulina, chlorella); sea vegetables, land vegetables; and grains (amaranth, quinoa).

Sea animals: fish (e.g. wild salmon, tuna, sardines, mackerel, trout) and seafood (e.g. shrimp, lobster, crab).

Land animals (Meat): beef, chicken, turkey, pork, lamb, and wild game (deer, bear).

Land animals (Dairy): yogurt; cow's milk, cow's cheese, raw milk; eggs, organic eggs from free-range chickens; and goat's milk, goat's cheese.

Note: The above food sources (except for the soy products and some of the plant products) provide complete proteins. The egg is considered the perfect protein food because it contains all the amino acids and is very easy to digest.

Calorie Size of a Protein:

Every gram of a protein provides the same number of calories as a carbohydrate - 4 calories of energy. For example, one egg contains about 6 grams of protein, which is equal to 24 calories. But, don't forget that the egg has about 0.5 grams of fat, so the total calories of an egg are 71 (24 + 2 + 45).



Fats

The primary purposes of fats are to form cell membranes, keep cell walls supple, cushion your organs and protect you from temperature extremes. Fats help to slow down the absorption of carbohydrates, trigger the feeling of “fullness” when you eat, and keep your skin and hair healthy.

There are four major types of fats:

Monounsaturated fats: are mainly found in foods that come from plants and are liquid at room temperature. They include olive oil, hazelnuts, almonds, Brazil nuts, avocado, cashews, sesame seeds, pumpkin seeds, and walnuts.

Polyunsaturated fats: come mainly from plants and are liquid at room temperature, and contain Omega-3 and Omega-6 *essential* fatty acids (EFAs). Omega-3 EFAs include alpha linolenic acid (ALA), eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). Plant oils such as flaxseed contain ALA. Marine oil (from crustaceans) and fish oil from wild salmon contain EPA and DHA. Polyunsaturates that are rich in Omega-3 EFAs include flax oil, hemp oil, pumpkin seeds, walnuts and oily fish, such as wild salmon, sardines, mackerel, trout and herring. Omega-6 EFAs include linoleic acid (LNA), gamma linolenic acid (GLA), and arachidonic acid (AA). Polyunsaturates that are rich in Omega-6 EFAs include evening primrose oil (EPO), borage oil and black current seed oil.

Saturated fats: are a major part of the phospholipid component of cell membranes. They are also a major component of healthy cells, the preferred fuel for the heart, and serve as cancer-fighting genetic “regulators” in the body. Unfortunately, when animals are fed corn, growth hormones and antibiotics, this compromises the saturated fats. However, saturated fats from animals that are wild or grass-fed and are not given growth hormones or antibiotics are much healthier. Saturated fats are found mostly in animal products and are solid at room temperature. They include butter, lard, and tallow (milk, cheese). Saturated fat is also found in tropical oils such as coconut and palm oils.



Trans fats: are man-made and reside in various processed foods including margarine, French fries, potato chips, pretzels, fried foods, and store-bought cookies, pies and cakes. Trans fats, or “partially hydrogenated oils”, were originally created to prolong the shelf life of packaged foods.

Calorie Size of Fats:

Fats are the most concentrated source of energy for your body, providing 9 calories per gram versus 4 calories per gram for carbohydrates and protein. For example, a tablespoon of olive oil contains about 14 grams of fat, which is equal to about 126 calories.