

Macronutrients vs Micronutrients

By Jan Clementson

The Building Blocks of Life

We all know that to survive and grow we need nutrients. But what are nutrients, where do they come from and what do they do? Nutrients come from the foods and drinks that we consume and include both plant and animal foods. **Ultimately, all nutrients come from the environment.** Plants take in nutrients directly from the soil through their roots and from the atmosphere through their leaves; whereas humans and animals break down food to release nutrients via specialised digestive systems. The effects of nutrients are dose-dependent and shortages are called deficiencies.



Nutrient Classifications

Nutrients can be classified into macronutrients or micronutrients, both of which are essential. Macronutrients are needed in larger quantities and provide the bulk energy for the metabolic system to function; whilst micronutrients are needed in very small amounts and provide the necessary co-factors for metabolism to be carried out. Proteins, fats and carbohydrates are macronutrients; whereas vitamins, minerals and phytonutrients are micronutrients.

Macronutrients

Carbohydrates are made up of types of sugars and are classified by their number of sugar units: *monosaccharides* (such as glucose and fructose), *disaccharides* (such as sucrose and lactose), *oligosaccharides* and *polysaccharides* (such as starch, glycogen, and cellulose). All carbohydrates are broken down in the body to the most simple sugar unit, which is glucose. Examples include bread, grains, potatoes, vegetables and fruits.



Proteins consist of multiple amino acids, which are the building blocks of proteins, joined together. Some of these amino acids are termed essential because the body cannot manufacture them. All proteins are broken down in the body to free amino acids. Examples include meat, fish, eggs, dairy, beans, legumes and nuts.



Fats consist of three fatty acids (basic fat units) attached to a sugar molecule (glycerol). Fatty acids are chains of hydrogen and carbon molecules. When these chains contain double bonds the fatty acids are called **unsaturated fats**; when only single bonds occur, the fatty acids are termed **saturated fats**. Examples of saturated fats include hydrogenated oils, such as palm and coconut oil, butter, cheese, animal fats and processed meats. Unsaturated fats include fish, nuts, seeds and olive oil.



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Micronutrients

Vitamins must be obtained via the diet because they cannot be synthesised in sufficient quantities by the body. Thirteen vitamins are universally recognized at present and are grouped under an alphabetical "generic descriptor" title. These include vitamins A, B1, B2, B3, B5, B6, B12, C, D, E, K, folic acid and biotin. Vegetables, fruits and grains are very dense in vitamins but fat soluble vitamins (A, D, E, K) can be found in animal fats, fish and vegetable oils.



Dietary Minerals refer to the chemical elements found in the human body that are required for bodily functions. In order of abundance, the seven major dietary elements are calcium, phosphorus, potassium, sulphur, sodium, chlorine, and magnesium. The "trace" or minor dietary elements include iron, copper, zinc, molybdenum, iodine, selenium, chromium and manganese. Minerals are found in foods such as meat, cereals (including cereal products such as bread), fish, dairy, vegetables, fruit and nuts.



Phytonutrients are compounds that occur naturally in plants. Some are responsible for colour and other properties, such as the deep purple of blueberries and the smell of garlic. The term is generally used to refer to those chemicals that may have biological significance, for example **antioxidants**, but are not established as essential nutrients. It is estimated that as many as 10,000 different phytonutrients exist.

They are widespread in fruits, vegetables, vegetable oils, nuts, seeds, grains, cereals and beans.



Sports Nutrition

Nutrition in sport generally focuses on the macronutrients at the expense of the micronutrients. Heavy emphasis is often placed on the number of calories and protein required for the specific sport and the ratio between the macronutrients. As these provide the bulk energy required for exercise, this is hardly surprising. However, the body works through a series of enzyme systems to burn the fuel for energy. All of these enzyme systems require the micronutrients for proper function. Without them, the fuel will be burned inefficiently or not at all, resulting in low energy production. **Micronutrients are essentially the sparks that light the fire!**

If you want to be firing on ALL cylinders when you exercise, make sure you include sufficient micronutrients as well as macronutrients.

ACTION POINTS

Eat food from EVERY category EACH DAY:

Carbs	•Grains, bread, potatoes, veg, fruit.
Proteins	•Meat, fish, eggs, dairy, legumes, nuts.
Fats	•Fish, meat, oils, nuts, seeds, dairy.
Vitamins	•Veg, fruit, grains, fish, meat.
Minerals	•Cereals, veg, fruit, nuts, fish, dairy.
Phytos	•Brightly coloured fruit, veg, grains.

Jan Clementson has a First Class Honours Degree in Nutritional Medicine and works as a Clinical Nutrition Advisor for BioCare Ltd.
Contact: jancllementson@hotmail.com