Macronutrients and Micronutrients

Macronutrients

Macronutrients are needed in larger quantities (in gram range). They normally include water, carbohydrates, fat and protein. Macronutrients (except water) are also called energy-providing nutrients. Energy is measured in calories and is essential for the body to grow, repair and develop new tissues, conduct nerve impulses and regulate life process.

Carbohydrates – are required for energy and provide body's main source of energy (4 calories per gram); they form the major part of stored food in the body for later use of energy and exist in three form: sugar, starch and fiber. The brain works entirely on glucose alone. When in excess, it is stored in the liver as Glycogen. Carbohydrates are also important for fat oxidation and can also be converted into protein.

Fats – are used in making steroids and hormones and serve as solvents for hormones and fat soluble vitamins. Fats have the highest caloric content and provide the largest amount of energy when burnt. When measured by a calorimeter, fats provide about 9 calories per gram of fat, making them twice as energy-rich than protein and carbohydrates. Extra fat is stored in adipose tissue and is burnt when the body has run out of carbohydrates.

Proteins – they provide amino acids and make up most of the cell structure including the cell membrane. They are the last to be used of all macronutrients. In cases of extreme starvation, the muscles in the body, that are made up of proteins, are used to provide energy. This is called muscle wasting. As for carbohydrates, proteins also provide 4 calories per gram.

Water – makes up a large part of our body weight and is the main component of our body fluids. The body needs more water every day than any other nutrient and we replenish it through foods and liquids we eat and drink. Water serves as a carrier, distributing nutrients to cells and removing wastes through urine. It is also a compulsory agent in the regulation of body temperature and ionic balance of the blood. Water is completely essential for the body's metabolism and is also required for lubricant and shock absorber.

Micronutrients

These nutrients include *minerals* and *vitamins*. Unlike macronutrients, these are required in very minute amounts. Together, they are extremely important for the normal functioning of the body. Their main function is to enable the many chemical reactions to occur in the body. Micronutrients do not function for the provision of energy.

Vitamins – are essential for normal metabolism, growth and development, and regulation of cell function. They work together with enzymes and other substances that are necessary for a healthy life. Vitamins are either *fat-soluble* or *water-soluble*. Fat soluble Vitamins can be stored in the fatty tissues in the body when in excess. Water soluble vitamins are excreted in urine when in excess and so need to be taken daily. Water soluble vitamins include Vitamin B and C. Green leafy vegetables are rich in Vitamin B, whereas Vitamin C is found abundantly in citrus fruits. Fat soluble vitamins are Vitamin A, D, E and K. Green leafy vegetables, milk and dairy products and plant oils provide these vitamins.

Minerals – are found in ionized form in the body. They are further classified into *macrominerals* and *microminerals* (or *trace minerals*). Macrominerals present in the body include Calcium, Potassium, Iron, Sodium and Magnesium to name a few. Iron is a constituent of Hemoglobin which is present in blood. Macrominerals are needed in more amounts, as compared to microminerals. Microminerals include Copper, Zinc, Cobalt, Chromium and Fluoride. They are mostly co-factors, and are necessary for the function of enzymes in the body, but are needed only in minor quantities. Approximately 4% of the body's mass consists of minerals.

Source: Adapted from www.foodpyramid.com/6-essential-nutrients and www.fao.org/docrep/017/i3261e/i3261e05.pdf