

## ENERGY

Energy is provided by the foods and drinks that we consume. Food and drinks contain different amounts of energy based on the levels of fat, protein, carbohydrate and alcohol present, and when the body breaks down these components this energy is released. Energy is needed by the body to grow and repair itself, keep warm and be active.

## CARBOHYDRATES

The primary role of carbohydrates is to supply the body's cells with glucose, which is an important energy source. Nearly all of the energy required by the brain to function each day is supplied by glucose from the diet. Carbohydrates also maintain blood glucose levels and have a role in gastrointestinal health. When carbohydrates are eaten, they are broken down into glucose which is circulated to all parts of the body via the blood. Any glucose that is not required immediately is stored in the liver and muscles as glycogen. Additional glucose is stored as fat.

Carbohydrates are composed of sugar molecules made up of carbon with hydrogen and oxygen, and are classified based on their structure. Simple sugars, such as monosaccharides and disaccharides, are quickly digested by the body. Examples of foods containing simple sugars are sweet-tasting foods, but also fruit and vegetables.

Complex sugars are also known as polysaccharides and are made up of long chains of monosaccharides, usually glucose. Examples are compounds such as starch and glycogen. Foods containing complex sugars include breads, noodles, rice and vegetables.

Fibre is a type of carbohydrate that is found in all plants eaten for food, such as fruit, vegetables, grains and legumes. Fibre cannot be digested in the stomach or small intestine but passes through to the large intestine, where bacteria break much of it down. As fibre is digested, the bacteria multiply and produce butyric acid, which is important for intestinal health as it protects against bowel cancer. Fibre is commonly categorised depending on how easily it dissolves in water. Soluble fibre partially dissolves in water and is found in oat bran, nuts, seeds, beans, apples and pears. This fibre decreases the glycaemic index of carbohydrate foods by slowing the release of glucose from food. Insoluble fibre does not dissolve in water and is found in whole grains, brown rice and a range of vegetables, including carrots and courgettes. Insoluble fibre is responsible for preventing and treating constipation.

## PROTEIN

Proteins are present throughout the body, including muscle, skin and hair. Protein is required in the body for building and repairing tissue, for making enzymes that assist with many of the chemical reactions in the body, and for producing haemoglobin which carries oxygen in the blood. The 'building blocks' of protein are amino acids, which are made from carbon, hydrogen, oxygen, nitrogen and occasionally sulphur. Each protein is composed of a chain of a specific number and sequence of amino acids. There are twenty amino acids which are either called essential (as they cannot be made in the body and must be consumed from the diet), or non-essential (can be synthesised in the body). The body does not store amino acids so a daily supply is required from the diet.

## FAT

Fat is a source of essential fatty acids and is necessary for the absorption of fat-soluble vitamins (Vitamin A, D, E, and K). It is also a concentrated energy source; 1 gram of fat provides 37 kJ energy or 9 calories, which is over twice the amount of energy provided by carbohydrate or protein. Fat also assists in satiety or a feeling of fullness after eating. The health issues associated with fat are related to excessive consumption, especially saturated fat. If excess energy is eaten in the form of fat, it is stored in the body as fat. High levels of fat intake can cause obesity and this increases the risk of diseases such as cardiovascular (heart) disease, type 2 diabetes, hypertension and cancers.

*Saturated fats* are solid at room temperature and are found in animal products, such as butter, full-fat milk and cheese. Coconut and palm oils are an exception to this 'rule' as both of these vegetable fats are mostly saturated. Most meats contain saturated fat although there may also be some monounsaturated fat present.

Saturated fats increase total blood cholesterol and 'bad' LDL cholesterol, which promote high levels of fat in the blood and encourage blood clotting. Studies have concluded that a decreased consumption of products containing large amounts of saturated fats decreases the risk of cardiovascular (heart) disease.

*Monounsaturated fats* are most commonly found in olive oil, canola oil, avocado oil, macadamia nuts and almonds. These types of fats decrease total cholesterol and LDL cholesterol but have no effect on HDL cholesterol, which has a protective effect on the heart.

*Polyunsaturated fats* decrease total cholesterol and LDL cholesterol while increasing HDL cholesterol. There are two essential polyunsaturated fats, Omega 3 and Omega 6, which cannot be synthesised in the body so they must be consumed in the diet. Omega 3 is commonly found in fish and fish oil products, soyabean, walnut and canola. Good sources of Omega 6 are sunflower seeds, soyabean and corn oils. These two polyunsaturated fats are used in the body to make other fatty acids which are important for our well-being and are important in the body in terms of controlling blood cholesterol concentrations and the body's immune response.

*Trans fatty acids* are commonly found in commercially prepared foods and are formed during the production of some margarine, due to the hydrogenation of vegetable oil. Small quantities of trans fatty acids may also form during deep frying. These fats are unsaturated but they increase total cholesterol and LDL cholesterol, while decreasing the good HDL cholesterol.

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### MINERALS

Minerals are inorganic substances that are required by the body and, unlike fats, carbohydrates and proteins, minerals are not energy yielding. Only small quantities of minerals are required in the diet, with daily intakes of minerals listed in milligrams (mg) or micrograms ( $\mu\text{g}$ ), but they have many important functions in the body. Some examples of minerals are calcium (for bone structure and health), sodium (regulates body water content and electrolyte balance) and iron (formation of haemoglobin in red blood cells).

Foods containing a particular mineral do not have to be treated with special care as minerals cannot be destroyed by heat, air or mixing. More important is each individual's ability to absorb minerals from a food once it has been eaten. The absorption of minerals is affected by each individual's requirement for a particular mineral and how available that mineral is in a food.

Excess consumption of minerals can be toxic but a deficiency of a particular mineral can also lead to health issues. Eating a varied diet will ensure that you achieve an adequate intake of minerals. In some cases, supplementation of minerals may be required if a deficiency is identified, for example, anaemia caused by iron deficiency.

### VITAMINS

Vitamins are inorganic compounds that are needed in small amounts (milligrams (mg) or micrograms ( $\mu\text{g}$ )) in the body for carrying out essential processes. The majority of vitamins required cannot be produced in the body so they need to be consumed in the diet.

Vitamins can be separated into two groups:

1. Water-soluble vitamins (Vitamin C, B Vitamins) are carried in the blood, excreted in the urine, needed in regular small doses and are unlikely to reach toxic levels in the blood.
2. Fat-soluble vitamins (Vitamin A, D, K) are absorbed into the lymph system, carried into the blood by protein carriers, stored in the body fat and are more likely to be toxic if consumed in excess of the body's requirement

### REFERENCES

Nutrition information. [www.bakeinfo.co.nz](http://www.bakeinfo.co.nz).

Healthy eating. [www.britishnutrition.org.uk](http://www.britishnutrition.org.uk).

Nutrition facts. [www.nutritionfoundation.org.nz](http://www.nutritionfoundation.org.nz).