

Lipids and Carbohydrates in Human Nutrition

Lipids

Lipids are a heterogeneous group of compounds, including fats, oils, steroids, waxes, and related compounds. They are concentrated sources of energy as well as structural components of cell membranes. A certain amount of dietary fat is required for normal bodily functions.

Fatty Acids (FA) are described according to the number of double bonds present:

- **Saturated fatty acids** have no double bonds, for example (palmitic and stearic acid)

Saturated fats have a significant hypercholesterolemic effect (increase blood cholesterol levels). They are found predominantly in animal products (butter, cheese and meat).

- **Unsaturated fatty acids** may contain one or more double bond's e.g. Monosaturated fatty acids have one double bond (oleic acid). Polyunsaturated acids (linoleic, linolenic, arachidonic acids)

Essential fatty acids have to be provided by the diet, they play vital roles in cell membrane structure. They belong to N-3 and N-6 classes. Oil rich fish contain long chain N-3 FA. They decrease the risk of coronary heart disease.

Cholesterol

Cholesterol is the principal sterol synthesized by animals, predominantly in the liver. It is an essential structural component of mammalian cell membranes and is required to establish proper membrane permeability and fluidity, also important in the manufacture of bile acids, steroid hormones and vitamin D.

Although cholesterol is important and necessary for biological processes, high levels of cholesterol in the blood have been linked to damage to arteries and cardiovascular disease.

Cholesterol is found in egg yolks and organ meats such as liver and kidneys but can also be synthesised in the body.

Requirement

- Daily fat intake should be 0.3g animal and 0.4g vegetable fat per kg of bodyweight.
- Cholesterol should be restricted to 300mg/day or less.

Excess fat intake should be avoided as it is linked to having an increased risk of obesity, coronary heart disease and certain types of cancer.

Carbohydrates

Monosaccharides are the simplest carbohydrates; they cannot be hydrolyzed to smaller molecules.

- Glucose is made in the body from the digestion of starch and disaccharide's. The normal blood sugar range is between 3.9-6.1 mmol/litre.
- Fructose is found in fruits and honey. It is converted to glucose in human metabolism.
- Galactose is produced via breakdown of lactose (milk) and then changed to glucose for energy.

Disaccharides are two joined monosaccharides and are the simplest polysaccharides:

- Sucrose
- Lactose

Polysaccharides are made of many single saccharide units:

- Starch (stored as glycogen)

Requirement

- Optimum intake is 4-6g/kg body weight.
- Sucrose intake should not exceed 10%.

Carbohydrates in the diet provide most of the energy to the body. They prevent breakdown of fats and proteins, which would cause excessive production of toxic metabolic by-products.

High intakes of sugar occur in many populations, this is linked to glucose intolerance, hyperlipidemia and an increase in the occurrence of dental caries.

Dietary Fibre

Dietary fibre is the indigestible portion of plant foods (resistant to human digestive enzymes):

- Cellulose
- Non-cellulose polysaccharides
- Single non-carbohydrate member-lignin.

Sources of dietary fibre: whole grains, pulses, vegetables and fruits.

Requirement: 30g/day. An excessive intake can reduce bioavailability.

Links

Related articles

- Minerals in Human Nutrition
- Trace Elements in Human Nutrition
- Food Contaminants

External Links

- <http://www.who.int/nutrition/topics/nutrecomm/en/index.html> WHO Nutrition (<http://www.who.int/nutrition/topics/nutrecomm/en/index.html>)

Bibliography

- BENCKO, Vladimir, et al. *Hygiene and epidemiology : selected chapters*. 2. edition. Prague. 2008. ISBN 80-246-0793-X.