

Macronutrients – fats and proteins

Macronutrients are needed by the body in large amounts

PROTEINS

Large biomolecules built of amino acids bound together into long chains

Proteins have many functions in our bodies:

Functions

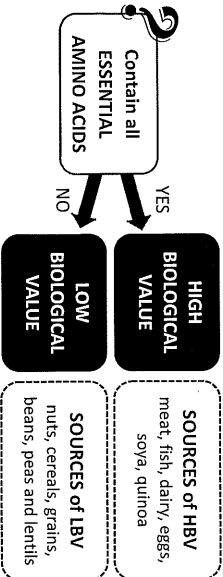
- Build enzymes and hormones
- Build cell membranes
- Repair and maintain tissues
- Defend the body (antibodies)
- Secondary source of energy



There are approximately 20 amino acids in total and each one has a specific function in our body. While most can be made by our bodies, approximately nine cannot – these have to be consumed through food.

- **Essential amino acids** – cannot be made by our bodies and need to come from food
- **Non-essential amino acids** – readily made by the body

Different foods contain different amounts of these essential amino acids. Foods that contain them all are called **high biological value (HBV)** and a protein source that lacks one of these essential amino acids is called a **low biological value (LBV)** protein.



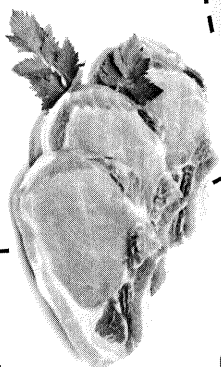
SOURCES of HBV
meat, fish, dairy, eggs, soya, quinoa

SOURCES of LBV
nuts, cereals, grains, beans, peas and lentils

Protein Complementation
A process of combining two or more LBV protein sources to obtain an HBV protein complementation.
Examples of protein complementation:
baked beans + bread
rice + peas
peanut butter + porridge oats

Too much or too little protein and the following can happen:

Excess	<ul style="list-style-type: none"> • Kidney and liver diseases • Weight gain
Deficiency	<ul style="list-style-type: none"> • Kwashiorkor • Slowing of growth rate • Swelling



15% of daily energy intake

FATS

Large biomolecules built of one particle of glycerol and three particles of fatty acids that provide energy

The functions of fats include:

Functions

- Source of energy
- Insulation
- Dissolve vitamins
- Build hormones
- Build cell membranes

There are two types of fatty acid, outlined below:

Saturated
Contain only single bonds. Solid at room temperature.

Sources:
meat, cheese, butter, cream, whole milk, lard, suet, eggs

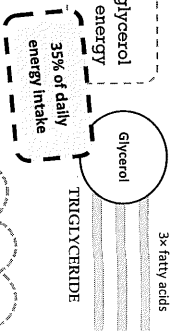
Unsaturated
Contain one or more double bonds. Liquid (oils) at room temperature.

Unsaturated fats (or fatty acids) can be divided into two further categories:

Monounsaturated
One double bond

Polysaturated
More than one double bond

Sources: fish and fish oil, vegetable oils and spreads, nuts and grains, avocados

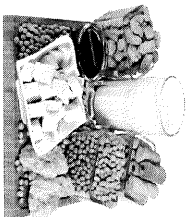


35% of daily energy intake

What about vegetarians and vegans?

Protein Alternatives
Vegetarians and vegans don't consume meat so instead they use protein alternative products, which are manufactured in order to provide protein in a diet, and protein-rich plant foods.

- Examples include:
- Mycoprotein (Quorn®)
 - Tofu
 - Tempeh
 - Soy chunks
 - Textured vegetable proteins (TVP)
 - Beans, lentils, chickpeas



Food can contain fat, even when you can't see it.

Visible

- Fats you can see – such as the fat on meat – are often saturated.
- However, visible fats can be unsaturated (such as oils in fish and from plants).

Invisible

- Unsaturated fats you cannot see – such as those in nuts and avocados – are often good for the brain!
- However, some invisible unsaturated fats can be found in processed foods.

Fats are needed, but so is a balance of them – too much fat or too little fat has consequences...

Excess

- Obesity
- Hypertension
- Coronary heart disease
- Fatty liver disease
- Type 2 diabetes

Deficiency

- Weight loss
- Vitamin deficiency
- Heart disease
- Feeling cold

Cholesterol
Fatty substance present in animal-origin foods, responsible for transporting fats around the body
Low-density lipoprotein (LDL) is 'bad' cholesterol
High-density lipoprotein (HDL) is 'good' cholesterol

Macronutrients – carbohydrates

Large biomolecules built of carbon, oxygen and hydrogen, either in the form of simple, double or complex molecules built of hundreds of molecules of sugar bonded together

CARBOHYDRATES

50% of daily energy intake

What do we need carbohydrates for?

Functions

- Primary source of energy
- Store energy for later
- Build DNA
- 'Protein sparer'

Free sugar
 Sugar that is added to foods, and the sugar naturally present in honey and fruit juices.
 These should make up no more than 5% of your daily energy intake.

Intrinsic sugar
 Sugar that is naturally present in fruit and vegetables.

VS

What happens if you eat too many or too few carbohydrates?

Excess

- Tooth decay
- Type 2 diabetes
- Weight gain and obesity
- Hypertension

Deficiency

- Weight loss
- Lack of energy, tiredness
- Severe weakness
- Hypoglycaemia

→ **Hypoglycaemia** – very low blood sugar level

- collapse/fainting, coma

→ **Hyperglycaemia** – very high blood sugar level

- type 2 diabetes, damage to the nerves

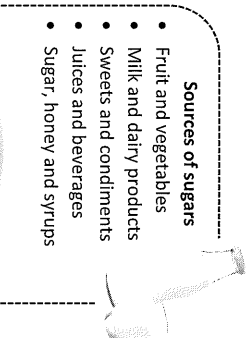
What happens if you eat too much or too little fibre?

Excess

- Constipation or diarrhoea
- Impaired absorption of nutrients

Deficiency

- Constipation or diarrhoea
- Increased risk of obesity, type 2 diabetes, cardiovascular disease, bowel cancer



Sources of sugars

- Fruit and vegetables
- Milk and dairy products
- Sweets and condiments
- Juices and beverages
- Sugar, honey and syrups



Sources of starches

- Starchy vegetables, e.g. potatoes, parsnips
- Grains, e.g. wheat, rice, barley, maize, quinoa, bread and pasta, porridge, couscous

Digestible
 Are absorbed and provide a source of energy

Sources of digestible polysaccharides

1. Starch – made up of several glucose molecules, this is found in grains, cereals and starchy vegetables
2. Dextrin – produced when starchy foods are cooked, e.g. toast or baking cakes

Non-digestible
 Are not absorbed and support digestive health. Also known as dietary fibre.

Sources of non-digestible polysaccharides (dietary fibre)

1. Cellulose – often found in plant cell walls
2. Pectin – found in cell walls of vegetables and fruits



Dietary fibre can either be soluble or insoluble

SOLUBLE

- Swells in stomach and increases satiety
- Slows down sugar ingestion and prevents high blood sugar levels

INSOLUBLE

1. Adds bulk to the stool
2. Regulates bowel movements
3. Prevents bowel cancer

Sources of dietary fibre:
 wholemeal products, bran, oatmeal, vegetables, fruit, nuts, lentils and beans

There are two types of carbohydrates: sugars and complex carbohydrates known as polysaccharides, which are further broken down in to subgroups.

SUGARS
 Sweet-tasting carbohydrates made up of simple or double molecules of carbohydrates

Monosaccharides
 One-sugar molecules

There are three main monosaccharides found in food:

1. Glucose – also known as blood sugar – can be found in fruits and vegetables. Also found in muscles and liver cells.
2. Fructose – sweet sugar found in many fruits
3. Galactose – a less sweet monosaccharide found in mammals' milk

Disaccharides
 Two-sugar molecules

There are three main disaccharides found in food:

1. Lactose – products made from mammals' milk
2. Sucrose – common sugar
3. Maltose – produced when starch is broken down; found in cereals

POLYSACCHARIDES
 Long chains of sugar bound together. Also known as complex carbohydrates.

Polysaccharides are either digestible or non-digestible.

30 g every day