

Protein—as a macro nutrient (1.1.1)

Key Words

Amino acids—the 'building blocks' that join together to make protein molecules

Essential amino acids—amino acids the body cannot make by itself and must get ready made from foods

Biological value—the number of essential amino acids that a protein food has

Protein complementation—eating different LBV protein foods together in order to get all the essential amino acids the body needs

Protein alternatives - manufactured food products, with a high protein content

What is it and what is it made of? - a macronutrient found in animal and plant food. Made up of 'building blocks' called amino acids

Amino acids: there are 20 in total. 10 are essential for the growth of children; 8 are essential for adults

High Biological Value (HBV) proteins contain all the 10 essential amino acids (EAA).

Low Biological Value (LBV) proteins are missing one or more essential amino acids (EAAs).

Functions in the body.

- Growth and repair
- Repair of the body when it is injured
- Giving the body energy (if it does not have enough carbohydrate and fats)
- Also needed for hormones (for growth and reproduction), enzymes (e.g. to digest food) and antibodies (to fight infection)

LBV proteins do not contain all the essential amino acids we need but if you eat a mixture of them the missing essential amino acids in one may be provided by one of the others. This is called

Protein complementation. If you put two LBV foods together in a meal, the EAAs missing in one will be provided by the other – they complement each other. Beans and bread are both LBV protein foods so, as beans on toast, they are a good example of protein complementation. Other examples are: Pitta bread and hummus, baked beans on toast, bean and rice salad (not with soya beans), peanut butter on toast, bulgur and bean salad (not with soya beans) and vegetable satay and rice.



Effects of deficiency

Children will not grow properly and may never reach full height

Hair loss (hair is made of protein. People can live without hair so if protein is deficient the body will use it for more important body needs.

Nails and skin in poor condition
Easily develop infections due to weakened immune system
Not able to digest food properly

Specific groups:

Pre-school children need protein for rapid growth.

Children ages 5—12 are growing in 'spurts'

Vegetarians

Need to make sure they mix their LBV protein foods

Vegans—eat no animals or animal products and rely on plant based protein foods

Convalescing from illness or injury —need protein to repair damaged cells, repair wounds

Sources:

HBV foods: meat, poultry, cheese, soya beans, milk, quinoa, eggs, fish., yogurt, quark, soya beans, quinoa.

LBV foods: peas, beans, nuts, lentils, cereals (rice, oats, barley, rye, millet, sorghum) and cereal products (bread, pasta), seeds and gelatine.

Protein alternatives are manufactured food products, with a high protein content, e.g. mycoprotein (Quorn), tofu, TVP and tempeh. They are used instead of meat in meals.

Useful to people who have decided to change from eating meat to a vegetarian diet as often made to look like meat or chicken, so they can help someone get used to not eating meat as they become fully vegetarian. Can be made into similar meals such as stir fries, pies, curries and burgers. They do not have much flavour on their own but easily take up the flavours of other ingredients.

Effects of excess: Too much nitrogen in the body is dangerous. The liver and kidneys have to work harder to remove it. This puts them under stress and could harm them.

Amount needed for different life stages

0.75g of protein is needed per 1 kg of body weight. Some groups need more than others e.g. teenagers (boys in particular) and breastfeeding women.

All teenagers need protein for growth, repair of body and energy. • Hormones (for growth and reproduction), enzymes and antibodies (to fight infection) are made from protein – teenagers need more of these as their body changes from a child to an adult. • Muscles made of protein – males are usually more muscular and taller than females, so need more protein.

Breast feeding women: • Protein is essential for growth and development of baby. • Breast milk provides protein. • Mother needs enough protein for her own body plus extra for the baby.



Fat —as a macro nutrient 1.1.2

Key Words

Fat: a macro nutrient supplying the body with a concentrated energy source

Oils: Fats liquid at room temperature e.g. sunflower oil

Solid fats: Fats solid at room temperature e.g. butter + lard

Visible fat: Fat in food seen easily e.g. fat on bacon

Invisible fat: Fat in food that cannot easily be seen e.g. butter in cooked pastry, oils in fried foods i.e. doughnuts and crisps

Fatty acid: part of a fat molecule

Triglyceride: fat molecule made up of 1 part glycerol + 3 fatty acids

What is it and what

is it made of? - a macronutrient found in animal and plant foods. Fat is **solid** at room (ambient) temperature/oil is **liquid**. Exactly the same energy value: 9kcal/37kJ per gram . Fats and oils are made up of **triglycerides** which look like this:



Types of fatty acids:

Monounsaturated fatty acids: fatty acid found mainly in solid fats and liquid oils

Saturated fatty acids: fatty acids found mainly in solid fats e.g. butter, lard, suet, block margarine, ghee, fat on meat, palm oil, coconut and chocolate. Saturated fatty acids can increase **cholesterol** level in the blood. Too much cholesterol can lead to thickening of the artery walls and Coronary Heart disease

Unsaturated fatty acids: fatty acids found mainly in liquid plant oils e.g. olive, rapeseed, sunflower, + corn; oily fish, avocado pears, nuts, seeds + some veg. fat spreads. These can help to reduce cholesterol in the blood

Essential fatty acids: when we eat food, our body breaks up (digests) the fat molecules they contain to make new fatty acids and fat molecules for our body to use. The two essential fatty acids needed by adults and children that cannot be made by the body and have to be eaten in the form of food are found in oily fish, plant and seed oils, eggs and fresh meat.

Functions in the body. (what it does in the body):

- Gives energy which is stored in the body. It is stored in the adipose tissue under the skin)
- Insulates to keep the body warm because the adipose tissue **insulates** the body from the cold and **protects** bones and kidneys from damage providing a cushion layer
- Provide fat soluble vitamins A, D, E and K.

Effects of excess: Fat is energy dense – 9kcal per gram.

Eating too much can lead to weight gain.

Could contribute to developing cardio vascular disease (CVD) and coronary heart disease (CHD)

Effects of deficiency

- If carbohydrate intake is also reduced, body weight will be lost because the body uses its energy store from its fat cells + it will not be replaced
- The body will chill quickly because there is not enough fat to insulate
- Fat deficiency in babies and children could affect normal growth
- The body will easily bruise as there is not a thick enough cushion of fat for protection
- Body will not receive enough vitamins A, D, E and K as these are found in foods containing fat

Sources of solid animal fats: **Visible** fat in meat, cheese, butter, lard, suet
Invisible: cheese; butter in cakes, pastries and desserts.
 Meat products e.g. sausages + burgers. Marbling in meat. Processed meals and take away.

Sources of solid plant fats: **Visible:** white vegetable fats, veg. fat spreads, (margarines), coconut cream, cocoa butter
Invisible: Processed foods. Chocolate + pastries, cakes, biscuits, doughnuts and breads made with hydrogenated white veg. spreads. oils in tuna, block vegetable fat, ghee, plant oils e.g. palm, olive and sunflower

Sources of liquid animal oils: **Visible:** animal oils, cod liver oil, oily fish, e.g. mackerel + sardines

Invisible: milk, cream, egg yolk, oily fish

Sources of liquid plant oils: **Visible:** plant oils, nuts and seed oils (e.g. sunflower, sesame, rapeseed, corn, olive, almond)

Invisible: many processed foods, ready meals + take away foods

Amount needed for different life stages

The amount needed is calculated as a percentage of our total daily energy intake. The recommended healthy adult amount is:

Type of fat	% of food energy every day
Total fat of which:	No more that 35%
Saturated fatty acids	11%
Monounsaturated fatty acids	13%
Polyunsaturated fatty acids	6.5%
Trans fatty acids	No more than 2%



Key Words

Photosynthesis: The process by which green plants trap energy from the sun and form carbohydrates

Sugars: a group of carbohydrates that taste sweet

Monosaccharides: a group of sugars made up of one sugar molecule

Disaccharides: a group of sugars made up of two sugar molecules

Polysaccharides: (Complex carbohydrates): a group of carbohydrates made up of many sugar molecules joined together but do not taste sweet

Glucose: the carbohydrate the body uses for energy production during respiration

Non starch polysaccharide: also known as dietary fibre. Bulks to the digestive system so that waste food moves along and is removed easily

Insoluble fibre: dietary fibre which helps prevent constipation

Soluble fibre: dietary fibre which helps reduce cholesterol

Effects of excess: If the diet has more energy (carbs) than it needs, the body converts and stores as fat. A contributory factor to CHD.

- Dental caries – particularly with younger age groups whose teeth are forming.
- Possibility of depression in adults: sugar causes a feel good chemical to be released by brain and quick bursts of energy. When blood sugar lowers can lead to depression.
- High sugar levels can cause inflammation in the body and lead to rheumatoid arthritis in later life.
- High sugar levels can damage collagen and elastin fibres in the skin and cause premature ageing of the skin .
- Liver problems can be caused by high sugar levels. Resistance to insulin that controls and turns sugar in blood stream into energy can lead to type 2 diabetes.
- Extra insulin in the blood stream can affect the arteries causing them to thicken which can lead to heart disease, heart attacks and strokes.

Carbohydrate —as a macro nutrient 1.1.3

What they are and what they are made of:

- A macronutrient found in plant foods. The process by which plants make carbohydrates is photosynthesis
 - Carbohydrates are classified into two main groups: sugars and complex carbohydrates
 - Sugars: a group of carbohydrates tasting sweet. Plants produce 2 types during photosynthesis:
 - Monosaccharides: one sugar molecule. Fructose, glucose, galactose
 - Disaccharides: two sugar molecules. Sucrose, maltose, lactose
- Complex carbohydrates: Do not taste sweet. Plants produce several types called **Polysaccharides:** Starch, pectin, dextrin, dietary fibre (also called non starch polysaccharide NSP) Also glycogen (made in mammals and humans) from the foods eaten.

Functions in the body (what they do in the body)

- Main energy source
- NSP (insoluble fibre) helps the body get rid of waste products: NSP helps to produce soft, bulky faeces (solid waste) which are easy to pass out of our body when we go to the toilet. Keeps digestive system healthy; controls weight; helps us feel fuller for longer. Soluble fibre (oats, nuts, peas, beans, lentils, prunes, bananas, pears, sweet potatoes + carrots slows down digestion and absorption of carbs. So helps to control blood sugar levels, which helps you stop feeling hungry. Could help reduce cholesterol levels.

Effects of deficiency: This is rare in the U.K.

- Lack of weight, tiredness
- Severe weakness

Sources:

Sugar: monosaccharides

Glucose: ripe fruit + veg. Available in drinks, tablets + powders.

Fructose: fruits, veg. + honey. Sweetener (HFCS) High Fructose Corn Syrup used as a sweetener in processed foods)

Galactose: milk from mammals.

Sugar: Disaccharides

Maltose: Cereals e.g. barley

Sucrose: extracted from sugar cane. AKA sugar.

Lactose: milk from mammals and products made from it e.g. yogurt, cheese

Complex carbohydrates:

Starch: cereals e.g. wheat, oats, barley + maize and cereal products e.g. breakfast cereals, pasta, bread); starchy veg. e.g. potatoes, yams, parsnip, peas + butternut squash

NSP: wholegrain cereal + cereal products e.g. breakfast cereal + pasta. Veg. fruit, pulses

Pectin: some fruits e.g. oranges, apples, plums + apricots + some root veg. e.g. carrots

Amount needed for different life stages Is calculated as a percentage of total daily energy intake. Rather than by weight (except NSP). The energy value of carbohydrate is 3.75g/16kJ of energy.

From 2 years+ this is the recommended intake:

Type of carbohydrate	% of food energy per day
Total carbohydrate	50%
Free sugars	No more than 5% of total carb. intake. Meaning no more than: (tsp. = teaspoons) 19g/day (4 tsp.) free sugars children 4 – 6 years 24g/day (5 tsp) children 7 – 10 years 30g/day (6 tsp) for children 11 and adults
Non Starch Polysaccharide (NSP) dietary fibre	Adults: at least 30g each day Children: each day 2 – 5: 15g 5 – 11: 20g 11 – 16: 25g 16 – 18: 30g

Watch out for: Hidden sugars mainly in processed foods: Look for these names – Molasses, Glucose syrup, Glucose-fructose syrup, treacle, maltose, fructose, sugar cane, sucrose, granulated sugar.



