



Nutrition

Exploring Nutrients

Lesson 1

Understand the effects that macronutrients and micronutrients have on the body.





Learning objectives

- State the function of nutrients
- Classify the types of nutrients
- Describe the classification of carbohydrate by structure and by dietary purposes
- Recognise the functions of carbohydrates in the diet
- Explain the functions of proteins in the diet
- List the essential amino acids required for adults and children
- State the different groups of fatty acids based on their structure
- Identify the functions of fats in the diet





Learning objectives

- Recognise the water soluble and fat soluble vitamins and what foods contain them
- Describe the functions of water soluble and fat soluble vitamins
- Explain the deficiency and toxicity effects of water soluble and fat soluble vitamins
- Define the functions of minerals in the diet
- Identify the deficiency and toxicity effects of minerals on the body
- List various foods containing the different minerals in the diet
- Summarise occasions when supplements are required





The body gets the nutrients it needs from food eaten, that is why it is important to eat the right types of food in the right quantities.





Nutrients are used by the body for growth, energy, development, upkeep of the body, to prevent deficiencies and disease.





Food contains a range of nutrients not just one single nutrient.





There are two types of nutrients:

1. Macronutrients – carbohydrates, proteins and fats
2. Micronutrients – vitamins, minerals and trace elements





Macronutrients are required by the body in large amounts and micronutrients are only required in small amounts.





Carbohydrates
are made up of
carbon, hydrogen
and oxygen
compounds.





There are two main ways of classifying carbohydrates one is by their structure and the other is by their dietary purposes.





Classification by structure

- Monosaccharides – simple carbohydrates e.g. fructose, glucose and galactose
- Disaccharides – two monosaccharide molecules without the water molecule e.g. lactose, sucrose and maltose
- Oligosaccharides – long carbon chain lengths between 3 and 10 carbon molecules
- Polysaccharides – are lot's of monosaccharide molecules joined e.g. glycogen, starch, pectin and cellulose





Classification by structure:

- Sugars
- Complex carbohydrates





Sugars can be classed as intrinsic sugars or extrinsic sugars. Intrinsic sugars are within the cells structure of the food e.g. fruit. Extrinsic sugars are not within the cells structure e.g. lactose in milk or table sugar and honey which are called non-milk extrinsic sugars.





Complex carbohydrates are classed as starch or dietary fibre.



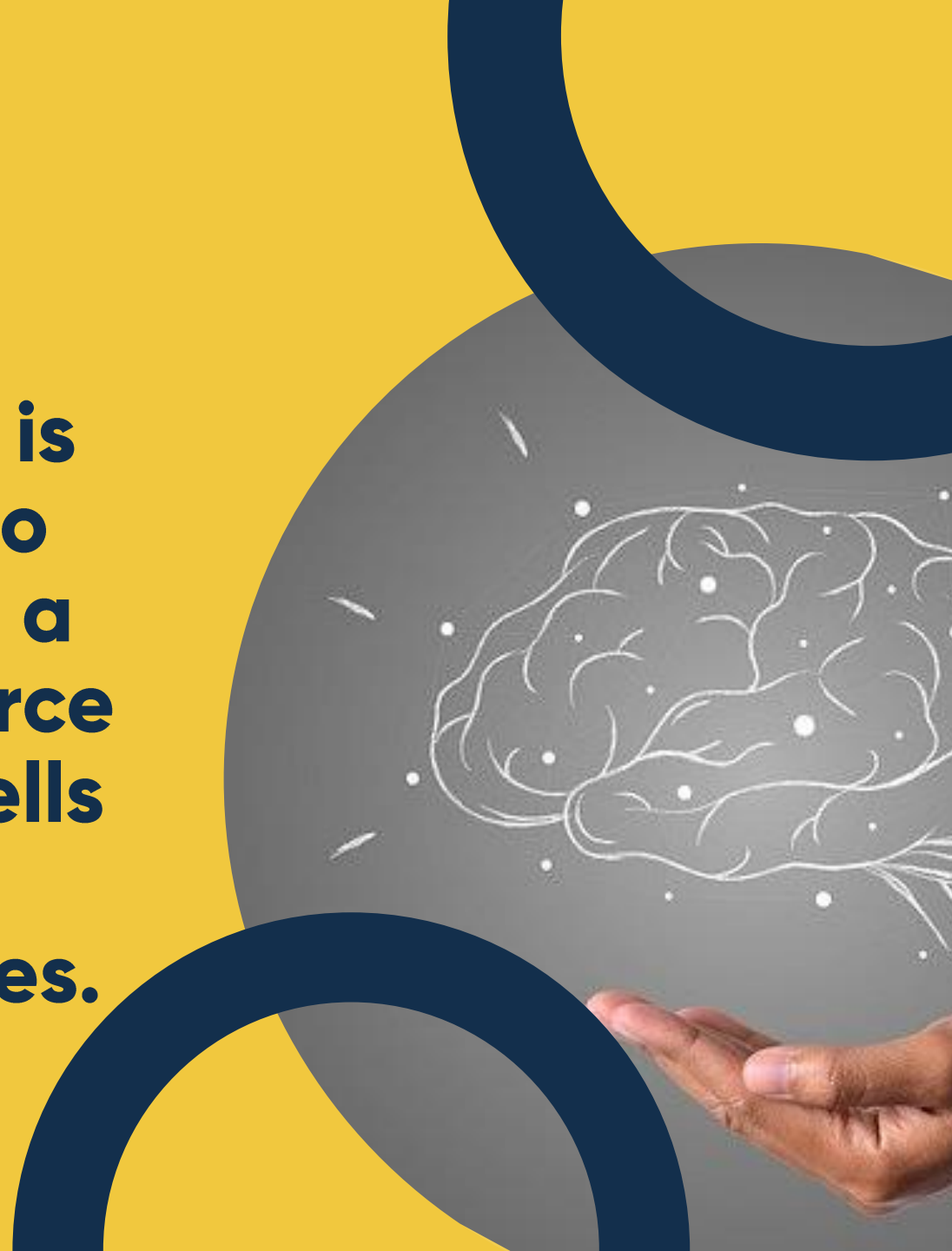


Starchy carbohydrates are found in foods such as bread, potatoes, pasta and rice.





When the body digests starch it is broken down into glucose which is a vital energy source for the bodies cells especially the brain and muscles.





Some starchy foods can also contain fibre these are the best types of starchy carbohydrates to consume:

- Wholemeal bread
- Wholewheat pasta
- Brown rice
- Potatoes with skins





Foods containing dietary fibre are cereals, oats, beans, lentils, bread, fruit and vegetables.





Dietary fibre is sometimes called 'roughage' it is not fully broken down by enzymes in the body. It can help bulk faeces and reduce the chances of constipation if consumed with plenty of fluids e.g. water. Some fibres can also help to produce a healthy gut microflora.





The main function of carbohydrates is to provide the body with energy. Starch or sugar carbohydrate provides the body with 3.75 kcals (sometimes rounded up to 4kcals) of energy per gram.





Carbohydrates can also provide the body with glucose. Proteins also provide glucose so if less carbohydrates are consumed then the body uses protein for glucose and the body is depleted or protein used for growth and repair of the bodies. So carbohydrates can have a protein-sparing function.





Consuming carbohydrates regularly can cause dental caries. When they are eaten it triggers the bacteria in the mouth to produce acid. The acid then attacks the enamel of the tooth and can create a cavity.





Sugar consumption is the biggest problem with dental caries and should not be eaten frequently. Regular brushing of the teeth with a fluoride toothpaste is essential to preventing dental caries.





The body breaks down carbohydrates into glucose so eating carbohydrates can make blood sugar levels increase. Therefore people with diabetes should monitor their carbohydrate intake.





Some dietary fibre can help to decrease cholesterol levels in the blood so can help keep the heart healthy reducing the risk of cardiovascular disease. Fruits, grains and oats help to decrease low density lipoprotein (LDL) cholesterol.





Lower incidences of bowel cancer are linked to high fibre diets.





Foods high in fibre help the body to feel fuller and reduce hunger. This can help to prevent excess weight gain.





Protein in the diet is very important for the growth, repair and maintenance of the body. All tissues and cells in the body contain protein.





Approximately 10 to 15% of the bodies dietary energy comes from proteins. 4 kcals of energy is provided by 1 gram of protein.





Proteins are made up of long chains of amino acids. There are 20 different amino acids most commonly found in both animal and plant proteins.





Some amino acids are essential and some are non-essential.

Essential amino acids are not produced by the body and must come from the diet.

Non-essential amino acids are produced by the body.





Essential amino acids for adults are:

- Isoleucine
- Leucine
- Valine
- Threonine
- Methionine
- Phenylalanine
- Tryptophan
- Lysine





Essential amino acids for children are:

- **All of the adult essential amino acids**
- **Histidine**
- **Arginine**
- **Cysteine**
- **Glycine**
- **Glutamine**
- **Tyrosine**
- **Proline**





**Certain diseases
can make the body
require a dietary
intake of specific
amino acids which
were not
considered to be
essential.**



**A process called
transamination
allows amino acids
to be converted by
the body into other
amino acids (non-
essential).**



Proteins in the diet can come from either animal cells or plant cells.





Animal proteins contain all of the essential amino acids required by the body. Animal proteins are eggs, meat, fish and dairy products.





Plant proteins on their own do not contain all the essential amino acids but a combination of different plant proteins can provide them all. Plant proteins are seeds, nuts, soya and pulses.





Foods high in protein can make the body feel fuller than food high in fats or carbohydrates. This can help with reducing the risk of weight gain by decreasing the energy intake.





Fats also known as lipids are made up of fatty acids and glycerol.





Some fatty acids are essential for the body but only in small amounts.





There are 3 groups of fatty acids based on their structure:

- Saturated
- Monounsaturated
- Polyunsaturated





Saturated fats are not good for the body they can cause cholesterol to build up in arteries leading to heart disease. Examples of saturated fats in the diet are butter and fatty cuts of meat.





Monounsaturated and polyunsaturated fats are good for the body when consumed in the right amount. They can help to reduce the risk of heart disease by reducing cholesterol in the body. Examples of unsaturated fats are olive oil, almonds, sunflower oil, fish and sesame seeds.





Polyunsaturated fats can also be categorised as omega-3 fatty acids or omega-6 fatty acids. These are essential for healthy brain function. Omega-3 fatty acids are found in fish such as salmon and herring. Omega-6 fatty acids are found in grapeseed oil and sunflower oil.





Fatty acids can be made by the body apart from omega-3 and omega-6 these are known as essential fatty acids and must be consumed in the diet.



Trans fatty acids are an exception to these groups of fatty acids because although they are the same chemical structure as a unsaturated fat they actually have an effect on the body the same as a saturated fat. Examples of foods containing trans fatty acids are doughnuts, pies and cakes.





**Fat can be a source
of energy for the
body 1 gram of fat
gives 9 kcals of
energy.**





Due to fat containing a lot of kcals per gram it is important not to consume too much as this could lead to weight gain and obesity.





**Fat-soluble
vitamins A, D, E
and K are carried
in the body by
fat.**





The essential fatty acids (omega-3 and omega-6) and fatty acids which have been synthesised from them and made into phospholipids within the bodies cells. This is very important in cell membrane formation especially with nerve tissue.





Essential fatty acids also play a role inside cells by controlling biochemical reactions when they are converted to prostaglandins and other compounds.



Revision Activity 1

List two essential amino acids for adults?