Water

Key Words

Hydrated: the body has enough water

Dehydrated: the body does not have enough water

Functions in the body:

- All cells, bodily fluids (e.g. saliva, blood, urine, digestive juices) and body tissues contain water
- Controls body temperature.
- Needed for chemical reactions in body.
- Keeps skin moist and healthy
- Removes waste products from body.

Sources:

- Drinking water (tap water).
- Naturally found in many foods (e.g. milk, milk products, fruit, vegetables, meat, fish, eggs).
- Added to many foods during preparation, cooking and processing(e.g. soup, sauces, pastries, breads, boiled rice, pasta, beans, pulses etc.).

Effects of excess:

- Substances in the blood become over-diluted.
- Vital organs in the body start to fail, e.g. heart, kidneys.
- May cause death.

Effects of deficiency:

- Thirst—the brain detects when the body is thirsty + sends a message to the mouth
- Headache—blood pressure is concentrated so as it passes through the brain results in a headache
- Dehydration – urine becomes very dark. Should be very pale yellow in colour
- Feeling weak and sick as the body's normal chemical reactions are affected
- Body overheats as it cannot cool itself down
- Confusion as dehydration affects how the brain works
- Blood pressure and heart rate change as volume of blood is reduced

Amount needed for different life stages

In the U.K it is recommended people drink 1—2 litres of water or other fluids a day (6—8 medium glasses) but needs to be increased in hot weather or if a lot of physical exercise takes place.

The Eatwell Guide limits fruit juice and/or smoothies to a total of 150ml per day. This is because they are both high in sugar and acids. The sugar is 'free' sugar because it has been released from the fruit during processing and can be concentrated. This is not good for the teeth meaning the enamel can be damaged by bacteria in the mouth producing acids from the sugar and acids in the fruit. If you drink more than 150ml you would also be getting more sugar than is recommended.

Bottled or tap water. Which source is better for environmental sustainability?

- Bottled water is sold in plastic bottles. These use a lot of energy and non-renewable resource (oil to make plastics) and they are bad for the environment because they have to be disposed of, often in landfill sites. Some, but not all, of the plastics used are recyclable.
- Tap water has to be cleaned to make it safe to drink, which uses energy, but it does not have the same effects on environmental sustainability as the plastic bottles used for bottled water.

Ways to encourage young children to drink more water:

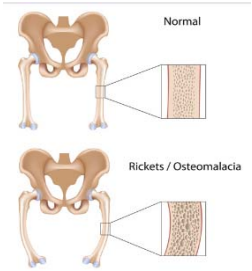
Provide more watery foods such as fruits, vegetables, salads.

- Add slices of fresh orange, lemon or lime, or fresh mint to tap water.
- Add fun-shaped ice cubes to tap water.
- Serve water with every meal as a regular habit.
- Adults should set an example and drink water with the child so it becomes normal behaviour.

Urine colour chart

Micronutrients needed in small amounts by the body

Minerals

Mineral	Functions	Sources	Deficiency and excess
Calcium	Strong bones and teeth; makes nerves and muscles work; helps blood clot after injury. 	Milk, cheese, yogurt, green leafy veg., canned fish with soft bones that are eaten e.g. salmon. Enriched soya drinks, wheat flour (added by law to plain white flour)	Rickets: caused by insufficient vitamin D in children meaning calcium cannot be absorbed Osteomalacia: adult form of rickets Peak bone mass: may not be reached. Osteoporosis: after peak bone mass is reached, bones naturally lose minerals and weaken. Minerals are not replaced and may become fragile and easily break. Excess: Too much salt leads to high blood pressure and cardiovascular disease.
Iron	Makes haemoglobin in red blood cells to carry oxygen to produce energy in body cells. 	Red meat, kidneys, liver, wholemeal bread added by law to wheat flour (except wholemeal), green leafy veg. e.g. watercress, spinach, cabbage), egg yolk, dried apricots, lentils, cocoa, plain chocolate, curry powder, fortified breakfast cereals.	Iron deficiency anaemia; tiredness, lack of energy, weakness, pale skin complexion, weak and spilt nails. Excess: Poisonous if too much taken e.g. in supplements.
Sodium	Controls water in body, nerves and muscles.	Salt (sodium chloride), salted foods, cheese, yeast extract, stock cubes, gravy, and seasonings, snack foods e.g. crisps, canned fish, bacon ham, dried fish, soy sauce, salted butter, fast foods, many ready meals and take away. Baking powder used in baked goods.	Muscle cramps. **Excess:** high blood pressure which can put a strain on the heart + kidneys which affects how efficiently they work 
Fluoride	Strengthens tooth enamel and bones.	Seafood, fish, tea and some water supplies.	Weak enamel – more chance of tooth decay. Excess: May lead to discoloured teeth.
Iodine	Produces thyroxin in thyroid gland to control metabolic rate of body.	Seafood, vegetables and dairy foods.	Swelling in neck (goitre).
Phosphorus	With calcium for strong bones and teeth; energy release; makes cell membranes especially in the brain.	Wide range of foods. 	This is rare. 

Key words:

Peak bone mass: the age at which the bones should contain the maximum amount of minerals and are at their strongest and most dense (30—35 years old)

Amounts needed for different life stages:

Teenage girls and women: need iron and vitamin C to replace iron lost in menstruation.

Boys and girls still growing: need calcium and vitamin D to enable bone growth and bone density to occur

Salt intake:

People should eat no more than 6g of salt each day. There is a concern about the amount consumed because:

• Too much sodium causes a rise in blood pressure which can lead to hypertension. • Hypertension can lead to a risk of CVD, blood clots and strokes. •Salt is added to many foods, e.g. cheese and salt fish, to preserve. Added as a flavouring in foods such as fried snacks, crisps, chips, ready meals. • Sodium also found in baking powder (sodium bicarbonate) and monosodium glutamate, which is used as a flavour enhancer in many processed and fast foods.• Because it is in so many different foods, it is easy to eat more salt (sodium) than people realise.

Protein—as a macro nutrient

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.

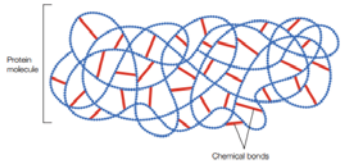
All **teenagers** need protein for growth, repair of body and energy. • Hormones (for growth and reproduction), enzymes and antibodies (to fight infection) are made from protein – teenagers need more of these as their body changes from a child to an adult. • Muscles made of protein – males are usually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

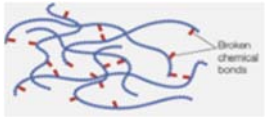
Protein—The functional and chemical properties

Key words:
Amino acids: individual building block for protein molecules
Chemical bonds: bonds that hold large protein molecules together in compact, folded bundles
Denaturation: the chemical bonds have broken and the protein molecule has unfolded and changed shape
Coagulation: the joining together of lots of denatured protein molecules, which changes the appearance and texture of the food
Gluten: a protein that is formed from two separate proteins called glutenin and gliadin when liquid is added to flour to make a dough

Chemical structure: • Protein molecules are very big. • Made up of long chains of amino acids and formed into long bundles held together with chemical bonds.

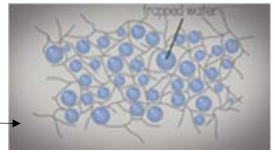


Denaturation: Protein molecules can easily be denatured. This means that the chemical bonds holding the protein molecule bundle together can be broken, which makes the protein molecule bundle unfold and change shape like this: These can be broken by:



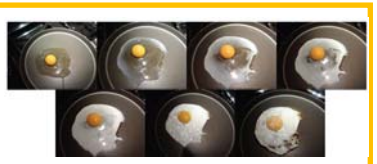
• Heating e.g. frying an egg
• Mechanical agitation e.g. whisking egg whites for meringue. This happens because egg-white protein can stretch and hold approximately 7 times its own volume of air when whisked. Whisking produces a gas-in-liquid foam, which becomes more stable as sugar is added. When baked, the proteins denature and water from them is driven out so the foam sets.
• Adding acid e.g. lemon juice/tomato juice added to raw meat to tenderise (marinate it) Lemons contain acids. Acids • •Adding acid e.g. lemon juice to milk proteins: the acids denature proteins in the condensed milk and cream and make them coagulate, which thickens and sets the mixture.
• Air bubbles e.g. formed in meringue
• Salt, for example, adding salt to poached eggs.

Coagulation →



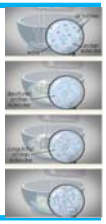
Coagulation:
• Denatured protein molecules unfold and start to join other denatured protein molecules nearby until they form a large mass. The denatured protein molecules are larger and take up more space than they used to. Because of this, they knock into other denatured protein molecules and start to join together in large groups – this is called coagulation.
• As protein foods are prepared and cooked, they change texture + become more **solid** (set) e.g. meat, fish, and eggs.
•Denatured protein molecules unfold and join up with other ones to form big groups – they **coagulate**
• As they coagulate, they trap air and water and this changes the colour, texture and flavour of the food.

Eggs

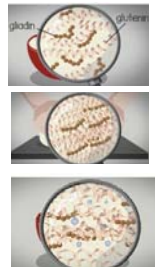


• The egg white change from transparent to opaque white and the whole egg has changed from a liquid food to a solid food when heated. • Egg white proteins begin to coagulate at 60°C; the egg yolk coagulates at 70°C. • Due to their ability to coagulate, the proteins in eggs are used in some recipes to hold and bind together other ingredients, for example, vegetables in a quiche flan, a breadcrumb or batter coating on the outside of some fried fish, the ingredients of a fish cake or beef burger. • If a food containing protein is overcooked, the coagulated protein molecules tighten up and squeeze out the water they were holding. This is called syneresis and is why overcooked meat or fish is dry and chewy, and why overcooked scrambled egg becomes rubbery and watery.

How foams are formed: Egg-white protein can stretch and hold approximately 7 times its own volume of air when whisked. The action of whisking denatures the protein. Whisking produces a gas-in-liquid foam, which becomes more stable as sugar is added. The denatured proteins coagulate and surround air bubble. When baked, the proteins denature and water from them is driven out so the foam sets



How gluten is formed: Gluten (in wheat flour) gives the right texture for bread making. **Gluten** is a protein that is formed from two separate proteins called glutenin and gliadin when liquid is added to make a dough. A gluten network is formed. The dough is kneaded and gluten gives bread dough elasticity = shrinking back when you stop stretching and shaping. This is because, long gluten molecules are coiled and bend in different places along their length. The gluten stretches and traps CO2 bubbles produced by yeast and then sets (or coagulates) when baked.



Fault finding:

Scrambled egg has become rubbery and watery: Egg contains protein and water. If cooked at too high a temperature or too quickly, the proteins will denature and coagulate too quickly so that instead of trapping the water molecules, they will squeeze the water out, and the coagulated protein will become tough and rubbery in texture.

Grilled meat is hard and dry: • The meat contains protein in the form of muscle fibres. It contains fat and water. If grilled at too high a temperature, or too close to grill elements or flames, or for too long, the proteins will denature and coagulate very quickly. The coagulated protein molecules will tighten up and the water will be squeezed out as this happens. If too much is lost through evaporation, the meat will become dry and the tightened protein will make the meat hard.

Cooking Food

Key words:
Conduction: transferring heat through a solid object into food
Convection: transferring heat through a liquid or air into food
Radiation: transferring heat by infra-red waves which heat up what they come into contact with food

Conduction:
Atoms in metal pans and baking trays start vibrating as heat energy from cooker goes into metal. Vibrations transfer heat energy to other metal atoms. Metal gradually heats up and passes heat energy to food. Metals are good conductors of heat .

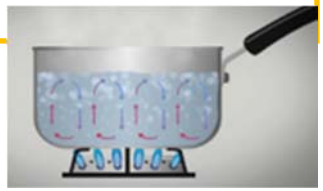
Convection
When a pan of water is heated, heat is conducted through the metal pan to water molecules. These move upwards then downwards in circular motion (convection currents) taking heat energy with them and passing it into the food. The more heat energy, the faster the water molecules move in circular convection currents. Also happens in oven with hot air currents. Gas oven/ordinary electric oven have zones of heat: hotter at top than bottom shelf due to convection. Electric fan ovens – heat evenly distributed by fan – same temperature on each shelf.

Radiation
Grilled/barbecued food heated by radiant heat. Infrared heat rays heat the surface of the food and are absorbed. Food must be no more than 3.5cm

Why is food cooked?
• **To make food safe to eat** – Some foods must be thoroughly cooked to destroy the food poisoning bacteria they could contain. – Some foods contain natural toxins (poisons) which would be harmful if the food was eaten raw e.g. raw red kidney beans. Cooking destroys the toxins and makes the food safe to eat.
• **To** develop flavours in the food – Cooking develops flavour by causing chemical reactions to take place in the food e.g. gelatinisation. – Cooking concentrates and intensifies flavour by causing water to evaporate
To improve the texture and appearance of food, and make it easier to eat, swallow and digest. Cooking causes starch granules to swell, gelatinise and thicken or soften a food . Cooking softens the structure of the cells in vegetables to make them less bulky and easier to eat – Cooking tenderises meat. This means the cooking process softens the meat so that it is easy to chew and digest.
• **To improve the shelf life** of food – Cooking destroys harmful micro-organisms such as bacteria and moulds, which preserves the food (makes the food last longer)
•**To** give **people a variety of foods in their diet** – Foods can be cooked in different ways to give variety, for example, potatoes

Dry heat	Moist (in liquid)	In oil
Baking in oven	Boiling: Cooking food in water at 100°C	Roasting: In oven in hot fat
Grilling/toasting	Simmering: Cooking food in small quantities of liquid at just under boiling point.	Sautéing: Pan frying in hot fat
Dry frying in no added oil	Stewing: slow-cooking on hob or in slow-cooker with liquid	Stir frying in little fat over high heat
	Poaching: Cooking in water	Deep fat frying
	Steaming: Cooking food	Shallow frying: Frying in a small amount of oil
	Braising: Slow-cooking **pre-sealed** meat + veg. in oven with liquid	
Other		
Induction cooking	Micro waving	

Heat Insulators
These are used to protect us from burning ourselves when cooking. E.g.
• Pan handles are plastic or wood making them comfortable to hold
• Hollowed metal pan handles allow the air to protect them from becoming too hot
• Wooden and silicone utensils protect us.
•Use insulated pan stands made from wood, cork, ceramics or metal to protect work surfaces
•Wearing oven gloves because these are made of thick, insulating material so the hands are protected from the heat



Retaining water soluble vitamins: B and C
• Do not prepare veg too far in advance; vitamin C will be exposed to oxygen and lost when it is cut or peeled. • Put veg. into a small amount of boiling water so they cook quickly; vitamin C and B vitamins will be lost in the water. • Cook all veg. for the minimum amount of time to minimise the damage by heat to vitamin C and B vitamins. • Steaming veg will reduce the loss of vitamin C and B vitamins to cooking water. • Serve the vegetable cooking water in the gravy to conserve some of the vitamins that have gone into it. • Do not prepare fruit too far in advance, to preserve the vitamin C. Add lemon juice to prevent enzymic browning and add acid to help stabilise vitamin C (ascorbic acid). • Keep the fruit cold and in a box to minimise its exposure to oxygen and conserve the vitamin C

Energy Needs

Key Words

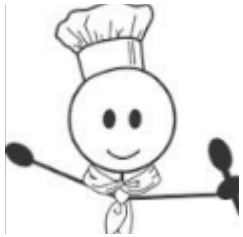
BMR: Basal Metabolic Rate is the amount of energy we need to keep our body alive.

Energy balance: the amount of energy we get from food each day is the same as the amount of energy we use each day.

Energy dense: foods . containing high amounts of fat and carbohydrates (especially sugar) e.g. pizza, pastry, chocolate bars, pastries, cakes, cookies, meat products i.e. sausages, burgers salami).

Kilocalorie (kcal)/ kilojoule (Kj): units used to measure energy.

PAL (Physical Activity Level): the amount of energy we use for movement and physical activity every day.



Functions in the body.

- Everyone needs energy to survive. It allows the body to:
- Move muscles and be physically active
- Produce heat to keep warm
- Send messages to the brain to make nerves work
- Allow the body to grow and develop
- Produce sound when using the voice

Sources:

Carbohydrate: foods containing sugar and starch (1g of pure carbohydrates = 3.75 kcals/16kJ of energy)
Fat: foods containing visible and invisible fats and oils. (1g of pure fat = 9 kcals37kJ of energy)
Protein: (1g of pure protein = 9 kcals/37kJ of energy)
Alcohol: many people drink alcohol in beer, cider, wines and spirits. (1g of pure alcohol = 7 kcals/29kJ of energy)

Effects of deficiency

The body will lose weight because if there is not enough energy to meet the needs of the body, the fat stores will be used over time gradually reducing them.

Effects of excess in the diet:
Energy not used will be stored in the fats cells for future use. If too much energy is stored as fat = obesity.

Amount needed for different life stages:

This depends on the amount of energy used every day. Three factors influence this:
- Physical Activity Level (PAL).
- Basal metabolic Rate (BMR).
- **Life stage** e.g., young children need extra energy due to their growth rate, energy used and small appetites.

Depending on a person's lifestyle and age, 40 to 70% of the energy needed is for their BMR. The BMR is different for different people due to their:
Age: Adults have higher rates than children. BMR deceases with age.
Body size: As the body grows their BMR increases due to the amount needed to move.

Energy Balance

The amount of energy we take in from food **must** be used up by our Basal Metabolic Rate and Physical Activity Level.
If we take in **more energy** from the food we use every day , the energy we do not use will be stored as fat and the body will **gain weight**.
If we take in **less energy** from food than we use every day, the energy stored in body fat will need to be used and the body will gradually lose weight. This is the basis of weight reducing diets.

Amount of energy needed daily by each nutrient:

Carbohydrate: 50%. **Most of which** should come from starch, intrinsic and milk sugars.

No more than 5% of the energy from carbohydrate should come from free sugars, intrinsic sugar found in fruit and vegetables.

Fat: 35% or less
Protein: 15%

Physical Activity Level:

Regular exercise is an important part of a healthy lifestyle. Physical activity :
- Reduces risk of developing heart disease, obesity and some cancers.
- Improves health of muscles and skeleton
- Keeps the brain alert and working
- Makes people feel good about themselves.
- Health experts are concerned about the **sedentary** (inactive) lifestyles due to too much sitting for long periods of time e.g. working at a desk, watching television, using the internet or playing computer games.

The recommended physical activity needed daily is suggested to be:
- Under 5 years: A minimum of 3 hours of physical activity spread over the day
- 5—18 years: Up to 60 minutes for several hours a day
- 19—64 years: 30 minutes on at least 5 days a week, for a minimum of 10 minutes at a time.

Fat —as a macro nutrient

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

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

- Provides an energy store (in the adipose tissue under the skin)
- Insulates to keep the body warm
- Protects bones and kidneys from damage providing a cushion layer
- Provide fat soluble vitamins A, D, E and K.

Similarities and differences between a fat and an oil

- **Similarities**: – Both: are made of triglyceride molecules: 3 fatty acids + 1 glycerol. Have exactly the same energy value: 9kcal/37kJ per gram. Are made of a mixture of fatty acids.

- **Differences**: Fat is solid at room (ambient) temperature/oil is liquid. Fats can be spread (they are plastic), creamed, rubbed in/oils are poured. Fats contain a lot of saturated fatty acids/ oils contain a lot of monounsaturated and polyunsaturated fatty acids.

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, dougnuts 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

What are 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

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

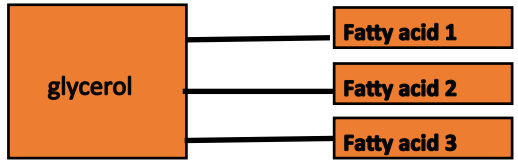
Essential fatty acids: when we eat food, our body breaks up (digests) the fat molecules they contain to make new fatty acids and fat molecules for our body to use. The two essential fatty acids needed by adults and children that cannot be made by the body and have to be eaten in the form of food are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

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
- 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

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)

Chemical structure of fats:



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%

Fats —Functional and chemical properties

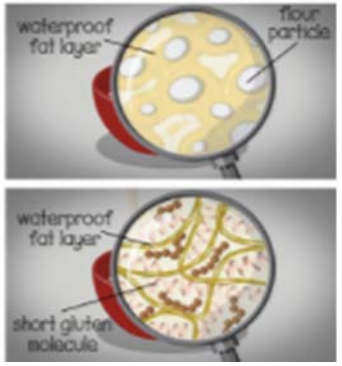
Remember: All fats and oils are all made of triglycerides – three fatty acids and one part glycerol.

Key words:

Aeration: fat can trap lots of air bubbles when beaten together with sugar e.g. cakes
Emulsification: Prevents oil in water or water in oil colloidal structures from separating out due to its hydrophilic and hydrophobic ability.
Plasticity: fat can be softened over a range of different temperatures so that it can be shaped and spread with light pressure
Shortening: fats shorten the length of the gluten molecules in pastries and cookies making a 'melt in the mouth texture'

Plasticity:
Fat can be spread on bread and crackers due to the plasticity of the fat. Plasticity means: the ability to be shaped and spread with light pressure. The plasticity of fats is due to their chemical structure. All fats are a mixture of triglycerides, containing different fatty acids. The triglycerides all have different melting temperatures. This is why fat will soften and melt over a range of temperatures, for example, chilled butter is very hard and so difficult to spread. When chilled the butter has little plasticity. At room temperature, the butter softens and becomes more plastic and which means it can spread easily. Saturated fats, such as butter, ghee and solid coconut oil tend to be more solid at room temperature and so have less plasticity. The more unsaturated fatty acids a fat contains the less solid it is and the more plasticity it has. Some vegetable fat spreads are made using triglycerides with a low melting temperature, which means we can spread them as soon as they come out of the refrigerator. A recipe that demonstrates plasticity is chocolate mousse, made with butter and plain chocolate.

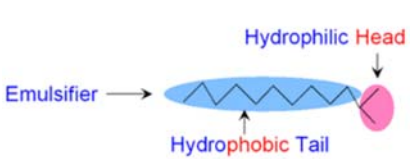
Shortening:
Shortcrust pastry, shortbread and biscuits rely on fat to give them their characteristic crumbly texture. The fat coats the flour particles and prevents them from absorbing water giving them a waterproof layer. This reduces the formation of gluten development, which would cause the dough to become elastic. When water is added, the gluten strands can only form short lengths because of the waterproofing of the fat. The texture of pastry and rubbed in biscuit mixtures is therefore 'short' and tender. When rolled, the pastry does not spring back like a bread dough does due to the **short gluten molecules.**

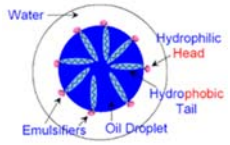


Fats such as pure vegetable fats are suitable for shortening because of their low water content. There are distinctive colours associated with the type of fat used, for example, butter produces a golden colour. Fats are also best used chilled because butter will soften in warm conditions due to plasticity. If it is too warm, it will quickly become oily when rubbed in and the pastry will be hard to handle. If it is chilled, it can be rubbed in more effectively.

Emulsification:
Food products e.g. mayonnaise, milk, butter and Hollandaise sauce are emulsions of either oil-in-water or water-in-oil.

- Oil and water will not mix together permanently. If shaken together the oil will eventually rise to the top (less dense)
- Oil and water can be made to mix together by adding an emulsifier. The emulsifier used in mayonnaise is called lecithin, which is found in egg yolk.
- Emulsifiers are molecules with two ends. One end is attracted to water (it is hydrophilic) and the other end is attracted to oil (it is hydrophobic – it doesn't 'like' water).
- When an emulsifier is added to a mixture of oil and water, its molecules arrange themselves so that they prevent the oil and water from separating. The mixture is now an **emulsion.** This is why mayonnaise does not separate when it is stored.





Aeration:

- Fats such as butter and vegetable fat spreads are able to trap air bubbles when they are beaten together with sugar for a cake mixture.
- They can do this because they have plasticity, which means they can be beaten, spread and mixed easily with a wooden spoon or whisk.
- Cooking oils do not trap air as effectively.

Mixing fat and sugar together is called **creaming** because, as the air bubbles are trapped, the mixture becomes lighter in colour and texture and its volume increases.

- The ability of the fats to aerate the mixture in this way is really important for producing a light, spongy texture in the baked cake
- Raw cake mixture consists of flour, fat, protein, sugar crystals and water (from egg white). These are interspersed with trapped air bubble, egg protein molecules (which are in tight coils) and starch granules (in the flour). As the mixture bakes, the fat melts; sugar crystals dissolve; egg protein molecules uncurl; as the y star to coagulate; starch granules in the flour swell and absorb melted fat and water from eggs; baking powder releases CO_2; the air and CO_2 bubbles expand with heat causing mixture to rise up and outwards. The mixture sets **as** the egg proteins become solid **(coagulate)** and the starch granules completely expand as it sets and the gases escape from the mixture**.**

Nutritional Information and Data

Key Words

Nutrition Profile: the type and amount of different nutrients a food product contains.
Nutritional requirement: The amount of each nutrient needed daily for individuals and different life stages
Nutritional analysis: finding out how much of each nutrient is in a portion of food (e.g. 100g), or a whole recipe, or a food product you make or buy.

Dietary Reference Value: The amount of a nutrient that is enough to ensure that the needs of nearly all the adult population (97.5%) are being met. By definition, many within the group will need less.

GDA (Guideline Daily Amounts): guide to the amounts of calories (kcal/Kj) sugar, fat, saturated fat and salt an average adult should aim to eat (and not exceed) to have a healthy, balanced diet).

What are nutritional requirements?
People need many different nutrients if they are to maintain health and reduce the risk of diet-related diseases. These are different for each nutrient and also vary between individuals and life stages, e.g. women of childbearing age need more iron than men.

Why do nutritional requirements vary?
Each nutrient has a particular series of functions in the body and some nutrients are needed in larger quantities than others. For example, protein is needed in gram (g) quantities. Vitamin C is needed in milligram (mg) quantities (1/1000 gram) and vitamin B_{12} is needed in microgram (µg) quantities (1/1000000 gram). Individual requirements of each nutrient are related to a person's age, gender, level of physical activity and state of health. Also, some people absorb or utilise nutrients less efficiently than others and so will have higher than average nutritional requirements, e.g. among older people, vitamin B_{12} absorption can be relatively poor.

The food label must show **per 100g or 100ml** and **per serving.** Per 100g. This helps consumers work out the percentage of each nutrient for comparison with similar products of the **identical** weight or volume. The amount of nutrients **per portion** of the food product. This helps consumers understand how much energy and nutrients are supplied by a whole portion of the product.
How is nutritional information shown as a food label?

Nutrient	Per 100g	**Per serving (150 g)**
Energy	586kj/140 kcal	879kj/210kcal
Fat: Of which: Saturates Monounsaturates Polyunsaturates	1.5g 0.2g 0.9g 0.4g	2.25g 0.3g 1.35g 0.6g
Carbohydrate Of which: Sugars Starch Fibre	50.0g 2.5g 42.0g 5.5g	75.0g 3.25g 63.0g 8.25g
Protein	8.0g	12.0g
Salt	0.2g	0.3g

How to read and understand nutrition needs on a food label:
It is used to inform customers about the nutritional profile of a food product.
The nutrients that are required by law to be included are:
Energy value: kilojoules (kj) and kilocalories (kcal)
Protein grams (g)
Fat (total): (g)
Saturated fats: (g)
Carbohydrate (total: (g)
Sugars: (g)
Salt (**NOT**) **sodium** because the word salt is known to consumers (g)

Other nutrients that, if included, **must** be written in **100g/100ml serving (**this is **voluntary**):
Monounsaturated fats (monounsaturates) (g)
Polyunsaturated fats (polyunsaturates) (g)
Polyols (sugar free sweeteners): (g)
Starch: (g)
Fibre: (g)
Fibre: (g)
Any vitamin or mineral present in significant amounts: Micrograms (µg) or Milligrams (mg)

If a health claim is made about a food product e.g. '*This product is high in Iron'* the amount that is present must be shown near the nutritional value table

The **Food Standards Agency** have designed a simple visual way called the **Traffic Light Labelling System'** to enable consumers to identify if food products have high, medium or low amounts of fat, saturates, sugar or salt using the traffic light labelling system.
RED means that the food product contains a **HIGH** amount of fat, saturates, sugar or salt.
AMBER means that the food product contains a **MEDIUM** amount of fat, saturates, sugar or salt.
GREEN means that the food product contains a **LOW**
The colours explained when thinking about fat, saturated fat, sugars and **salt:**
Red = high danger level, poor choice for healthy eating, e.g. butter in fried products.
Amber = caution in quantities eaten e.g. sugar in fruit.
Green = free to go low levels. Healthiest choice, e.g. vegetables

For the average adult, this is the **Guideline** to **Daily Amounts** (**GDA**)

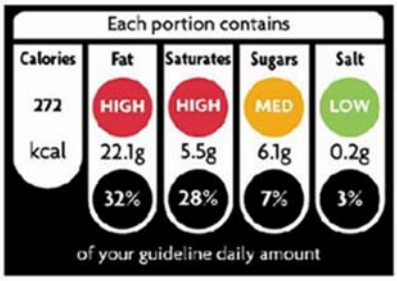
Nutritional Information and Data

Per 100g of food			
	Low	**Medium**	**High**
Fat	Less than 3g	3g - 20g	More than 20g
Saturated fat	Less than 1.5g	1.5g - 5g	More than 5g
Salt	Less than 0.3g	0.3g - 1.5g	More than 1.5g
Sugars	Less than 5g	5g - 15g	More than 15g

The traffic light labelling system helps the consumer with food choices because it:
*Increases consumer awareness of suitability of foods for them and their age, gender and Physical Activity Level (PAL).
*Allows consumer to make **informed** choices
*Allows consumer to make comparisons between products/work out health benefits of food products.
*Presents accurate up to date information on salt, fats, sugar content for their RNI (Reference Nutrient intake)
*The information is linked to the %GDA (guided daily amounts) the person is recommended to eat.
*Quickly identifies nutritional content levels of the food
*Instant, visual information allowing quick access to nutrient content especially for people who do not have English as a first language.
*Easy to read/interpret because it uses the traffic light colour where red is linked to stop or danger.

Consumers should aim for more green, less red and moderate amounts of amber foods.
Where red or amber are used, the consumer can adjust the other foods eaten in the day to balance out the ambers and reds.

So, why do the following appear on nutritional labels on food products:
The amount of different types of fat: So that consumers can manage their consumption of saturates (linked to CHD) and polyunsaturates.
The amount of sugars: So that consumers who are managing their intake of sugar for a kilocalorie reduced or diabetic diet can manage the amount of sugar per portion/100g or ml.
The amount of fibre: Consumers requiring a high or low fibre diet van see the amount they are consuming



Factors to consider when planning meals:
• Healthy eating: How to produce balanced meals which meet the dietary guidelines, for example, DRV or the Eatwell Guide for different life stages.
• Physical activity level (PAL): Whether physically active or mostly sedentary (inactive), which will affect how much energy different people need from food every day.
• Income/cost of food: How much families have to spend on food. Having a food budget will help families to plan meals.
• Eating habits: Meal times, eating with others or eating alone, snacking or grazing. Each family member's likes and dislikes for different foods.
• Celebration/occasion/religion: Different religious and cultural factors may affect what food is purchased, for example, Muslims buy halal meat.
• Preferences/enjoyment: The family's likes and dislikes will be important in what food should be purchased.
• Food availability/seasonality: Many families prefer to buy food in season – this can improve sensory characteristics and reduction in food miles.

Nutritional needs and health

Key Words

Diet: the food that you eat every day. There are also special diets (e.g. a low-fat diet, a calorie-controlled diet).

Healthy, balanced diet: contains the correct amounts of carbohydrates, fats, proteins, vitamins, minerals and water that people need for good health, to grow properly, be active and maintain a healthy body for their age, gender and PAL (physical Activity Level)

Lacto-vegetarian: does not eat meat, fish or eggs but will eat milk + milk products + eggs

Lacto-ovo-vegetarian: does not eat meat, fish but will eat milk, milk products + eggs

Dietary guidelines: The Eatwell Guide matches the Government's recommendations for a diet that would provide all the nutrients needed by a healthy adult or child (over the age of 5 years). The dietary guidelines are:

1 Base your meals on starchy foods.
2 Eat lots of fruit and vegetables.
3 Eat more fish – including a portion of oily fish each week.
4 Cut down on saturated fat and sugar.
5 Eat less salt – no more than 6g (1 level teaspoon) a day for adults.
6 Get active and maintain a healthy weight.
7 Don't get thirsty – drink plenty of water.
8 Don't skip breakfast.

When writing about a healthy, balanced diet: 1. Write out the definition. 2. Refer to Eatwell Guide. 3. Discuss the proportion of different food groups that should be eaten and why.

Breakfast is important:

- It replaces nutrients that have been used up during sleep.
- Helps discourage snacking on sweet, fatty and salty foods during the morning.
- Breakfast should provide slow-release energy and B group vitamins, which release the energy and make their muscles, nerves and brain function normally and aids concentration
- Provides minerals for growth (calcium/phosphorus) and iron for red blood cells (especially for females, due to menstrual losses of iron).

Potatoes, bread, rice, pasta and other starchy carbohydrates 38%

- About of all the food we eat should be from this group.
- If possible, choose wholegrain or higher-fibre versions, with less added fat, salt and sugar, because they contain more dietary fibre and nutrients and make us feel full for longer.

Fruit and vegetables 40%

- About of all the food we eat should be from this group.
- Eat at least five portions (fresh, canned or frozen) of a variety of fruit and vegetables every day.
- 1 portion = 80g, for example: – 1 apple, banana, orange or similar-sized fruit – 3 heaped tablespoons vegetables – a dessert-sized bowl of salad – a glass (150ml) fruit juice – counts as a maximum of one portion a day – 30g dried fruit – counts as a maximum of one portion a day.
- Does not include potatoes.

Dairy and alternatives 8%

- About of all the food we eat should be from this group.
- Eat 2–3 foods a day from this group, for example: a glass of milk (150ml), a small pot of yogurt, a piece of cheese about 25g, a small pot of fromage frais.
- Choose lower-fat and lower-sugar options, for example, 1% fat milk, reduced-fat cheese, natural or low-sugar yogurts.
- Alternatives include 'milks' and related products such as yogurts, made from soya beans, nuts, oats and rice.
- Try to choose unsweetened alternative milks that have been fortified with calcium.
- Provides calcium for healthy bones, teeth and nails

Beans, pulses, fish, eggs, meat and other proteins 12%

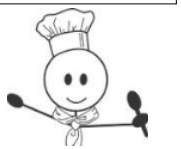
Eat more beans and pulses (peas and lentils).
Vegetable protein foods include tofu, tempeh, tetured vegetable protein and mycoprotein.
Eat two portions of sustainably sourced fish per week – one of which is oily.

- Eat less (no more than 70g a day) red and processed meat products (e.g. sausages, meat pies, cold meat, smoked and cured products such as bacon and salami), which can be high in fat, salt and food additives.

The Eatwell Guide also recommends • **sweet, salty and fatty foods** such as crisps, chips, cakes, biscuits, chocolate, ice cream, sauces should be eaten less often and in smaller amounts • people should drink 6–8 cups or glasses of fluid a day (water, lowerfat milk, sugar-free drinks, and unsweetened tea and coffee) • fruit juice and/or smoothies should be limited to 150ml a day • people should check the nutritional labels on packaged foods and choose foods lower in fat, salt and sugars.

Oils and spreads 1%

- Eat only small amounts of foods in this group.
- Choose unsaturated oils (such as olive oil, rapeseed oil, vegetable oil) and unsaturated vegetable fat spreads.



Planning balanced meals

Seasonal/local foods—are these available? What do they cost?

What is available in the shops to buy/markets where they live?

Cost of ingredients to make the food

Lifestyle—whether they are active/not active/a busy family etc.

Time available to buy, prepare and cook

Their likes + dislikes

Food allergies/intolerances

Health conditions that may limit what can be eaten

Things to take into account when planning meals for people at any life stage or with a specific dietary need

Religious, cultural dietary restrictions they need to follow

Type of meal to be eaten—everyday or special occasion meal etc.

Nutritional profile of the meal—does it meet dietary Guidelines?

Serving suitable portion sizes for their needs

Food portion size and costing:
When planning meals (especially for a large number of people (e.g. school or hospital meals), there are guidelines for how much of each different food type for an average size portion. www.healthyfood.co.uk. If portions are too big, they extend the stomach and it will mean that you may eat more than your body requires. If excess fat and carbohydrates are eaten this can lead to obesity which is a health problem that can lead to: CVD, CHD, Type 2 diabetes, hypertension + certain cancers. If all the food is not eaten this is waste and drains food resources and the waste

Key word:
Life stages: phases of development that people go through during their life, such as infancy (babyhood), childhood, adolescence (teenagers), adulthood and the elderly.

Food	Description	Weight of portion
Boiled rice	medium	180g
Mashed potato	1 scoopful	160g
Breakfast cereal	medium	30g
apple	medium	100g
mayonnaise	Heap dsp.	20g
Baked beans	medium	135g
Minced beef	medium	70g
chicken	medium	100g
White fish	Medium 150g	cheddar
3 tbsp., grated	25g	

Planning meals for different life stages and needs

You must be able to explain:

What are life stages?
Pre-school children (1–4 years)/children (5–12 years)/adolescents (teenagers)/adults/elderly adults

At each life stage:
What happens to their body/which nutrients are particularly important/what their best eating habits and lifestyle choices would be.

Special dietary needs:
Vegetarians/coeliacs (cannot eat gluten)/lactose intolerant.

Special diets:
High-fibre/low-sugar/fat-reduced/low-sodium (salt) diets.

How to modify a recipe, meal, diet to meet dietary guidelines:

Base your meals on starchy foods: use wholegrain (wholemeal) cereal foods; choose a variety of starchy foods; add seeds to soups, stews, breads, desserts, porridge; toast starchy foods to add texture and flavour; add toasted seeds, rice flour, semolina to baked foods to add texture; roast starchy foods to strengthen flavour; serve bread with meals; food in wraps e.g. tortillas, pittas; dry fry seeds + sprinkle onto foods.

Eat lots of fruit and vegetables: choose very fresh fruit and vegetables; locally produced and in season; add vegetables to main meals to increase the flavour, colour, texture; frozen fruit and vegetables are convenient + good; remove tough and inedible parts; garnish and decorate foods with fruit and vegetables.

Eat more fish: fresh, frozen, dried, canned can be used (dried and canned may be salty); choose sustainably sourced fish; high-risk food; food hygiene needs to be good when preparing fish; remove bones; flavour with lemon, lime, fresh herbs, fresh ginger, garlic; simple cooking method is best; often served with a sauce or dressing.

Eat less saturated fat and sugar: study food labels for invisible fat +sugar; eat fewer energy dense foods e.g. fried snacks, chocolate, biscuits, pastries, sweet fizzy drinks, sauces, salad dressings; eat more low-energy foods e.g. fruits and vegetables, wholemeal cereals; choose lean meat; cut down on meat products e.g. sausages, pies, cold meats; choose low-sugar and low-fat versions of products; reduce free (added) sugars; high-fat foods e.g. butter, cheese, lard, ghee; avoid frying food – grill, steam, or bake instead; use veg. oils rather than solid fats; cut sugar content down in recipes; trim fat from meat; avoid energy dense accompaniments, e.g. cream, ice cream, custard, sauces.

Eat less salt: read food labels for salt content; eat fewer salty snacks, e.g. crisps; eat fewer salty foods, e.g. cheese, canned or dried fish, processed meat products, e.g. smoked bacon and sausages, salted nuts, yeast extract; choose low-salt versions of food products; reduce or leave out salt from a recipe; reduce use of stock cubes; reduce consumption of ready meals and takeaway foods; use alternative flavours to salt, e.g. lime juice, ginger, spices, garlic, spring onion; serve foods with alternatives to salt, e.g. fresh herbs, chillies, orange or lemon zest.

Planning balanced meals for different life stages (1)

Pre-school children 1 – 4 years

The best eating habits and lifestyle choices:

*Regular meals + drinks
*Small portions
*Trying new foods regularly
*Eating fresh + raw foods as well as cooked
*Let children eat until they are full – don't expect them to finish everything

These choices are important because:
•body growth is rapid so all nutrients especially protein are essential.
•energy needs are high
•limiting free sugars limits tooth decay and putting on excess weight

Advice for Parents:
•Serve small portions
•Some foods may cause choking e.g. nuts
•Involve children in all aspects of eating e.g. shopping and meal preparation.
•The Eatwell guide does not apply to this age group.
•Encourage them to care for their teeth

Encourage:
*Drinking water + whole milk
*Sharing + enjoying food as a group
*Happy meal times
*Involving children in choosing, buying and preparing meals
*Tooth care – cleaning regularly and not eating/drinking too many sugary foods and drinks

Discourage: eating snacks between meals because this can lead to obesity, tooth decay and type 2 diabetes.

Children 5 – 12 years

The best eating habits and lifestyle choices:	This is important because:
*Regular meals + drinks – especially breakfast (wholegrain + fortified)	Energy needs are high The brain and body need to have a 'kick start' to the day. Fortified cereals have B vitamins (to release energy from foods); calcium (for strong teeth and bones) and wholegrain (for a healthy digestive system). Help to feel fuller for longer to avoid mid morning snacking.
*Following the Eatwell guide	Body growth and development is rapid so all nutrients especially protein are essential.
*Drinking water instead of sugary/fizzy drinks	Hydrates. Limiting free sugars limits tooth decay and putting on excess weight
*Continue to try new foods regularly	Extends acceptance of new foods and flavours
*Eating fresh + raw foods as well as cooked instead of too many ready prepared meals and fast foods	Fresh foods have antioxidants; provide different textures and help to feel fuller for longer. Ready prepared meals and fast foods are high in fats, sugar and salt and low in NSP (dietary fibre)
* Share and enjoy food as a group/family	Develops confidence with food especially new flavours + textures
*Being physically active most of the time *Not spending too much time inactive (sedentary) using the computer and mobile phone	Children can become overweight due to inactivity 
*Have enough sleep	Children are rapidly growing and need time to rest.

Adults

The best eating habits and lifestyle choices:
•Regular meals + drinks. Always eat breakfast.
•Drink plenty of water
•Follow the Eat well Guide
•Take regular weight bearing exercise e.g. running, walking + exercise to stay fit and keep a healthy body weight
•Spend time outside in the sun to make vit. D
•Get plenty of sleep
•Avoid too much stress
•Avoid eating too many energy dense foods (high in fat, sugar) and salt

•Wholegrain breakfast cereals contain fibre required for a healthy digestive system.
•The Eatwell Guide (if followed) will provide all nutrients but especially:
•Calcium + Vit. D – the skeleton reaches peak bone mass around 30 years of age and gradually starts to lose minerals and become weakened after this age.
•Iron + vit. C (which helps the blood to carry oxygen around the body) to avoid anaemia by loss through menstruation.
•The B group of vitamins release energy from foods and allows the brain to concentrate.
•Energy dense foods may develop: obesity, CHD, CVD, Type 2 diabetes, gallstones, hypertension

Adolescents (Teenagers) 13 – 19 years

Planning balanced meals for different life stages 2

The best eating habits and lifestyle choices:	This is important because:
*Regular meals + drinks – always breakfast (wholegrain + fortified) 	Energy needs are high The brain and body need to have a 'kick start' to the day. Fortified cereals have B vitamins (to release energy from foods); calcium (for strong teeth and bones) and wholegrain (for a healthy digestive system). Help to feel fuller for longer to avoid mid morning snacking. The B group of vitamins release energy from foods and allows the brain to concentrate.
*Following the Eatwell guide	Body growth and development is rapid so all nutrients especially protein are essential.
*Eat/drink plenty of calcium rich foods	Minerals are taken into the bones and teeth so that the skeleton reaches peak bone mass when teenagers become adults
*Spend time outside	Vitamin D (with calcium) strengthens the skeleton allowing it to gain maximum bone density. This allows it to reach peak bone mass when they are adults.
*Drinking water instead of sugary/fizzy drinks	Water hydrates the brain and aids concentration. Limiting free sugars limits tooth decay and putting on excess weight. Fizzy drinks may affect how many minerals are taken into the bones
*Eating fresh + raw foods as well as cooked	Fresh and raw foods contain vitamin C (which with iron, helps the blood to carry oxygen around the body) to avoid anaemia. Fresh foods have antioxidants. Raw foods are required for a healthy digestive system as they contain NSP (dietary fibre
*Eating iron rich foods e.g. red meat, liver, kidneys, wholemeal bread, green leafy veg. egg yolk, dried apricots, lentils, cocoa, curry powder and fortified breakfast cereals.	Teenage start to menstruate so need to intake iron rich foods/ vitamin C for the absorption of iron to prevent anaemia
• Eat plenty of protein foods	Boys: growth and muscular tissue, development. • Girls: more protein for growth spurts/development
* Share and enjoy food as a group/family	Develops confidence with food especially new flavours + textures
*Being physically active most of the time *Not spending too much time inactive (sedentary) using the computer and mobile phone or watching TV	Teenagers can become overweight due to inactivity. Being a healthy weight reduces risk of obesity and development of diabetes.
*Have enough sleep	Teenagers are rapidly growing and need time to rest.
* Eating too many ready prepared meals and fast foods as these are high in fats, sugar and salt and low in NSP (dietary fibre)	can become overweight due to inactivity. Develop Type 2 diabetes and develop poor eating habits for adulthood
*Eat oily fish	Rich in fats called omega 3 fatty acids which may help prevent coronary Heart Disease (CHD). E.g. salmon, mackerel, sardines + fresh tuna

Elderly Adults

The best eating habits and lifestyle choices:

- Regular meals + drinks. Always eat breakfast.
- Drink plenty of water
- Follow the Eat well Guide
- Take regular weight bearing exercise to stay fit and keep a healthy body weight
- Spend time outside in the sun to make vit. D
- Get plenty of sleep
- Avoid too much stress
- Eat smaller portions as the appetite decreases and metabolic rate slows down
- Eat plenty of fibre to maintain a healthy digestive system

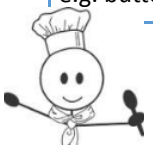
This is important because:

- Weight management – to avoid health risks associated with unhealthy weight. E.g. CHD
- There is a decline in immunity to infections e.g. 'flu. A decline in cognitive thought processes and memory and mobility – This group need for range of nutrients to support this e.g. Omega 3 fatty acids help and B vitamins
- Osteoporosis post menopause – oestrogen to protect bone health calcium/phosphorus/vitamin D
- Include Vitamin B12 and folates - lack of these linked to Alzheimers, memory loss and heart disease.
- Digestive function e.g. constipation – ensure high fibre in diet -cereal foods
- Reduce salt intake - links to CHD, blood pressure problems
- Ensure food supplements not used to replace real foods
- Less mobile/active therefore may need to take care with energy balance
- Include the antioxidant vitamins A, C and E may help to prevent cancer and heart disease
- Include vitamin C and iron to prevent iron deficiency anaemia.

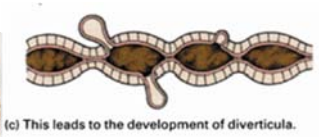
Planning balanced meals for specific groups of people (1)

When planning meals for specific groups of people remember some have specific dietary needs for a variety of reasons:
- Choosing not to eat certain foods
- Having a dietary intolerance or allergy to certain foods
- Medical or health condition

Foods to be avoided	Foods eaten	Dietary need:
-Vegetarians do not eat any flesh – they do not eat meat, poultry or fish/ shellfish. Vegetarians who do eat dairy products and eggs (**lacto-ovo-vegetarian**).	Dairy products (milk, cheese, yogurt, cream, butter), eggs. All plant foods e.g. fruit, nuts, seeds veg.	Not enough protein of high biological value (red meat, eggs, poultry + dairy products). People still growing will not reach full adult height. Adults 30+ reach adult height so the body needs to be maintained to keep it free from disease, strong and active. All age groups may have skin and nails in poor condition; may lose hair + don't digest food properly. Vitamin A in dairy products, liver, kidneys, oily fish, egg yolk, milk. Might develop poor vision in dim light and dry mucus membranes. Need to eat vegetable fat spreads + fortified breakfast cereals as Vitamin A is added + plant based sources. Vitamin D found in oily fish, meat, liver, butter. Needs to be replaced with sunshine and supplements + eating green leafy veg., enriched soya drinks and products made from soya. Vitamin B1 found in pork, cheese, milk, eggs. Needed to release energy from foods. Eat plenty of wholegrain cereals and fortified breakfast cereals. Vitamin B2 found in milk and milk products. Beef, pork and milk. B2 releases energy from carbohydrate, fat and protein foods during respiration. Eat fortified breakfast cereals, rice, mushrooms + dairy products, Vitamin B3 (niacin) found in beef, pork, eggs and milk. B3 releases energy from foods. If deficient may develop a rare disease - pellagra. Vegans need to eat wheat + maize flour Vitamin B12 (cobalamin) found in liver, meat, fish and cheese. B12 makes healthy blood cells (with vitamin B9). Deficiency can lead to pernicious anaemia - shows as severe tiredness. Vegans need to eat marmite and fortified breakfast cereals. Calcium in dairy products + fish with edible softened bones. If no dairy products eaten, impact could be osteomalacia in later adult life because the bones will be weakened. By age 30 skeleton has reached peak bone mass. Muscles + nerves might not work properly. Teeth may also weaken. Iron found in red meat, liver, kidneys, egg yolk. If these not eaten iron deficiency anaemia = tiredness, energy lack, weakness, pale skin, weak + split nails. Do not eat too many carbohydrate foods to fill up if vegan or too many energy dense dairy products = weight gain.
lacto-vegetarian do not eat eggs + any meat, poultry or fish/shellfish.	Dairy products (milk, cheese, yogurt, cream, butter). All plant foods e.g. fruit, nuts, seeds veg.	
Vegan All animal products even if the animal was not killed to produce it.	All plant foods e.g. fruit, nuts, seeds veg. products from plants e.g. soya milk, T.V.P (Texturised Vegetable Protein made from soya)	
Coeliacs Gluten in wheat, oats, barley and rye	Must avoid any food containing gluten. Many gluten free food products available.	Coeliacs have an intolerance to the protein gluten. In the small intestine, villi line the inside and nutrients are absorbed through them into bloodstream. Gluten intolerance causes the villi to become very small and deformed so not enough nutrients are absorbed. Coeliacs become malnourished – they get anaemia, lack energy and suffer from tiredness and weight loss. Children do not grow properly.
Lactose Intolerance Drinking milk and eating milk products e.g. butter, cream, yogurt and cheese.	Can buy lactose free dairy products.	People cannot digest it the milk sugar found naturally in milk. Bacteria in large intestine break it down. This causes bloating, flatulence, abdominal pain, diarrhoea, nausea. May miss out on calcium, protein, fat soluble vitamins.



Planning balanced meals for specific groups of people (2)

Foods to be avoided	Foods eaten	Dietary need:
High Fibre diet: Foods low in soluble and insoluble non starch Polysaccharide. Foods where the fibre has been removed e.g. white flour, pasta and white rice.	Fresh, whole foods that have had little processing, wholegrain cereals and cereal products e.g. bread, rice, pasta	Some people need to increase fibre intake to avoid developing problems in their digestive system including: •Constipation •Diverticula disease (a painful condition affecting the lining of the intestines) •Cancer of the colon and rectum Overall health should improve as fibre intake increases   (c) This leads to the development of diverticula.
Type II diabetes: Foods sweetened with free sugars e.g. breakfast cereals, soft drinks, desserts, cakes, biscuits, confectionery, sauces, preserves and ice cream.	Sweet foods containing natural intrinsic sugars e.g. fresh fruit and veg. Extrinsic milk sugars (lactose) in milk + milk products	**Low sugar diet—Type II diabetes** The pancreas has to keep producing insulin to regulate the amount of glucose entering the digestive system. If sugar intake is controlled the blood sugar levels remain consistent. With controlled sugar intake the body maintains a healthy weight.  **The importance of not eating lots of sugary snacks and sweetened soft drinks in between meals:** They are popular, inexpensive, readily available and human have a liking of sweet foods. However, sugar is bad for health: • easily gives excess energy, • raises blood sugar levels = an insulin response which could eventually lead to insulin resistance and Type 2 diabetes. • Raises the acidity level in the mouth due to bacterial action on the teeth, which can lead to tooth decay and gum disease.
Full fat versions of dairy foods. Foods containing 'invisible fats' e.g. fried food, crisps, cakes, meat products e.g. sausage rolls.	Naturally low fat foods such as fruits and veg. Cereals (wheat, rice, barley etc.) white fish e.g. cod, haddock, whiting. Fat reduced versions of foods such as milk and cheese	**Low fat** Some people need a fat-reduced diet if they are trying to reduce the energy density of their diet or have CHD. Weight loss will occur due to less fat being consumed. Cholesterol levels will reduce. Some fat soluble vitamins may be reduced (but can still be gained but in smaller quantities). 
Low sodium diets: Preserved or flavoured foods with salt e.g. yeast extract (marmite), cheese, dried + canned fish. Some types of bread, sauces e.g. soy sauce. Pickles, chutneys, ready meals. Foods containing monosodium glutamate (a flavour enhancer), fast food, fried snacks. Foods with added baking powder e.g. cakes, biscuits, scones. Some bottled mineral water	Naturally low sodium/ salt foods e.g. fruit and veg., milk and eggs.	**Low sodium diets:** Some people need a low sodium diet if they have high blood pressure or if there is a chance they may develop it. 6g is recommended daily for an average healthy person.  

Diet, Health and Nutrition : OBESITY (1)

Key Words

Risk factor: an action or natural tendency that makes you more likely to develop a disease or health condition

Malnutrition: Having a diet that is not balanced

Diet – related disease: a disease or health condition where one or more of the risk factors for developing it are linked directly to what or how much of a particular food group you eat or drink over time.

What does being in good health mean?

Eating a healthy, balanced diet.

- Drinking plenty of water.
- Being physically active.
- Having enough sleep and relaxation.
- Avoiding too much stress.

Obesity—what is it?

A diet related disease. Too much fat stored in adipose tissue.

What causes it? (risk factors)

• Body not in energy balance – too much energy consumed and not used for physical activity. Fat is then stored and the person gradually becomes overweight and eventually obese.

• Many foods and soft drinks are energy dense. Because they contain hidden fats and sugars.

What happens to the body?

• Stored fat builds up under the skin (adipose fat) and inside body around abdomen + intestines = visceral fat).

• Visceral fat eventually pushes up the diaphragm squashing the lungs making breathing difficult

• Extra weigh carried = strain on heart, blood vessels, liver, kidneys, skeleton + muscles.

• Obesity leads to Type 2 diabetes, heart disease, breathing difficulties, cancer, arthritis and high blood pressure. Can lead to heart disease, high blood pressure, cancer, diabetes, pain in joints and stroke.

How can it be prevented + treated over time?

• To prevent = person needs to be in energy balance.

• To lose some of the stored fat the person needs to take in less energy from food than is used daily. Over a period of time = weight loss.

• If physical activity level is increased the store will be used quickly.

What is it?:

Cardiovascular disease: The cardiovascular system is the heart and blood vessels. Diseases can affect all parts e.g. coronary heart disease (CHD). To work properly, the coronary arteries have to work properly and be clear for blood to pass through them, otherwise CHD develops.

High Blood Pressure (hypertension) : The blood vessels that carry the blood around the body needs to have pressure for it to work properly. If the measurement is consistently high then this can lead to CHD, stroke (a blood clot in the brain) or damage to eyes and kidneys.

What causes it? (risk factors)

Coronary heart disease (CHD) and High Blood Pressure (hypertension)

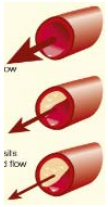
• If a lot of salt is consumed this can change the volume and capacity of the blood meaning the heart works harder which can lead to heart attack.

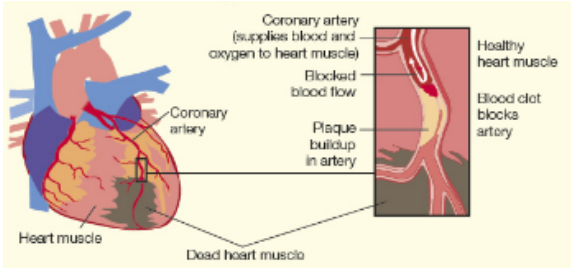
• Obesity puts strain on the heart and this could lead to CHD

• Other contributory factors are: smoking (which changes the blood's consistency); a sedentary lifestyle; stress; alcohol and family history.

What happens to the body?

In **CHD** the coronary arteries become **blocked** by **fatty deposits (plaques)** + these prevent blood flowing freely. This happens when a diet contains excess **saturated fat.** This can increase the levels of **cholesterol** in the blood. If cholesterol levels are high it may be deposited in, build up and block the **coronary arteries** that supply the heart with blood and oxygen. If the heart muscle does not get enough oxygen the muscle will stop working = **heart attack** (which permanently damages the heart muscle + may cause death.





High Blood Pressure:

The lining of the blood vessels become less flexible, especially with age, which makes it harder for the heart to pump blood around them

How can it be prevented + treated over time?

By following the Eatwell Guide and 8 healthy eating tips.

Reducing salt intake

Loosing weigh if necessary.

Taking regular physical exercise.

Trying to reduce stress levels.

Limiting alcohol intake.

Not smoking.

Diet, Health and Nutrition: Skeletal diseases (2)

Skeletal Diseases: What are they?

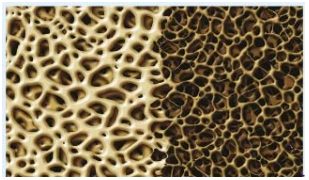
Skeleton includes bones + teeth. Bones and teeth are affected by diet-realted disease.

Rickets: Deficiency of vitamin D in children meaning not enough calcium is absorbed by the body from food.

In adults, lack of vit. D will lead to weakened bones (**osteomalacia)**

Osteoporosis: The natural ageing process that becomes apparent in old age but can happen earlier in life.

• **Osteoporosis** means '**porous bones**'.



Tooth decay: Teeth are important as they physically break down food to enable us to **digest and absorb** nutrients from it.

• Teeth are vulnerable to being **diseased and decayed**, making them unable to do their job.

What happens to the body?

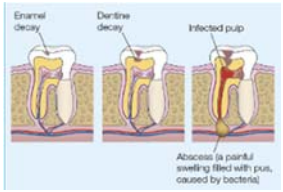
Rickets: The teeth and bones are unlikely to contain enough calcium to enable them to reach maximum strength (**peak bone mass**).

As the bones are not strong enough, the leg bones bend outwards under the weight of the body. Skeleton remains weak and more likely to break with age.

Osteoporosis: Need to reach peak bone mass by about age 30 to make sure the skeleton is as strong as possible. After this time minerals e.g. calcium is slowly removed and not

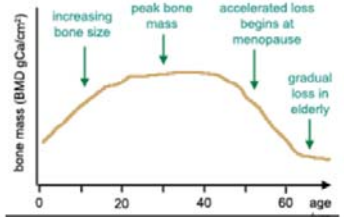
replaced. The skeleton gradually weakens, bones become porous and more likely to break. In some people osteoporosis is severe and they have a lot of pain; bone weakness and become bent over.

Tooth decay: caused by bacteria in mouth turning sugars and other foods into acids. The acids dissolve the enamel, bacteria enter and cause decay.



What causes them? (risk factors)

Rickets: Lack of vit. D often caused by lack of exposure to sunlight (staying indoors too much or completely covering the skin with clothing.



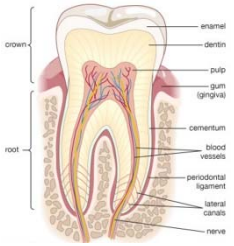
Osteoporosis:

•The effect of osteoporosis are worse if bones never reach peak bone mass when the person was younger.

•Some people have a family history so are more at risk.

Tooth decay:

Healthy teeth look like this:



•In the mouth there are millions of **bacteria** living on the gums and teeth.

•Every time food is eaten and drinks consumed any foods containing sugar and starch **and/or free sugars** encourage a sticky film of plaque to build up on the tooth's enamel.

•Bacteria feed on plaque and turn the sugars + starches into **acids.**

•The acids stay on the teeth for approx. 45 minutes before saliva neutralises them.

How can it be prevented and treated?

Rickets:

•Making sure the diet has enough calcium and other minerals.

•Regularly exposing the skin to sunlight.

Osteoporosis:

•The rate minerals are withdrawn from the bones can sometimes be slowed down by making sure there is enough vitamin D and calcium and staying physically active

Tooth decay:

•Clean teeth regularly; avoid eating between meals, especially sweet foods; avoid sweetened fizzy drinks and fruit juices which are acidic and can dissolve the enamel; visit dentist regularly for check-ups.

Diet, Health and Nutrition: Iron Deficiency Anaemia

What is it?

Anaemia is a diet-related condition caused by a deficiency of iron in the blood.

The body needs **iron** (a mineral) to make **haemoglobin** in **red blood cells**.

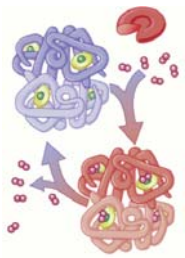
Haemoglobin picks up **oxygen** from the lungs and carries it to all body cells where it is used with **glucose**, to produce **energy** during **respiration**.

Vit. C is needed to help the body **absorb iron** from food during its digestion.

What happens to the body?

The symptoms of iron deficiency are:

Lack of energy
Tiredness
Muscle weakness
Weak, ridged fingernails
Pale inner eye lids
Pale complexion
Feeling cold



What causes it (risk factors)?

If there is not enough iron (or vitamin C) the body will develop **iron deficiency anaemia**.

Anaemia can affect all age groups but teenage girls and women who are **menstruating** are at most risk.

How can it be prevented and treated?

Make sure the diet contains plenty of iron rich foods (see minerals knowledge organiser) and vitamin C rich foods (see vitamins knowledge organiser).

AND

Diet, Health and Nutrition: Type 2 diabetes

Type 2 diabetes

What is it?

For all body cells to produce **energy** during respiration a continuous supply of **glucose** is needed.

Glucose enters the bloodstream after absorption during the process of digestion.

To get the glucose into the body cells a hormone is needed called **insulin** (which is produced in the **pancreas).**

Insulin is the 'key that unlocks the door' for each body cell to use glucose. If the 'key' i.e. **no insulin** is unavailable doors cannot be opened to release glucose so it stays in the bloodstream and it cannot enter the cells = **Type 1 diabetes.**

If there are plenty of 'keys' i.e. enough insulin but the 'locks' are damaged or will not work (called **insulin resilience)** the glucose cannot enter the cells and stays in the bloodstream. This is what happens in **Type 2 diabetes,** which develops often in older adults (but increasingly in younger children and adults). This is a preventable diet related disease.

What happens to the body?

A diabetic will have these symptoms:

Feeling tired and weak because glucose is locked in the cells and is not available for energy the body needs.

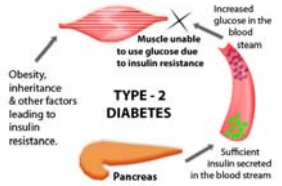
Feeling thirsty (because the glucose in the bloodstream makes it concentrated and the body knows it needs to dilute it).

Weight loss because the stores of body fat have to be used for energy.

Frequent urination because more water is drunk to counteract the effects of thirst and more glucose goes into the urine.

Blurred vision due to the tiny blood vessels in the (retina) – back of the eyes being affected by extra glucose.

Diabetes can lead to permanent damage because of the excess glucose in the blood. For example:
Eventual blindness.
Numbness in fingers and toes because the capillaries (tiny blood vessels) are damaged.



What causes it? (Risk factors)

Insulin resistance leads to Type 2 diabetes **if** the diet **is unbalanced.** If foods containing a lot of **free** and **refined starches e.g. white bread, pasta, rice** are eaten frequently every day.

People who are overweight or obese or have high blood pressure, and/or have a sedentary (not active lifestyle) are **more likely** to develop Type 2 diabetes.

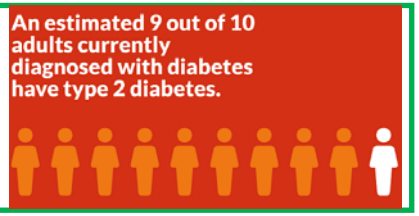
The pancreas has to continually make insulin to deal with the large amounts of glucose that enter the bloodstream. This leads to the 'door locks' in the body becoming faulty or damaged.

How can it be prevented and treated?

By following the advice of the Eatwell Guide and the 8 tips for a balanced diet.

Take **physical exercise regularly.**

Limit alcohol intake.



Food spoilage and contamination.

Key Words

Micro-organisms—tiny microscopic forms of life both plant and animal

Food Spoilage—Making food unfit and unsafe to eat

Contaminate—making a food unsafe to eat by allowing it to come into contact with micro-organisms that will grow and multiply.

Pathogenic—capable of causing illness

High-risk food—foods containing a lot of moisture and nutrients (especially protein) e.g. meat + fish) that easily support the growth of pathogenic micro-organisms, particularly bacteria. Also called **perishable foods**

Catalyst—a substance that speeds up the rate of a chemical reaction

Types of microorganism that can spoil foods: **Bacteria, moulds, yeasts.**

Micro-organisms make food unfit and unsafe to eat: Because they contaminate it with their waste products, their physical presence (being in the food) and the toxins (poisons) that they produce.

Conditions needed for micro-organisms to grow and multiply: The right temperature, food, moisture, time, the right amount of acidity/alkalinity (pH).

Pathogenic micro-organisms, e.g. bacteria/moulds cause food poisoning. • Non-pathogenic micro-organisms do not cause food poisoning.

Yeasts are tiny plants in the air which settle on food.

High risk foods are foods that will spoil quickly and are most likely to cause food poisoning because bacteria and other micro-organisms can grow and multiply very easily and quickly in it. • They have the right conditions for growth: nutrients (especially protein) and water/ moisture. • These types of foods spoil very quickly and must be refrigerated, cooked thoroughly and eaten within a few days. • Examples: meat, poultry, fish, shellfish, cream, milk, cheese, eggs, yogurt.

Pathogenic bacteria examples are: Campylobacter, E. coli, Salmonella, Listeria.

- **The symptoms of food poisoning** can include:

Enzymes are • Natural substances (mostly proteins) found in foods and all living things. • Called biological catalysts, which means they have the ability to speed up chemical reactions.

Enzymes affect fruits and vegetables when they have been harvested they ripen and eventually break down the cells and tissues in them. They change colour and any starch they contain is broken down and converted to sugar so they soften and sweeten.

Some fruits, such as apples + bananas, go brown when exposed to air because enzymes and natural substances in them react with oxygen when they are cut or peeled. Enzymes are proteins. Proteins are denatured by acids. Lemon juice contains citric and other acids, which stop the enzymic browning process from happening because it denatures the protein. Salt, submerging in water or vinegar also delay enzymic browning

Moulds are air bourne spores. Lots of types exist. In right conditions when mould spores land on food they germinate and send down a root system (mycelium) into food. Invisible waste products from the mould come out through the mycelium and into the food. They may be harmful (toxic), so even if the visible mould is scraped off, there may still be waste products present

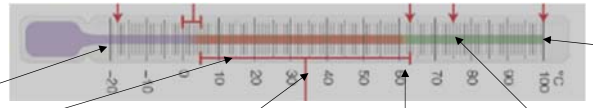
Some micro-organisms do not cause food poisoning but are used in food production

Blue-veined cheese: A special culture containing non-pathogenic bacteria and the spores of a non-pathogenic mould is added to the milk.• The bacteria set the milk into a semi-solid by turning the lactose sugar (in the milk) into lactic acid, which coagulates the protein, adds flavour and texture and helps to preserve the cheese. • The moulds germinate as the cheese ripens which adds blue veins and a particular flavour.

Bread: A special baker's yeast is used. If given the right conditions of warmth, moisture, food (sugar or starch) and time, it breaks down the starch in the flour and produces CO_2 gas bubbles, which make the dough rise. It also produces alcohol, which adds flavour, but evaporates in the oven. The yeast adds flavour to the baked bread.

Yogurt: made from milk fermented by two types of non-pathogenic bacteria. • The bacteria ferment the lactose sugar in the milk producing lactic acid. The lactic acid denatures and coagulates the milk proteins, which makes the milk become semi-solid. • The lactic acid and other natural substances that are produced give the yogurt its distinct, traditional flavour.

-18°C to –24°C Freezer. Bacteria dormant



100°C. water boils. Bacteria cells are dead. Bacteria spores can survive

Chilled food 0°C to 5°C. Bacteria multiply slowly

5°C to 63°C **Danger zone.** Bacteria multiply rapidly = ideal conditions for growth

63+°C keep cooked food hot

75°C. Cooked from raw food Reheat cooked food once

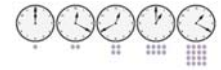
Steps to prevent food poisoning when buying, storing and cooking food:

Buying foods: •Food should be bought from a reputable supplier and the shop should be clean. •The foods should be stored correctly in the shop, e.g., perishable foods at the correct temperature in fridges or freezers • The food should be in good condition, e.g. there should be no bruising on fruit or veg •The foods should be within the use-by date for high-risk foods (such as chicken, dips, burgers and cream) and best-before date for ambient foods, such as breads. The packaging needs to be checked to ensure that it is intact and there is no contamination from rodents.

Storing food: •Follow the instructions on packaging. •High-risk foods need to be stored in a fridge at a temperature to slow down the growth of micro-organisms. Frozen foods should be stored in a freezer so that micro-organisms are dormant. •It is important to rotate the stock within a fridge and freezer so that foods are eaten within their use-by dates. This also helps to avoid throwing food away which is out of date. •Raw meats stored on the bottom shelf of the fridge to avoid any drip from the raw meat touching the cooked foods and causing cross-contamination. •All foods should be stored in the correct containers or sealed packages to avoid cross-contamination or damage to the food during storage.

Cooking food: The person cooking is following personal hygiene rules e.g. wearing a clean apron, cleaning hands before handling food, making sure long hair is tied back. •The area where food is being prepared should also be clean e.g. wiping surfaces with antibacterial spray, ensuring all equipment is clean. Any frozen foods should be thoroughly defrosted before cooking to ensure that the centre of the food is cooked thoroughly. •High-risk foods should be cooked to 75°C to ensure that harmful micro-organisms, such as Salmonella, are destroyed and to help prevent food poisoning. •A food probe could be used to ensure that this temperature is reached in the centre of food e.g. chicken.

Key words: Buying and storing food



- **Ambient storage:** The food is stored at ordinary room temperature – usually about 20–21°C.
- **Shelf-life:** This is how long a food product will last before it becomes unsafe or unpalatable [not nice] to eat.
- **Use-by date:** It is not safe to eat the food after its use-by date.
- **Best-before date:** This tells you that after this date, a non-high-risk food will still be safe to eat, but may have begun to go stale (changed in texture and flavour). After the best-before date the food may not be at its best quality.
- **Temperature danger zone**: The danger zone is from 5 to 63°C. This is the temperature range in which bacteria grow rapidly.
- **Core temperature:** This is the internal temperature food must be heated to which to ensure it is cooked properly. A minimum core temperature of 70°C for 2 minutes (or an immediate reading of 75°C).

Points to look for when buying:

Fresh Fruit and vegetables • A good, bright colour • A firm, crisp texture (not wilted or soft) • An unblemished smooth skin • No mould growth • Not too much soil on the skin of root vegetables • No damage • Stored so air can circulate freely • Buy only when you can see the quality of the fresh produce • Buy food in season.

Fresh meat • Not too much fat • A bright red or pink colour for beef, lamb or offal • Creamy-white to pink clean flesh for poultry • A fresh smell • Moist flesh, but not wet, slimy or dried out • A firm, springy texture • No risk of cross-contamination • Stored at the correct temperature of less than 5°C • Do not buy more than you need as it can deteriorate quickly.

Fresh fish: • Bright red gills • Firm flesh • A fresh smell, no fi shy smell • Clear, shiny eyes that are not sunken • Scales firmly attached, not loose and flaking off • Moist (but not slimy) skin • Bright, natural colouring • White fish should be a pearly colour • Shellfish should be intact; shells should not be broken

Personal hygiene rules when preparing + cooking food. Wash hands, wear clean apron, tie back or cover hair, do not spit, sneeze or cough over or near food, wash hands after using toilet, handling raw eggs, meat, poultry, fish, shellfish or rubbish, don't wear jewellery, never smoke when cooking, don't put finger in food and lick fingers, don't double dip.

Campylobacter Found in dirty water, raw poultry + meat. Milk. Incubation 48—60 hours. Diarrhoea, abdominal pain, nausea, fever

E.coli—beef (minced), raw milk, dirty water. Incubation = 12—24 hours. Diarrhoea, abdominal pain, vomit, fever + kidney damage

Salmonella—raw + undercooked poultry, eggs + meat, raw milk. 12—36 hours. Diarrhoea, abdominal pain, vomiting, fever

Listeria—soft cheese + made from unpasteurised milk; salad veg., pates. 1—70 days. Flu-like symptoms.

Staphylococcus aureus—people Hands, nose, mouth, skin. 1—6 hours. Abdominal pain, vomiting, low body temperature

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Food spoilage and contamination.

Key Words

Micro-organisms—tiny microscopic forms of life both plant and animal

Food Spoilage—Making food unfit and unsafe to eat

Contaminate—making a food unsafe to eat by allowing it to come into contact with micro-organisms that will grow and multiply.

Pathogenic—capable of causing illness

High-risk food—foods containing a lot of moisture and nutrients (especially protein) e.g. meat + fish) that easily support the growth of pathogenic micro-organisms, particularly bacteria. Also called **perishable foods**

Catalyst—a substance that speeds up the rate of a chemical reaction

Types of microorganism that can spoil foods: **Bacteria, moulds, yeasts.**

Micro-organisms make food unfit and unsafe to eat: Because they contaminate it with their waste products, their physical presence (being in the food) and the toxins (poisons) that they produce.

Conditions needed for micro-organisms to grow and multiply: The right temperature, food, moisture, time, the right amount of acidity/alkalinity (pH).

Pathogenic micro-organisms, e.g. bacteria/moulds cause food poisoning. • Non-pathogenic micro-organisms do not cause food poisoning.

Yeasts are tiny plants in the air which settle on food.

High risk foods are foods that will spoil quickly and are most likely to cause food poisoning because bacteria and other micro-organisms can grow and multiply very easily and quickly in it. • They have the right conditions for growth: nutrients (especially protein) and water/ moisture. • These types of foods spoil very quickly and must be refrigerated, cooked thoroughly and eaten within a few days. • Examples: meat, poultry, fish, shellfish, cream, milk, cheese, eggs, yogurt.

Pathogenic bacteria examples are: Campylobacter, E. coli, Salmonella, Listeria.

- **The symptoms of food poisoning** can include:

Enzymes are • Natural substances (mostly proteins) found in foods and all living things. • Called biological catalysts, which means they have the ability to speed up chemical reactions.

Enzymes affect fruits and vegetables when they have been harvested they ripen and eventually break down the cells and tissues in them. They change colour and any starch they contain is broken down and converted to sugar so they soften and sweeten.

Some fruits, such as apples + bananas, go brown when exposed to air because enzymes and natural substances in them react with oxygen when they are cut or peeled. Enzymes are proteins. Proteins are denatured by acids. Lemon juice contains citric and other acids, which stop the enzymic browning process from happening because it denatures the protein. Salt, submerging in water or vinegar also delay enzymic browning

Moulds are air bourne spores. Lots of types exist. In right conditions when mould spores land on food they germinate and send down a root system (mycelium) into food. Invisible waste products from the mould come out through the mycelium and into the food. They may be harmful (toxic), so even if the visible mould is scraped off, there may still be waste products present

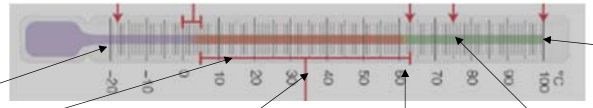
Some micro-organisms do not cause food poisoning but are used in food production

Blue-veined cheese: A special culture containing non-pathogenic bacteria and the spores of a non-pathogenic mould is added to the milk.• The bacteria set the milk into a semi-solid by turning the lactose sugar (in the milk) into lactic acid, which coagulates the protein, adds flavour and texture and helps to preserve the cheese. • The moulds germinate as the cheese ripens which adds blue veins and a particular flavour.

Bread: A special baker's yeast is used. If given the right conditions of warmth, moisture, food (sugar or starch) and time, it breaks down the starch in the flour and produces CO_2 gas bubbles, which make the dough rise. It also produces alcohol, which adds flavour, but evaporates in the oven. The yeast adds flavour to the baked bread.

Yogurt: made from milk fermented by two types of non-pathogenic bacteria. • The bacteria ferment the lactose sugar in the milk producing lactic acid. The lactic acid denatures and coagulates the milk proteins, which makes the milk become semi-solid. • The lactic acid and other natural substances that are produced give the yogurt its distinct, traditional flavour.

-18°C to –24°C Freezer. Bacteria dormant



100°C. water boils. Bacteria cells are dead. Bacteria spores can survive

Chilled food 0°C to 5°C. Bacteria multiply slowly

5°C to 63°C **Danger zone.** Bacteria multiply rapidly = ideal conditions for growth

63+°C keep cooked food hot

75°C. Cooked from raw food Reheat cooked food once

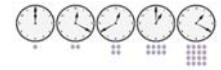
Steps to prevent food poisoning when buying, storing and cooking food:

Buying foods: •Food should be bought from a reputable supplier and the shop should be clean. •The foods should be stored correctly in the shop, e.g., perishable foods at the correct temperature in fridges or freezers • The food should be in good condition, e.g. there should be no bruising on fruit or veg •The foods should be within the use-by date for high-risk foods (such as chicken, dips, burgers and cream) and best-before date for ambient foods, such as breads. The packaging needs to be checked to ensure that it is intact and there is no contamination from rodents.

Storing food: •Follow the instructions on packaging. •High-risk foods need to be stored in a fridge at a temperature to slow down the growth of micro-organisms. Frozen foods should be stored in a freezer so that micro-organisms are dormant. •It is important to rotate the stock within a fridge and freezer so that foods are eaten within their use-by dates. This also helps to avoid throwing food away which is out of date. •Raw meats stored on the bottom shelf of the fridge to avoid any drip from the raw meat touching the cooked foods and causing cross-contamination. •All foods should be stored in the correct containers or sealed packages to avoid cross-contamination or damage to the food during storage.

Cooking food: The person cooking is following personal hygiene rules e.g. wearing a clean apron, cleaning hands before handling food, making sure long hair is tied back. •The area where food is being prepared should also be clean e.g. wiping surfaces with antibacterial spray, ensuring all equipment is clean. Any frozen foods should be thoroughly defrosted before cooking to ensure that the centre of the food is cooked thoroughly. •High-risk foods should be cooked to 75°C to ensure that harmful micro-organisms, such as Salmonella, are destroyed and to help prevent food poisoning. •A food probe could be used to ensure that this temperature is reached in the centre of food e.g. chicken.

Key words: Buying and storing food



- **Ambient storage:** The food is stored at ordinary room temperature – usually about 20–21°C.
- **Shelf-life:** This is how long a food product will last before it becomes unsafe or unpalatable [not nice] to eat.
- **Use-by date:** It is not safe to eat the food after its use-by date.
- **Best-before date:** This tells you that after this date, a non-high-risk food will still be safe to eat, but may have begun to go stale (changed in texture and flavour). After the best-before date the food may not be at its best quality.
- **Temperature danger zone**: The danger zone is from 5 to 63°C. This is the temperature range in which bacteria grow rapidly.
- **Core temperature:** This is the internal temperature food must be heated to which to ensure it is cooked properly. A minimum core temperature of 70°C for 2 minutes (or an immediate reading of 75°C).

Points to look for when buying:

Fresh Fruit and vegetables • A good, bright colour • A firm, crisp texture (not wilted or soft) • An unblemished smooth skin • No mould growth • Not too much soil on the skin of root vegetables • No damage • Stored so air can circulate freely • Buy only when you can see the quality of the fresh produce • Buy food in season.

Fresh meat • Not too much fat • A bright red or pink colour for beef, lamb or offal • Creamy-white to pink clean flesh for poultry • A fresh smell • Moist flesh, but not wet, slimy or dried out • A firm, springy texture • No risk of cross-contamination • Stored at the correct temperature of less than 5°C • Do not buy more than you need as it can deteriorate quickly.

Fresh fish: • Bright red gills • Firm flesh • A fresh smell, no fi shy smell • Clear, shiny eyes that are not sunken • Scales firmly attached, not loose and flaking off • Moist (but not slimy) skin • Bright, natural colouring • White fish should be a pearly colour • Shellfish should be intact; shells should not be broken

Personal hygiene rules when preparing + cooking food. Wash hands, wear clean apron, tie back or cover hair, do not spit, sneeze or cough over or near food, wash hands after using toilet, handling raw eggs, meat, poultry, fish, shellfish or rubbish, don't wear jewellery, never smoke when cooking, don't put finger in food and lick fingers, don't double dip.

Campylobacter Found in dirty water, raw poultry + meat. Milk. Incubation 48—60 hours. Diarrhoea, abdominal pain, nausea, fever

E.coli—beef (minced), raw milk, dirty water. Incubation = 12—24 hours. Diarrhoea, abdominal pain, vomit, fever + kidney damage

Salmonella—raw + undercooked poultry, eggs + meat, raw milk. 12—36 hours. Diarrhoea, abdominal pain, vomiting, fever

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Carbohydrate —as a macro nutrient

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

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

•Not enough NSP = constipation. May lead to cancer of the bowel

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

Refined and processed:

•Refined carbohydrates are quickly broken down + absorbed by the body. = rapid rise in the blood sugar level. If eaten frequently throughout the day, over a period of time, = stress on the pancreas (produces hormone – insulin). Insulin allows glucose to enter body cells to use it for energy. Eventually the pancreas may stop working or its cells may become resistant to insulin so Type 2 diabetes may result.

•Too much NSP could result in the body not being able to absorb iron and calcium.

•Sugar might = tooth decay. Sugars released from foods or commercially added are set free. (Inside unprocessed foods they are intrinsic)

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 children11 **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.

Carbohydrates —Functional and chemical properties

Key words:

Caramelisation: The breaking up of sucrose (sugar) molecules when heated = a change in colour, flavour + texture of the sugar as it turns into a caramel.

Dextrinisation: The breaking up of starch molecules into smaller groups of glucose molecules when they are exposed to dry heat

Gelatinisation: the swelling of starch granules when they are cooked with a liquid to the point where they burst and release starch molecules

Dextrinisation:

when foods containing starch e.g. bread, cakes, biscuits, scones and pastries are cooked using dry heat e.g. baking = grilling, they change to a brown colour on the outside.

Dry heat (oven/grill) causes starch to change colour, texture and flavour.

The starch molecules break down to change to dextrin (a smaller group of glucose molecules)

Caramelisation

Sugar (sucrose) used for cooking (disaccharide made from glucose + fructose) is heated and melts to a syrup. The syrup boils. It is important **not to stir** the syrup as it caramelises.

The sucrose molecules break up and water molecules are formed.

As heating continues, water evaporates, the syrup gets thicker and changes from a colourless and clear syrup to a golden brown

caramel. If you stir, the sugar will **crystallise** into large, hard lumps. The ideal temperature of caramelising sugar is 160°C to 170°C.

It will eventually burn and become bitter if cooked for too long

because too much water is driven off and carbon is left behind, which makes the caramel dark and bitter.

Foods that contain natural (intrinsic) sugar e.g. onions (glucose, fructose) which they store during growth will caramelise. When sautéing (means frying them gently in oil for several minutes (the

structure of the onion softens and breaks down and the sugars are released. The heat changes the sugars in the onions and caramelises them, so that they turn a golden -brown colour and develop a characteristic flavour.

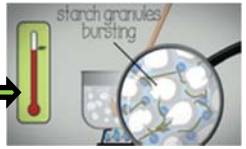
Gelatinisation—What happens:

Starch is found in small packets (granules).

Starch molecules are made of thousands of glucose molecules joined in **long straight** chains or **short chains with branches.** They sink to the bottom of cold liquids. If not stirred = lumps.

When **heated** to 60°C starch granules absorb water and swell up = the sauce starts to **thicken**, because there is less room for the starch granules to move around

At 80°C starch granules are very swollen and start to burst, letting starch out into the liquid.



At 100C the starch molecules form a 3D network that traps water stopping them moving around so much. At 100°C the liquid completely thickens – it has gelatinised.

As it cools the starch molecules form longer chains and the water molecules stay trapped so it becomes a solid gel.

Sauces must be stirred all the time to prevent starch granules sticking together at bottom of pan where they will swell up, stick together and make lumps

As the sauce cools down the starch molecules start to form longer chains and the water molecules stay trapped inside them so the sauce gradually becomes a **solid gel.**

If the sauce is not stirred, the starch granules will stay at the bottom of the pan whilst this is happening and will stick together and to the bottom of the pan, where some of them may burn. The sauce will have an unpleasant texture because the starch granules will have formed lumps as they swelled and they will not be distributed throughout the sauce.