

MACRONUTRIENTS

Nutrient	Source	Function	Effects of deficiency and excess	
MACRONUTRIENTS	Carbohydrates	<p>Starches – found in cereal grains such as rice, wheat, oats, plus starchy tubers (potatoes and sweet potatoes) and vegetables (carrots, beets, corn)</p> <p>Sugars – lactose found in milk and dairy, fructose found in honey, fruits and some vegetables (peppers, tomatoes etc.)</p> <p><u>Glycaemic Index</u> – how quickly carbs convert to blood sugars. High GI convert quickly eg white bread, cornflakes, white rice, pineapple</p> <p>Medium – brown rice and oats</p> <p>Low GI – convert slowly – most fruits, carrots, wholewheat bread, beans, peas, lentils</p>	<p>Starches (polysaccharides) provide energy when broken down – slow release energy to the body (wholegrain provide slower release carbohydrates). Provide <u>fibre</u></p> <p>Sugars (Disaccharides and Monosaccharides) provide quick release energy to the body's' cells. Known as empty calories</p> <p>1g carbs = 3.75KCal</p> <p>Intrinsic sugars – found in naturally in food eg fruit, vegetables</p> <p>Extrinsic sugars – added to foods eg white sugar, honey, artificial sweeteners</p>	<p>Deficiency of carbohydrates is extremely rare in the UK. Short term – weak, hungry and tired. Long term lack of carbohydrates in the diet can cause Ketosis – a condition where the body switches to using protein as an energy source.</p> <p>Excess – converts to fat – obesity, type 2 diabetes, heart disease, some cancers. Excess sugars – tooth decay</p> <p>No more than 5% of daily calories should come from sugar</p>
	Proteins	<p>Protein is digested by the body into its component parts – called amino acids. There are 8 which are essential for adults and 12 for children. HBV protein foods contain all the essential amino acids. LBV have one or more missing.</p> <p>High Biological Value (HBV) protein: Meat, fish, poultry, eggs, Quorn, milk, soya, Quinoa</p> <p>Low Biological Value (LBV) protein: Tofu, beans, nuts, seeds, grains eg wheat</p>	<p>It is needed for growth and repair, the production of body chemicals eg enzymes and hormones</p> <p>Is also a source of secondary energy</p> <p>1g protein = 4Kcal</p> <p>Complementary proteins – eating a mixture of LBV proteins in order to get all the essential amino acids eg Beans on toast</p>	<p>Protein deficiency can cause:</p> <ul style="list-style-type: none"> • Wasting of muscle & muscle loss • Oedema – build up of fluids in the body • Slow growth in children <p>Severe deficiency leads to kwashiorkor → </p> <p>Excess – some is removed as waste. Rest is stored as fat.</p> <p>Adults need 55g of protein a day</p>
	Fats	<p>Saturated fats - Butter, cheese, meat, lard. Contain low density lipoproteins LDL (bad) which raise blood cholesterol levels and clog artery walls.</p> <p>Unsaturated fats – olive oil, avocado oil, fish oils. These contain high density lipoproteins HDL (good) which help to remove cholesterol by taking it to the liver where it is processed and removed..</p> <p>Visible fats – fat on meat, bacon rind</p> <p>Invisible fats – cheese, avocados, nuts.</p> <p>Oils are turned into solid fats by hydrogenation. These fats are unhealthy.</p>	<p>Fat is a term used to describe lipids – this can refer to solid fats and oils. Fat is broken down by the body and used for energy. 1 g fat = 9KCal</p> <p>Also provide warmth when stored under the skin. Protects organs eg heart, liver.</p> <p>Carries fat soluble vitamins A, D, E & K. Important for hormone production</p> <p>Contains essential fatty acids that the body is unable to make itself</p> <p>Omega 3 and 6 are essential fatty acids which promote heart and brain development and prevent depression.</p>	<p>Lack of fat in the diet can lead to deficiencies of fat soluble vitamins A, D, E & K.</p> <p>Excess fat (either type) – obesity and all diseases linked to it.</p> <p>Excess unsaturated fat - build up of cholesterol on artery walls which can lead to a heart attack.</p> <p>Adults men need 95g fat and women 70g. No more than 30g or 20g saturated fat</p>

MICRONUTRIENTS - VITAMINS

	Nutrient	Function	Source	Effects of deficiency/excess
FAT SOLUBLE VITAMINS	Vitamin A Retinol <i>An antioxidant</i>	Required for a healthy immune system Keeps mucous membranes of eyes, digestive system and lungs healthy Helps vision in dim light	Dairy products, fortified spreads, Egg yolk, oily fish, yellow fruits eg mango, apricots and yellow, red and green (leafy) vegetables eg spinach, carrots, sweet potatoes, tomatoes, red peppers	Deficiency is rare in developed countries but can lead to night blindness and a compromised immune system Dry mucous membranes Excess: pregnant women should avoid liver as high levels of Vit A can cause birth defects
	Vitamin D Cholecalciferol	Essential for absorbing calcium from foods Formation of strong bones and teeth especially during childhood and adolescence	Sunlight in UK summer Food sources – oily fish, eggs, liver, fortified cereals and margarines	Poor absorption of calcium – rickets (soft bones) in children and osteomalacia in adults At risk groups – pregnant, breastfeeding, babies, those over 65, people who cover up skin Excess – can cause kidney damage and in infants hypercalcaemia (weak bones, kidney stones).
	Vitamin E <i>An antioxidant</i>	Antioxidant protects body from diseases Strengthens immune system Helps maintain healthy skin and eyes	Plant oils eg soya, corn, olive oil Nuts, seeds, Milk, egg yolk Polyunsaturated spreads and oils	Deficiency is unlikely Excess can cause headaches, nausea and can affect blood coagulation
	Vitamin K	Helps blood clot and is good for bone health	Green leafy vegetables, cauliflower Liver, bacon, cereals and vegetable oils	Deficiency is unlikely. Newborns given Vit K shot to prevent bleeding Excess is stores in liver for future use
WATER SOLUBLE VITAMINS	Vitamin B Group	All B's release energy from foods And most keep the skin, eyes and nervous system healthy	Red meat, Liver, Eggs, Wholegrain foods, yeast/yeast extract	Severe deficiency & excess are rare in developed countries. Lack of B Group vitamins can cause dry, cracked skin
	B1 Thiamin B2 Riboflavin B3 Niacin B9 Folic acid	+Helps childhood growth +helps childhood growth +helps lower fat levels in blood +helps reduce spina bifida in unborn babies	fresh and dried fruits rice, mushrooms seeds, nuts, beans potatoes, oranges, berry fruits	Lack – beriberi (muscle wasting) Excess – headaches Excess – very rare – kidney stones Lack – pellagra (diarrhoea, sore skin, memory loss) Excess liver damage Lack = megaloblastic anaemia (sickness, diarrhoea, spina bifida in babies. Excess – stomach problems and trouble sleeping Lack – pernicious anaemia, fatigue, depression, damage to nervous system. Vegans have to supplement diet with fortified foods
	B12 Cobalamin	+Making red blood cells and processing folic acid	fish, milk, cheese	
	Vitamin C <i>An antioxidant</i> Levels of Vit B and C diminish during storage, processing and cooking	Helps the body absorb iron from food Essential for the formation of collagen (the body's scaffold tissue) Aids wound healing Supports a healthy immune system & fights infection	Fruits including – kiwi, strawberry, citrus fruits Peppers, tomatoes Dark green vegetables including cabbage, broccoli	Extreme deficiency is called scurvy. This is very rare however symptoms include bleeding gums, wounds not healing properly, tiredness. Lack of vitamin C can also be linked to iron-deficiency anaemia as absorption of iron will be affected by lack of vitamin C. Excess is eliminated in urine

MICRONUTRIENTS - MINERALS

MINERALS

	Nutrient	Function	Source	Effects of deficiency/excess
	Calcium	Form, strengthen and maintain bones and teeth For blood clotting To keep nerves and muscles working properly Normal growth in children	Dairy foods, green leafy vegetables, eg cabbage Wholegrain cereals Soya drinks with added calcium Fish with edible bones eg sardines Bread made with fortified flour Vit D needed to help body absorb calcium eg macaroni and cheese, sardines on toast	Deficiency – rickets, osteomalacia, osteoporosis (reduction in bone density) At risk groups – lactose intolerant, have coeliac disease, breastfeeding or past the menopause Excess - stomach pain and diarrhoea. Builds up in kidneys
	Iron	Helps make haemoglobin in red blood cells which carry oxygen to the body cells	Red meat, offal, wholegrain cereals, green leafy vegetables eg watercress, beans, nuts, dried fruits, fortified breakfast cereals, all wheat flour is fortified. Vit C needed in order for iron to be absorbed eg cereal with kiwi, wholemeal toast and lemon curd	Deficiency – iron deficiency anaemia – tired, lethargic, pale. At risk – girls due to periods, nursing mothers and pregnancy. Excess – constipation, nausea, vomiting, stomach pain
	Fluoride	To strengthen the bones and enamel in the teeth and help prevent tooth decay	Fish and seafood, some water supplies, tea	Deficiency – may lead to weak enamel on the teeth and lead to tooth decay Excess – permanently coloured teeth
	Phosphorous	Works with calcium to build strong bones and teeth Important for energy release	Red meat, dairy foods, fish, poultry, bread, brown rice, oats	Deficiency – unlikely as in lots of foods Excess – involuntary muscle convulsions, diarrhoea and stomach cramps. Can reduce calcium levels - fractures
	Iodine	To produce the hormone thyroxine. Which controls the metabolic rate of the body	Seafood, vegetables, milk and dairy	Deficiency – swelling in the neck (goitre); if pregnant mother is deficient, baby may develop cretinism (brain damage)
	Sodium (salt)	Helps to control the amount of water in the body Helps body to use energy Helps to control the nerves and muscles	Salt Processed foods eg crisps, bacon, ham, sausages Some breakfast cereals Yeast extract Stock cubes	Deficiency – muscle cramps Excess – high blood pressure which can damage heart and kidneys and lead to a stroke Aged 11 + = 6g day RDA

ALL ABOUT WATER...



FUNCTIONS

- Transporting nutrients in blood
- Removing waste products that are then passed in to the urine and faeces
- Regulating body temperature (e.g. by sweating)
- Aiding digestion and prevents constipation
- Acting as a lubricant and shock absorber in joints

WHICH SOURCES SUPPLY IT?

- **Water:**
Fresh water is the best way to hydrate the body; it contains no energy, is sugar free and will not rot teeth.
- **Other fluids:**
Milk (particularly low fat milk) is an important fluid, especially for children, and is about 90% water (whole milk should be consumed until two years old as under 2 years they may not get the calories they need from lower-fat milks). Tea can be an important source of fluid. It can help meet daily fluid recommendations, and is a source of antioxidants and polyphenols, which reportedly protect against heart disease and cancer. Caffeine drinks are stimulants and should be avoided as they cause the body to produce urine more quickly. Fruit and herbal teas are suggested instead of tea varieties that contain caffeine. Fresh fruit is preferable to fruit juice because it has more fibre and nutrients, and less sugar.

HOW MUCH IS NEEDED?

- In a typical UK diet, drinks provide 70-80% of water needs; the remaining 20-30% comes from food, e.g. soup, casseroles, fruits and vegetables.
- How much fluid a person needs will depend on factors such as: room temperature, room humidity, exercise.

WHAT HAPPENS IF YOU DON'T HAVE ENOUGH?

- Lack of fluids causes dehydration. Symptoms include thirstiness, a dry and sticky mouth, feeling tired, losing concentration, dizziness and headaches.
- Dehydration can increase the risk of kidney stones and urinary tract infections.

WHAT HAPPENS IF YOU HAVE TOO MUCH?

- Very rare – but can damage the body and cause hyponatremia (water intoxication). Hyponatremia occurs when sodium in the blood drops to a dangerously low level (sodium is needed for muscle contraction and for sending nerve impulses).

In the UK water is fortified with Fluoride which is added to strengthen teeth, make them more resistant to acid and prevent tooth decay. Other minerals may naturally be found in water such as calcium, sodium, potassium, magnesium, iodine.

The Bristol Stool Chart

The Bristol stool chart shows how the shape of different stools (poos) on a continuum.

Both dietary fibre and water play a HUGE role in keeping the digestive system functioning properly.

Too little water and/or fibre can result in constipation (the Type 1 and 2 stools)

Bristol Stool Chart

Type 1		Separate hard lumps, like nuts (hard to pass)
Type 2		Sausage-shaped but lumpy
Type 3		Like a sausage but with cracks on the surface
Type 4		Like a sausage or snake, smooth and soft
Type 5		Soft blobs with clear-cut edges
Type 6		Fluffy pieces with ragged edges, a mushy stool
Type 7		Watery, no solid pieces. Entirely Liquid



FIBRE – non starch polysaccharide (NSP)

What is it?

There are two types of fibre:

Insoluble fibre. This fibre bulks up stools (poo) and holds water in them, making them softer and easier to pass. It also makes waste move through the digestive tract more quickly which is better for the gut and can prevent constipation and piles. Examples include wholegrain cereals, wholemeal bread, bran, nuts, corn, oats, fruits and vegetables (especially the skin).

Soluble fibre – is broken down and helps to remove cholesterol in the blood which can prevent CHD. Sources include oats, barley, rye, most beans and peas, fruits such as bananas, apples and root vegetables such as carrots.

Dietary fibre also can help weight control as it keeps you feeling fuller for longer.

It also slows down the absorption of carbohydrates in the blood which helps to keep blood sugar levels constant.

How Much do we Need?

30g a day for adults

2-5 years 15g per day, 5-11 years 20g per day, 11-16 years 25g per day, 16+ years 30g per day

Too little fibre – constipation, haemorrhoids (piles), diverticulitis and certain cancers

Too much – bloated, stomach cramps, flatulence and can prevent mineral absorption.

To increase your fibre intake you could:

- Choose high fibre cereals e.g. bran flakes, or porridge
- Choose whole-wheat pasta, bulgur wheat or brown rice, wholemeal bread
- Go for potatoes with skins
- For snacks try fruit, veg sticks, rye crackers, unsalted nuts
- Include plenty of vegetables with meals
- Add pulses like beans, lentils or chickpeas to stews, curries and salads
- Add nuts and seeds to recipes