Micronutrients – vitamins

Micronutrients are needed by the body in small amounts

Fat-soluble vitamins

Vitamins A, D, E and K, present mainly in fatty foods, which can be stored in the body for long periods of time – excess may be harmful

A

Retinol

Beta-carotene

DRV 600–700 mcg daily

Functions:
- Growth and development of the body
- Helps support vision at night
- Keeps the skin and cell membranes healthy

Sources:
- Liver, milk and dairy, egg yolk, oily fish
- Red, yellow and green vegetables and fruit

Deficiency: night blindness, flaky and dry skin
Excess: toxic, harmful to unborn babies

Beta-carotene – inactive form of vitamin A, found in plant foods

Retinol: active form of vitamin A, found in animal-origin foods

D

Cholecalciferol

Sunshine vitamin

DRV 10 mcg daily

Functions:
- Healthy bones and teeth
- Helps absorb calcium

Sources:
- Produced in the skin in response to sunshine exposure
- Liver, milk and dairy, egg yolk, oily fish

Deficiency: rickets, osteoporosis, depression, increased risk of cancer
Excess: damage to the kidneys and other organs, weakened bones

Vitamin D deficiency is very common in the UK. For this reason, a doctor can prescribe you a vitamin D supplement.

E

Tocopherol

DRV 3–4 mg daily

Functions:
- Helps growth of the baby during pregnancy
- Keeps cell membranes and muscles healthy
- Helps build sperm cells and red blood cells

Sources:
- Vegetable oils, seeds and nuts
- Egg yolk, wheatgerm

Deficiency: muscular dystrophy, anaemia, infertility
Excess: loss of appetite, nausea, flatulence, diarrhoea

K

Phylloquinone

DRV 1 mcg daily per kg body mass

Functions:
- Ensures proper blood clotting and healing of wounds
- Prevents bleeding by supporting blood clotting when injured

Sources:
- Produced by gut bacteria
- Leafy green vegetables, green tea

Deficiency: bleeding, bruising
Excess: very rare, no known symptoms

Vitamins A, C, E

Water-soluble vitamins

Group B vitamins and vitamin C

Easily excreted from the body, usually non-toxic in excess, deficiency may be harmful

	Function in the body	Source	Effects of deficiency and excess
Vitamin B1 *Thiamine* **DRV** 0.8–1 mg daily	• Helps release energy from food • Supports the nervous system	• Liver, milk and dairy • Bread and cereals • Eggs, nuts, peas	• **Deficiency:** beri-beri disease • **Excess:** very rare
Vitamin B2 *Riboflavin* **DRV** 1.1–1.3 mg daily	• Supports healthy skin, nerves and mucous membranes	• Chicken, eggs, milk and dairy • Rice, bread, cereals, leafy vegetables, soya	• **Deficiency:** skin problems, dry lips, poor growth • **Excess:** very rare
Vitamin B3 *Niacin* **DRV** 13.2–16.5 mg daily	• Releases energy from carbohydrates • Helps keep skin and nerves healthy	• Meat and poultry • Cereals and grains • Pulses (beans, lentils and other)	• **Deficiency:** pellagra, inflammation of skin, dementia (memory loss) • **Excess:** damage of the liver
Vitamin B9 *Folate / folic acid* **DRV** 200 mcg daily	• Ensures proper development of the nervous system • Helps build red blood cells	• Bread and cereals • Broccoli, Brussel sprouts, spinach • Liver, chickpeas and peas	• **Deficiency:** spina bifida in newborns • **Excess:** no known effects
Vitamin B12 *Cobalamin* **DRV** 1.5 mcg daily	• Helps build red blood cells	• Meat, milk and dairy, egg yolk • Fish and beef	• **Deficiency:** pernicious anaemia, more likely in vegans • **Excess:** no known effects
Vitamin C *Ascorbic acid* **DRV** 40 mg daily	• Builds connective tissues (such as skin and mucous membranes) • Helps healing of wounds • Increases absorption of iron	• Potatoes, tomatoes, Brussel sprouts • Berries, currants • Citrus fruit (lemon, orange, kiwi)	• **Deficiency:** scurvy, impaired healing • **Excess:** stomach pain and diarrhoea

Antioxidants

Protect cells from the damage caused by free radicals.

Help prevent cardiovascular disease, cancer and maintain youth.

***FREE RADICALS** are particles of oxygen which have seven electrons and steal electrons from other particles in the body, causing damage and oxygen stress.*

Sources of antioxidants:
- Fresh fruit and vegetables
- Nuts
- Whole grains
- Oily fish

How cooking affects nutritional value of food

Water-soluble vitamins can be lost by exposure to **high temperatures**, **high pressure**, **oxygen** and **enzymes**. Therefore, the following should be practised in order to reduce vitamin loss:

- Store foods out of direct sunlight
- Cut vegetables when you need them – so as not to expose to oxygen
- Boil vegetables for a short time when cooking them to reduce exposure to temperature and water
- Steam vegetables when possible
- Avoid damaged fruit and vegetables – bruised vegetables release enzymes that can reduce vitamin C.

Micronutrients (minerals)

Micronutrients are needed by the body in small amounts

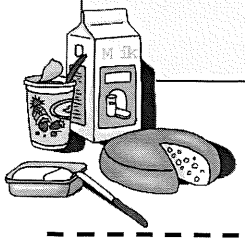
Calcium (Ca)

- Works together with phosphorus and vitamin D to ensure proper bone and tooth health
- Helps blood clotting
- Ensures proper functioning of nerves and muscles

Excess: Excess is rare, but too much may lead to it being stored in the kidneys, stopping them from working.

Deficiency: **Rickets** – effect of calcium deficiency in children, in which bones don't grow properly and impair movement

Osteoporosis – effect of calcium deficiency in adults, in which bones become weak, brittle, easy-to-break and heal slowly

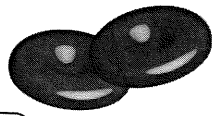


Commonly found in milk and dairy products

Also present in nuts, bread and cereals, oily fish and green vegetables

DRV: 700mg daily

Iron (Fe)



- Necessary for building red blood cells

Haem iron *(Easily absorbed by the body)*: Red meat, offal, egg yolk

Non-haem iron *(Difficult to absorb)*: Green leafy vegetables, dried fruit, chocolate, lentils

Haemoglobin – red pigment in the blood cells which carries oxygen around the body

Menstruation – Part of the female monthly cycle when bleeding occurs

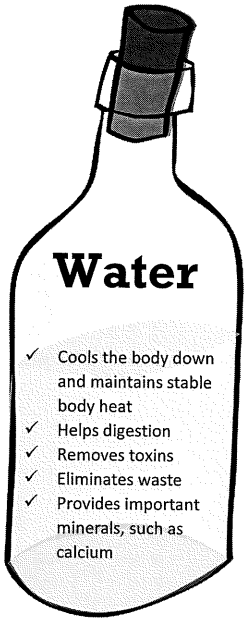
Excess: Stomach ache, Nausea, Vomiting, Constipation

Deficiency: Iron deficiency anaemia – symptoms include: pale complexion, tiredness, weak and split nails

Deficiency is usually caused by loss of blood, impaired absorption or genetic disorders.

DRV: 8.7 mg (men aged 19+) / 14.8 mg (women aged 19–50); 8.7 mg (women aged 50+)

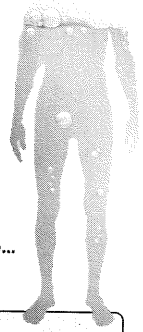
Water



- ✓ Cools the body down and maintains stable body heat
- ✓ Helps digestion
- ✓ Removes toxins
- ✓ Eliminates waste
- ✓ Provides important minerals, such as calcium

Water is **LOST** from the body by:

- Breathing – lungs, mouth and nose
- Body waste – kidneys and intestines
- Sweating – skin



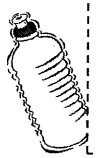
This can lead to...

HEAT STROKE: Uncontrolled, life-threatening increase in body temperature

DEHYDRATION: A harmful reduction in water loss in the body

HYDRATION: Amount of water necessary for proper functioning of the body

Adults should drink around 2 litres of water a day!



Drink more:

- on hot, sunny days
- when you exercise a lot
- when you have a fever
- when you want to lose weight

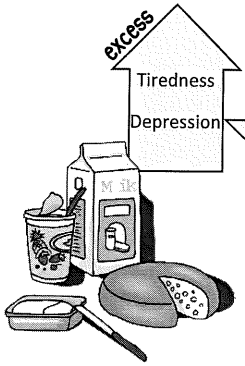
DRV: Less than 6 g of salt (2.4 g of sodium) daily

Phosphorus (P)

- Works together with calcium and vitamin D to ensure proper bone and tooth health
- Essential for energy release

Excess: Tiredness, Depression

Deficiency: Decalcification of bones, Weak, brittle bones



Milk and dairy

Bread and cereals

Nuts, meat and fish

DRV: 550 mg

Iodine (I)

- Builds hormones in the thyroid gland
- Controls the rate of metabolism

Excess: Weight gain, change in metabolism

Deficiency: Swelling of the thyroid (goitre)

Thyroid: small gland in the front of the neck

Red meat, sea fish, shellfish, cereals, grains, Nuts, meat and fish.

May be breathed in at the seaside and in salt caves

DRV: 140 mcg daily

Fluoride (F)

- Builds and strengthens tooth enamel

Excess: Brittle tooth enamel, Tooth decay

Deficiency: Tooth decay / dental caries

Bony fish (e.g. sardines) and seafood, tea, toothpaste and mouthwash

Fluoride is also added to drinking water by **fluoridation**

DRV: 2.9–3.4 mg daily

Sodium (Na)

- Maintains body water balance
- Important for the conduction of nerve impulses

Excess: High blood pressure = **hypertension**, Heart failure and stroke, Kidney damage

Deficiency: Muscle cramps, Swelling of the body

Sources:

- Kitchen salt
- Tinned foods (e.g. fish)
- Processed foods and fast foods
- Salty snacks (e.g. crisps and nuts)
- Smoked and cured meats, bacon, cheese
- Bread