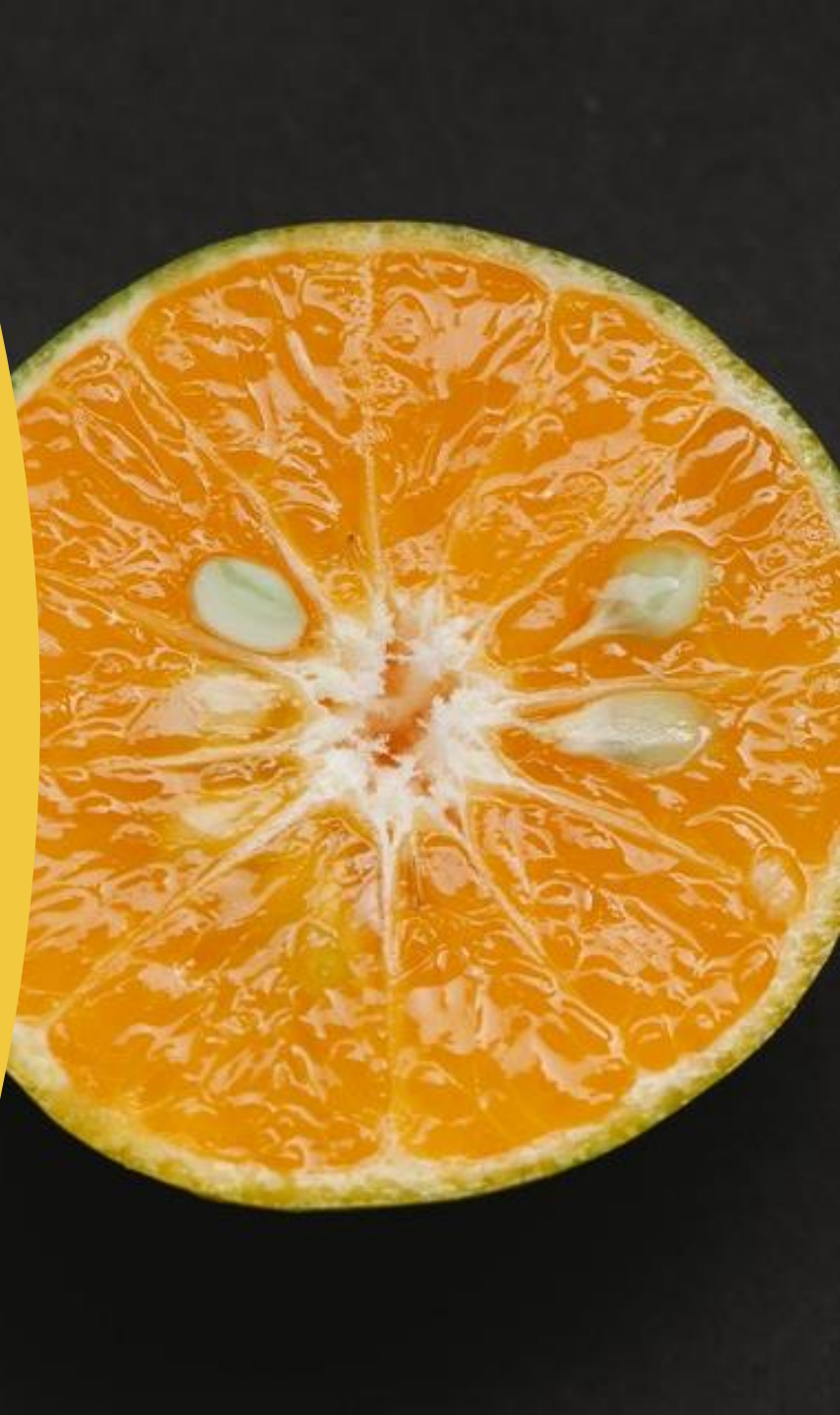
Nutrition

Exploring Nutrients

Lesson 3

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



Minerals are inorganic materials which the body needs in small amounts to be able to function correctly.

FOODSPHERE

Minerals take part in the production of teeth and bones, they form part of fluids and tissues of the body. They are also part of enzyme systems which the body uses to operate nerve functioning.

Minerals required by the body in larger amounts are:

- Phosphorus
- Calcium
- Magnesium
- Potassium
- Sodium
- Chloride

Minerals required by the body in smaller amounts called trace minerals/element are:

- Zinc
- Iron
- Iodine
- Selenium
- Fluoride
- Copper
- Manganese
- Chromium

Calcium

Function – is used in the body to create strong teeth and bones. It plays a role in the functioning of muscles and nerves in the body. It also helps the normal clotting of blood cells.

Calcium

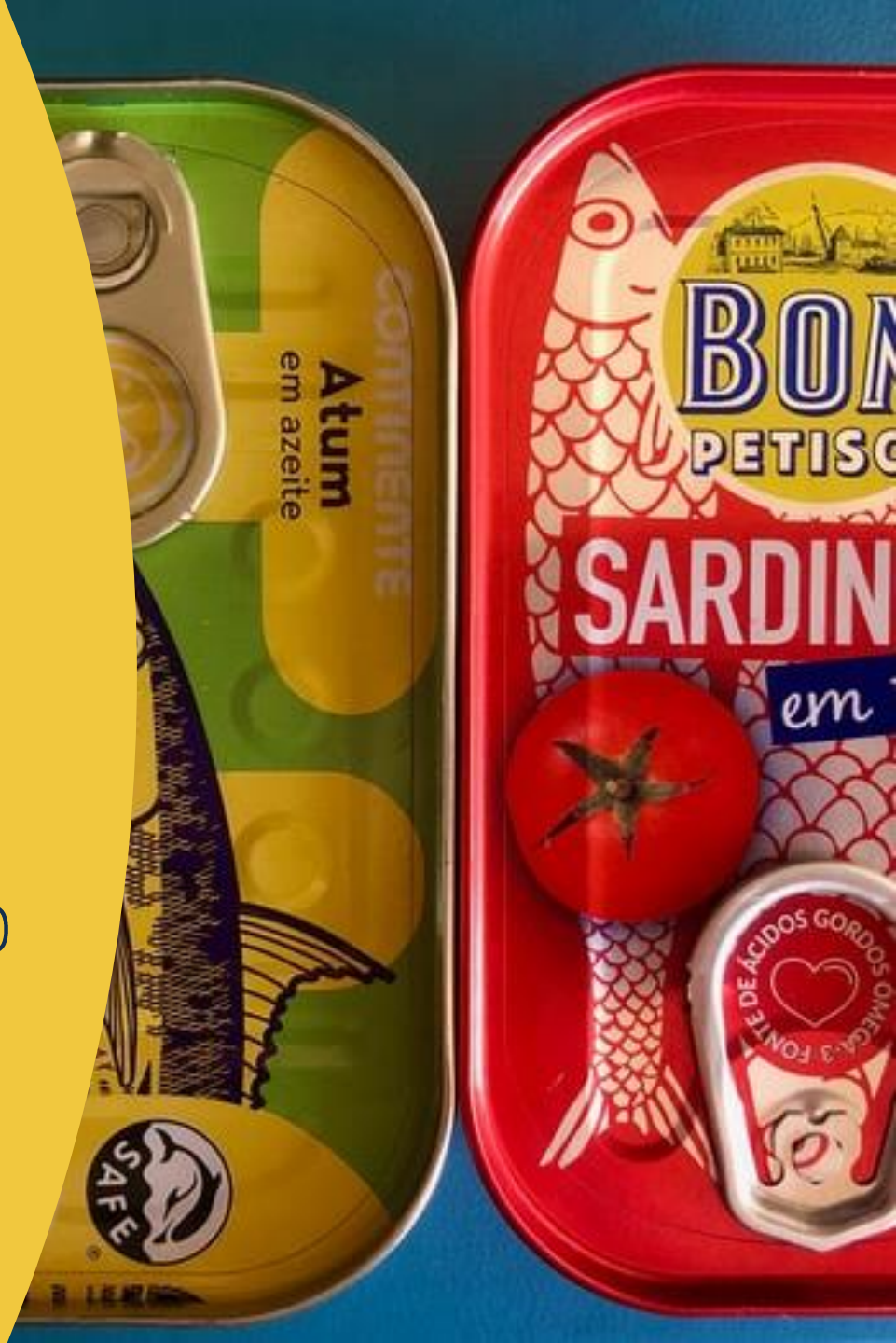
Deficiency – this is rare because the bones act as a source of calcium in times of need which has an affect on bone density.

Toxicity – high doses of calcium can cause diarrhoea and stomach pain.

Calcium

Foods containing calcium are:

- Cheese
- Milk
- Yoghurt
- Some green leafy vegetables e.g. kale
- Bread (fortified with calcium)
- Canned fish e.g. sardines



Phosphorus

Function – it is used to build strong teeth and bones. It also plays a role in helping energy be released from food.

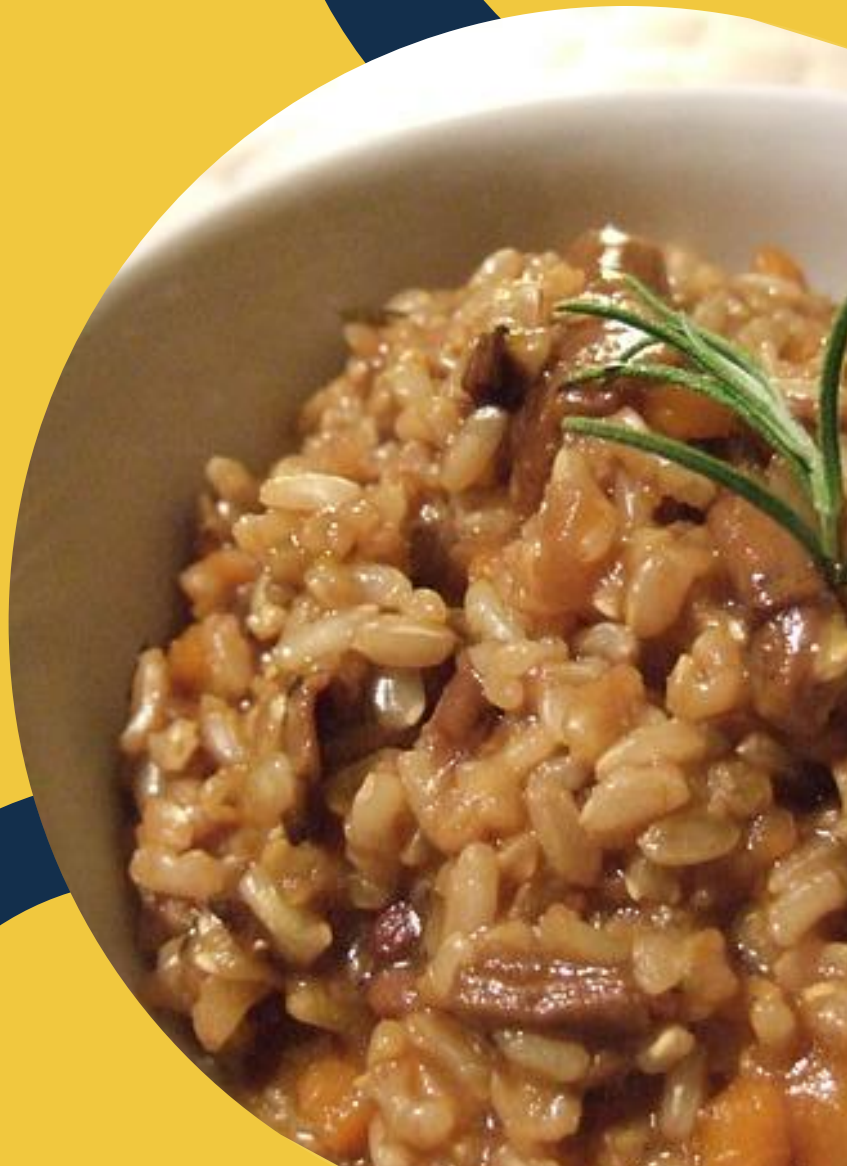
Phosphorus

Deficiency and toxicity – neither of these are likely to occur.

Phosphorus

Foods containing phosphorus are:

- **Poultry**
- **Red meat**
- **Fish**
- **Dairy products**
- **Wholegrains e.g. brown rice and pasta**



Magnesium

Function – it plays a role in helping to release energy from food. It helps bones and muscles to maintain strength, it also ensures the muscles and nerves function correctly.

Magnesium

Deficiency – this is rare but can cause muscle weakness and neuromuscular dysfunction. It can occur in people who have malabsorption issues e.g. alcoholics.

Toxicity – this is rare but may cause diarrhoea.

Magnesium

Foods containing magnesium are:

- **Nuts e.g. Brazil nuts**
- **Seeds e.g. sunflower seeds**
- **Green leafy vegetables**
- **Bread**
- **Wholegrain cereals**

Sodium

Function – this helps to regulate water content within the body.

Sodium

Deficiency – this is unlikely to occur but sodium can be lost by the body through excess sweating, diarrhoea, renal failure, certain diuretic drugs and Addison's disease.

Toxicity – this is very common and can contribute to high blood pressure leading to cardiovascular disease and stroke.

Sodium

Sodium is only found in small amounts in food naturally. The biggest source of sodium is from adding salt (sodium chloride) to food. Salt is added to food during preparation, processing, preserving food and when serving food.

Potassium

Function – maintains normal blood pressure and regulates the water and electrolyte content in the body. It helps in the normal functioning of muscles and nerves.

Potassium

Deficiency – low blood potassium levels can cause severe diarrhoea, weakness, confusion and heart failure.

Toxicity – can result in being harmful to the body this is likely if the kidneys are not working correctly.

Potassium

Foods containing potassium are:

- Red meat
- Poultry
- Fish
- Milk
- Wholegrain cereals
- Vegetables
- Bananas

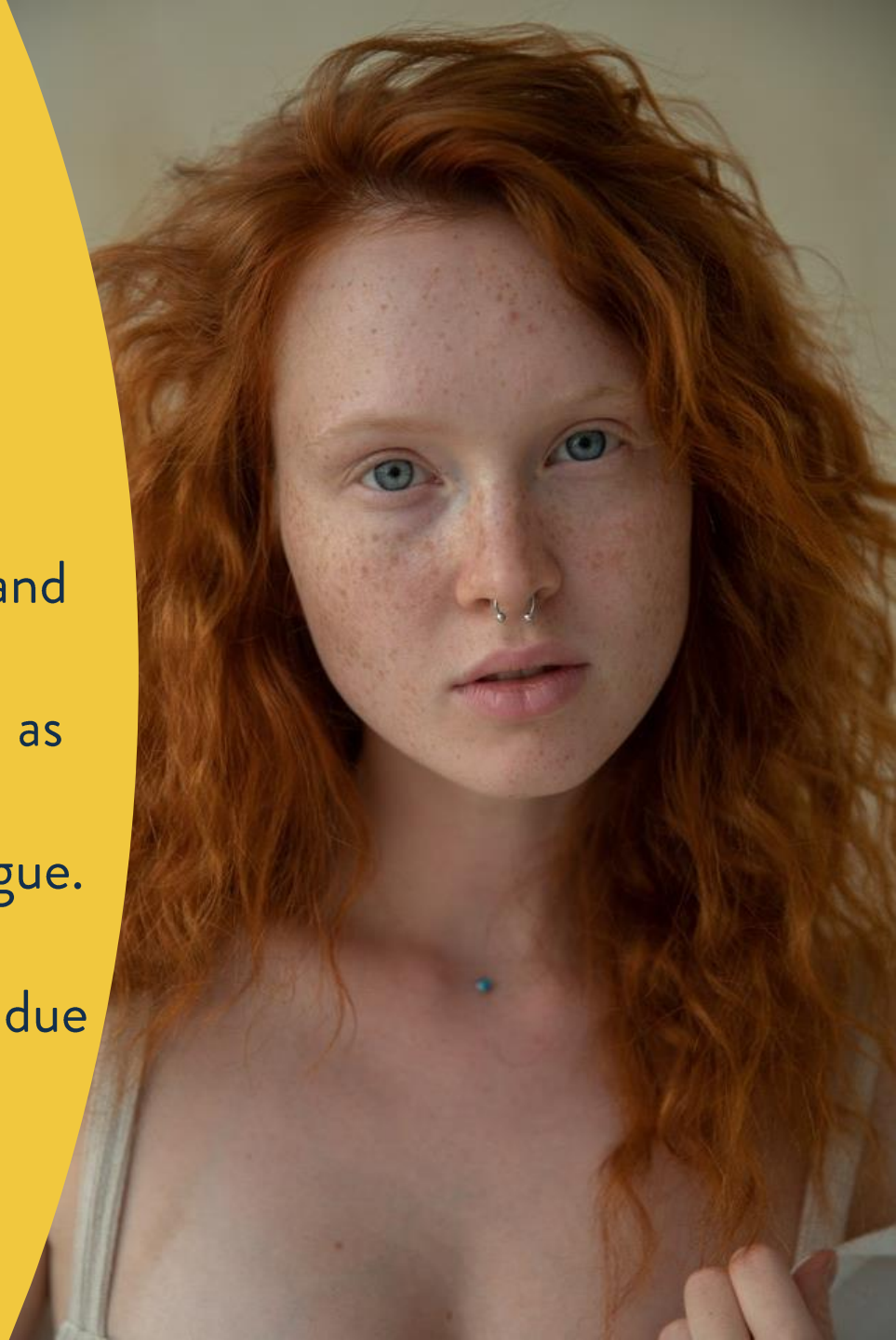
Iron

Function – iron plays a vital role in the production of haemoglobin in red blood cells, this carries oxygen around the body. It helps the immune system and brain to function normally. It is also used in energy metabolism and drug metabolism.

Iron

Deficiency – this can cause a condition called anaemia and is most common in teenage girls and women of child bearing age. Anaemia shows symptoms such as pale skin, fatigue, dizziness, weakness and sore, swollen tongue.

Toxicity – is rare but can occur due to conditions such as haemochromatosis.



Iron

Foods containing iron are:

- **Haem iron (from animals) e.g. liver, red meat and poultry**
- **Non-haem iron (from plants) e.g. nuts, pulses, dark green leafy vegetables and dried fruit**

Zinc

Function – zinc plays a role in a number of reactions in the body it is a cofactor for several enzymes. It is involved in the metabolism of protein, lipid, carbohydrate and production of energy. It is needed for cell division helping repair and growth of tissues in the body and reproductive development. Zinc ensures the normal functioning of skin structure, wound healing and the immune system.

Zinc

Deficiency – is thought to be linked with delayed puberty and short height in some countries.

Toxicity – this can have an effect on copper metabolism.

Zinc

Foods containing zinc are:

- **Meat**
- **Poultry**
- **Milk**
- **Cheese**
- **Wholegrain cereals**
- **Some shellfish e.g. mussels**

Iodine

Function – this helps the body to make thyroid hormones, thyroxine and triiodothyronine. It also helps to ensure the normal functioning of the brain.

Iodine

Deficiency – this can cause tiredness and swelling of the thyroid gland also known as a goitre.

Toxicity – an excess intake of iodine is not absorbed by the body so doesn't cause a problem.

Iodine

Foods containing iodine are:

- Milk
- Yoghurt
- Fish
- Eggs
- Cheese

Fluoride

Function – fluoride in the body causes mineralisation of bones and teeth, it protects teeth from dental caries.

Fluoride

Deficiency – this is common where water supply is low in fluoride.

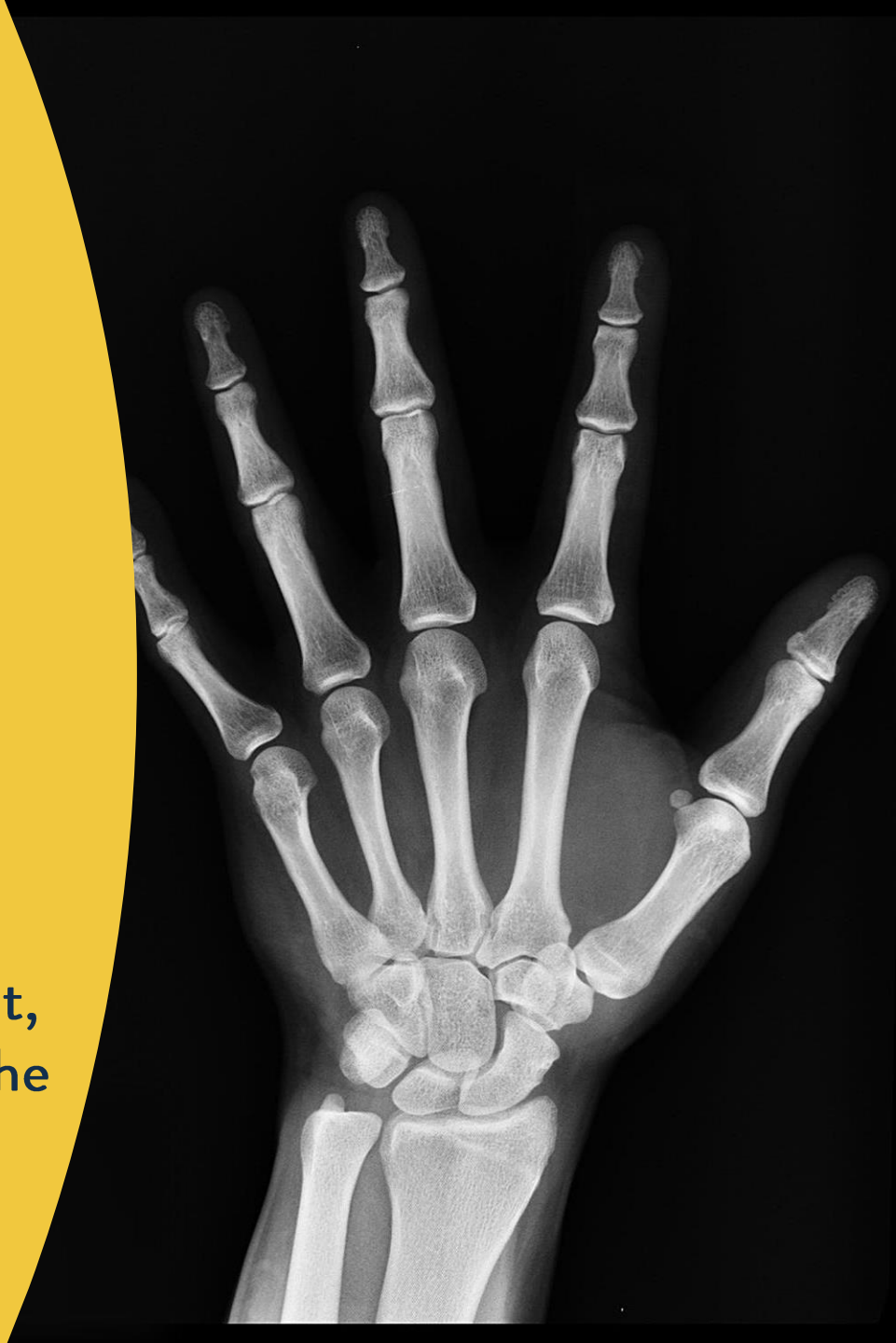
Toxicity – this is rare and can cause a condition called fluorosis leading to crumbling teeth and calcification of ligaments and muscles.

Fluoride

Fluoride is found in water, tea , fish and is added to toothpaste.

Copper

Function – forms a component of several enzymes in the body, it is required to produce red and white blood cells. Copper is used by the body when utilising iron correctly, this helps with brain development, growth, bone strength and the immune system.



Copper

Deficiency – this is rare and only usually occurs in people who have Menke's disease.

Toxicity – this is rare and only usually occurs in people who have Wilson's disease.

Copper

Foods containing copper are:

- **Shellfish**
- **Liver**
- **Nuts**
- **Kidneys**
- **Wholegrain cereals**

Selenium

Function – it forms part of some antioxidant enzymes protecting the body against oxidative damage. Selenium is required for the use of iodine when producing thyroid hormones. It also helps with the immune system and reproductive system functioning.

Selenium

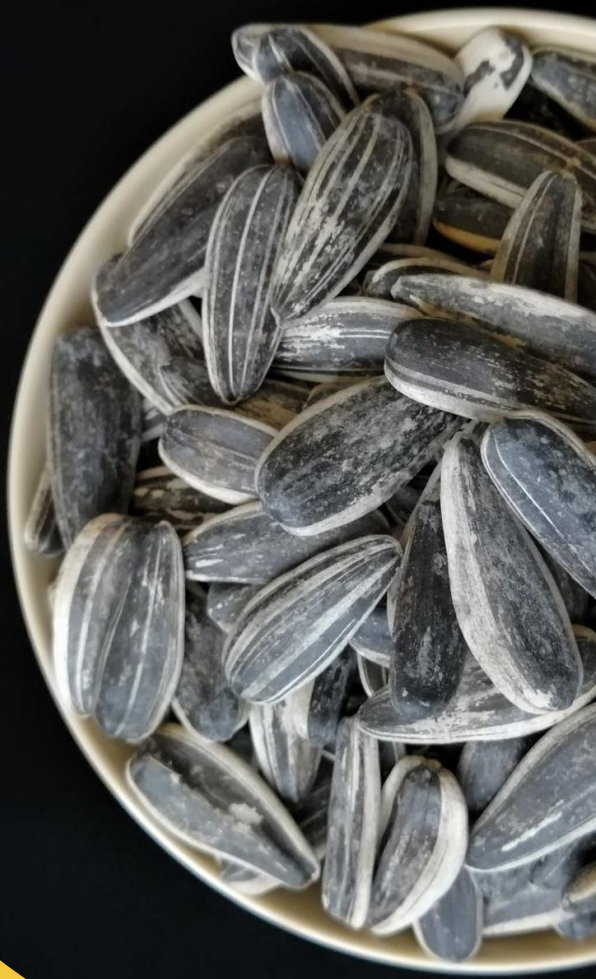
Deficiency – can cause a condition called Keshan disease, this is common in rural China.

Toxicity – this is known as selenosis and symptoms consist of brittle nails and hair, skin lesions and breath has a garlic odour.

Selenium

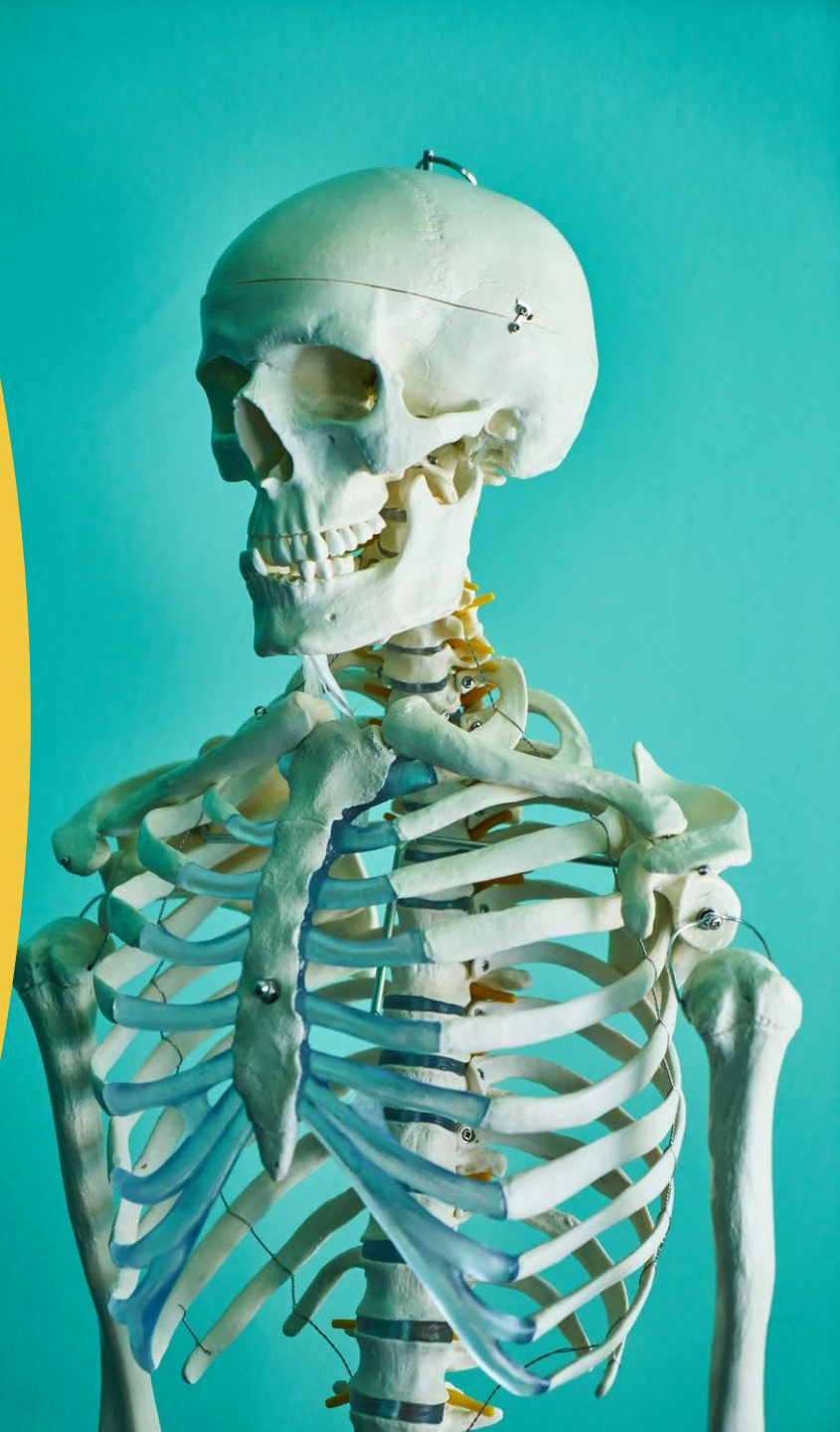
Foods containing selenium are:

- **Nuts e.g. brazil nuts**
- **Meat**
- **Seeds e.g. sunflower seeds**
- **Eggs**
- **Fish**



Manganese

Function – this is used in the formation of bones and energy metabolism. It forms part of antioxidant enzymes protecting the cells from free radical-mediated damage.



Manganese

Deficiency and toxicity – both are very rare.

Manganese

Foods containing manganese are:

- Vegetables
- Cereals
- Nuts
- Tea

Chromium

Function – plays a role in carbohydrate and lipid metabolism. It helps promote insulin to control glucose levels in the blood.

Chromium

Deficiency – can cause the body to have a reduced glucose tolerance.

Toxicity – does not occur.

Chromium

Foods containing Chromium are:

- Meat
- Nuts
- Cereal grains

Revision Activity 3

What minerals are required in large amounts?