science

biology

Y8 B5 – Respiration

1) Breathing

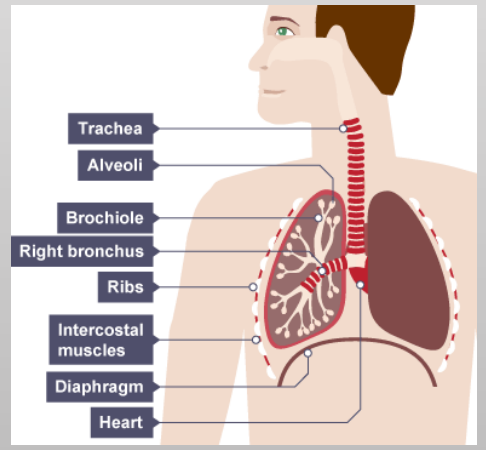
- Ventilation is the scientific name for breathing in and out
- When we breathe in, we **inhale**
- when we breathe out, we **exhale**

	Inhaling	Exhaling
Diaphragm	Contracts and moves downwards	Relaxes and moves upwards
Intercostal muscles	Contract, moving the ribs upwards and outwards	Relax, moving the ribs downwards and inwards
Volume of ribcage	Increases	Decreases
Pressure inside the chest	Decreases	Increases
Movement of air	Moves into the lungs	Moves out of the lungs

We need to breathe in oxygen and breathe out carbon dioxide.

2) The Lungs

The lungs are part of the **respiratory system**. They allow gases to be exchanged. Air passes through the mouth, to the **trachea** which then splits into two branches called **bronchi**. One branch goes into each lung. The bronchi further split into more branches called **bronchioles**. At the end of the bronchioles are **air sacs** called **alveoli**.



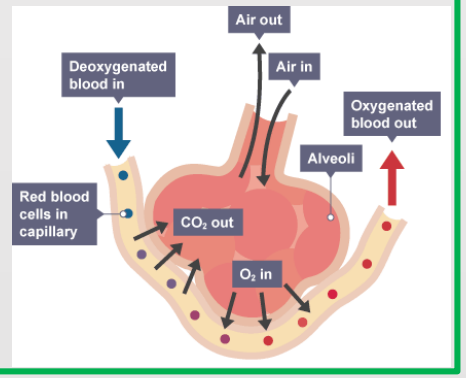
3) Alveoli

Gas exchange in the lungs happens in the alveoli.

- Gases **diffuse** from **high concentration to low concentration**
- Oxygen diffuses from alveoli into the blood when we inhale
- Carbon dioxide diffuses from blood into the alveoli as we exhale

The alveoli have special features to allow efficient gas exchange:

- **thin walls** (one cell thick)
- **large surface area**
- good blood supply
- moist surface



4) Factors Affecting the Lungs

Lung function can be increased and decreased.

- **Exercise** increases lung function as it strengthens the intercostal muscles which **increases lung volume** so more gas exchange can happen.
- **Asthma** decreases lung function. It is where there is **restriction in the airways** due to inflammation, excess mucus and muscle constriction. Asthma can be genetic or it can be due to the environment. It is treated using drugs called bronchodilators (inside an inhaler).

5) Effects of Smoking on the Lungs

Cigarettes contain substances that are harmful to your health:

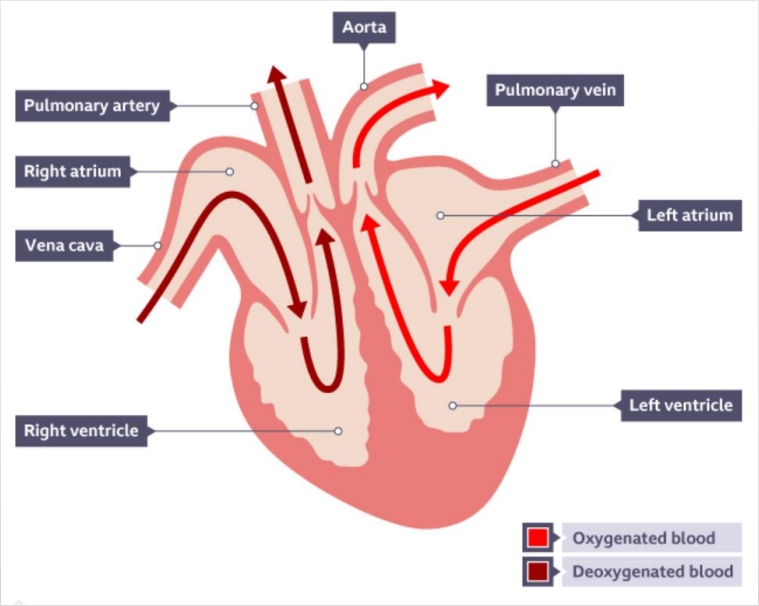
- **Smoke** – damages cilia on epithelial cells lining the airways so microbes can't be removed properly leading to **bronchitis**.
- **Tar** – coats inside of lungs and alveoli which causes coughing. This can cause **cancer** of the lungs, mouth and throat.
- **Nicotine** – addictive substance that increases the heart rate and blood pressure. This can lead to **heart disease**.
- **Carbon monoxide** – reduces the amount of oxygen your red blood cells can carry so your circulatory system has to work harder and so can lead to **heart disease**.

6) The heart and the circulatory system

The heart is a **muscular organ** that pumps blood around your **circulatory system**.

The **circulatory system** is the heart and all the blood vessels in the body which carry cells and substances to all its parts.

The **heart** pumps blood to the lungs and then the rest of your body.



It has four chambers:

- The two top chambers are the **right and left atrium**.
- The bottom chambers are the right **and left ventricle**.

The **atria** collect blood and then pump them to the **ventricles** below. The ventricles then pump the blood to the **body**.

The **muscular** lining of the ventricles that are bigger because they have to pump the blood further than the atria.

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7) Respiration

Respiration is a chemical reaction which happens in cells to **release energy**. The energy released is needed for the life processes.

Respiration takes place in the **mitochondria,** in cells.

There are two types of respiration:

Aerobic Respiration

Glucose + oxygen → carbon dioxide + water

Anaerobic Respiration

Glucose → lactic acid

Anaerobic respiration happens when no oxygen is available and produces **lactic acid** which builds up in muscles and **causes pain and fatigue**. This can only be used for a short period of time, usually during intense exercise.

Aerobic respiration happens when there is plenty of oxygen available and **releases more energy** than anaerobic respiration.

8) Exercise

Exercise immediately causes an increase in:

- **breathing rate**
- **tidal volume** (the volume of air breathed in or out in one breath)

Regular exercise has some additional effects, including an increase in the:

- strength of the diaphragm and intercostal muscles
- **vital capacity** (volume of air that can be forcibly exhaled after inhaling fully)

Exercise also causes an **increase in heart rate**, which;

- Increases the amount of blood flow to muscles
- **More glucose and oxygen** reach muscle cells
- **More aerobic respiration** can take place
- **More energy can be released** for muscle contraction

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