

Organisms

3. Breathing

CONCEPT 2

LESSON GUIDE

GAS EXCHANGE

PRECISE LEARNING POINTS

KNOW

I know what gases involved in gas exchange and where it takes place.

APPLY

I can apply my knowledge to explain how the parts of the body that perform gas exchange have been adapted its purpose.

EXTEND

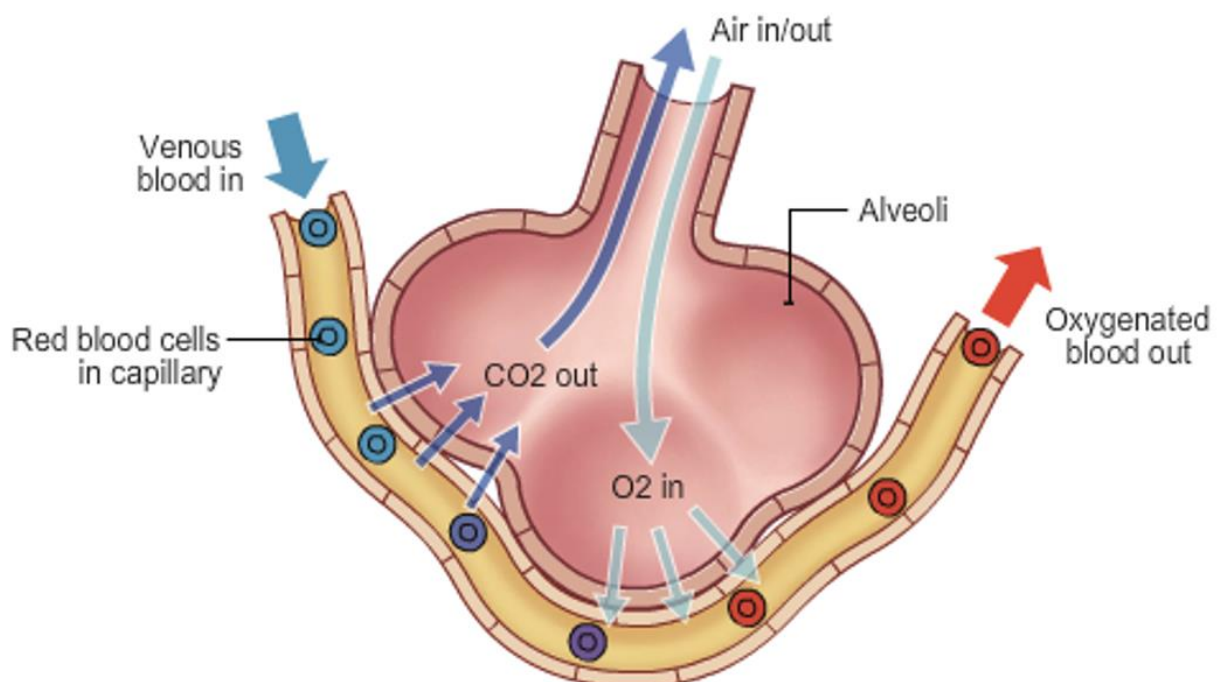
I can extend my knowledge to explain the difference between breathing and respiration.

NOTES

Breathing is important as it ensures we absorb enough **oxygen gas** into our bloodstream. This gas is needed by the cells in our body for **respiration**. Respiration releases **energy** to keep our cell and body functions working. Respiration produces **carbon dioxide gas** as a waste product. This gas must be excreted by the lungs, as if it builds up in our blood stream it is dangerous. It needs to be **breathed out**.

Absorbing oxygen into the blood stream and removing carbon dioxide from the bloodstream in the lungs is called **GAS EXCHANGE**.

Gas exchange takes place across the walls of the **ALVEOLI** in the lungs.



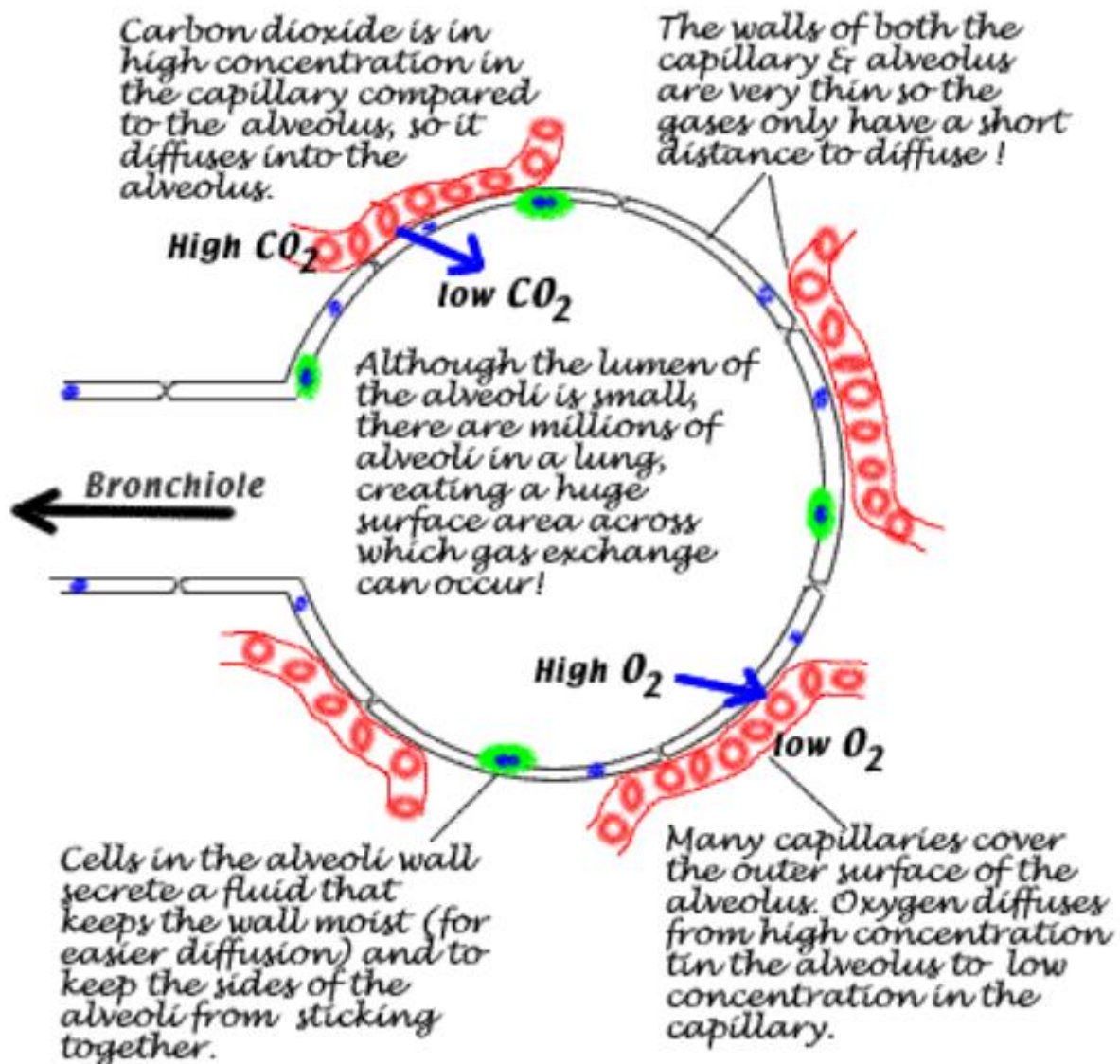
Gas exchange relies upon **diffusion** happening efficiently across the **alveoli walls**. Diffusion is the movement of particles from a higher concentration to a lower concentration. **Oxygen** particles must diffuse **from the air** in the alveoli **into the bloodstream**.

Carbon dioxide must diffuse in the opposite direction. **From the bloodstream into the air** in the alveoli. The alveoli and its surroundings are **adapted** to ensure gas exchange is **efficient**.

Adaptations consist of:

1. **Large surface area** for gas exchange to take place. The lungs contain as much as 500 million alveoli. As a whole surface that's as much as a tennis court! More particles can therefore move at the same time ensuring more oxygen and carbon dioxide diffuse across the alveoli walls.
2. **Many capillaries** are wrapped around each alveolus. This reduces the distance diffusion must take place over so ensuring diffusion is fast enough for gas exchange.
3. The walls of the alveoli are **moist**. This enables gases to dissolve in this moisture speeding up diffusion. It also helps prevent the alveoli walls sticking to each other and collapsing.
4. **Thin** alveolar walls and **thin** capillary walls keep the diffusion distance short and make it easier for particles to diffuse more quickly. Each wall is **one cell thick!**

Structure & Function of the Alveolus



Respiration is a **biochemical process**. This means it is a series of chemical reactions that happens in **living cells**. Mitochondria **releases energy** from chemical energy stores in glucose during respiration. To do this, oxygen is needed as a **reactant**. This oxygen is supplied by breathing. Respiration produced carbon dioxide as a waste **product**. This must be removed by breathing it out. Breathing is the **physical process** of moving air into and out of the **lungs** of our body to enable **gas exchange** to take place. Breathing allows the oxygen needed for respiration to be absorbed and it also removes the carbon dioxide waste product from respiration. So, although they are intricately linked, they are not the same.