

Blood - air barrier

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In this presentation we will be talking about...

01

Explain what will happen if there is no blood air barrier

02

Define the blood air barrier

03

Identify the types of the alveolar cells

04

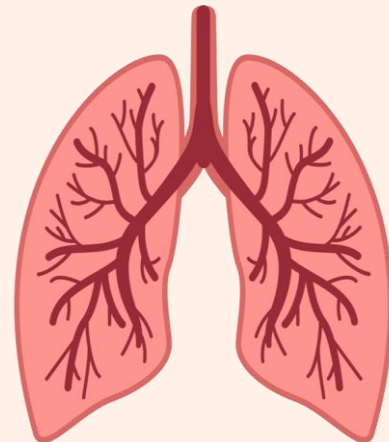
Describe the structure of blood air barrier

05

Define gas exchange

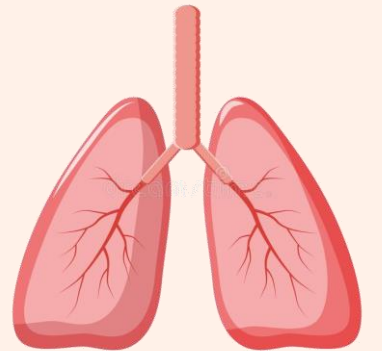
06

Discuss the important characteristic of the gas exchange surface



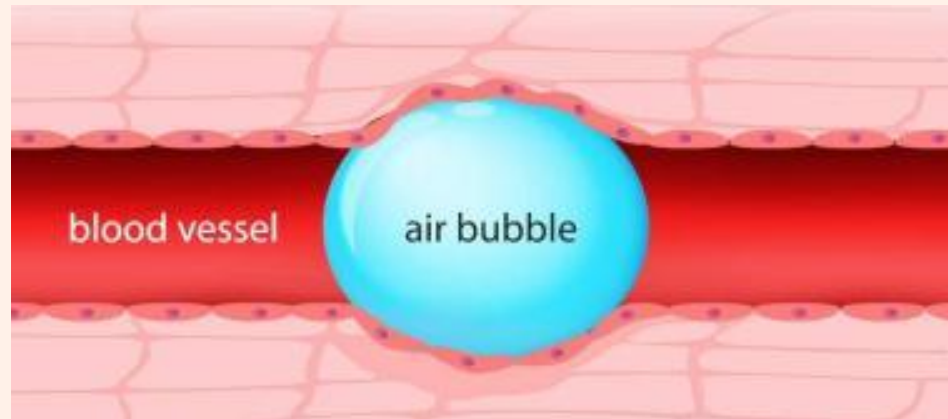
what happens if there is no blood air barrier?

- We know already that blood air barrier is vary important in the body because it prevent air bubbles from entering the blood and the blood from entering the alveoli.
- What happens if air bubbles entered the blood ? (**Venous air embolism**)



What happens if air bubbles entered the blood ?

- **Venous air embolism:** These air bubbles can travel to your brain, heart, or lungs and cause a heart attack, stroke, or respiratory failure. Air embolisms are rather rare.
- It will block the blood vessel which will slower or stop the blood move causing low blood oxygen levels can damage other organs in the body.



Embolism Symptoms



Pain in calf or thigh



Coughing up blood



Wheezing



Dull chest pain



Coughing



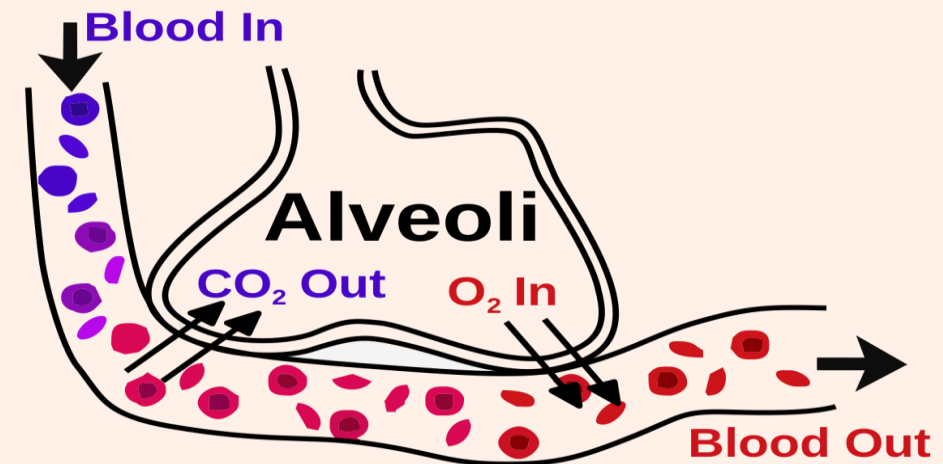
Loss of consciousness



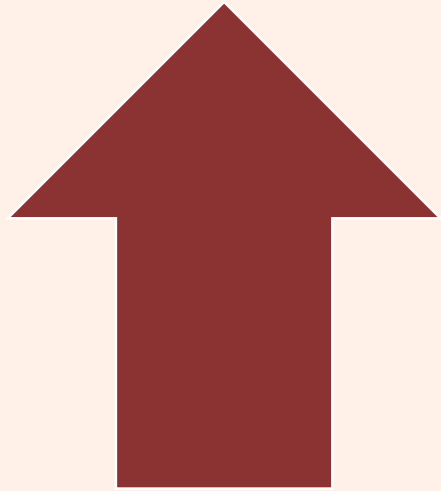
Sudden shortness of breath

Blood air barrier

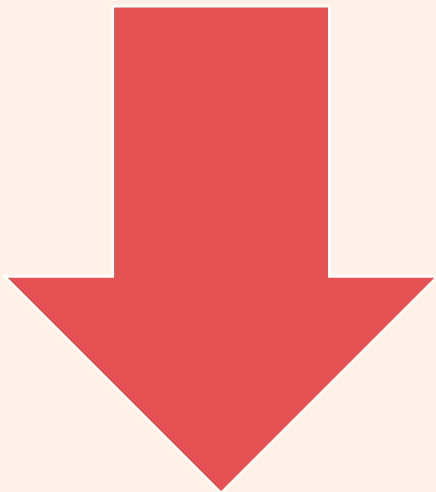
- The blood air barrier or the respiratory membrane exists in the gas exchanging region of the lungs.
- The blood air barrier is placed between the alveoli and the blood vessels. (The tiny blood vessels called capillaries)
- It exists to prevent air bubbles from forming in the blood, and from blood entering the alveoli.



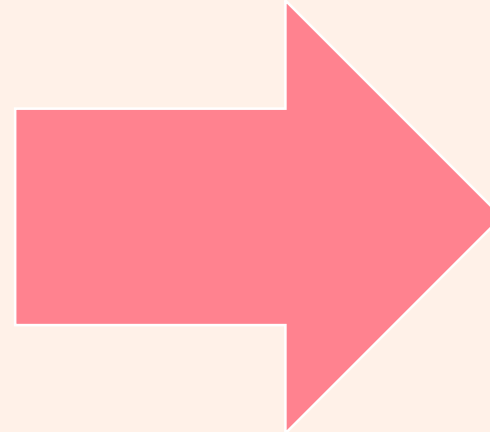
Types of the alveolar cells



Type I
pneumocyte



Type II
pneumocyte



Alveolar
macrophages



Types of the alveolar cells



Type I alveolar cells	Type II alveolar cells
Covers 95% of the alveolar internal surface area	Covers only 5% of the alveolar internal surface area
Thin and squamous	Large and cuboidal
Responsible for gas exchange	Responsible for secretion of surfactant
They cannot be divided	They are able to divide

Types of the alveolar cells

Alveolar macrophages

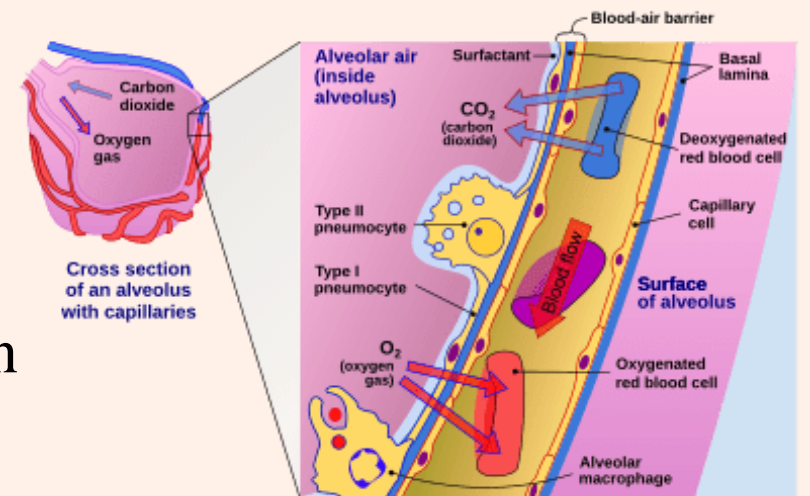
Mononuclear phagocytes that are residents in alveoli

They derive from blood monocytes

The cell membrane of these cells can utilize a network of microtubules to change shape during chemotaxis or phagocytosis.

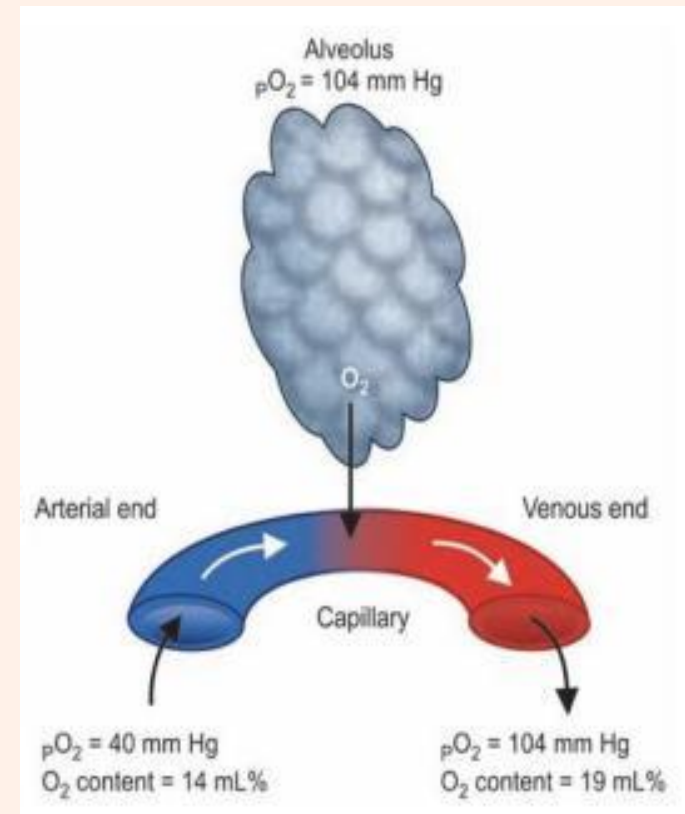
Structure of blood air barrier

- This blood-air barrier is extremely thin approximately $2\mu\text{m}$ - 600 nm ; to allow sufficient oxygen diffusion.
- The blood air barrier is formed by the type I pneumocytes of the alveolar wall.
- It have capillary endothelial cells which are layer that makes up the blood vessels wall and contain blood.
- It is extremely strong; This strength comes from the collagen type IV.
- Damage can occur to this barrier at a pressure more than 40 mm Hg .



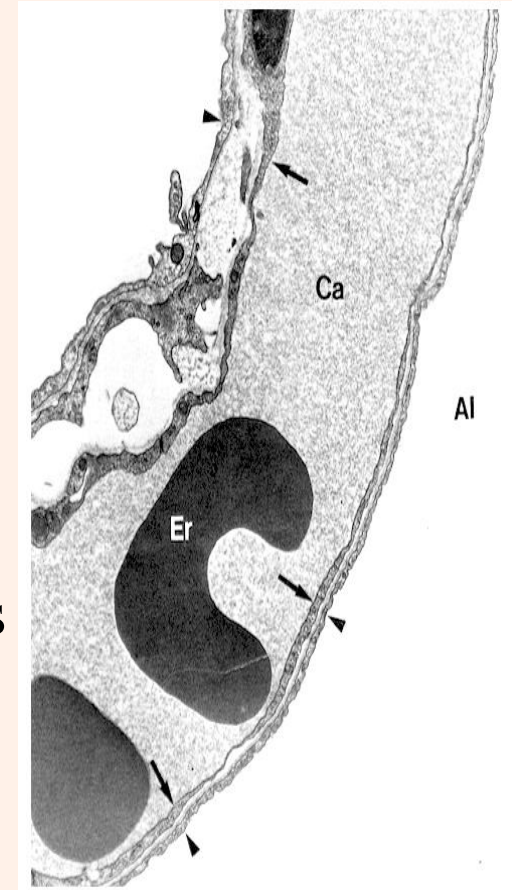
What is gas exchange?

- Gas exchange is the physical process by which gases move passively by diffusion across a surface. For example, this surface might be the air/water interface of a water body, the surface of a gas bubble in a liquid, a gas-permeable membrane, or a biological membrane that forms the boundary between an organism and its extracellular environment.



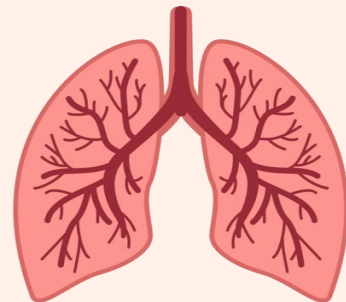
Important characteristic of the gas exchange surface

- Have a large surface area relative to the volume of the organism.
- They are thin, so have a short diffusion pathway.
- They have a moist surface where gases can dissolve first before they diffuse in or out.
- They are able to maintain the diffusion gradient down which the gases can diffuse.



summary

- The blood air barrier exists to prevent air bubbles from forming in the blood, and from blood entering the alveoli.
- There are different types of the alveolar cells type I alveolar cells, type II alveolar cells and alveolar macrophages.
- It have capillary endothelial cells which are layer that makes up the blood vessels wall and contain blood.
- Gas exchange when gases move passively by diffusion across a surface.
- One of the gas exchange surface important characteristic is that it is very thin.
- Explained venous air embolism and its symptoms.



Refrance

- <https://www.ncbi.nlm.nih.gov/books/NBK557542/>
- https://www.answers.com/biology/What_are_the_features_of_a_gas_exchange_surface
- <https://www.healthline.com/health/air-embolism>
- <https://www.mayoclinic.org/diseases-conditions/pulmonary-embolism/symptoms-causes/syc-20354647>





Thank you
for listening