



# Blood Air Barrier

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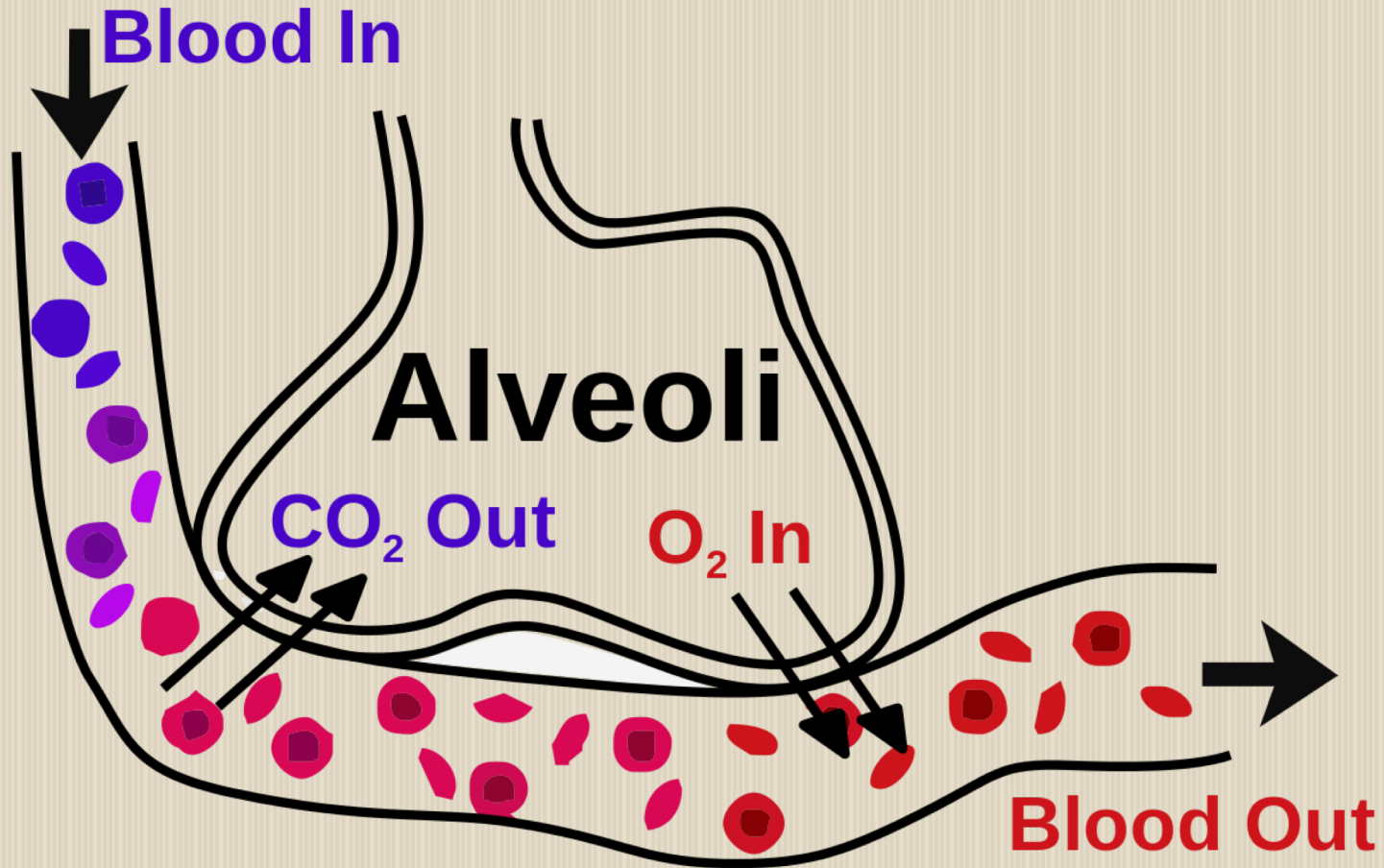
# Blood\_ air barrier

## ❑ What is the Blood-Air Barrier ?

The barrier between capillary blood and alveolar air comprising the alveolar epithelium and capillary endothelium with their adherent basement membrane and epithelial cell cytoplasm pulmonary gas exchange occurs across this membrane.

❑ The blood–air barrier (alveolar–capillary barrier or membrane) exists in the gas exchanging region of the lungs. It exists to prevent air bubbles from forming in the blood, and from blood entering the alveoli. It is formed by the type 1 pneumocytes of the alveolar wall, the endothelial cells of the capillaries and the basement membrane between the two cells. The barrier is permeable to molecular oxygen, carbon dioxide, carbon monoxide and many other gases

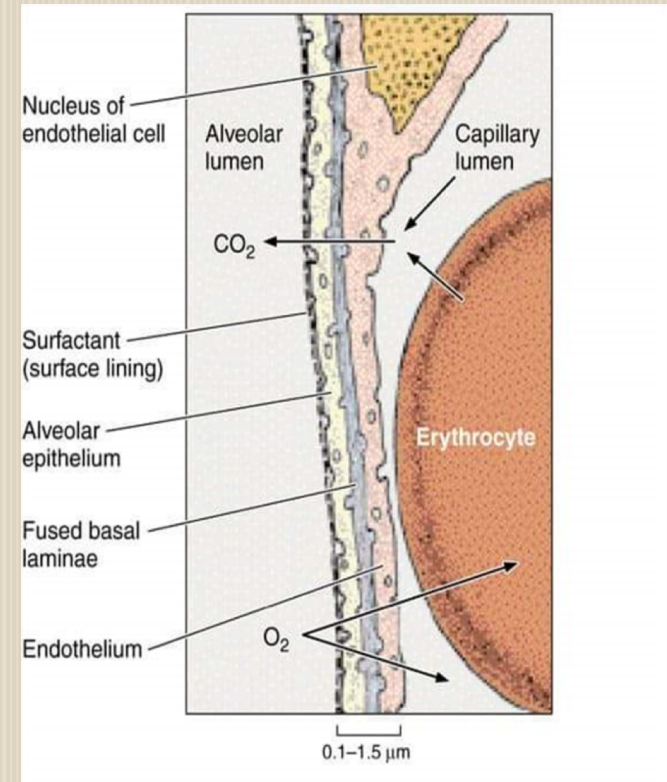
# Blood\_ air barrier

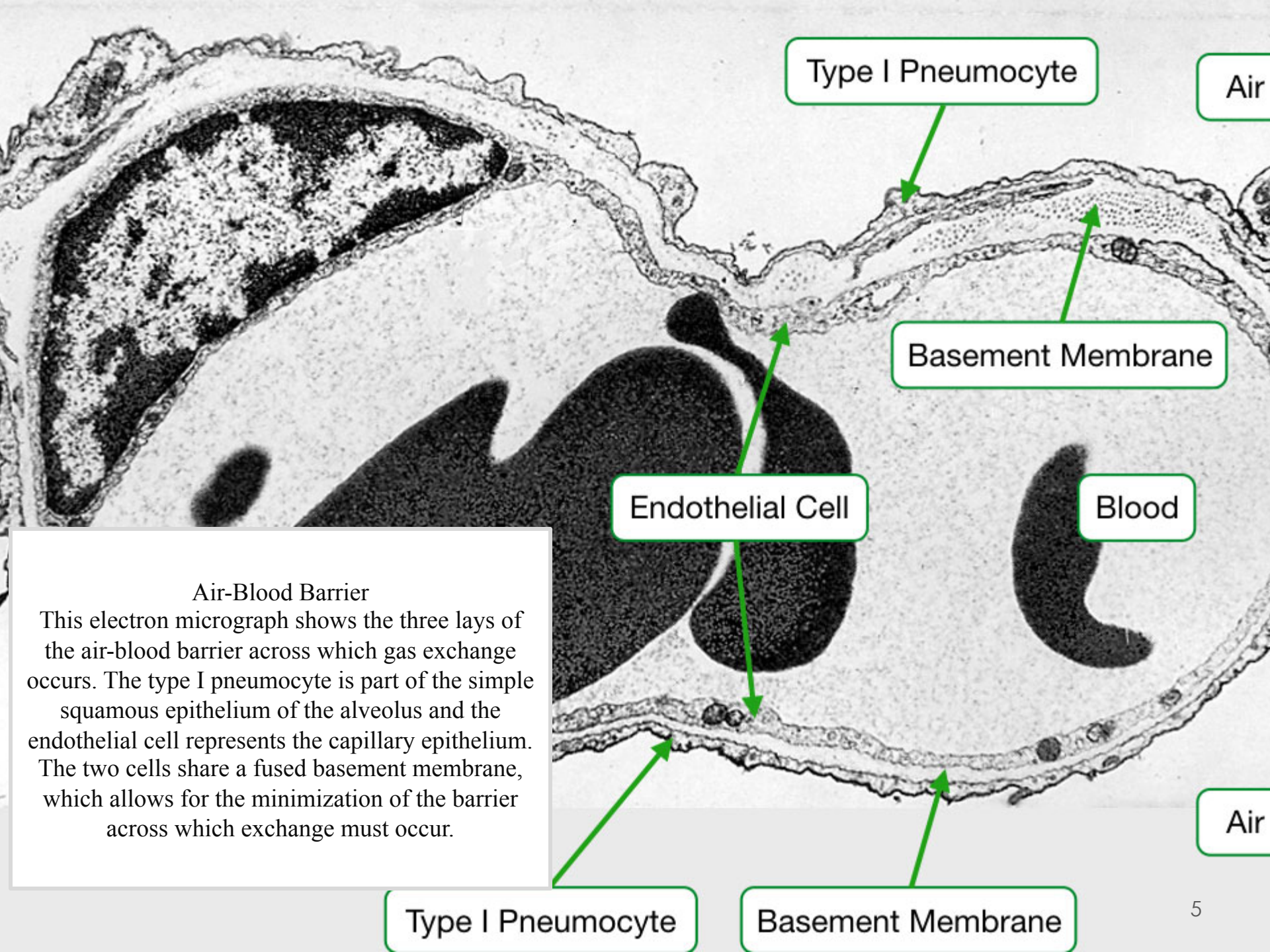


## ➤ Blood-air barrier:

- Two to three highly attenuated, thin cells lining the alveolus, the fused basal laminae of these cells and of the capillar endothelial cells, the thin endothelial cells of the capillary.
- Thickness of these layers varies from 0.1 to 1.5 $\mu\text{m}$ .
- The inner lining of alveoli is covered by a layer of surfactant, which lowers fluid surface tension and helps prevent collapse of alveoli.
- The blood air barrier is separate between alveolar and the capillary.

## Structure of Blood-air barrier





Type I Pneumocyte

Air

Basement Membrane

Endothelial Cell

Blood

**Air-Blood Barrier**  
This electron micrograph shows the three layers of the air-blood barrier across which gas exchange occurs. The type I pneumocyte is part of the simple squamous epithelium of the alveolus and the endothelial cell represents the capillary epithelium. The two cells share a fused basement membrane, which allows for the minimization of the barrier across which exchange must occur.

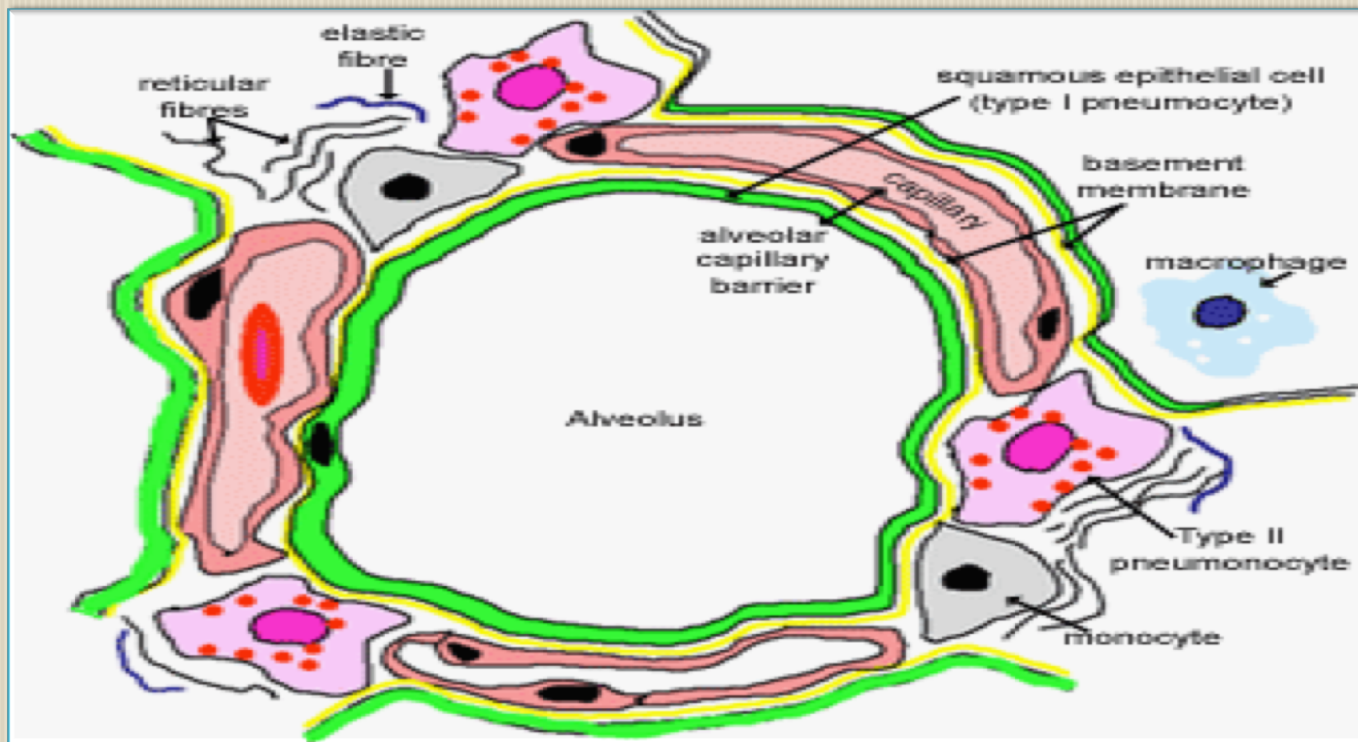
Air

Type I Pneumocyte

Basement Membrane

# Types of alveolar cells:

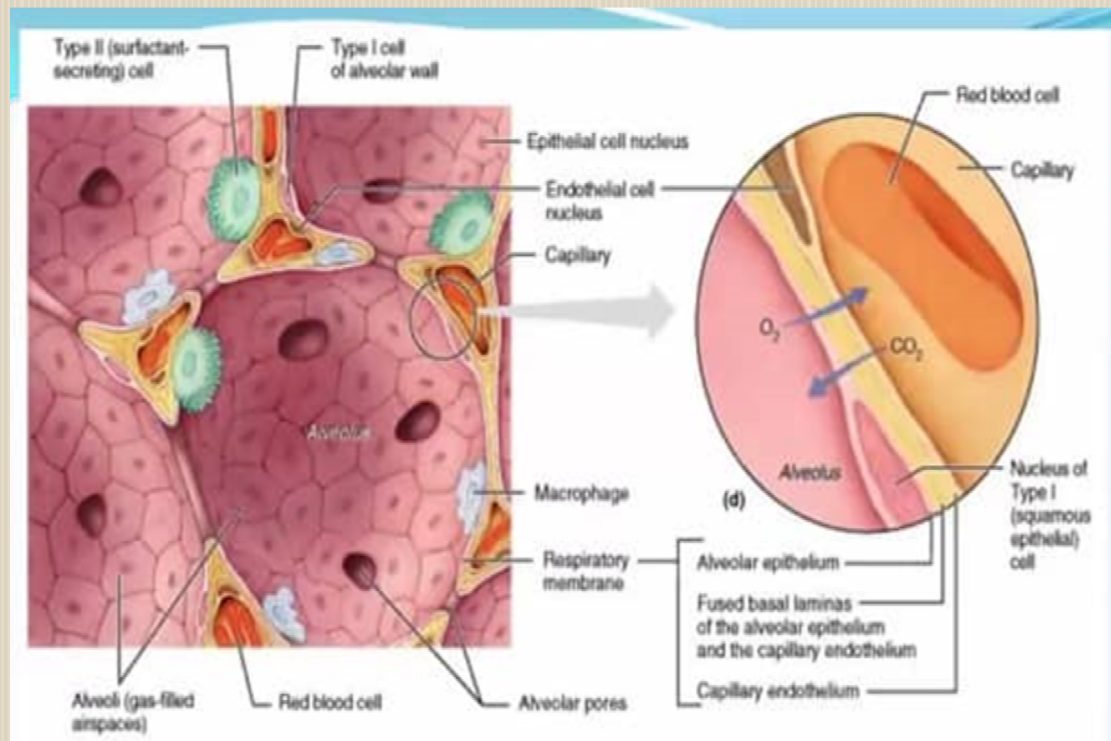
- There are two types of alveolar cells:



# Types of alveolar cells

- **Type I** alveolar cells (or type I pneumocytes) are also extremely attenuated cells that line the alveolar surfaces.
- Type I cells maintain the alveolar side of the blood-air barrier and cover about 95% of the alveolar surface; .  
Organelles are grouped around the nucleus, reducing the thickness of the cytoplasm at the blood-air barrier .it is squamous epithelium.
- type II alveolar cells cover the remainder 5%.
- **Type II** alveolar cells (type II pneumocytes or septal cells) are cuboidal cells that bulge into the air space, interspersed among the type I alveolar cells and bound to them with occluding junctions and desmosomes. Type II cells often occur in groups of two or three along at points where two or more alveolar walls unite. The inner lining of alveoli is covered by a layer of surfactant, not depicted here, which lowers fluid surface tension and helps prevent collapse of alveoli. It turns to the type I when the type I decreases.
- It is excreted by the surface that reduces the surface tension of fluid

- These epithelial cells rest on the same basal lamina and have the same origin as the type I cells that line most of the alveolus. Type II cells divide to replace their own population after injury and to provide progenitor cells for the type I cell population. Type II cell nuclei are rounded and may have nucleoli, and their cytoplasm is typically lightly stained with many vesicles.







# References

- Junqueira's Basic Histology Text and Atlas 13th , chapter 17
- [https://en.wikipedia.org/wiki/Blood-air\\_barrier](https://en.wikipedia.org/wiki/Blood-air_barrier)
- [medcell.med.yale.edu/histology/respiratory\\_system\\_lab/air\\_blood\\_barrier.php](http://medcell.med.yale.edu/histology/respiratory_system_lab/air_blood_barrier.php)