

Alveolar Gas Exchange

Alveoli are locations for gas exchange. O₂ from inhaled air can be exchanged for CO₂, which will be exhaled. They are the most basic structural unit of the lungs. The pulmonary artery brings deoxygenated blood, which is O₂-poor and CO₂-rich, from the heart to the lungs. The CO₂ comes from the byproduct of cellular respiration released by cells throughout the body and picked up by the blood. These gases then diffuse across a two-cell thick barrier. CO₂ diffuses into the air of the alveoli to be exhaled, while O₂ diffuses from the air into the blood for distribution to cells. The gases reach an equilibrium value (equal partial pressures in the blood and alveoli), and the blood leaves the alveoli back to the heart. Blood travels through the pulmonary vein to the left atrium and is now O₂-rich and CO₂-poor. Heat can also be exchanged across the alveoli. This exchange is a useful mechanism of thermoregulation, as the body can release excess heat through warm breaths and retain needed heat if the body temperature is too low.



PLAY PICMONIC

Characteristics

Pulmonary Artery Blood is O₂-Poor, CO₂-Rich

[Arrow-vessel going to Lungs with lots of CO₂ molecules](#)

Blood in the pulmonary artery is low in O₂ concentration because it has returned from dropping off oxygen to all cells in the body. It is high in CO₂ concentration because it has picked up CO₂, a metabolic byproduct, from those cells. From pulmonary artery the O₂-poor blood goes into the lungs to become O₂-rich blood.

Two-Cell Thick Air-Blood Barrier

[Two Cell Barrier](#)

The layer of cells between an alveolus and blood is only two cells thick, which allows for the diffusion of gas in both directions following separate concentration gradients.

CO₂ Diffuses Into Air

[CO₂-molecule Diffuses Into Air](#)

Carbon dioxide diffuses into the alveoli from the CO₂-rich blood and is exhaled.

O₂ Diffuses Into Blood

[O₂-tank Diffusing Into Blood](#)

O₂ is inhaled into the alveoli, where it diffuses across the alveolar-capillary membrane into oxygen-poor blood in the pulmonary capillaries and makes oxygen-poor blood oxygenated, which is then transported to the heart for systemic circulation.

Gases Equilibrate

[Gas-scales at Equilibrium](#)

The concentration of both CO₂ and O₂ equilibrate through diffusion until there are roughly equal concentrations of both in the alveoli and the blood.

Pulmonary Vein is O₂-Rich, CO₂-Poor

[Vine from Lungs with lots of O₂-tanks](#)

The pulmonary vein runs from the alveoli to the left atrium of the heart and is eventually pumped out to the body. This blood is O₂-rich and CO₂-poor because it has just picked up oxygen and dropped off carbon dioxide at the alveoli.

Thermoregulation

Thermometers

The other exchange that occurs at the alveoli is heat exchange. Breathing contributes to body temperature regulation by breathing out warm air if the body temperature is high or retaining heat from the air if the body temperature is low.