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|  | **External** | **Internal** |
| **Definition** | **Exchange of gases between the air in the alveoli and the blood in the pulmonary capillaries** | **Exchange of gases between the blood and the tissues.** |
| **Location** | **Thoracic Cavity****In the lungs- alveoli and blood capillaries (ie. atmosphere and blood)** | **Systemic blood capillaries and the tissue fluid of cells.** |
| **PO2** **Partial pressure of Oxygen** | **LUNGS****PO2 in the alveoli is > PO2 in the blood****[O2] in atmosphere is > [O2] in the pulmonary capillaries and O2 diffuses from the lungs into the blood plasma then into RBC** | **BLOOD!****PO2 in the blood capillaries is > PO2 in the tissues (Oxygen is being used for cellular respiration)****[O2] in blood capillaries is > [O2] in the tissues and O2 diffuses out of the blood into the tissues** |
| **PCO2****Partial pressure of carbon dioxide** | **BLOOD** **PCO2 in the blood is > PCO2 in the atmosphere (air)****[CO2] in Pulmonary caps> [CO2] in air and diffuses from plasma into the lungs** | **CELLS!****PCO2 in the tissues is > PCO2 in the blood.****[CO2] in tissue fluid > [CO2] in blood and diffuses from tissues into the blood** |
| **Oxygen Reaction** | **Hb + O2(g) 🡪 HbO2****deoxyhemoglobin +oxygen 🡪 oxyhemoglobin** | **HbO2 🡪 Hb + O2(g)** **Oxyhemoglobin ->deoxyhemoglobin + oxygen** |
| **Carbon Dioxide Reaction** | **Most carried as HCO3- bicarbonate ion:****H++HCO3-🡪 H2CO3** **🡪H2O +CO2 (g)↑****Carbonic anhydrase is the enzymes for H2CO3** **🡪H2O + CO2 (g)↑** | **Most combines with water:****H2O + CO2🡪 H2CO3** **🡪H++HCO3-****Carbonic anhydrase is the enzymes for H2O + CO2🡪 H2CO3**  |
| **Hemoglobin (Hb)****Reactions** | **HbCO2 🡪 Hb + CO2 (g)↑**carbaminohemoglobin**Hb + O2(g)↓ 🡪 HbO2**Deoxyhemoglobin + oxygen 🡪 oxyhemoglobin**HHb 🡪 Hb+ H+**reduced Hbreleaseses H+ | **Hb + CO2 (g)↑ 🡪 HbCO2** **HbO2 🡪 Hb + O2(g)** **Hb+ H+🡪 HHb**Hemoglobin and Hydrogen ions combine to form reduced hemoglobin**.**  |