    - Blood flows through the lamellae opposite to the direction that water does
        - Counter current flow optimizes P oxygen gradient between blood and water
- Hemoglobin:
    - Many in one RBC
    - One hemoglobin can bind 4 oxygen molecules
    - Low P oxygen = only 1 oxygen binds
        - When 1 binds it changes the shape of the hemoglobin and makes it easier for more to bind
    - High P oxygen = hemoglobin 100% saturated
    - Only 1 oxygen molecule is released when hemoglobin circulates whole body
        - Saves oxygen for when and where it is really needed
    - Carbon dioxide has a 240 fold higher binding affinity to hemoglobin
    - Excess H+ binds to hemoglobin and lowers oxygen affinity
        - binding/dissociation curve shifts right
        - Hemoglobin will release more oxygen when pH in tissue is low
    - 2,3 bisphosphoglyceric acid (metabolite of glycolysis)
        - Low P oxygen → increased glycolysis
        - BPG binds with deoxygenated hemoglobin and lowers oxygen affinity
        - Shifts curve right
- Carbon dioxide is transported as bicarbonate ions in the blood but converted back to carbon dioxide in the lungs
- Carbonic anhydrase speeds up carbon dioxide into carbonic acid which then dissociates into bicarbonate and water
- Breathing is generated from the brain
    - Can be voluntary or involuntary but involuntary dominates
- Motor neurons in dorsal medulla increase firing rate just before inhalation
    - Leave the CNS to form phrenic nerve which innervates the diaphragm
    - Exhalation occurs when they stop firing
- Exhalation is a passive recoil of the lung tissues
- Motor neurons in the ventral medulla become active when breathing demand is high