Session 9

10/01

- Where does oxygen bind to on Hb?

  Central Iron of the heme group. (Porphyrin Ring)

- What are the two states of Hb?
  T (deoxygenated) and R (oxygenated)

- What happens to Hb when oxygen binds?

  There is a confirmational change from T (deoxygenated) to R (oxygenated).

- What does this confirmation change look like? What amino acid is involved?
  When in the T state (deoxygenated), the heme group is concave due to the histidine "pulling" it downwards. Once oxygen binds and a confirmational change occurs (T→R), the structure of the heme group becomes planar by "pulling it upwards".

- What interacts with each subunit of Hb?
- The porphyrin ring (heme group)

- Where in the body is PO_2 highly concentrated? Where is PO_2 low?

  High: Lungs

  Low: Tissues (muscle cells)

- What causes oxygen to dissociate from Hb? Where is this occurring?

  Low PH and CO_2 Production. Tissues / Muscle cells

- Why is oxygen concentration relatively low in tissues/muscle cells?
  Oxygen is used to create CO_2 in cellular respiration.

- Where does CO_2 bind on Hb? Write out the chemical equations of the binding of CO_2 relative to their location in the body.
  Specifically binds to N-terminus of a subunit.
  Tissues
  $CO_2 + NH_3^+$-Subunit → COO^--NH-Subunit
  Lungs
  $CO_2 + NH_3^+$-Subunit ← COO^--NH-Subunit

- Where is Mb found?
  In muscles cells (cardiac, skeletal, etc.)

- How many subunits make up Mb?
  One

- What is the function of Mb?
  It acts as an oxygen reservoir for muscle cells. It releases oxygen when it's needed in tissues.

- The muscles of deep diving mammals such as whales contain exceptionally large amounts of Mb. How does this circumstance contribute to prolonged dives?

  Mammals such as whales do not have the same respiratory rate that humans/other animals do. Compared to humans, their respiratory rate can be as little as 1.25 breaths per MINUTE. They must have high amounts of Mb in order to maintain a relatively stable concentration of O_2 in muscles/tissues. Without high amounts of Mb (an oxygen reservoir), whales would be in a constant hypoxic state.