Review 09

Gas Exchange, con't

	atmospheric air	alveolar air*
oxygen	157 mm Hg	100 mm Hg
carbon dioxide	0.3 mm Hg	40 mm Hg

*doesn't change significantly with exercise!

- blood coming into lungs has
  $P_{O_2} \approx 40$ mm Hg $P_{CO_2} \approx 45$ mm Hg
- blood leaving lungs has
  $P_{O_2} \approx 100$ mm Hg $P_{CO_2} \approx 40$ mm Hg (refer to above table)

Oxygen carried in blood plasma (very little) and hemoglobin (mostly)

- up to 4 oxygen molecules/hemoglobin molecule (1 per subunit)
- carries almost 100% of oxygen
- oxygen-hemoglobin association-dissociation curve—know how to use!
- "Bohr Effect"--as body temp and acidity increase (as in active muscle) the O_2-Hb assoc-dissoc curve shifts to right, offloading even more oxygen into the muscle

Altitude

- lower atmospheric pressure results in lower P_{O_2}
- lower P_{O_2} results in lower saturation of Hb by O_2, resulting in
- lowered oxygen delivery to tissues, resulting in
- quicker fatigue
- other complications:
  pulmonary edema (lungs begin to fill with fluid)
  similar problem with brain, leading to confusion and loss of consciousness

Carbon Dioxide carried

- non-specifically bound to hemoglobin (about 25%)
- as carbonic acid or bicarbonate ion (about 65%)
- as gas dissolved in blood plasma (about 10%)

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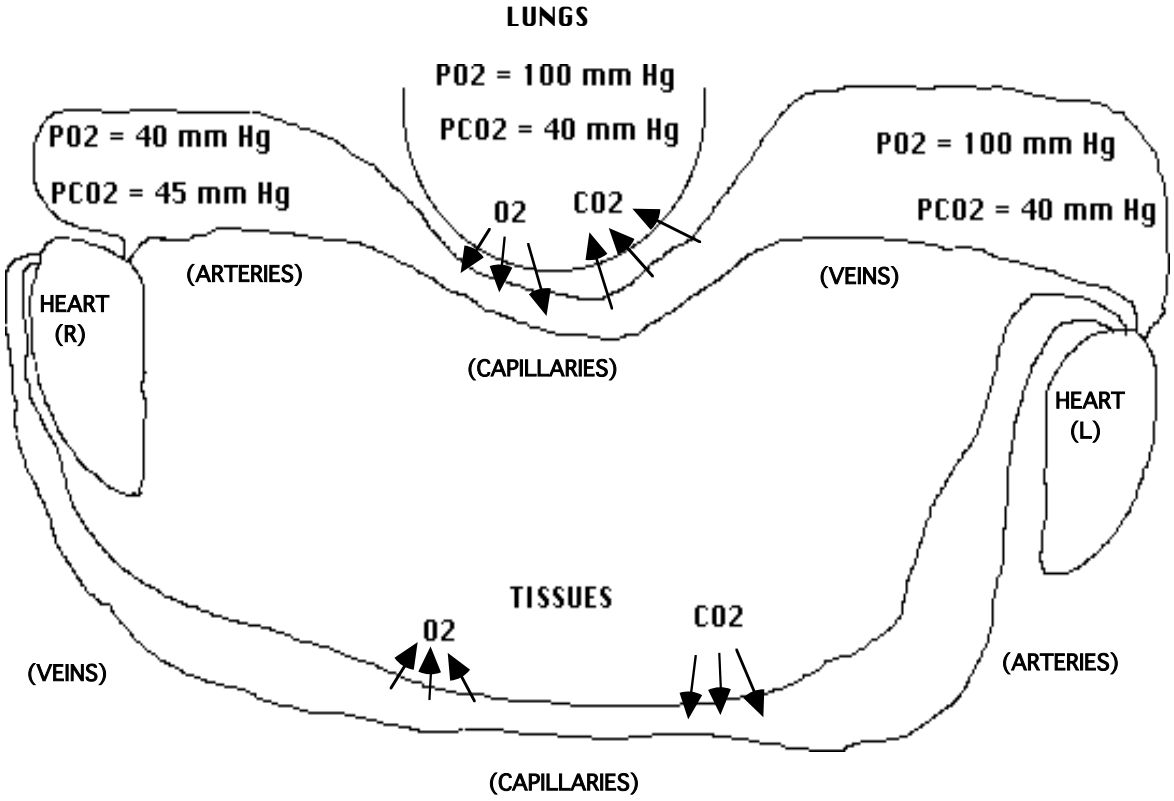

Myoglobin (in muscle)
- provides oxygen reserve for low oxygen conditions
- comparison of oxygen association-dissociation curves for myoglobin and hemoglobin....

Carbon Monoxide....binds tightly to heme groups, displacing oxygen
- removed only slowly by normal breathing
- sunlight helps to break bond, remove more rapidly