CONCEPT: FETAL HEMOGLOBIN

●A fetus has structurally *different* Hb because it must be able to _____ O_2 from its mother's blood.

□ Fetal hemoglobin (FHb) has two _____ (γ) subunits rather than two β subunits (Fetal hemoglobin: $\alpha_2\gamma_2$).

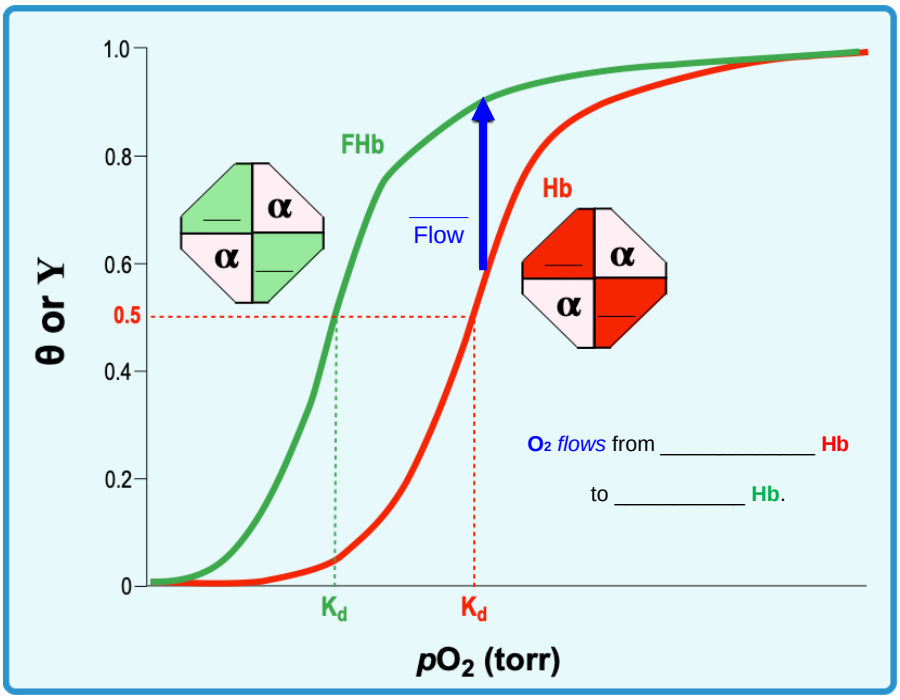
●FHb therefore has a *low* affinity for BPG, which correlates with _____ O_2 affinity.

□ This allows _____ *flow* from the maternal oxyhemoglobin (HbO_2) to the fetal deoxyhemoglobin (FHb).

EXAMPLE: According to the dissociation constants (K_d) in the plot below, which hemoglobin has a stronger affinity for O_2?

a) Adult Hb.

b) Fetal Hb.



PRACTICE: Fetal hemoglobin binds oxygen with a _____ affinity than adult hemoglobin, because it lacks the binding site for _____, which is an allosteric _____ of oxygen binding to adult hemoglobin.

a) Lower ; BPG ; inhibitor.

b) Higher ; H_+ ; inhibitor.

c) Higher ; BPG ; activator.

d) Higher ; BPG ; inhibitor.

e) Lower ; CO ; inhibitor.

PRACTICE: Why is the decreased affinity of fetal hemoglobin for BPG advantageous?

a) With more BPG molecules bound, there are less heme groups available for O_2 binding.

b) Decreased BPG binding biases FHb toward the R state.

c) More free BPG is available to bind adult hemoglobin, resulting in its shift to the R state.

d) BPG is available to bind to fetal myoglobin, helping to release O_2 in fetal muscle tissue.