

Protein Function - Myoglobin and hemoglobin
Chapter 7 Learning Objectives

By the end of this chapter you should be able to:

- 1) Explain the physiological roles of both oxygen carrying proteins. Also be able to relate the affinities of each molecule in respect to the location in the body, O₂ saturation levels and other factors which affect the protein
- 2) Know the main features of the structure of myoglobin and the heme as determined by the x-ray crystallography.
- 3) Describe the major differences in the oxygenated and deoxygenated states of hemoglobin.
- 4) Understand the importance of the Fe in O₂ binding, and the relevance of the amino acids involved. Don't forget the oxidation state of the iron
- 5) Compare the subunit composition of adult and fetal hemoglobin. Know exactly what the effect on altering the subunit composition has on O₂ affinity.
- 6) Describe the significance of the conserved amino acids between myoglobin and hemoglobin.
- 7) Relate the three dimensional structure of hemoglobin and the contact points to the function of the protein
- 8) Define cooperative binding of hemoglobin vs. the manner in which myoglobin binds O₂
- 9) Explain and interpret a hill plot. Know the significance of the hill coefficient.
- 10) Describe the Bohr effect on O₂ binding.
- 11) Know the affect of increased concentration of CO₂ on Hb O₂ binding.
- 12) Explain the effect of 2,3-bisphosphoglycerate (BPG), on the affinity of hemoglobin for O₂
- 13) Correlate the changes in fetal hemoglobin with it's physiological function
- 14) Distinguish between the sequential model and the concerted model of cooperatively
- 15) Explain and relate the concept of allosterism and cooperativity.
- 16) Describe sickle-cell anemia as a genetically transmitted molecular disease. Also be able to contrast the structural differences of deoxygenated Hb S vs. Hb A
- 17) Define thalassemias and indicate the results of such a mutation.