

## Title: Hemoglobin

### Purpose:

- To explore the role of point mutations in the function of the hemoglobin *beta*-chain
- To practice using an online simulation

### Materials:

Online *Hemoglobin* interface

### Procedure:

1. Go to [http://www.mhhe.com/biosci/genbio/biolink/j\\_explorations/ch01expl.htm](http://www.mhhe.com/biosci/genbio/biolink/j_explorations/ch01expl.htm)
2. Click *Skip Intro*
3. Locate the slider on the bottom left-hand side of the screen. This slider permits you to select any one of the 146 amino acids in the beta-hemoglobin chain and determine what happens to the hemoglobin molecule if any of the single amino acids are converted into other amino acids.
4. Click and drag the slider to any amino acid position. The number (location in the chain) will appear in the window above the slider and at the top. The amino acid will also be highlighted in the diagram of the hemoglobin molecule. Known changes to the amino acid you have selected/highlighted will appear in the small window below *Nature of Change*. *Consequences* of the change will also appear.
5. Play around with the simulation until you feel comfortable with how it works. To get an idea of the numbers and types of mutations that occur, click the buttons under *Investigate Amino Acids*.
6. For each amino acid position, FOR WHICH THERE IS A CHANGE, record the nature of the change and the consequences in a data table.  
(See results for a sample data table 1).
7. Determine the number of changes associated with unstable hemoglobin, increased affinity increases, decreased oxygen affinity, stickiness, and no consequences.  
(See Results for sample data table 2)
8. Use Create a Graph (<http://nces.ed.gov/nceskids/graphing/>) to construct a bar graph showing the relative numbers of amino acid changes associated with the consequences.

### Results:

Data Table 1: Amino Acid Changes and Consequences in $\beta$ -Hemoglobin		
Amino Acid Position	Nature of Change	Consequence
1		
6		

Data Table 2: Consequences of Amino Acid Changes in $\beta$ -Hemoglobin				
No consequences	Unstable hemoglobin	Increased O <sub>2</sub> Affinity	Decreased O <sub>2</sub> Affinity	Stickiness

**Discussion:** see lab grading guidelines (<http://www.jdenuno.com/PDFfiles/LabGuide1.pdf>)

**Conclusion:** testable statement about the relation of amino acid position to functional consequences.

**Reflection:** personal statement