

## **Surfing in proteopedia: for a better understanding the link between structure and function of proteins**

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This is an activity developed for a fifteen-week integrate Biochemistry/Cell Biology course (“From the Molecules to a Cell”) at School of Medical Science, by Claudia Castro. Students worked on this assignment during the first week of the course.

As Proteopedia is a very useful site for understanding protein structures this activity is designed as a learning experience to facilitate the construction of biochemical knowledge, analyze and adapt multimedia materials according to the learning objectives.

Because the information available about proteins in Proteopedia is very wide, we offer you a study guide with some questions oriented to understand structure-function relationship of proteins.

To carry out the activity proposed enter the following website:

[http://www.proteopedia.org/wiki/index.php/Main\\_Page](http://www.proteopedia.org/wiki/index.php/Main_Page)

In this site, search the pages where you will find the information necessary to answer the guide

### **1.-Hemoglobin and Myoglobin: <http://Proteopedia.org/w/Hemoglobin>**

- a) Identify the chains that form hemoglobin and myoglobin, what kind of secondary, tertiary, and quaternary structure can you recognize? Mention the differences between these two proteins.
- b) Identify the prosthetic group, iron (Fe) and oxygen binding site in both proteins.
- c) Return to hemoglobin structure and observe the location of the histidine f9.
- d) Superimposing the cursor on the structure permits different aminoacids to be labeled. Analyze the type of aminoacids that you find within the structure and justify their locations.
- e) Using the tool “evolutionary conservation” you can observe which aminoacids have been conserved or which ones have varied. In what area do you find the most conserved aminoacids in hemoglobin structure? Elaborate a conclusion.
- f) Identify an aminoacid change which leads to an anomalous hemoglobin.

## **2.-Iron Metabolism Protein:**

[http://proteopedia.org/w/Sandbox\\_116\\_-\\_Human\\_Hemochromatosis\\_Protein\\_\(1a6z\)](http://proteopedia.org/w/Sandbox_116_-_Human_Hemochromatosis_Protein_(1a6z))

- a) Describe the role and structure of Human\_Hemochromatosis\_Protein (HFE).
- b) With which protein HFE has a high homology? Find how these two proteins differ.
- c) HFE can bind to  $\beta$ 2-microglobulin, find this interaction in the structure and mention the diverse type of secondary structure you can differentiate.
- d) Identify within the structure, the Transferrin Receptor (RTf) and the aminoacids that interact with HFE.
- e) What kind of disease is Hemochromatosis? Identify different mutations leading to this pathology.

## **3.-Fibrous Proteins: Collagen <http://www.proteopedia.org/w/Collagen>**

- a) Find differences between a fibrous protein and a globular protein.
- b) Which amino acids predominate in the structure of Collagen? How is the variability of amino acids in the primary structure?
- c) List the main characteristics of the secondary structure of this protein.
- d) Compare Collagen structure with others fibrous protein, such Keratin and Elastin.
- d) What would happen if a mutation occurs in the polypeptide chain that changes glycine for alanine?