Molecular Basis for Sickle Cell Disease

Adapted from Nicholas' Story by Didem Vardar-Ulu for CH373-S20

POST-CLASS WORK- VERSION A

Q1. (10 points) Suppose a second mutation occurs in HbS, which changes the amino acid residue Phe85 to Glu. What effect would this have on sickling of red blood cells? Explain your answer with an illustration to support your reasoning. (Hint: Use a screenshot from the interactive images in http://earth.callutheran.edu/Academic_Programs/Departments/BioDev/omm/jsmolnew/hemo/hemoglobina.html and find a suitable view to explain your answer).

Q2. (10 pnts) In the video you watched, Nicholas says hydroxyurea an approved drug for treating Sickle Cell Disease, changed his life. His mother explained that since he started the hydroxyurea treatment, Nicholas has been able to be more active and have a regular schedule with sports, school, and friends.

"What does hydroxyurea do and how does it help Nicholas have a more regular life?"

Search for hydroxyurea in DrugBank (https://www.drugbank.ca/drugs/DB01005), a curated resource that provides a wide variety of information of drugs and drug-like molecules. Using the information provided about what the drug does and its mechanism of action and your understanding of the molecular basis of sickle cell disease write a short explanation of how hydroxyurea help SCD patients. Your answer should provide a plausible explanation to how the interferes with the sickling process. Make sure to provide specific biochemical links between what the drug's direct effect is and the ultimate outcome (improvement in symptoms) based on the molecular explorations you did during the "in-class" part of the case study. You will be graded based on the correct and specific biochemistry you offer in your hypothesis and not for "the correct answer".