**Mild Sickle Cell Anemia**

After completing the activity – i.e., explaining the question “What is the molecular basis for sickling and pain in Sickle Cell Disease?” you should have understood the molecular basis of sickle cell disease pathology is formation of deoxygenated sickle hemoglobin (HbS) fibers that distort the shape of red blood cells.

An article in the American Journal of Medicine reports an unusually mild clinical course for sickle cell disease patient (Prchal, et al., 1989, PMID:2913789, DOI: [10.1016/0002-9343(89)90277-5](https://doi.org/10.1016/0002-9343%2889%2990277-5)). Investigations during a medical procedure revealed that on top of the sickle cell mutation, the individual had an additional mutation (Alpha Montgomery) where Leu 48 in the hemoglobin alpha chain is mutated to Arg.

**Q. Visualize the structure of deoxy sickle cell hemoglobin (PDB ID 2hbs). Locate the HbS and alpha Montgomery mutations. Explore the neighborhood and interactions of these residues to explain the impact of the additional mutation on (a) stabilizing the oxy and deoxy forms of hemoglobin, and (b) ability to form fibers in the deoxy form? Describe how the additional mutation in hemoglobin alpha chains can lead to milder clinical symptoms of Sickle Cell Disease? Explain your answer in words and include suitable illustrations to support your reasoning. Use iCn3D to generate the illustration(s).**