**Nicholas’ Story**

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**Section II: Hydroxyurea to the Rescue**

*Box 8: Question*

In the video Nicholas says hydroxyurea 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. The second question that we will ask in this case is “**What does hydroxyurea do and how does it help Nicholas have a more regular life?**” In this section we will explore the molecular impact of using hydroxyurea.

**Part 1: What does Hydroxyurea do?**

*Box 9: Storyline*

In the video we learned how Hydroxyurea, an approved drug for treating Sickle Cell Disease, changed Nicholas’ life. Here we will learn about the chemical nature of the drug and how it helps in managing complications of SCD.

1. Search for hydroxyurea in DrugBank (a curated resource that provides a wide variety of information of drugs and drug-like molecules). Look for information about this drug in DrugBank (<https://www.drugbank.ca/drugs/DB01005>), then refer to it to answer the following questions?

Q1. What is the chemical structure of hydroxyurea? Draw or paste a picture of this molecule below and describe its function (as listed in DrugBank).

Q2. What does hydroxyurea do to help manage sickle cell disease? Feel free to consult the scientific literature and data resources (e.g. the DrugBank) to answer this question.

*Box 10: Concept*

In the late 1940s Janet Watson reported that babies with sickle cell disease showed lesser sickling and it took longer for the sickling to appear compared to their carrier mothers. She suggested that there was something in the fetal hemoglobin that protects the babies in utero from the harmful effects of sickle cell disease. (see: [https://doi.org/10.1016/0002-9343(48)90029-1](https://doi.org/10.1016/0002-9343%2848%2990029-1))

Q3. Why do you think that there is a need for adult and fetal hemoglobins ?

Q3. Why do you think that babies and fetuses have a different type of hemoglobin? (Hint: Fetal hemoglobin’s oxygen dissociation curve is left-shifted compared to HbA.)