Constructing a Pedigree: Sickle Cell Anemia

Background Information

Disease: Follows an **autosomal disease** inheritance pattern. Those affected with Sickle Cell have a substitution mutation in their DNA that codes for the **Hemoglobin Protein**. The function of **hemoglobin** is to bind **oxygen** so that the **red blood cells** can deliver it to all cells within the body via the bloodstream. The **mutated protein, hemoglobin**, changes shape and becomes elongated and sticky. This in turn changes the shape of the red blood cell from a disk to a crescent moon. The shape change in red blood cells causes them to clump **together and get stuck in blood vessels, preventing** adequate flow of oxygen to cells that need it. Without oxygen, cells cannot make enough **ATP** to undergo **aerobic respiration** and thus cannot **maintain homeostasis.**

*You will construct a **family pedigree** for the West Family, of which Sickle Cell occurs, using the Pedigree Help Handout.*

- Anita and Bernard had eight children together. Neither of them had symptoms of Sickle Cell Disease. Their eight children are Roger, Cameron, Laura, Kia, Frank, Fred, Lila and Manny. Unfortunately, two of their children (Cameron and Kia) are affected with Sickle Cell. What are Anita and Bernard's genotypes?

- Roger married Rita, and one of their two sons has Sickle Cell. What genotypes does Roger, Rita and sons have?

- Cameron married Tina, who does not have Sickle Cell. They have three children, Nolan, Nico and Natalie. None of their children have Sickle Cell. What genotypes do Tina and children have?

- Laura, Kia and Frank are not married and do not have children.

- Fred married collegiate track star, Pria. None of their five daughters have Sickle Cell. What is your educated guess of both Pria and Fred's genotypes?

- Lila married Fabio, who has Sickle Cell and two of their three children are affected with Sickle Cell. What are the genotypes of Lila, Fabio and their children?

- Based on the pedigree you constructed, what type of inheritance is displayed- complete dominance, incomplete dominance or co-dominance? Explain your reasoning.