NOVA ScienceNow video: Stem Cells BREAKTHROUGH (Reprogramming)

http://www.pbs.org/wgbh/nova/sciencenow/0305/03.html

Questions:

1. Describe what causes sickled red blood cells to form, and what sickle cell anemia is.

   Answer: Sickle cell anemia is a single amino acid deletion mutation which causes the cells to clump together when deoxidized. It causes pain, and an inability to properly transport oxygen. It can also clog the arteries.

2. Which stem cells can create any cell in the body? Where are they found?

   Answer: Pluripotent stem cells can create any cell in the body. They are found in early embryos.

3. What makes different cell types in the body different from each other?

   Answer: All cells in the body have the same DNA. Different genes are expressed in different cell types. The different genes cause cells to have a variety of functions.

4. What is Yamanaka's basic theory on turning regular skin cells into Pluripotent stem cells?

   Answer: Yamanka first wanted to find the genes that are specifically turned on in embryonic stem cells, genes that control the identity of the stem cell. He reasoned that if he could express the important controlling genes in other cells he could turn the cells into embryonic stem cells.

5. How did he deliver these cell-function-changing genes?

   Answer: He used a virus to introduce the regulatory genes into the cell nucleus.

6. How do you think induced Pluripotent Stem Cells could be used to cure HbS in humans? (Open Ended)
   Answer: Could inject cultured stem cells into bone marrow to grow normal Hb cells.