MEDICAL RESEARCH STUDY ON SICKLE CELL ANEMIA

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Bio 260

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The disease of sickle cell anemia that affects African-Americans was first detected by Dr. James B. Herrick in Chicago in 1910. The first patient he had was a 20yr. old dental student born in Grenada, West Indies. The young man complained of coughs fever and had also suffered weakness and dizziness. The blood work revealed an abnormal crescent shape to the red blood cells. The second discovery was made in 1927 by Dr. Hahn and Gillespie who found that the sickle shape was related to low oxygen levels in the blood. The genetic cause was found to be a substitution of valine amino acid for glutamic acid on position 6 in the hemoglobin sequencing.

A bone marrow transplant done for treatment of acute leukemia in 1984 had the unexpected side affect of the production of normal RBC in the child, the first documented cure of the disease. The problem with bone marrow transplants is that most SCD patients are of African descent, and very few African-Americans are on the transplant match registry. This has left physicians with only treating the symptoms and helping patients during a “crisis” which can be very painful and life threatening experience.

The most recent research by Dr. Linzhao Cheng of the Johns Hopkins Institute for Cell Engineering has been in the use of adult stem cells. A patient’s own stem cells are extracted from his bone marrow and after inducing the adult cells to act like embryonic cells, these cell are called induced pluripotent stem cells (IPS), the defective valine amino acid is replaced with glutamic amino acid. This produced 300 IPS cell that were DNA sequenced and four were found to have the corrected gene but after further study three did not pass future testing. Dr. Cheng stated that because the IPS cells are immature Hb cells they are not capable of producing enough adult cell Hb genes. The goal is to learn how to convert them to mature Hb cells. Research is also being done by transplant stem cells from siblings that have shown promise.
Resources:

C:\Documents and Settings\Compaq_Administrator\My Documents\Correcting Sickle Cell Disease with Stem Cells - 09-28-2011.mht

http://www.hopkinsmedicine.org/institute_cell_engineering/experts/linzhao_cheng.html

Linzhao Cheng laboratory: http://www.stemcelllab.org/Cheng_Laboratory/Main.html

Institute for Cell Engineering: http://www.hopkinsmedicine.org/institute_cell_engineering/

http://sickle.bwh.harvard.edu/index.html

http://www.nslc.wustl.edu/sicklecell/part1/background.html