Discovering Sicke Cell Anemia Essay, Research Paper

Discovering Sicke Cell Anemia

The topic that I am learning about is Sickle Cell Anemia, a hereditary

disease which affects red blood cells. Throughout this research paper, I will

discuss what exactly it is, how it is caused, any known treatments or cures, and

many other facts that are important in this disease.

Sickle Cell Anemia is a health problem throughout the world. More than

250,000 babies are born worldwide with this inherited blood cell disorder

(http://www.medaccess.com/h\_child/sickle/sca\_01.htm). The disorder causes red

blood cells to extend into a sickle shape which clogs the arteries.Persistant

pain and life-threatening infections result from the illness. About one in 400

black newborns in the U.S. have sickle cell anemia. And one in 12 black

Americans carry the sickle cell trait (http://www.medaccess.com/h\_

child/sickle/sca\_01.htm). This leaves a good chance that the parent with the

trait can pass the defect onto offspring although their own health is not harmed.

The cause of sickle cell anemia is rather simple but it leaves a life

threatening affect. Anyone who carries the inherited trait for sickle cell

anemia, but doesn’t have the disorder, is actually protected from a severe form

of malaria. This helped the children in countries where malaria was a problem,

to be able to survive against that disease. What happened to those children?

They grew up, had their own children and ended up passing the gene for sickle

cell anemia onto their offspring.

This disease is a hereditary blood disorder that affects the red blood cell.

Red blood cells contain a protein called hemoglobin which transports oxygen from

your lungs to every part of your body. Hemoglobin’s oxygen carrying ability is

essential for living but if there is a structural defect on the pigmented

molecule, it can be fatal. When a normal red blood cell distributes its oxygen,

it has a disc shape. But when an affected red blood cell containing sickle cell

hemoglobin releases its oxygen, the image of the cell changes from a disc shape

to a sickled shape. In hemoglobin, there are four chains of amino acids. Two are

know as alpha chains, and two are called beta chains. In a normal hemoglobin,

the amino acid in the sixth position on the beta chain is known as glutamic acid

(refer to diagram 1.1 on page 6). During sickle cell anemia, the glutamic acid

is pushed out of its place and replaced with another amino acid called

vialine(refer to diagram 1.2 on page 6). This simple substitution has

devastating consequences.

Hemoglobin molecules that contain the beta chain defect stick to one

another instead of staying separate after releasing oxygen. This forms long,

rigid rods inside the red blood cells. The rods cause the normally smooth and

disc shaped blood cells to take on a sickle shape. When this happens, the blood

cells lose essential ability to deform and squeeze through small blood vessels

and arteries. The sickle cells becomes stiff and sticky which clog vessels,

depriving tissue from receiving a sufficient blood supply. This change makes the

hemoglobin less soluble in water. When a person is deprived of oxygen, the

hemoglobin molecules join together and form fibers. The fibers cause the blood

cells to change shape.

Sickle hemoglobin and normal hemoglobin carry the same amount of oxygen but

there are two major differences between the two kinds of cells. The normal

hemoglobin is found in only disc shaped red blood cells that are soft, which

permits them to easily flow through small blood vessels. Diseased red blood

cells are sickle shaped and are very hard which tend to get stuck in small blood

vessels and stop the flow of blood.

The other difference between the two cells is their longevity. Sickle cells

do not live as long as normal cells. Normal healthy cells can survive for about

120 days , while the more fragile sickle cells can survive for about 60 days or

even less. The body cannot make new red blood cells as fast as it loses sickled

blood cells. A sickle cell patient has fewer red blood cells and less

hemoglobin than normal red blood cells. This results in less oxygen being

convenient for use by the cells of the body.

Anyone whose parent has the gene for sickle cell anemia have the chance of

at least having sickle cell trait. In order for a child to have the disease,

both parents must have the sickle cell gene(refer to diagrams 2.1 and 2.2 on

page 6). The disease affects mostly African Americans in Africa, South America,

Latin America, the West Indies, Greece, Spain, Italy, and Turkey.

When the blockage of sickled red blood occurs, it can take place in any

organ or joint of the body wherever a blood clot develops. The frequency and

amount of pain varies widely depending on the person. In some people, painful

episodes occur once a year but for other patients, they can have as many as 15

to 20 episodes annually. These excruciating, disruptive events can be so brutal

that the patient must go into the hospital for five to seven days to obtain

intravenous fluids and narcotic pain killers. The pain can only be controlled,

it cannot be stopped or you cant even identify when it is likely to happen again.

Sickle cell clots are life threatening, depending on where it occurs. One

of the most severe places for a clot to occur in is the brain. It could lead to

a stroke which could turn into paralysis or even worse, death. Sometimes a

blood transfusion is required every three to four weeks to avoid recurrence of

clots in the brain.

When blood capillaries are clogged, it can lead to many types of problems,

depending upon where the blockage occurs. The outcome of the blockages may lead

to problems such as kidney infections, death and decay of tissues, intense pain

in chest, arms and legs, disease of the retina of the eye, slow healing sores or

ulcers, and even gallstones. When the hemoglobin is low, it is manifested by

fatigue and weakness.

Currently, there is no cure for Sickle Cell Anemia. But the doctors do

offer a treatment that helps control this disease. Pain medication, antibiotics,

rest and high fluid intakes are all treatments for aspects of sickle cell anemia.

There are also experimental therapies that are available to some patients. The

drug hydroxyurea is a treatment that reduced 50% the frequency of painful

episodes and hospital visits. Preventive administration of penicillin to

affected children by the age of four months greatly decreases mortality from

infections.

While researching this topic and studying about the disease, I have learned

many new details about it. I realized that even the slightest change in the

sequence of amino acids can lead to very harmful effects. In this disease, only

one amino acid was substituted and still the illness is very harsh. I also

learned how exactly the cells deform and why they go into a sickle shape. It

was very interesting to learn that the disease mostly effects African Americans.

I also learned that when the sickles get clogged in an artery, it results in a

very painful attack on the person and may cause them to have an episode. When

episodes occur, the patient may have to go into a hospital for pain killers.

The disease also can lead to ulcers, strokes, paralysis, decay of tissues, and

many other problems throughout the persons entire life. Sickle Cell Anemia is a

very serious disease that effects a person and there way of life. It doesn’t

have a known cure yet but many treatments and therapy are available. If a

person has this disease, it is life-threatening and painful attacks can occur at

any time, anywhere. It is important to know the causes and reasons for the

disease so that you can relate to what a person with Sickle Cell Anemia is going

through.