WISCONSIN DEPARTMENT of HEALTH SERVICES

Sickle Cell Trait

What is Hemoglobin?

Hemoglobin is a protein inside of red blood cells that carries oxygen to all parts of the body. Normal adult hemoglobin is called hemoglobin A. Sickle hemoglobin is called hemoglobin S.

What is Sickle Cell Trait?

People with sickle cell trait inherit a normal hemoglobin gene (hemoglobin A) from one parent and an abnormal hemoglobin gene (hemoglobin S) from the other parent. People with sickle cell trait make both hemoglobin A and hemoglobin S. **Sickle cell trait is different from sickle cell disease. It will never turn into sickle cell disease.** Sickle cell trait does not typically cause health problems, though can under certain circumstances.

Why is it Important to Know if You Have Sickle Cell Trait?

The most important aspect of identifying people with sickle cell trait is to educate and inform them of the risk of having a child affected by a potentially more serious hemoglobin disorder, some of which include:

- Hemoglobin SS
- Hemoglobin SC
- Hemoglobin S beta + thalassemia
- Hemoglobin S beta 0 thalassemia
- Hemoglobin SE
- Hemoglobin SD

These are all various forms of sickle cell disease. If a child inherits one copy of the hemoglobin S gene from one parent and a second copy of an abnormal gene such a S, C, D, E, or a beta thalassemia mutation, the combination results of a form of sickle cell disease. Sickle cell disease is a serious blood disorder that requires life-long medical care.

If both parents have sickle cell trait, each child that they have together has a:

- 1 in 2 (50%) chance of having sickle cell trait
- 1 in 4 (25%) chance of having sickle cell disease.
- 1 in 4 (25%) chance that they will have normal hemoglobin.

If one parent has sickle cell trait and the other parent has another abnormal hemoglobin gene (like hemoglobin C, D, E or beta thalassemia), each of their children has a:

- 1 in 4 (25%) chance of having sickle cell trait.
- 1 in 4 (25%) chance of having a form of sickle cell disease.
- 1 in 4 (25%) chance that they will have normal hemoglobin.

- 1 in 4 (25%) chance of having the other abnormal hemoglobin gene trait

If only one parent has sickle cell trait, each of their children has a:

- 1 in 2 (50%) chance of having sickle cell trait.
- 1 in 2 (50%) chance that they will have normal hemoglobin.

What Are Other Important Things to Know About Sickle Cell Trait?

Under most circumstances, sickle cell trait does not cause symptoms. It is the most common inherited hematologic genetic condition in the world, with nearly 300 million people affected worldwide. Unlike sickle cell disease, sickle cell trait does not cause anemia, it does not affect life expectancy, and should not cause severe symptoms. Rarely, under certain conditions of physical or environmental extremes, some individuals with sickle trait can experience symptoms. These can include blood in the urine, kidney problems, spleen problems, muscle break down during extreme exercise, and elevated pressure in the eye following traumatic eye injuries.

More information about each of these rare complications can be found at:
cdc.gov/ncbddd/sicklecell/toolkit.html

Because sickle cell trait is an inherited condition, genetic counseling and possibly genetic testing for the family should be considered so that they can be fully informed of their potential risks of having a future child affected by one of the more serious hemoglobin disorders.

The content of this fact sheet has been reviewed by the NBS Advisory Hemoglobinopathy Subcommittee.