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My46 Trait Profile

# Alpha-thalassemia

*Alpha-thalassemia is genetic blood disorder and is often characterized by chronic anemia (i.e., low blood count). It is caused by mutations in the HBA1 and HBA2 genes that make the alpha-globin protein.*

**Characteristics of Alpha-thalassemia**

Alpha-thalassemia is a genetic condition characterized by microcytic hypochromic anemia (i.e., where the red blood cell counts and hemoglobin levels are low) varying from mild (e.g., almost no symptoms) to severe (e.g., a lethal form causing death in the newborn period). Alpha-thalassemia occurs more frequently in individuals with Mediterranean, North African, Middle Eastern, Indian, and Central and Southeast Asian ethnicity.

Hemoglobin Bart syndrome is the most severe form with fetal symptoms usually detected late in the 2nd trimester or early 3rd trimester of pregnancy. Symptoms of hemoglobin Bart syndrome include edema (increased amount of fluid under the skin), pleural and pericardial effusions (fluid detected in the lungs and/or around the heart) and severe anemia. Hemoglobin Bart syndrome results in death soon after birth.

Comparatively, hemoglobin H disease is less severe with symptoms appearing in infancy or childhood. Symptoms of hemoglobin H disease include microcytic hypochromic anemia and an enlarged liver and spleen. The degree of anemia may be different between individuals and some require blood transfusions on a regular basis.

**Diagnosis/Testing**

Most individuals with alpha-thalassemia are diagnosed through clinical signs and symptoms, and by blood work with specific red blood cell findings suggestive of alpha-thalassemia. Diagnosis may also be achieved by genetic testing. Most individuals with alpha-thalassemia have a deletion (i.e., a missing piece) of one or both genes that make the alpha-globin proteins. These proteins make up a molecule called hemoglobin. Hemoglobin is found in red blood cells and is responsible for carrying oxygen throughout our body. If the genes that make alpha-globins are not working, then less hemoglobin is made and less oxygen is delivered to cells in the body interfering with the ability of the body and organs to work properly. There are two copies of each gene that make alpha-globins resulting in four working genes. Individuals with hemoglobin H disease typically have a deletion in three of the four copies, and individuals with hemoglobin Bart syndrome have all four copies of the genes deleted.

**Management/Surveillance**

Management of hemoglobin H disease includes regular monitoring red blood cell counts and hemoglobin measurements with blood transfusions if needed. During childhood, there should be regular monitoring of growth and development.

**Mode of inheritance**

Alpha-thalassemia is inherited in an autosomal recessive pattern. This means that an individual must inherit two deletions from one parent and one or two deletion(s) from the other parent. If both parents are carriers of alpha-thalassemia, they have a 1 in 4 (25%) chance with each pregnancy of having a child with alpha-thalassemia.

**Risk to family members**

Parents of a child with alpha-thalassemia are carriers of alpha-thalassemia. If a sibling of a child with alpha-thalassemia is unaffected, he/she has a 2 in 3 (66%) chance of being a carrier of alpha-thalassemia.

**Special considerations**

There are two types of carriers for alpha-thalassemia: alpha thalassemia trait and alpha thalassemia silent carriers.

Individuals with alpha-thalassemia trait have a deletion in two of the four copies of the genes. Alpha-thalassemia trait can usually be detected through routine blood work that reveals small (microcytic) and pale (hypochromic) red blood cells. The two deletions could be inherited separately (i.e., on different chromosomes) or together (i.e., on one chromosome). It is important to determine whether the two deletions are inherited together because that increases the risk of having a child with Hemoglobin H disease or Hemoglobin Bart syndrome depending on the carrier status of the partner.

Individuals who are alpha-thalassemia silent carriers have a deletion in one of the four copies of the genes. Most of the time, these individuals have normal red blood cells, and are not identified unless genetic testing is pursued. The risk of having a child with hemoglobin H disease or hemoglobin Bart syndrome depends on which type of carrier the parents are and precise risks can be determined once that is known.

**Resources**

Cooley's Anemia Foundation
http://www.cooleysanemia.org/
Genetics Home Reference: Alpha thalassemia
http://ghr.nlm.nih.gov/condition/alpha-thalassemia
KidsHealth: Alpha thalassemia
http://kidshealth.org/parent/medical/heart/thalassemias.html

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