Hemoglobin C trait is an inherited blood trait. It is most often found in people whose ancestors came from Africa, Italy, Greece, Latin America, and the Caribbean region, but it can also be found in people with ancestry from other parts of the world. To understand this condition, it helps to know more about how your blood is made.

**Hemoglobin**

Your blood contains millions of red blood cells. Each of your red blood cells has hemoglobin, which gives blood its red color and carries oxygen throughout your body. Hemoglobin is made by combining a “heme” portion (iron) and a “globin” portion (protein). The iron comes from the food you eat and your body makes the globins.

There are different kinds of hemoglobin that the body can make. The most common kind in an adult is hemoglobin A. For hemoglobin A, your body puts two “alpha” globin chains together with two “beta” globin chains. Hemoglobin C is caused by a change in the beta globin chains.

The instructions for making globin chains are part of the genetic information you inherit from your parents. Genetic instructions are called genes. You inherit your genes in pairs, with one copy of each gene coming from each parent. One particular gene, the beta globin gene, is responsible for telling the body how to make beta globin chains. In hemoglobin C, the gene for making beta globin chains makes a slightly different globin chain than usual.

**Hemoglobin C Trait**

When you have one typical copy of the beta globin gene and one copy of the gene making hemoglobin C, you have hemoglobin C trait. Your body is still able to make plenty of hemoglobin A, but you also make a less common type of hemoglobin, called hemoglobin C. This is not a disease and does not affect your health. This trait can cause the red blood cells to be slightly smaller than usual. Sometimes, this is mistaken for low iron levels (iron-deficiency anemia). However, taking an iron supplement does not change the size of the red blood cells.

Hemoglobin C trait does not change into a blood disease. The importance of identifying hemoglobin C trait is that it helps find couples whose children may be born with a related blood disease. Your chance for having a child with a blood disease depends on whether or not your partner has a blood trait, and, if so, which trait they have.

**My partner has NO blood trait:**

When only one parent has hemoglobin C trait and the other does not have a blood trait, there is essentially no chance of having a baby with any form of inherited blood disease. However, each child has a 50% (or 1 in 2) chance to inherit hemoglobin C trait from the parent.

**My partner has a blood trait:**

When one parent has hemoglobin C trait and the other parent has a related blood trait (hemoglobin C, beta-thalassemia, sickle cell), there is a 25% (or 1 in 4) chance in each pregnancy for the baby to have a type of blood disease related to hemoglobin C. There is a 75% (or 3 in 4) chance that the baby will not have a blood disease.
BLOOD DISEASES RELATED TO HEMOGLOBIN C

If your partner has hemoglobin C trait:  
**Hemoglobin C disease**

When both parents have hemoglobin C trait, they could have a child with hemoglobin C disease. A person with hemoglobin C disease only makes hemoglobin C and does not have any hemoglobin A. This causes mild to moderate anemia (small red blood cells), which is not improved with iron. Some people with this condition can develop an enlarged spleen or become jaundiced (showing yellowness to the skin or whites of the eyes). However, people with hemoglobin C disease usually have no serious medical problems.

If your partner has beta thalassemia trait:  
**Hemoglobin C-beta thalassemia disease**

When one parent has hemoglobin C trait and the other parent has a different blood trait called beta-thalassemia trait, they could have a child with hemoglobin C-beta thalassemia disease. Hemoglobin C-beta thalassemia disease can cause mild to moderate anemia (small red blood cells), which is not improved with iron. However, this condition does not typically cause any serious health problems.

If your partner has sickle cell trait  
(hemoglobin S trait):

**Hemoglobin SC disease**

When one parent has hemoglobin C trait and the other parent has a different blood trait called hemoglobin S trait (sickle cell trait), they could have a child with hemoglobin SC disease, a form of sickle cell disease. Hemoglobin SC disease is a lifelong condition that sometimes includes serious health problems, but it affects each person differently. A person with hemoglobin SC disease has red blood cells that can collapse into a sickle shape, instead of the usual round shape. This makes the red blood cells more rigid and sticky. The sickled cells can get stuck in the blood vessels and create blockages. This leads to pain in the area of the blockage and may cause damage to that area. Blockages can happen in any part of the body, such as the bones, spleen, liver, heart, lungs, kidney, brain, and muscles. Sickled cells also get broken down more quickly by the body, which causes chronic anemia and fatigue.

A person with hemoglobin SC disease needs regular medical visits to watch for problems related to this condition. Medical problems related to hemoglobin SC disease are unpredictable, but can start early in life.

Testing for blood diseases

It is possible to test the developing baby for blood diseases as early as 10 weeks in pregnancy, using a prenatal test, such as CVS or amniocentesis. Early detection can allow the family to prepare for the birth of a baby who may need special care related to the blood disease. If testing shows the baby has a serious blood disease, parents can choose whether or not to continue the pregnancy.

In California, all babies are routinely tested at birth for common blood diseases through the Newborn Screening Program. This testing can also identify babies with hemoglobin C trait.
**KEY TO SYMBOLS**

**AA** Hemoglobin A  
- Two typical beta globin genes

**AC** Hemoglobin C trait  
- One typical beta globin gene  
- One hemoglobin C gene

**CC** Hemoglobin CC  
- Two hemoglobin C genes

**AB** Other beta globin trait (beta thalassemia or sickle cell)  
- One typical beta globin gene  
- One changed beta globin gene

**CB** Hemoglobin C-related diseases  
- One changed beta globin gene  
- One hemoglobin C gene

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**One parent with hemoglobin C trait**

Both parents with hemoglobin C trait  
One parent with hemoglobin C trait  
One parent with beta thalassemia (or sickle cell) trait

- Each child has a 50% chance to have trait.  
  NOT at risk for disease

- Each child has a 25% chance to have a blood disease related to Hemoglobin C