

## Beta Thalassemia

$\beta$ -thalassemia is an inherited microcytic, hypochromic anemia which occurs in Mediterranean populations. These patients have problems synthesizing beta-globin and lead to decreased amounts of the normal hemoglobin tetramer form. One presentation is  $\beta$ -thalassemia minor, where diagnosis occurs with increased HbA2 fraction ( $> 3.5\%$ ), and patients are typically asymptomatic and require no intervention.  $\beta$ -thalassemia major, or Cooley's anemia, is more severe and patients need regular blood transfusions, which may lead to a secondary hemochromatosis. On skull x-ray, these patients show a crew-cut appearance due to marrow expansion.



PLAY PICMONIC

### Mechanism

#### Microcytic, Hypochromic Anemia

[Small-cells with Hippo-chrome and Anemone](#)

Lab results in patient with beta thalassemia show a microcytic, hypochromic anemia. This means that the mean corpuscular volume is less than 80 (MCV  $< 80$ ).

#### Mediterranean Populations

[Mediterranean Sea](#)

This particular dyscrasia is prevalent among Mediterranean populations; particularly Greece, Turkey and Italy.

#### Decreased Beta-Globin

[Down-arrow Beta-fish-Globe](#)

Hemoglobin is normally composed of two  $\alpha$ -chains and two  $\beta$ -chains. In this disorder,  $\beta$ -globin synthesis does not occur properly. There are varying phenotypes, correlating to if only one or both  $\beta$ -chains are effected.

### Beta-Thalassemia Minor

#### Increased HbA2

[Up-arrow He-man-globe with A-Apple and \(2\) Tutu](#)

Patients with  $\beta$ -thalassemia minor are diagnosed by having an increased HbA2 fraction ( $> 3.5\%$ ). This type of hemoglobin is described by having two  $\alpha$ -chains and two  $\delta$ -chains (instead of  $\beta$ -chains).

#### No Intervention

[Broken Intervention-sign](#)

Often, these patients are asymptomatic and are monitored for symptoms.

### Beta-thalassemia Major

#### Blood Transfusions

[Blood Transfusion-IV](#)

This is a severe microcytic, hypochromic anemia. Untreated, it causes anemia, splenomegaly and severe bone deformities. It progresses to death before age 20. Treatment consists of periodic blood transfusion; splenectomy if splenomegaly is present, and treatment of transfusion-caused iron overload. Cure is possible by bone marrow transplantation.

#### Hemochromatosis

[He-chrome-man](#)

Patients with this disease can develop a secondary hemochromatosis (due to frequent blood transfusions).

### **Crew-cut on Skull X-Ray**

#### [Crew-cut Skull](#)

Patients with this disease develop erythroid hyperplasia and have marrow expansion. This manifests as a "crew-cut" skull on x-ray and "chipmunk facies."

### **Diagnosis**

#### **Electrophoresis**

##### [Electric-fairy](#)

Diagnosis for beta thalassemia minor is confirmed with increased HbA<sub>2</sub> on hemoglobin electrophoresis. Alternatively, beta thalassemia major is diagnosed by finding increased HbF on hemoglobin electrophoresis.