

Thalassemia & Iron Overload

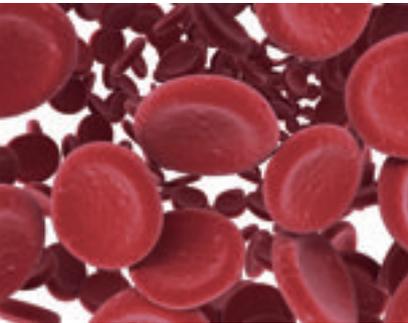


Fig. 1
Thalassemia refers to a diverse family of genetic disorders characterized by an underproduction of hemoglobin¹.

Thalassemia refers to a diverse family of genetic disorders characterized by an underproduction of hemoglobin, a protein in red blood cells that carries oxygen (Fig. 1)¹. It is one of the most common genetic diseases worldwide, with nearly 68,000 affected children born with various forms of thalassemia each year^{2,3}.

Forms of thalassemia can range from milder types to severe cases that start in infancy and require regular blood transfusions for patient survival^{1,2}. Clinical complications can vary by type of thalassemia. Patients also suffer from chronic iron overload because of extra iron received with blood transfusions or, in the case of non-transfusion-dependent thalassemias (NTDT), as a consequence of the disease^{3,4}. Most patients with thalassemia are of South and Southeast Asian, African, Mediterranean or Middle Eastern origin^{5,6}. Immigration has made the disorder more common in many other regions of the world (Fig. 2)^{5,6}.

As doctors have come to understand the benefits of blood transfusions and the need to manage iron overload, thalassemia has evolved from a fatal pediatric disease to a chronic, well-managed disease for many patients^{3,4}. However, there are still challenges with diagnosis and treatment of some types of thalassemia, including NTDT^{4,6}.

Causes and Classification

Thalassemia is caused by a disruption of normal hemoglobin production in the blood system and is categorized into different genetic types^{1,3}:

Beta thalassemia is most prevalent in people of Mediterranean and Middle Eastern descent⁷. It can lead to ineffective production of red blood cells, chronic anemia and accumulation of excess iron in the blood and organs⁷. Beta thalassemia is further classified by the severity of the disease into three main forms⁷:

1. **Beta thalassemia major** is characterized by profound anemia, often requiring medical attention in the first two years of life and leading to a dependency on blood transfusions^{7,8}.
2. **Beta thalassemia intermedia** is characterized by less severe anemia that appears in adolescence or early adulthood⁸. Patients may not require blood transfusions, or may require them only occasionally, but can still suffer serious long-term complications^{6,7}.
3. **Beta thalassemia minor** is usually clinically asymptomatic but may lead to mild anemia in some carriers⁷.

Another type is **Hemoglobin E (HbE) beta thalassemia**, which is one of the most common mutations⁹. The severity can vary significantly, with some NTDT patients experiencing no symptoms and others requiring regular transfusions^{6,9}.

Alpha thalassemia occurs predominantly in people of Southeast Asian, Middle Eastern and Mediterranean descent¹⁰. The type of mutation influences severity¹⁰. A moderate-to-severe form called **hemoglobin H (HbH) disease** can cause anemia and other health complications, including iron overload¹⁰.

Fig. 2

Most patients with thalassemia are of South and Southeast Asian, African, Mediterranean or Middle Eastern origin. Immigration has made the disorder more common in many other parts of the world¹.



Disease symptoms can vary significantly based on the type of thalassemia and severity of the condition. Patients with thalassemia may experience symptoms such as¹:

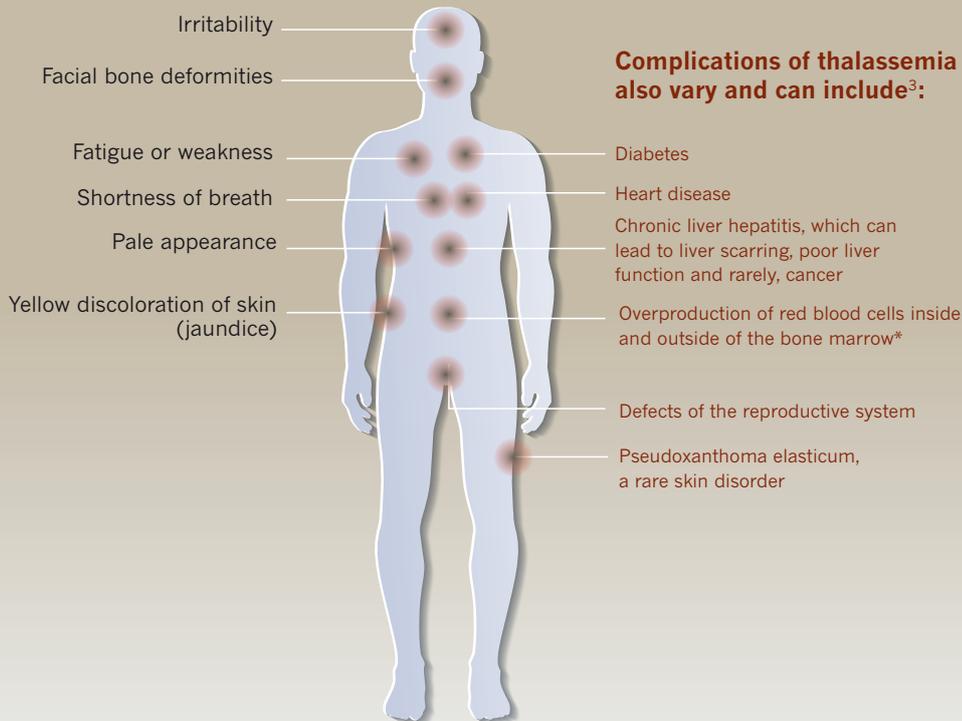


Fig. 3
Chronic iron overload may occur in thalassemia patients because of regular blood transfusions and because of excessive absorption of iron in the gastrointestinal tract³.

Chronic Iron Overload in Thalassemia

Chronic iron overload may occur in patients with thalassemia because of regular blood transfusions and may occur in NTD patients because of excessive absorption of iron in the gastrointestinal tract (Fig. 3)³. It can cause additional serious complications because the body does not have a mechanism to dispose of the excess iron³.

Complications of chronic iron overload in thalassemia patients include cardiac disease (including heart dysfunction and arrhythmias), pulmonary hypertension, bone disease (including osteoporosis), endocrine diseases (including hypothyroidism and hypogonadism), liver fibrosis and cirrhosis³.

References

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