

α-thalassemia

1 in 9,000 births — α-thalassemia
1 in 55,000 births — β-thalassemia

Frequency of carriers is higher in Africa, Asia (south and southeast), Mediterranean and Middle East.

Compiled by steven.chan@uci.edu, 2009.08.11.
Handouts and references available at www.stevenchan.us/alphathal

CHROMOSOME 16

HEMOGLOBIN PRODUCED

SYMPTOMS & LABS

MANAGEMENT

Four genes control α-globin chain synthesis. **Normal.**

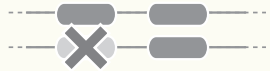


95% ● HbA α₂ β₂
2% ◐ HbA₂ α₂ δ₂
2% ◐ HbF α₂ γ₂

Normality.

No therapy required.

1 gene is deleted in **α-thalassemia minima, α-thalassemia-2 trait, silent carrier of α-thalassemia.**



HbA α₂ β₂
HbA₂ α₂ δ₂
HbF α₂ γ₂

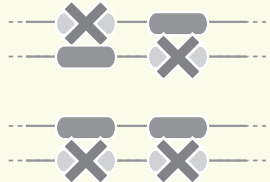
Asymptomatic.

Slight hypochromia.
Slight microcytosis.

No therapy required.

Dx only by DNA analysis.

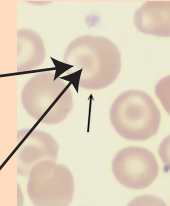
2 genes are deleted in **α-thalassemia minor, α-thalassemia-1 trait.**



↓ HbA α₂ β₂
↓ HbA₂ α₂ δ₂
↓ HbF α₂ γ₂

Hypochromia.
Microcytosis.
Target cells.

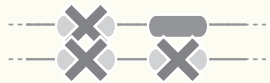
MCV < 80 fL.



No therapy required.

Risk for producing offspring with **Hb Barts.**

3 genes are deleted in **Hemoglobin H disease.**



↓ HbA α₂ β₂
↓ HbA₂ α₂ δ₂
↓ HbF α₂ γ₂
5 – 30% ◐ HbH —β₄

Microcytic. Target cells.

HbH can't release O₂ to tissues, because affinity is greater than HbA + HbH insoluble → Precipitates form inclusion bodies. → **Chronic hemolytic anemia** (hepatosplenomegaly, indirect hyperbilirubinemia, ↑LDH, ↓haptoglobin, ↓leg ulcers) → **Neonatal jaundice, occasionally hydrops fetalis.**

Most don't require chronic transfusion in 1st decade of life.

Splenectomy, transfusion in 2nd, 3rd decade of life.

Avoid oxidants that may exacerbate HbH (e.g. antimalarials, some sulfa drugs).

All 4 genes are deleted in **Hb Barts.**



~~HbA α₂ β₂~~
~~HbA₂ α₂ δ₂~~
~~HbF α₂ γ₂~~
Hb Barts —γ₄

Hydrops fetalis: High output heart failure → excess fluid accumulation → fetal demise, neonatal mortality.

Almost always lethal in utero. Consider therapeutic termination of pregnancy in mothers at risk.

Chronic intensive hypertransfusion, iron chelation, hematopoietic cell transplantation.

Both HbH and Hb Barts can't release O₂ to tissues → ischemia.