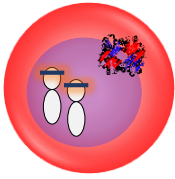
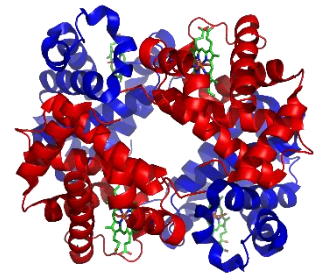
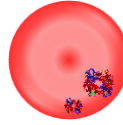


## Thalassemia:

- genetic disorder
- *quantitative* abnormalities in  $\alpha$  or  $\beta$  hemoglobin chains
- contrast qualitative abn. as in sickle cell anaemia
- clinically heterogeneous because various genetic lesions variably impair globin-chain synthesis, and other genetic modifiers may exist

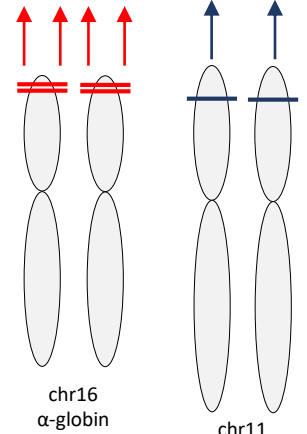


Excess  $\alpha$ -globin chain synthesis with reduced  $\beta$ -globin chain synthesis



The erythroblast fails to synthesize mutated  $\beta$ -globin. These cells may also undergo apoptosis as unpaired  $\alpha$ -chains form hemichromes

Hypochromic, microcytic mature red cells  
Target cells are evident  
Formation of inclusion bodies and Heinz bodies can also be seen  
Precipitation of the unpaired protein causes cell death and cell membrane abnormalities



## The $\alpha$ -Thalassemias

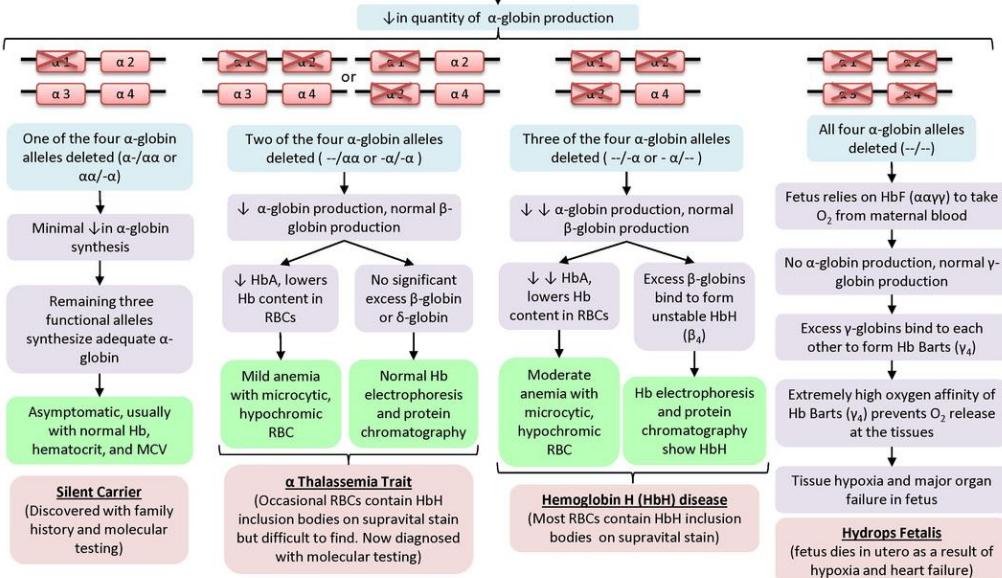
### Alpha Thalassemia: Pathogenesis and clinical presentations

Normal adult hemoglobin (Hb) is  
• 96% HbA ( $\alpha\alpha\beta\beta = 2\alpha + 2\beta$  chains)  
• 2% HbA<sub>2</sub>,  $\alpha\alpha\delta\delta$   
• 2% HbF  $\alpha\alpha\gamma\gamma$  (fetal hemoglobin)

Two genes on chromosome 16 code for  $\alpha$ -globin. Two copies of chromosome 16 in each diploid cell makes for four  $\alpha$ -globin alleles.

Deletion mutation of one or more  $\alpha$ -globin alleles

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Legend: Pathophysiology Mechanism Sign/Symptom/Lab Finding Complications Published November 20, 2012 on www.thecalgaryguide.com

## The $\beta$ -Thalassemias

| Name                   | Clinical symptoms   | Alleles                                |
|------------------------|---|--|
| Thalassemia minor      | Microcytic anemia.  | $\beta^+/\beta$<br>$\beta^0/\beta$     |
| Thalassemia intermedia | Mild to moderate anemia; may have slow growth and bone abnormalities.   | $\beta^+/\beta^+$<br>$\beta^0/\beta^+$ |
| Thalassemia major      | Severe microcytic, hypochromic anemia. Causes splenomegaly and severe bone deformities. Treatment consists of periodic blood transfusion; splenectomy for splenomegaly. | $\beta^0/\beta^0$                      |

Absence of  $\beta$ -globin called  $\beta$ -zero thalassemia.  
Reduced amount of  $\beta$ -globin called  $\beta$ -plus thalassemia.  
Having either B0 or B+ thalassemia does not necessarily predict disease severity, however.