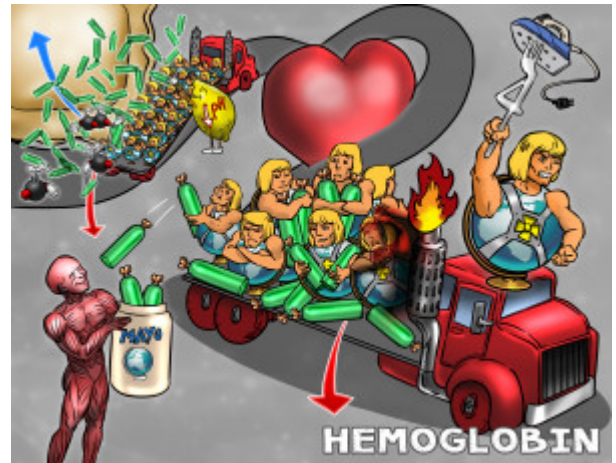


Hemoglobin

Hemoglobin is a metalloprotein in blood that carries oxygen from the alveolus to all tissues in the body. It is composed of four iron heme subunits that can each individually bind oxygen. These four hemes participate in cooperative binding, which means that when one heme subunit binds oxygen, the others are more likely to bind more oxygen. This gives the oxygen saturation curve its characteristic shape. There are many hemoglobin molecules in red blood cells because the body has high oxygen demands. In areas of high oxygen concentration, the propensity to bind oxygen increases. Such areas include the alveolus, where hemoglobin needs to bind oxygen in order to deliver it to cells. In areas with high carbon dioxide levels, the propensity to bind oxygen decreases, allowing hemoglobin to drop oxygen off in high metabolic areas (because CO₂ is a byproduct of metabolism). Additionally, high temperatures and low pH levels reduce oxygen binding. There is a derivative of hemoglobin, myoglobin, which is only found in muscle tissue. It only has one subunit rather than four.



PLAY PICMONIC

Hemoglobin Has Four Iron Hemes

[He-man-globe with \(4\) Fork Iron](#)

Hemoglobin is composed of four iron heme subunits that can each individually bind oxygen. These four hemes participate in cooperative binding, which means that when one heme subunit binds oxygen, the others are more likely to bind.

Lots Of Hemoglobin In Red Blood Cells

[Lots of He-man-globes in RBC truck](#)

Lots of hemoglobin is needed in red blood cells because of the high oxygen demands of the body.

High O₂ Levels Increase O₂ Binding

[Lots of O₂-tanks cause up-arrow He-man-globe binding](#)

High O₂ levels increases hemoglobin's binding affinity for oxygen, allowing it to pick up oxygen in areas like the alveolus.

High Temperature Reduces O₂ Binding

[Hot-flame makes He-man-globe to drop Down-arrow O₂-tank](#)

High temperature also reduces oxygen-binding affinity in hemoglobin as part of the physiological response to hyperthermia.

High CO₂ Levels Reduce O₂ Binding

[Many CO₂-molecules pushing Down-arrow O₂-tanks Off](#)

High carbon dioxide levels reduce hemoglobin's binding affinity for oxygen, allowing it to drop oxygen off at tissues. Because tissues are undergoing cellular metabolism, they produce CO₂ as a byproduct and use O₂ as an electron acceptor.

Low pH Reduces O₂ Binding

[Acidic-lemon with Down-arrow dropping O₂ tanks](#)

Low pH reduces O₂ binding in a condition called acidosis. If respiration levels are low and CO₂ is not being exhaled fast enough, blood becomes acidic and O₂ binding in hemoglobin is reduced.

Myoglobin Binds Oxygen in Muscle

[Mayo-globe held by Muscle-man](#)

Myoglobin is a hemoglobin derivative found only in muscle cells. It has one subunit instead of four.