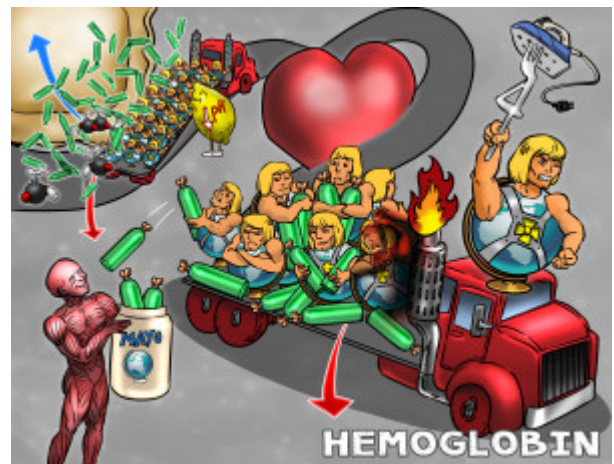


## Hemoglobin

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 CO<sub>2</sub> 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.



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### 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 O<sub>2</sub> Levels Increase O<sub>2</sub> Binding

[Lots of O<sub>2</sub>-tanks cause up-arrow He-man-globe binding](#)

High O<sub>2</sub> levels increases hemoglobin's binding affinity for oxygen, allowing it to pick up oxygen in areas like the alveolus.

### High Temperature Reduces O<sub>2</sub> Binding

[Hot-flame makes He-man-globe to drop Down-arrow O<sub>2</sub>-tank](#)

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

### High CO<sub>2</sub> Levels Reduce O<sub>2</sub> Binding

[Many CO<sub>2</sub>-molecules pushing Down-arrow O<sub>2</sub>-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 CO<sub>2</sub> as a byproduct and use O<sub>2</sub> as an electron acceptor.

### Low pH Reduces O<sub>2</sub> Binding

[Acidic-lemon with Down-arrow dropping O<sub>2</sub> tanks](#)

Low pH reduces O<sub>2</sub> binding in a condition called acidosis. If respiration levels are low and CO<sub>2</sub> is not being exhaled fast enough, blood becomes acidic and O<sub>2</sub> 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.