OPEN ACCESS Freely available online

Journal of Hematology & Thromboembolic Diseases

Perspective

Role of Haemoglobin in Human Biology and Clinical Practice

Eric Clareiy*

Department of Hematology, University of Florence, Florence, Italy

DESCRIPTION

Haemoglobin is a vital protein molecule found in red blood cells, playing a crucial role in the respiratory system of humans and many other animals. It is responsible for the efficient transport of oxygen from the lungs to the body's tissues and the return of carbon dioxide from the tissues back to the lungs for exhalation. This oxygen-carrying function is essential for cellular respiration, which produces the energy needed for bodily functions. Without haemoglobin, oxygen delivery would be severely impaired, threatening the survival of cells and organs.

Structurally, haemoglobin is a complex protein composed of four subunits, each containing a heme group with an iron atom at its core. This iron atom is essential because it is the binding site for oxygen. When oxygen enters the lungs, it diffuses across the alveolar membrane into the blood, where it binds to haemoglobin in red blood cells. Each haemoglobin molecule can carry up to four oxygen molecules, making it highly efficient for oxygen transport. Once the red blood cells reach tissues in need of oxygen, the haemoglobin releases the oxygen molecules, which then diffuse into the surrounding cells to support metabolism.

In addition to oxygen transport, haemoglobin also plays a role in carrying carbon dioxide, a metabolic waste product, back to the lungs. A portion of the carbon dioxide bonds to the haemoglobin molecule itself, while the remainder dissolves directly in the blood plasma or is changed into bicarbonate ions. This dual role highlights the importance of haemoglobin not only in oxygen delivery but also in maintaining the acid-base balance and overall respiratory function of the body.

The amount and quality of haemoglobin in the blood are critical indicators of health. Anaemia, a haemoglobin shortage, can cause symptoms like weakness, exhaustion, dyspnoea, and pale complexion. Anaemia can be caused by various factors, including nutritional deficiencies (particularly iron, vitamin B12, and folate), chronic diseases, genetic disorders such as sickle cell anaemia and thalassemia, or excessive blood loss. The most prevalent kind of anaemia is iron-deficiency anaemia, which is frequently treated with dietary modifications or iron supplements.

On the other hand, abnormally high levels of haemoglobin can occur in individuals living at high altitudes, where oxygen levels are lower, or in those with certain medical conditions such as polycythaemia vera, a disorder in which the bone marrow produces too many red blood cells. While increased haemoglobin can enhance oxygen-carrying capacity, excessively high levels can lead to increased blood viscosity and a higher risk of clotting or stroke.

Modern medicine relies heavily on haemoglobin measurements for diagnostic purposes. A simple blood test known as the Complete Blood Count (CBC) includes a haemoglobin measurement and helps assess overall health or detect a range of disorders. Haemoglobin A1c, a variant of haemoglobin that binds to glucose, is used to monitor long-term blood sugar levels in individuals with diabetes, providing insights into how well their condition is being managed.

CONCLUSION

Haemoglobin is much more than just a component of blood; it is a central player in sustaining life by ensuring that oxygen reaches every cell in the body. Its structure, function, and regulation exemplify the intricacies of human physiology. Whether through aiding in the diagnosis of health conditions or understanding the body's adaptation to environmental challenges, haemoglobin continues to be an area of active research and medical interest. Ensuring proper haemoglobin levels through a balanced diet, regular health check-ups, and managing chronic conditions is key to maintaining optimal health and vitality.

Correspondence to: Eric Clareiy, Department of Hematology, University of Florence, Florence, Italy, E-mail: Clarerics34@gmail.com

Received: 10-Mar-2025, Manuscript No. JHTD-25-37898; **Editor assigned:** 12-Mar-2025, PreQC No. JHTD-25-37898(PQ); **Reviewed:** 26-Mar-2025, QC No. JHTD-25-37898; **Revised:** 02-Apr-2025, Manuscript No. JHTD-25-37898(R); **Published:** 09-Apr-2025, DOI: 10.35248/2329-8790.25.13.654

Citation: Clareiy E (2025). Role of Haemoglobin in Human Biology and Clinical Practice. J Hematol Thrombo Dis.13:654.