**Ministry of Higher Education Class: 3rd stage Lecture (1)**

 **And Scientific Research Subject: Hematology.**

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 **Techniques**

**Hematology**

**Definition**

Hematology is the branch of [medicine](https://en.wikipedia.org/wiki/Medicine) concerned with the study of the **cause,** **prognosis, treatment,** and **prevention of diseases related to**[**blood**](https://en.wikipedia.org/wiki/Blood). It **involves treating diseases that affect the production of blood and its components**, such as [**blood cells**](https://en.wikipedia.org/wiki/Blood_cells), [**hemoglobin**](https://en.wikipedia.org/wiki/Hemoglobin), [**blood** **proteins**](https://en.wikipedia.org/wiki/Blood_proteins), [**bone marrow**](https://en.wikipedia.org/wiki/Bone_marrow), [**platelets**](https://en.wikipedia.org/wiki/Platelet), [**blood vessels**](https://en.wikipedia.org/wiki/Blood_vessel), [**spleen**](https://en.wikipedia.org/wiki/Spleen), and **the mechanism of**[**coagulation**](https://en.wikipedia.org/wiki/Coagulation). Such diseases might include [**hemophilia**](https://en.wikipedia.org/wiki/Hemophilia)**, blood clots (**[**thrombus**](https://en.wikipedia.org/wiki/Thrombus)**),** other **bleeding disorders**, and **blood**[**cancers**](https://en.wikipedia.org/wiki/Cancer)such as [**leukemia**](https://en.wikipedia.org/wiki/Leukemia)**,**[**multiple myeloma**](https://en.wikipedia.org/wiki/Multiple_myeloma), and [**lymphoma**](https://en.wikipedia.org/wiki/Lymphoma). The laboratory analysis of blood is frequently **performed by a**[**medical technologist**](https://en.wikipedia.org/wiki/Medical_technologist) or [**medical laboratory scientist**](https://en.wikipedia.org/wiki/Medical_laboratory_scientist)**.**

**Importance of hematology**

Haematology is the specialty responsible for the diagnosis and management of a wide range of benign and malignant disorders of the red and white blood cells, platelets and the coagulation system in adults and children.

**General function of blood**

Blood is a combination of plasma and cells that circulate through the body. It supplies essential substances, such as sugars, oxygen, and hormones, to cells and organs, and removes waste from cells.

The main [components](https://www.redcrossblood.org/donate-blood/how-to-donate/types-of-blood-donations/blood-components.html) of blood are:

* plasma
* red blood cells
* white blood cells
* platelets

**1**

**Plasma**

Plasma accounts for around [55%](http://www.redcrossblood.org/learn-about-blood/blood-components) of blood fluid in humans. Plasma is 92% water, and the contents of the remaining 8% include:

* glucose
* hormones
* proteins
* mineral salts
* fats
* [vitamins](https://www.medicalnewstoday.com/articles/195878.php)

The remaining 45% of blood mainly consists of red, white blood cells and platelets. Each of these has a vital role to play in keeping the blood functioning effectively.

**Red blood cells, or erythrocytes**

Red blood cells have a slightly indented, flattened disk shape. They transport oxygen to and from the lungs. Hemoglobin is a protein that contains iron and carries oxygen to its destination. The life span of a red blood cell is 4 months, and the body replaces them regularly. The expected number of red blood cells in a single drop (microliter) of blood is [4.5–6.2 million](https://uihc.org/health-library/complete-blood-count-guide-patients-cancer) in males and 4.0–5.2 million in females.

**White blood cells, or leukocytes**

[White blood cells](https://www.medicalnewstoday.com/articles/327446) make up [less than 1%](http://www.redcrossblood.org/learn-about-blood/blood-components/white-blood-cells-and-granulocytes) of blood content, forming vital defenses against disease and infection. The number of white blood cells in a microliter of blood usually ranges from [3,700–10,500](https://uihc.org/health-library/complete-blood-count-guide-patients-cancer). Higher or lower levels of white blood cells can indicate disease.

**Platelets, or thrombocytes**

Platelets interact with clotting proteins to prevent or stop bleeding. There should be between [150,000 and 400,000](https://uihc.org/health-topics/complete-blood-count-guide-patients-cancer) platelets per microliter of blood.

**2**

Bone marrow produces red blood cells, white blood cells, and platelets, and from there they enter the bloodstream. Plasma is mostly water that is absorbed from ingested food and fluid by the intestines. The heart pumps them around the body as blood by way of the blood vessels.

**Functions**

Blood has various functions that are central to survival. They include:

* supplying oxygen to cells and tissues
* providing essential nutrients to cells, such as amino acids, fatty acids, and glucose
* removing waste materials, such as carbon dioxide, urea, and lactic acid
* protecting the body from diseases, infections, and foreign bodies through the action of white blood cells
* regulating body temperature

The platelets in blood enable the clotting, or coagulation of blood. When bleeding occurs, the platelets group together to create a clot. The clot forms a scab, which stops the bleeding and helps protect the wound from infection.

**3**