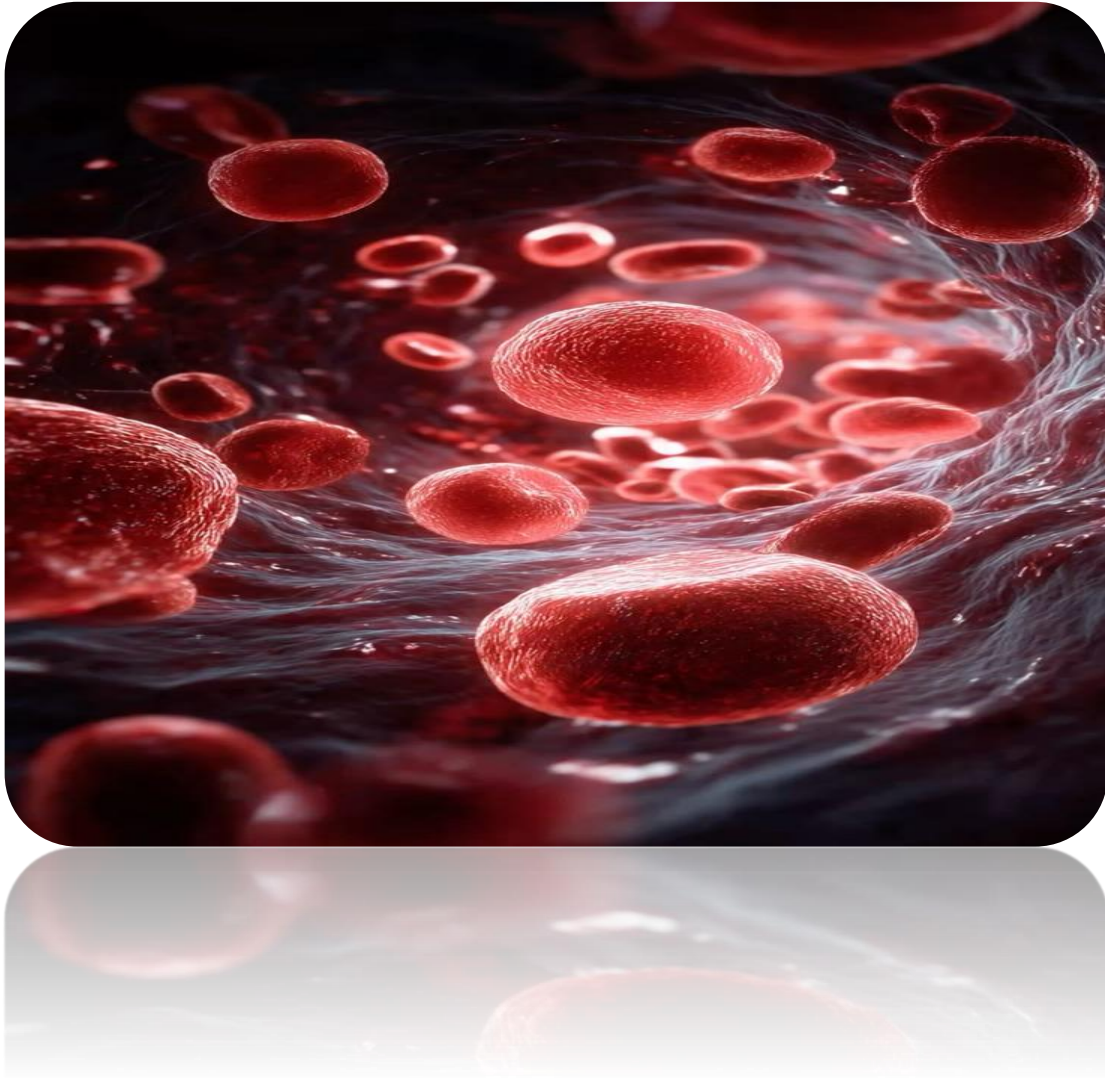


Blood, and Lymph Systems



Blood is a specialized body fluid in the circulatory system of humans and other vertebrates.

It has four main components:

- plasma
- red blood cells (RBC)
- white blood cells (WBC)
- platelets.

Blood has many different functions, including transporting oxygen and nutrients to the cells and tissues.

Blood is **made up of liquid and solids**. The liquid part, called plasma, is made of water, salts, and protein. Over half of blood is plasma. The solid part of blood contains red blood cells, white blood cells, and platelets. Red blood cells (RBC) deliver oxygen from the lungs to the tissues and organs.

Blood	<p>55% is liquid = plasma</p> <p>45% is solid = cells</p> <p>Cells containing fluid that circulates through the heart, arteries, veins, and capillaries, carrying nourishment, electrolytes, hormones, vitamins, antibodies, heat, and oxygen to the tissue and taking away waste matter and carbon dioxide.</p>
Liquid plasma	<p>55% of the total blood volume.</p> <p>92% water and contains the plasma proteins (albumin, globulins, and fibrinogen), as well as gases, nutrients, salts, hormones, and excretory products.</p>
Blood serum	product of blood plasma that does not contain fibrinogen (fibrinogen is responsible for clotting of blood).
Red blood cells	<p>Function: carry oxygen to tissues and carbon dioxide to the lungs.</p> <p>The average life cycle of a red blood cell is 120 days</p> <p>Hemoglobin gives the RBC's color.</p>

<p>White blood cells</p>	<p>1 ½ times larger than RBCs.</p> <p>Function: Protects the body against infection by bacteria and foreign substances.</p> <p>The white blood cells have a rather short life cycle, living from a few days to a few weeks. A drop of blood can contain anywhere from 7 000 to 25 000 white blood cells at a time.</p>
<p>Neutrophils:</p>	<p>(50-70%) most numerous of the WBCs.</p> <p>Responsible for body's protection against infection.</p>
<p>Eosinophil</p>	<p>(1-4%) greatest in numbers when there is an allergic reaction or parasitic infection.</p>
<p>Lymphocytes</p>	<p>(20-40%) smallest of the WBCs.</p> <p>Involved with the immune system and the production of antibodies.</p>
<p>Blood groups</p>	<p>four groups: ABO system: discovered in 1901. Discovered because physicians were trying to learn why blood transfusions sometimes caused death and at other times save a patient.</p>
<p>Platelets</p>	<p>Function: Small cells which aid in blood clotting when an injury occurs. The human body does not handle excessive blood loss well. Therefore, the body has ways of protecting itself. If, for some unexpected reason, sudden blood loss occurs, the blood platelets kick into action.</p>

A, B, AB, and O:

system of classifying blood according to differences in antigen makeup. There are two **antigens** and two **antibodies**. Human blood is divided into four types.

Type A: second most common blood type.

Type B: third most common blood type.

Type AB: least common blood

type.

Type O: most common.

Antigen

(identifier) foreign materials that when introduced into the body stimulate the production of an antibody. Antigens include toxins, bacteria, foreign blood cells, and the cells of transplanted organs.

Naturally occurring antigens are the blood type factors A and B that are present at birth in some individuals.

Antibodies:

(destroyer) a Y-shaped protein on the surface of B cells that is secreted into the blood or lymph in response to an antigenic stimulus, such as a bacterium, virus, parasite, or transplanted organ, and that neutralizes the antigen by binding specifically to it, an immunoglobulin.

An antibody then helps to neutralize or inactivate the antigen.

Lymph

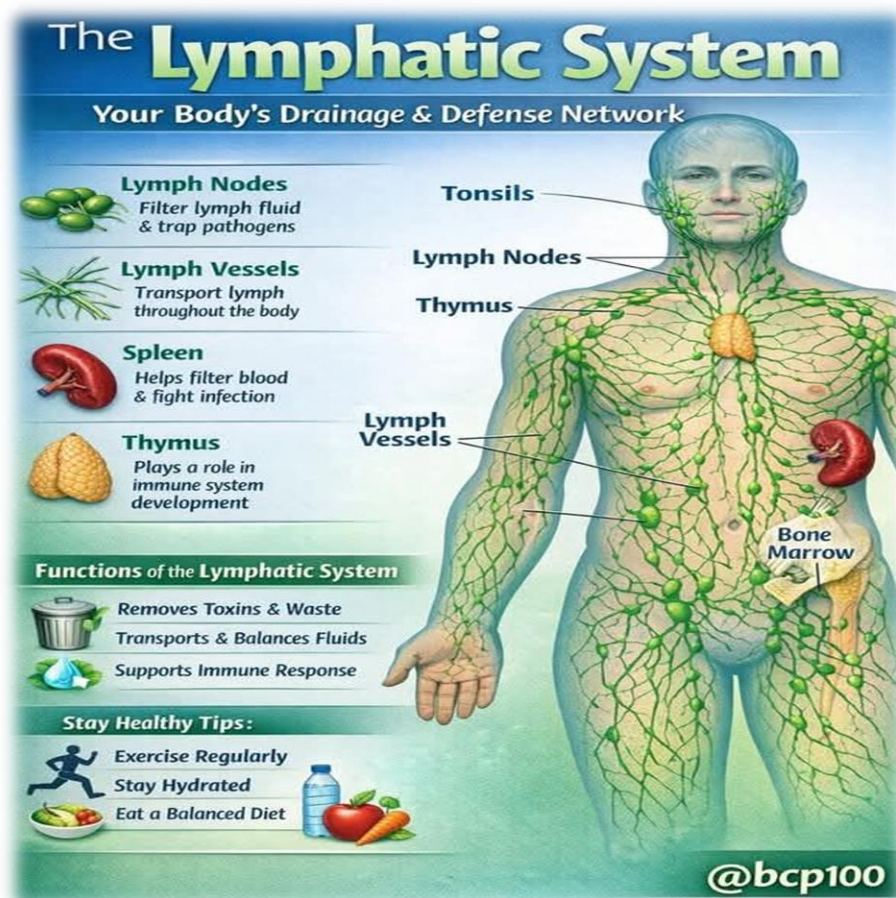
The lymphatic system or lymphoid system is **a network of delicate tubes throughout the body**. It drains fluid (called lymph) that has leaked from the blood vessels into the tissues and empties it back into the bloodstream via the lymph nodes. The main roles of the lymphatic system include managing the fluid levels in the body.

What is lymph and where it is present?

Lymph is a clear to white fluid made of White blood cells, especially lymphocytes, the cells that attack bacteria in the blood and body tissues.

Where does lymph come from?

Lymph is a fluid similar in composition to **blood plasma**. It is derived from blood plasma as fluids pass through capillary walls at the arterial end. As the interstitial fluid begins to accumulate, it is picked up and removed by tiny lymphatic vessels and returned to the blood. Lymph is part of the lymphatic system,



Lymph

is a fluid that surrounds body cells and flows in a system of lymph vessels that extend throughout the body. Originates from blood plasma. Blood circulates through the capillaries, small amounts of plasma seep through the capillary wall, (now called interstitial fluid), this fluid either returns to the capillary or enters the lymph capillary and is then called lymph.

Lymph vessels: begin as closed- ended capillaries in tissue spaces and terminate at the right lymphatic duct and the thoracic duct in the chest cavity.

Lymph nodes: small filtering stations which help fight infection. Serve as depositories for cellular debris. Lymph is filtered and replenished with lymphocytes and antibodies. The macrophages lining the lymph nodes destroy bacterial and debris. Lymph nodes become larger in size when there is an infection due to the increase in the number of bacteria.



Lymph circulation

lymph vessels from the right chest and arm join the right lymphatic duct which drains into the right subclavian vein.

All other sites enter the thoracic duct and drain into the left subclavian vein.

Lymph is now in the blood and will circulate and become plasma.

Lymphatic organs:

The organs of the lymphatic system are your:

Bone marrow. This is the soft, spongy tissue in the center of certain bones, **Thymus.** This organ is located in your upper chest beneath your breastbone, and it's most active before puberty. **Lymph nodes.** Lymph nodes are bean-shaped glands that monitor and cleanse lymph as it filters through them. **Spleen.** This largest lymphatic organ is located on your left side under your ribs and above your stomach. Your spleen filters your blood and removes cells that are old or not working properly. It also keeps red blood cells and platelets available in case your body needs them.

