Commentary
Volume 12:S3, 2022

Journal of Blood & Lymph

ISSN: 2165-7831 Open Access

Hematologic and Lymphatic Systems: Responsible for Immune Response

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Description

The hematologic system is made up of blood (plasma and formed elements) and bone marrow, which is the primary organ that produces blood cells. Lymphatic vessels and tissues make up the lymphatic system. Other organs and structures, such as the spleen, liver, and kidneys, perform related functions as well. The hematologic system serves three purposes: Transportation, regulation, and protection. These functions include nutrient and oxygen delivery to cells, waste removal, blood volume regulation, blood cell and antibody production, and blood coagulation. The lymphatic system transports dietary fats, drains interstitial fluid, and provides immunity to aid in infection defense. It also recycles and returns excess proteins to the systemic circulation that may have escaped from blood vessels.

The hematologic and lymphatic systems transport and protect cells in the body. Furthermore, blood plays a role in regulatory processes, while lymph plays a role in the formation of elements, the removal of exotic substances, and the absorption and storage of substances in the body. Blood is a versatile vascular fluid that is thicker, heavier, and more viscous than water. Despite being a liquid, it has a distinct property that contributes to its ability to form solid clots.

The primary goal of blood is to provide a consistent environment for all body tissues. It maintains homeostasis through its viscosity (thickness), as well as its ability to transport dissolved substances and move to all body parts. The transportation of oxygen, carbon dioxide, nutrients, heat, waste products, and hormones to and from cells is the responsibility of blood. It also aids in the regulation of pH, body temperature, and cellular water content. It helps to protect against blood loss and external body invasion. Blood is classified as a connective tissue because it is composed primarily of cells that, in terms of origin and development, share many similarities with other connective tissues. It differs from other connective tissues in that its cells are not fixed and can freely move to any cell in the body.

Hematopoiesis (hemopoiesis) is the process by which blood cells are produced and matured. The red bone marrow is responsible for the production of blood cells, also known as "formed elements." (RBCs are also produced in the liver and spleen during development.) Other tissues, such as the lymph nodes, spleen, and thymus, help to produce and mature agranular white blood cells. The formation of red blood cells is referred to as erythropoiesis (erythrocytes). Erythropoiesis requires dietary elements such as iron, cobalt, copper, amino acids, and certain vitamins. Blood is made up of plasma as well as formed elements. It travels through a closed network of vessels pumped by the heart. The volume of circulating blood varies according to body size.

The fluid portion of circulating blood is known as blood plasma. It accounts for 55% of blood volume. Plasma is composed of 90%water. The remaining 10% is mostly plasma proteins, but it also contains salts (electrolytes), nutrients, nitrogenous waste products, gases, hormones, and enzymes. Plasma contains Sodium (Na^+), Calcium (Ca^+), Potassium (K^+), and Magnesium (Mg^{2+}) salts. Other ions found in plasma include bicarbonates, sulphates, chlorides, and phosphates. These salts from food are absorbed by plasma and used by body cells. The preservation of these salts within plasma regulates the chemical and acid-base balance of the blood, contributing to overall body homeostasis. The hematologic system is made up of blood (plasma and formed elements) and bone marrow and the lymphatic system (lymph, lymph nodes, and lymph vessels) aids the circulatory system by draining excess fluids and proteins from tissues and returning them to the bloodstream, preventing tissue swelling.

How to cite this article: Maurizio, Sonali "Hematologic and Lymphatic Systems: Responsible for Immune Response". *J Blood Lymph* 12 (2022): 015.

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Received: 02-Sep-2022, Manuscript No. JBL-22-77107; **Editor assigned:** 07-Sep-2022, Pre QC No. JBL-22-77107 (PQ); **Reviewed:** 15-Sep-2022, QC No. JBL-22-77107; **Revised:** 22-Sep-2022, Manuscript No. JBL-22-77107 (R); **Published:** 03-Oct-2022, DOI: 10.37421/ 2165-7831.2022.12.015