

Impact of Hematologic Disorders on the Human Health

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DESCRIPTION

The peripheral blood system is a crucial component of the human body that plays a vital role in maintaining overall health and functioning. The peripheral blood system is a complex network of cells, tissues, and organs that plays a vital role in maintaining the homeostasis of the body. It is responsible for transporting oxygen, nutrients, hormones, and immune cells to different tissues and organs throughout the body.

It comprises several types of blood cells, such as Red Blood Cells (RBCs), White Blood Cells (WBCs), and platelets. The primary function of the peripheral blood system is to transport oxygen, nutrients, and other essential substances to different parts of the body and remove waste products from the body. This study focuses on the components of the peripheral blood system, their functions, and their clinical significance.

Components of the peripheral blood system

The peripheral blood system is composed of three main types of blood cells: RBCs, WBCs, and platelets. Each type of blood cell has unique characteristics and functions.

Red Blood Cells: Red Blood Cells (RBCs), also known as erythrocytes, are the most abundant type of blood cell in the peripheral blood system. They are responsible for carrying oxygen from the lungs to the body's tissues and carbon dioxide from the tissues to the lungs. RBCs are disk-shaped and contain hemoglobin, a protein that binds to oxygen and carbon dioxide. The concentration of RBCs in the blood, known as the hematocrit, is an essential indicator of the body's oxygen-carrying capacity.

The production of RBCs is controlled by a hormone called Erythropoietin (EPO), which is produced by the kidneys. Low oxygen levels in the body stimulate the production of EPO, which, in turn, stimulates the bone marrow to produce more RBCs. RBCs have a lifespan of approximately 120 days, after which they are removed from the bloodstream by the spleen and liver.

White Blood Cells: White Blood Cells (WBCs), also known as leukocytes, are a crucial part of the body's immune system. They

are responsible for defending the body against infections and other foreign invaders. There are several types of WBCs, including:

Neutrophils are the most abundant type of WBC in the blood. They are the first responders to infections and are responsible for phagocytosing (engulfing and digesting) bacteria, fungi, and other foreign substances.

Lymphocytes are the second most abundant type of WBC in the blood. They are responsible for producing antibodies that target specific pathogens, such as viruses and bacteria. There are two main types of lymphocytes: B cells and T cells.

Monocytes are the largest type of WBC in the blood. They are responsible for phagocytosing bacteria, viruses, and other foreign substances. When they leave the bloodstream and enter the tissues, they differentiate into macrophages, which are specialized phagocytic cells.

Eosinophils are involved in allergic reactions and parasitic infections. They release enzymes that break down the outer membrane of parasites and secrete inflammatory molecules that recruit other immune cells to the site of infection.

Basophils are involved in allergic reactions and play a role in the immune response to parasites. They release histamine, which causes inflammation and increases blood vessel permeability.

Platelets: Platelets, also known as thrombocytes, are small, disk-shaped cells that are involved in the clotting of blood. When a blood vessel is damaged, platelets aggregate at the site of injury and release clotting factors that promote the formation of a blood clot. This process is essential in preventing excessive bleeding and promoting wound healing.

Functions of the peripheral blood system

The peripheral blood system is composed of the blood and blood vessels that circulate throughout the body. Its main functions include:

Transport of oxygen and nutrients: The peripheral blood system delivers oxygen and nutrients to all tissues and organs of the body, allowing them to function properly.

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Removal of waste products: The system also removes waste products, such as carbon dioxide and other metabolic wastes, from the body.

Immune response: The peripheral blood system plays a critical role in the body's immune response, by transporting immune cells and antibodies to areas of infection or injury to fight off pathogens.

Blood clotting: The system also helps to form blood clots, which are important for stopping bleeding and repairing damaged blood vessels.

Hormonal regulation: The peripheral blood system helps to transport hormones, such as insulin and thyroid hormone, throughout the body to regulate various bodily functions.

Temperature regulation: The system helps to regulate body temperature by transporting heat away from internal organs and towards the skin, where it can be dissipated.

CONCLUSION

Disorders in the peripheral blood system can lead to severe health complications. Various diseases and conditions can affect the peripheral blood system, including anemia, leukemia, lymphoma, and thrombocytopenia. For example, anemia occurs when there is a deficiency of red blood cells or hemoglobin, leading to reduced oxygen supply to the body's tissues. Leukemia is a type of blood cancer that affects white blood cells, leading to their uncontrolled growth and accumulation in the bone marrow and other organs. Treatment for these conditions depends on the specific disease or condition and can range from medications and blood transfusions to stem cell transplantation. Overall, the peripheral blood system is a complex and dynamic system that is essential for maintaining good health and preventing disease. Regular monitoring and appropriate medical interventions can help ensure proper functioning of this system and prevent complications.