

Chapter-13

Poisoning Introduction to Pathology of Blood and Urine

- **Lymphocytes and Platelets, their role in health and disease.**
- **Erythrocytes - Abnormal cells and their significance.**
- **Normal and Abnormal constituents of Urine and their significance.**

Introduction to Pathology of Blood and Urine—

- The pathology of blood involves the study of the cellular and molecular components of blood and their interactions.
- Blood is composed of various cells and plasma, which contains nutrients, hormones, electrolytes, and other vital components that are essential for the body's normal functioning.
- Any abnormality in the composition or function of these components can lead to a wide range of medical conditions.

Common blood disorders include anemia, leukemia, and hemophilia.

- Anemia is a condition in which the body does not have enough red blood cells, causing fatigue and weakness.
- Leukemia is a type of cancer that affects the blood and bone marrow, leading to an overproduction of abnormal white blood cells.
- Hemophilia is a genetic disorder that causes the blood to clot abnormally, leading to excessive bleeding.

Lymphocyte's role in health and diseases.



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- Lymphocytes are a type of white blood cell that plays a crucial role in the immune system. They are responsible for identifying and attacking foreign substances such as viruses, bacteria, and cancer cells. There are two main types of lymphocytes: B cells and T cells.
- B cells produce antibodies that help identify and neutralize pathogens. When a B cell encounters a foreign substance, it produces a specific antibody that binds to the pathogen and signals other immune cells to destroy it.
- T cells play a variety of roles in the immune system, including recognizing and destroying infected cells, regulating the immune response, and helping B cells produce antibodies.
- Abnormalities in lymphocytes can lead to various diseases, such as lymphoma, leukemia, and autoimmune disorders. Lymphoma and leukemia are cancers that affect lymphocytes, while autoimmune disorders occur when the immune system mistakenly attacks the body's own cells and tissues.

Platelet's role in health and diseases.

- Platelets, also known as thrombocytes, are small fragments of cells that help the blood clot to stop bleeding. They are formed in the bone marrow and circulate in the blood. When a blood vessel is damaged, platelets rush to the site and stick together, forming a plug to stop the bleeding.
- Abnormalities in platelet function can lead to bleeding disorders, such as hemophilia and von Willebrand disease, or thrombotic disorders, such as deep vein thrombosis and pulmonary embolism.
- Hemophilia and von Willebrand disease are inherited disorders that impair the blood's ability to clot, while deep vein thrombosis and pulmonary embolism occur when blood clots form in the veins and travel to other parts of the body, leading to serious complications.

Erythrocytes - Abnormal cells and their significance.

Red blood cells (RBCs) or erythrocytes are the most abundant type of blood cells in the human body, and their main function is to transport oxygen from the lungs to the body tissues and to carry carbon dioxide from the tissues back to the lungs. The shape of RBCs is an important characteristic that can provide information about a person's health status. A medical professional can evaluate



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the shape and size of RBCs as part of a complete blood count (CBC) test to diagnose and monitor blood disorders. Some abnormal shape of RBCs.

1. Normal RBCs— Normal RBCs have a biconcave shape with a flattened centre, which increases their surface area for efficient gas exchange. Normal RBCs are essential for oxygen transport and carbon dioxide removal.
2. Sickle cell-shaped RBCs— Sickle cell-shaped RBCs have a crescent or sickle shape and are characteristic of sickle cell anaemia, a genetic disorder that affects the production of haemoglobin. These abnormal RBCs can cause blockages in the blood vessels, leading to pain, organ damage, and other complications.
3. Schistocyte-shaped RBCs— Schistocyte-shaped RBCs have an irregular shape and are fragmented due to physical damage, such as from trauma or mechanical heart valves. These abnormal RBCs can cause haemolysis, anaemia, and other blood disorders.
4. Target-shaped RBCs— Target-shaped RBCs have a central dark spot surrounded by a lighter ring and an outer dark ring. Target-shaped RBCs can be caused by iron deficiency anaemia, liver disease, thalassemia, and other conditions.
5. Ovalocyte-shaped RBCs— Ovalocyte-shaped RBCs have an oval or elliptical shape and can be seen in various blood disorders, including hereditary elliptocytosis, thalassemia, and myelofibrosis.
6. Tear-drop-shaped RBCs— Tear-drop-shaped RBCs have a teardrop or pear-shaped appearance and can be seen in various blood disorders, including thalassemia, myelofibrosis, and other conditions.

Introduction to Pathology of Urine.

The pathology of urine involves the analysis of the chemical and physical properties of urine and their relationship to disease.

Urine is a waste product that is produced by the kidneys and excreted from the body through the urinary system. It contains a variety of components that can provide valuable diagnostic information when analyzed.



Examination of urine.

The investigation of urine, also known as urinalysis, is a medical test that evaluates the composition and properties of urine to diagnose various medical conditions. Here are some common investigations of urine:

1. **Physical examination**— This includes the colour, odour, and appearance of the urine. Normal urine is pale yellow in colour, clear, and has a mild odour. Abnormal urine may be cloudy, have a strong odour, or be a different colour, which can indicate various medical conditions.
2. **Chemical analysis:** A dipstick test is used to check for the presence of different chemicals in the urine, such as glucose, protein, ketones, blood, and bilirubin. Abnormal results can indicate conditions such as diabetes, kidney disease, or liver disease.
3. **Microscopic examination:** The urine sample is examined under a microscope to detect the presence of abnormal cells, bacteria, crystals, or other particles. This can help diagnose conditions such as urinary tract infections, kidney stones, or cancer.
4. **Culture and sensitivity testing:** If there is evidence of infection in the urine, a culture and sensitivity test may be performed to identify the type of bacteria causing the infection and determine the most effective antibiotic to treat it.
5. **Urine cytology:** This is a microscopic examination of the urine to detect abnormal cells that may indicate bladder cancer or other urinary tract cancers.
6. **24-hour urine collection:** This test involves collecting all urine produced in a 24-hour period and measuring the volume, composition, and excretion of certain substances in the urine. It can be used to diagnose kidney disorders and other conditions.
7. **Stone analysis:** If a person has kidney stones, the stones can be analysed to determine their composition, which can help determine the cause and treatment of the stones.

