

Histology

2.1 INTRODUCTION

Histology is the study of microscopic anatomy of cells and tissues. Hence, histology is the science concerned with minute structure of cells, tissues and organs in relation to their functions.

2.2 TISSUES

- **How are the organs of the body formed?**

All organs of the body are formed of tissues.

- **What is a tissue?**

A tissue is a collection of similar type of cells. The cells are associated with some intercellular matrix (ground substance) and they are governed by some laws of growth and development to form tissue. These cells are adopted to perform same function or functions.

- **How are tissues classified?**

Tissues are usually classified into four categories which are (i) epithelial tissue (ii) connective tissue (iii) muscular tissue and (iv) nervous tissue.

- **What do you understand from epithelium or epithelial tissue?**

Epithelium is lining or covering tissue. It is a sheet of cells that either covers an external surface or internal surface of an organ or any part of the body.

- **What is connective tissue?**

Connective tissue has few cells but it has a large amount of non-living ground substance or matrix. It can be (i) connective tissue proper or supporting tissue (ii) skeletal tissue and (iii) fluid connective tissue.

- **What is connective tissue proper or supporting tissue?**

Connective tissues proper as name suggests, connect and anchor parts and give support to the body and its organs. This is the reason why the connective tissues

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blood cells). The blood forming activity of marrow gradually lessens with age and red marrow is replaced by yellow marrow.

• What is fluid connective tissue?

Blood is a liquid connective tissue. It is a red coloured fluid. It consists of a liquid portion which is called plasma and of three different kinds of cells. The cells are (i) red blood corpuscles (ii) white blood corpuscles and (iii) platelets.

Plasma is the liquid portion of the blood. It forms about two-thirds of the blood. It contains about 80% of water. It is almost a colourless clear fluid and contains everchanging variety of substances in solution and suspension. Among the various substances present in the plasma such as gases, absorbed food material, inorganic salts, vitamins, metabolic waste products, hormones, antitoxin, it also has soluble blood protein called fibrinogen.

The cytoplasm of red corpuscles contains a pigment which is called haemoglobin. The haemoglobin makes the red corpuscles appear red. The haemoglobin combines readily with oxygen in the lungs to form an unstable compound which is called oxyhaemoglobin. In the tissues, oxyhaemoglobin breaks up and releases oxygen. Here haemoglobin combines with carbon dioxide to form an unstable compound which is called carboxyhaemoglobin. Carboxy haemoglobin breaks up in the lungs and releases carbon dioxide for expiration. Haemoglobin, therefore, transports gases and as such plays a vital part in respiration. The red corpuscles are formed in the liver and the spleen which also destroy the worn out corpuscles. As these are nucleated, they live for a pretty long time.

The white blood corpuscles (leucocytes) are small, semi-transparent, nucleated and amoeboid cells. These can crawl out between neighbouring endothelial cells and hence they are found in every nook and corner of the body. At any part of the body having infection, they accumulate in very large numbers and serve to defend the body against the disease germs. They are able to eat bacteria and other germs in amoeba-like manner. White blood corpuscles are produced in the bone marrow and lymphatic glands.

Platelets contain a chemical which plays an important role in the clotting of blood.

• What are the various functions of blood?

The various functions of blood are:

- (a) *Transport of gases* RBC (red blood corpuscle) combines with oxygen to form oxyhaemoglobin which breaks up and releases oxygen in tissues. In tissues, RBC combines with carbon dioxide to form carboxyhaemoglobin which breaks up in the lungs to release carbon dioxide for expiration.

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• **What are striped muscular tissues?**

The striped muscles are under the control of 'will' and they are wide and non-tapering. In the striped muscle, fibres are united in parallel bundles which are continuous with connective tissue sheath surrounding the tendons that unite the muscle to the skeleton.

• **What are unstriped muscles?**

The unstriped muscles are not in the control of 'will' and they are found in the alimentary canal, the lungs and the blood vessels. Unstriped muscles are made of elongated, spindle shaped, flattened fibres which are rarely forked at the ends. The number of unstriped muscle fibres are united together by a minute quantity of intercellular substance into a thin and flat band and a number of such bands are bound together by connective tissues into a larger bundle.

• **What is cardiac muscle?**

The cardiac muscles are found only in the wall of the heart. The structure is somewhat in between striped and unstriped muscles. These muscles contract rhythmically and these muscles are immune to fatigue.

• **What is nervous tissue?**

Nervous tissue consists of (i) nerve cell and (ii) nerve fibre. Nerve cells are known as neurons. Each neuron consists of a cell body from which arises a system of branching fibres. The number of fibres branching from the cell body is variable. On this basis, neurons can be classified as (i) multipolar (ii) bipolar and (iii) unipolar. Neurons with many processes are multipolar. Neurons with two processes arising at the opposite poles are known as bipolar. Neurons having processes arising from the same pole are known as unipolar.

The cytoplasm of each neuron contains a large and spherical nucleus, large number of dark staining minute particles (nissel granules) and numerous cytoplasmic strands known as neurofibrillae. Neurofibrillae helps in the passage of the nerve impulse.