Human Physiology

Physiology is defined as the study of functions of various systems and different organs of the body. Physiology is of different types namely, Human Physiology, Animal Physiology and Plant Physiology. Human Physiology and Animal Physiology are very much inter-related. Knowledge of Human Physiology is essential to understand the other allied subjects like Biochemistry, Pharmacology, Pathology, Medicine, etc.

Cell Physiology

All the living things are composed of cells. A single cell is the smallest unit that has all the characteristics of life .

Structure of the Cell

Each cell is formed by a cell body and a membrane covering the cell body called the cell membrane. Cell body has two parts, namely nucleus and cytoplasm surrounding the nucleus. Thus, the structure of the cell is studied under three headings:

1. Cell membrane.
2. Cytoplasm.
3. Nucleus.

Cell Membrane

Cell membrane is a protective sheath, enveloping the cell body. It is also known as plasma membrane. This membrane separates the fluid outside the cell called extracellular fluid (ECF) and the fluid inside the cell called intracellular fluid (ICF). The cell membrane is a semipermeable membrane. So, there is free exchange of certain substances between ECF and ICF.

Composition of Cell Membrane

Cell membrane is composed of three types of substances:

1. Protein (55).
2. Lipids (40%).
3. Carbohydrates (5%).

Functions of Cell Membrane

1. Protective function: Cell membrane protects the cytoplasm and the organelles present in the cytoplasm
2. Selective permeability: Cell membrane acts as a semipermeable membrane, which allows only some substances to pass through it and acts as a barrier for other substances
3. Absorptive function: Nutrients are absorbed into the cell through the cell membrane
4. Excretory function: Metabolites and other waste products from the cell are excreted out through the cell membrane
5. Exchange of gases: Oxygen enters the cell from the blood and carbon dioxide leaves the cell and enters the blood through the cell membrane
6. Maintenance of shape and size of the cell: Cell membrane is responsible for the maintenance of shape and size of the cell.

Cytoplasm

Cytoplasm of the cell is the jelly-like material formed by 80% of water. It contains a clear liquid portion called cytosol and various particles of different shape and size. These particles are proteins, carbohydrates, lipids or electrolytes in nature. Cytoplasm also contains many organelles with distinct structure and function .

Cytoplasm is made up of two zones:

1. Ectoplasm: Peripheral part of cytoplasm, situated just beneath the cell membrane
2. Endoplasm: Inner part of cytoplasm, interposed between the ectoplasm and the nucleus.

Functions of cytoplasmic organelles

Rough endoplasmic reticulum	Synthesis of proteins
Smooth endoplasmic reticulum	Synthesis of lipids and steroids
Golgi apparatus	Processing, packaging, labeling and delivery of proteins and lipids
Lysosomes	Degradation of macromolecules
Centrosome	Movement of chromosomes during cell division
Ribosomes	Synthesis of proteins
Mitochondria	1. Production of energy 2. Synthesis of ATP
Cytoskeleton	1. Determination of shape of the cell 2. Stability of cell shape 3. Cellular movements

Nucleus

Nucleus is the most prominent and the largest cellular organelle. It has a diameter of 10 µ to 22 µ and occupies about 10% of total volume of the cell. Nucleus is present in all the cells in the body except the red blood cells. The cells with nucleus are called eukaryotes and those without nucleus are known as prokaryotes. Presence of nucleus is necessary for cell division .

Most of the cells have only one nucleus (uninucleated cells). Few types of cells like skeletal muscle cells have many nuclei (multinucleated cells). Generally, the nucleus is located in the center of the cell. It is mostly spherical in shape. However, the shape and situation of nucleus vary in some cells.

Structure of Nucleus

1- Nuclear membrane.
2- Nucleoplasm.
3- Chromatin.
4- Nucleolus.