

HUMAN ANATOMY AND PHYSIOLOGY - I



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Acknowledgment

First and foremost, praises to God, the Almighty, for his immense shower of blessing and kindness throughout the work and has allowed

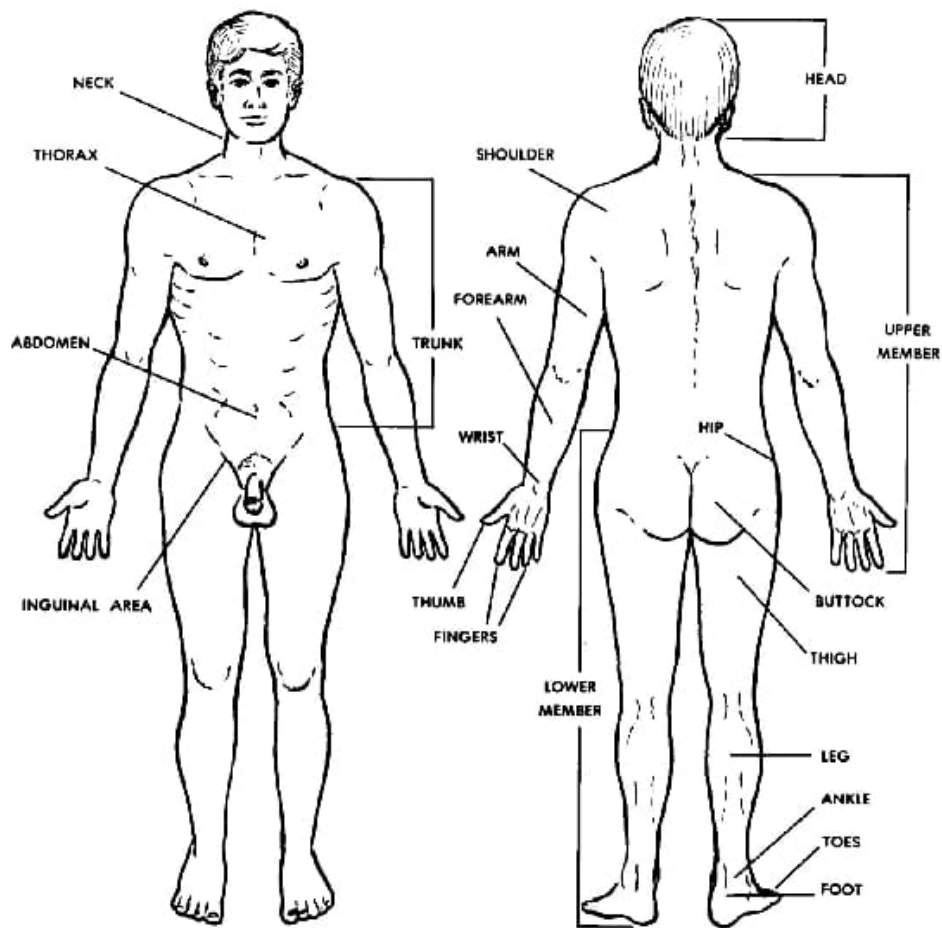


Figure. Regions of the human body.

REGIONS OF THE HUMAN BODY

The human body is a single, total composite. Everything works together. Each part acts in association with ALL other parts. Yet, it is also a series of regions. Each region is responsible for certain body activities. These regions are:

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Chapter. 1 Introduction to human body

DEFINITIONS

Anatomy is the study of the structure of the body. Often, you may be more interested in functions of the body. Functions include digestion, respiration, circulation, and reproduction. Physiology is the study of the functions of the body.

The body is a chemical and physical machine. As such, it is subject to certain laws. These are sometimes called natural laws. Each part of the body is engineered to do a particular job. These jobs are functions. For each job or body function, there is a particular structure engineered to do it.

In the laboratory, anatomy is studied by dissection (SECT = cut, DIS = apart).

BODY TYPES

No two human beings are built exactly alike, but we can group individuals into three major categories. These groups represent basic body shapes.



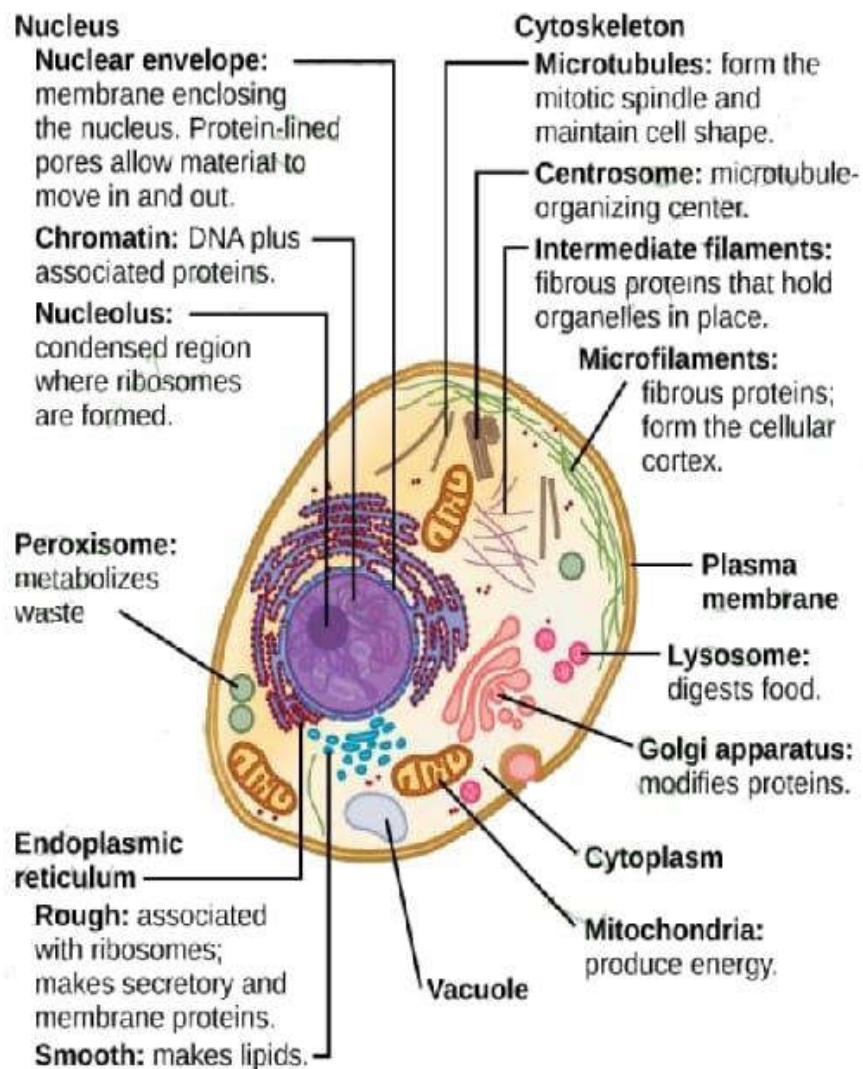
Chapter. 2

Cellular level of organization

INTRODUCTIONS:

CELL: It is living structural and functional units of body enclosed by membrane.

CYTOLOGY: It is the branch of science concern with the study of cells.



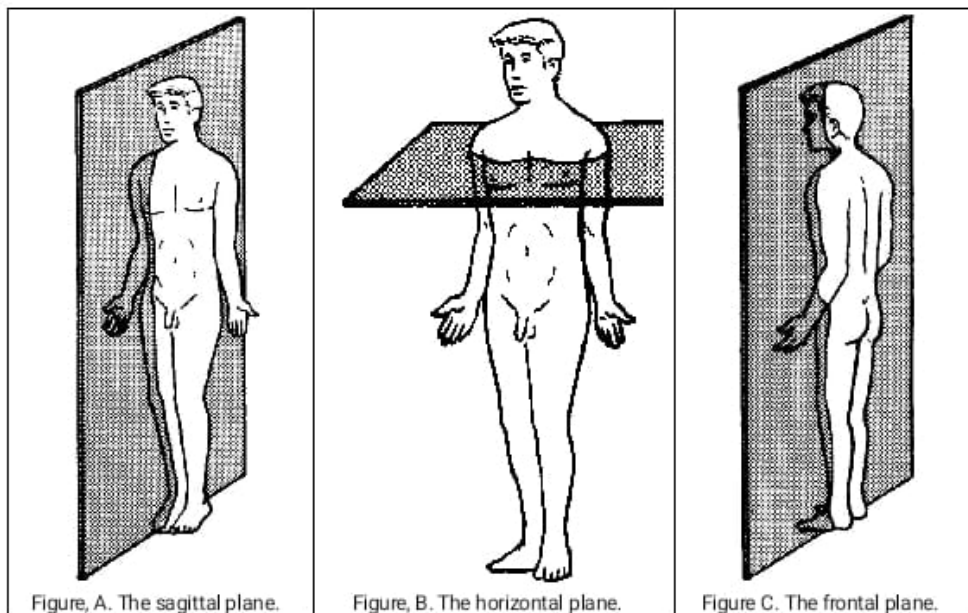
PLANES OF THE BODY

See figures A through C for the imaginary planes used to describe the body.

Sagittal planes are vertical planes that pass through the body from front to back. The median or midsagittal plane is the vertical plane that divides the body into right and lefthalves.

Horizontal (transverse) planes are parallel to the floor. They are perpendicular to both the sagittal and frontal planes.

Frontal (coronal) planes are vertical planes which pass through the body from side to side. They are perpendicular to the sagittal plane.



DIRECTIONS

Superior means above. **Inferior** means below.

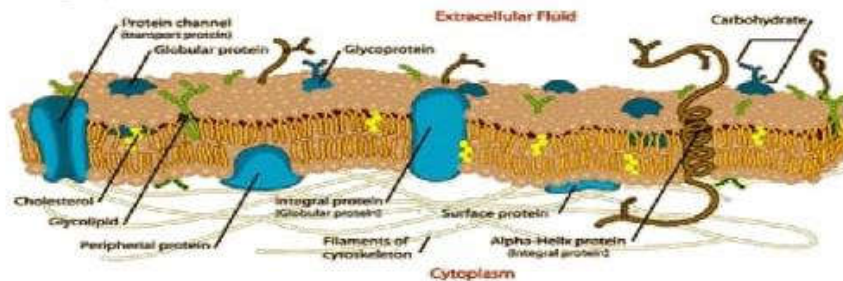
Anterior refers to the front of the body. A commonly-used substitute word is **Ventral**. **Posterior** refers to the back of the body. A commonly-used substitute word is **Dorsal**. **Medial** means toward or nearer the midline of the body.

Lateral means away from the midline or toward the side of the body.

Superficial means closer to the surface of the body.

THE PLASMA MEMBRANE

- It is a thin barrier that separates the internal components of a cell from extracellular materials. It is also known as cell membrane.
- It is well describe by fluid mosaic model. According to this model, the molecular arrangement of the plasma membrane resembles an ever-moving sea of fluid lipidsthat contains a mosaic of many proteins.



Some proteins floats freely like ice bridges in the lipid sea, whereas others are anchored at specific location like boat at a dock.

✓ MEMBRANE CHEMISTRY AND ANATOMY:

- It consist 50:50 mix by weight of protein and lipids that are held together noncovalent interactions.
- In plasma membrane protein are large molecules than the lipid. So one protein molecules surrounded by around 50 lipids molecules.

A) Membrane lipids:

- The plasma membrane is made up by lipid bilayer.
- It consist three types of lipids,
 - a) **Phospholipids:** 75% of membrane lipids are phospholipids. It contains phosphategroups.
 - b) **Cholesterol:** 20% of membrane lipids are cholesterol. Which is a steroid attachedwith -OH group.
 - c) **Glycolipids:** 5% of membrane lipids are glycolipids. Attached with carbohydrategroups.
- The lipid bilayer is amphipathic because it consist both polar and non polar parts.
- In phospholipids, the polar part is the phosphate containing head which is hydrophilic (water loving). The non polar part contains two long fatty acid tails which are hydrophobic (water hating) hydrocarbon chains.
- Cholesterol molecules are weakly amphipathic.
- In glycolipids carbohydrate groups act head as polar group while their fatty tail act as non polar group.

CYTOPLASM

It consist all the cellular contains between plasma membrane and nucleus. It consist two components:

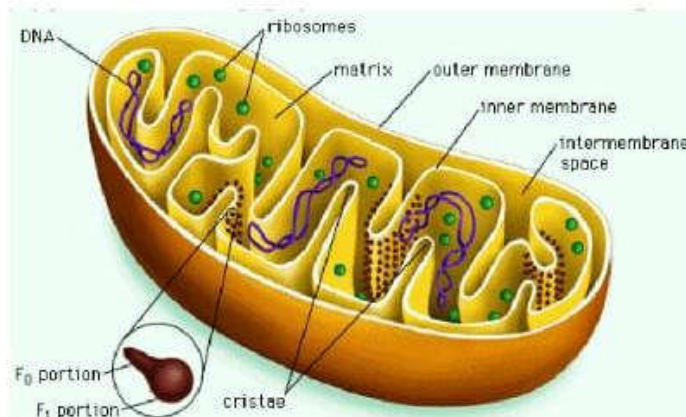
1. Cytosol:

- It is the unsaturated soluble portion of the cells.
- Chemically it is 75-90 % water plus solid components (protein, carbohydrate, lipids and inorganic substance).
- Inorganic substance and smaller organic substance such as simple sugar and amino acid are soluble in water and are present as solute. While larger particle such as protein and polysaccharide glycogen found as colloidal particle in surrounding medium and they are not dissolved.
- The cytosol receives raw material from the external environment and gain usable energy from them by decomposition reaction.

2. Organelles

- These are specialized structures that have characteristics appearance and specific role in growth, maintenance, repair and control.
- The number and types of organelles vary in different kinds of cells depending on their function. Different types of organelles are:

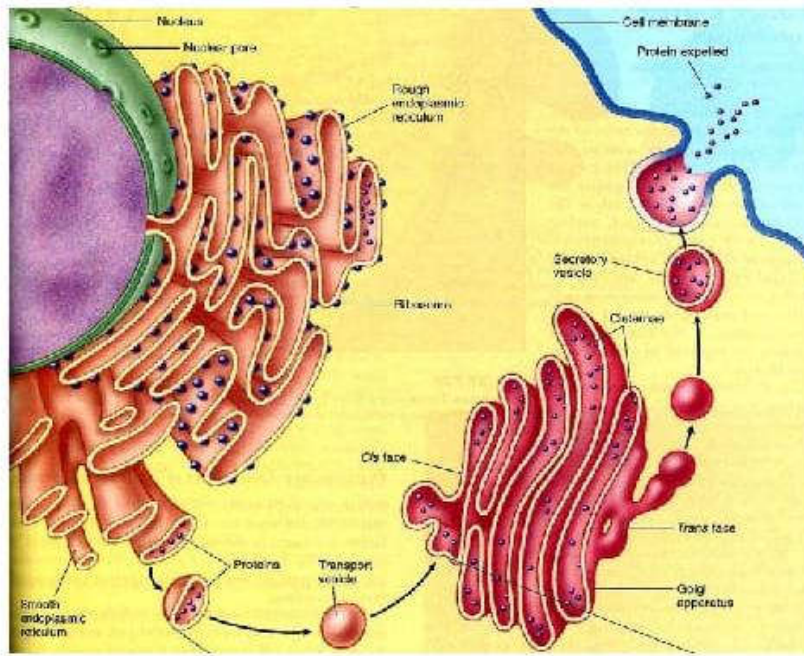
A) Mitochondria:



- Mitochondria are the largest components of the cytoplasm.
- They are the power house of the cell and each cell may contain from 50 to 2500 mitochondria depending upon the respiratory activity of the cells.

Eg: The cell of skeletal muscle, kidney and liver contain large number of mitochondria while heart muscles contain less.

- They vary in shape and size (0.5 to 3 μ long and 0.1 to 0.6 μ wide).
- They have two membranes, the outer is smooth but the inner is arranged



- In chromosomes two identical pair consist nucleoprotein strands that are joined at centromere and separated during cell division is known as chromatid. It forms a toughthread like structure in not dividing 46 chromosomes.

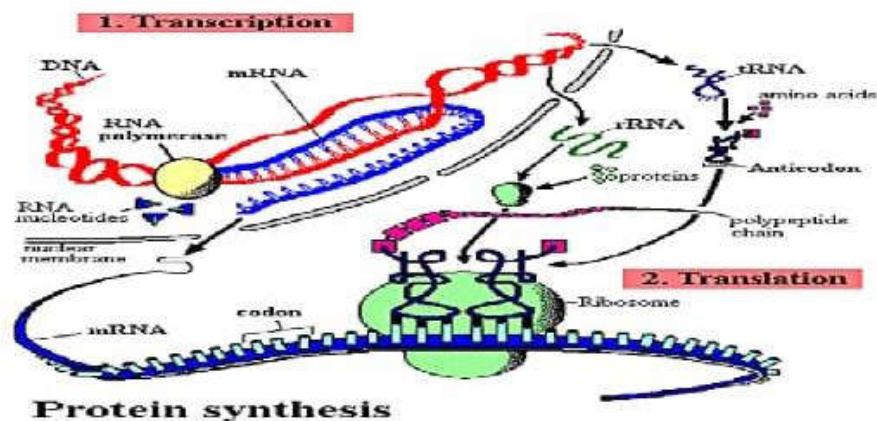
- Chromatin has a "beads on a string (thread)" structure. Each beads known as nucleosomes consist eight proteins molecules called as histone which are wrapped by double strand DNA twice around it.

PROTEIN SYNTHESIS

Cells are basically protein factories that constantly synthesize large number of diverse protein. The, protein determine the physical and chemical characteristics of cells and therefore of organisms.

Some proteins are structural to form plasma membranes, microfilaments, microtubules, Centriols, mitochondria and other parts of cells.

Other proteins serve as hormones, antibodies and contractile elements in muscle tissue also it act as enzyme.



This process can be divided into two parts:

1. Transcription

- Before the synthesis of a protein begins, the corresponding RNA molecule is produced by RNA transcription.

Three forms of RNA are made from the DNA template,

- messenger RNA (mRNA) which direct synthesis of a polypeptide chain,
- transfer RNA (tRNA) which bind to amino acid during translation and
- ribosomal RNA (rRNA) which comes together with ribosomal protein to make up ribosomes.

In protein synthesis, one strand of the DNA double helix is used as a template by the RNA polymerase to synthesize a messenger RNA (mRNA) this strand refer as sense strand and the