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HUMAN ANATOMY AND PHYSIOLOGY – I

UNIT 1

TOPIC :

- **Introduction to human body**

  Definition and scope of anatomy and physiology, levels of structural organization and body systems, basic life processes, homeostasis, basic anatomical terminology.

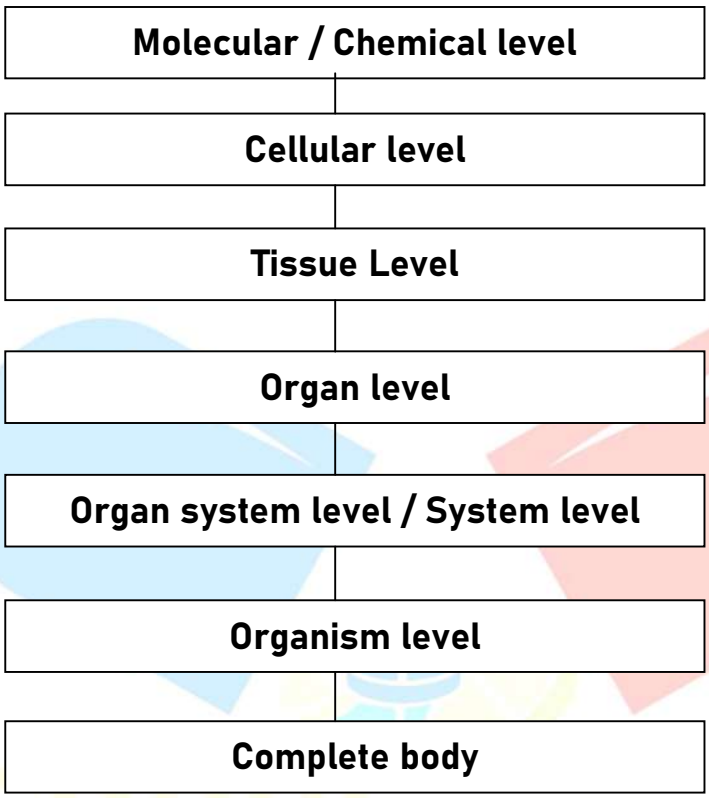
Introduction to human body

- The human being is a very complex Multi cellular Organism
- The study of human body is Divided under two Major principles
- **Anatomy :** It is the branch of science Which deal with the Study of structure of different organs of human body
    - Eg Histology [Study about Tissue]
- **Physiology :** It is the branch of science Which deal with the Study of function of different organs of human body
    - Eg Neurophysiology [Study about Neurons

Scope of anatomy and physiology

- Study of structure and function of body parts
- Helpful in the study of human evolution and development
- To understand the pathology of disease and pathological changes
- To determine the technique of surgeries
- To know the parameters of normal health

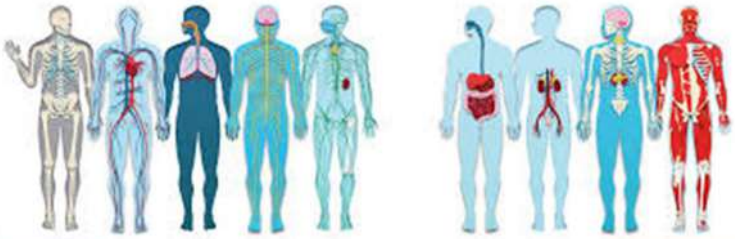
Levels of structural organization and body system



- **Molecular / Chemical level :** It is the most basic level two or more atoms / Molecules joined together to form cells. eg : oxygen (o), Carbon (c), Hydrogen (H) etc.
- **Cellular level :** It is the basic structural and functional level of body i,e cell two or more cells joined together to form tissue
- **Tissue level :** These are the group of cells which works together to perform a particular function. eg : skin
- **Organ level :** In this different types of tissues combine Together to form organs Which Do proper functioning of body. eg : Heart, lungs, kidney, etc
- **Organ system level / System level :** In this group of organs combine together to form system. eg : Digestive system, Respiratory system, etc
- **Organism level :** It is the highest level and a complete body made up with combined of all system. eg : human body

Body System

→ A System is a group of Organ, which combined together to perform proper functioning.

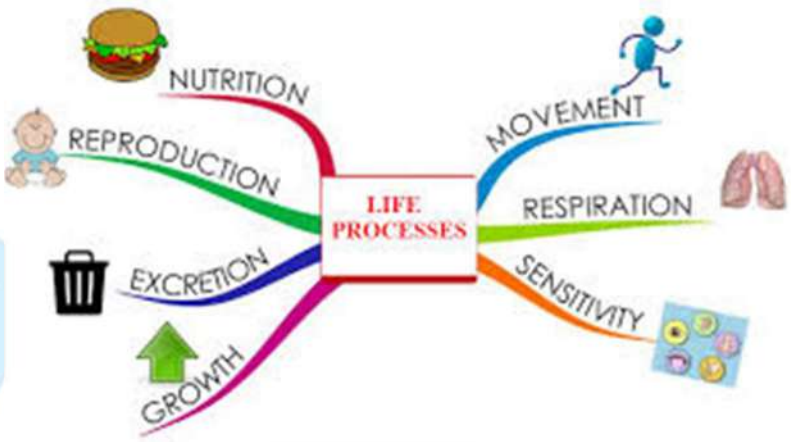


The Human body Consists of the following system :

- **The integumentary system :** Includes the skin and derived structure it protects internal organs and helps maintain body temperature
- **The skeletal system** : Includes the bones and joints, it provides support and protection to internal organs.
- **The Muscular system :** Includes skeletal muscles and it provides movement
- **The nervous system :** Includes the brain, spinal cord, and nerves. It provides regulation of body functions and sensory perception.
- **The endocrine system :** Includes hormone-producing cells and glands. It regulates homeostasis, growth and development.
- **The cardiovascular system :** Includes blood, heart, and blood vessels. It is responsible for delivery of oxygen and nutrients to the tissues.
- **The lymphatic and Immune system :** Includes lymphatic vessels and fluid. It is involved in the defense against infection.
- **The Respiratory System :** Includes lungs and airways. It is involved in the absorption of oxygen and release of carbon dioxide.
- **The Digestive System :** Includes organs of the gastrointestinal tract. It is responsible for absorption of nutrients.
- **The Urinary Sustem :** Includes the Kidneys, ureters, and bladder. It is responsible for electrolyte balance and waste removal.
- **The Reproductive system :** Includes the reproductive organs in males and females. It controls the biological process by which new individuals are produced.

Basic Life Process

- Human Body performs different types of function for its survival and growth, so all the living organism have some specific life process.
    - Metabolism
    - Responsiveness
    - Movement
    - Growth
    - Differentiation
    - Reproductive
    - Respiration
    - Digestion
    - Excretion



- **Metabolism**

  Different types of chemical reactions that occurs in a living organism is called metabolism.

  Major types of Metabolism

  Catabolism : Break Down of molecules to obtain energy.

  Anabolism : Synthesis of any compound needed by body.

- **Responsiveness**

  It is ability to sense and react to changes in its internal or external environment.

  Eg: Cold, Sensitivity etc.

- **Movement**

  It Includes motion of the whole body individual organs etc.

- **Growth**

  It is the development of our body and also increase in body Size.

- **Differentiation**

  It is the development of cell from an unspecialized to a specialized state.

  Eg : Stem cell generate complete human body.

- **Reproductive**

  It refers to the formation of new cells and also produce new offsprings eg : foetus...

- **Respiration**

  It involves the exchanges of O_2 and CO_2 between the cell and the external environment.

- **Digestion**

  It involves the degradation of food and large molecules. It is also responsible for the absorption of nutrients into blood.

- **Excretion**

  It is the process of removal of waste products from the body Eg : Urination etc...

Homeostasis

→ It is derived from two greek words.

- **Homeo** *means* **Same/Constant**
- **Stasis** *Means* **State**

→ It means staying the same

→ It is a condition when our internal environment is constant with respect to external environment.

→ It is a condition that may vary but remains relatively Constant.

Homeostasis control mechanism

- All the body organs coordinate with each other to maintain homeostasis
- This coordination is mainly controlled by Neuroendocrine System (Nervous + Endocrine System]
- It has three components:-

i) **Receptors :-** It is a type of sensor, which recieve/detect changes or other stimuli

ii) **Control centre :-** It recieve the stimuli from receptors and analyse it.

iii) **Effectors/feedback system :-** If there are any change take place in internal environment, then feedback system is take back into its constant state or in homeostasis

It is of two types:-

1) Positive feedback system (+) :- Used to increase when anything is decrease in our internal environment, then it is try to back into its normal situation by increasing it.

Eg : During childbirth, it stimulate the release of oxytocin which increases the contraction of the uterus to help in childbirth.

2) Negative feedback system (-) :- used to decrease When anything is increase in our internal Environment (body), then this system is try to back into normal condition by decreasing it

Eg : the regulation of body temperature, where the body sweats to cool down when it's too hot or shivers to warm up when it's too cold.

Basic Anatomical Terminology

The anatomical terminology of the body can be studied under three groups:

I. Directional terms
II. Sectional planes\planes of the body
III. Body cavities

1. Directional terms

Directional terminologies are used to locate and one body structure with respect to other

I. **Superior (Upper,Cranial)end** : The end of the head lies in the upper most position therefore it is known as the superior end.

II. **Inferior (lower) end** : This part starts from the extremity of the main body or the trunk along the legs in the downward direction or ground.

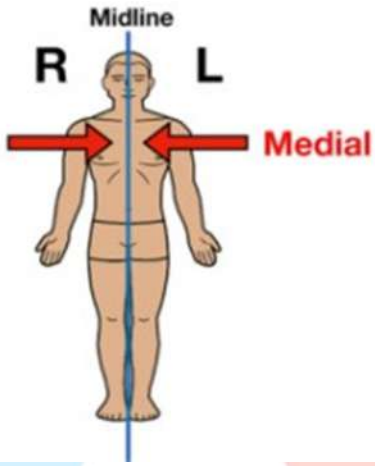
III. **Anterior or ventral end** : This includes the body parts present on the front side , like chest, nipples, abdomen and external genitalia.

IV. **Posterior or Dorsal end**: This includes the body parts present on the back side, vertebral column (also known as the backbone), shoulder blades and buttocks.

V. **Supine position:** In this positions the face is towards the upper side (roof) while the back faces downwards.

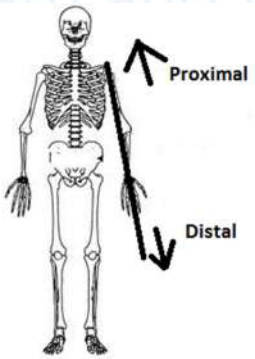
VI. **Prone position:** In this position the face focuses downwards or towards the ground.

VII. **Medial position**: It is an imaginary line passing through the longitudinal axis of the body dividing it into two equal halves from the middle starting from front to the back.



VIII. **Lateral position :** It is that anatomical position of the body in which it is divided into two fragments though the mid line and the body structures remain away.

IX. **Proximal:** It describes a body part that is closer to a point of attachment or closer to the trunk of the body than another part. For example the elbow is proximal ho the wrist.

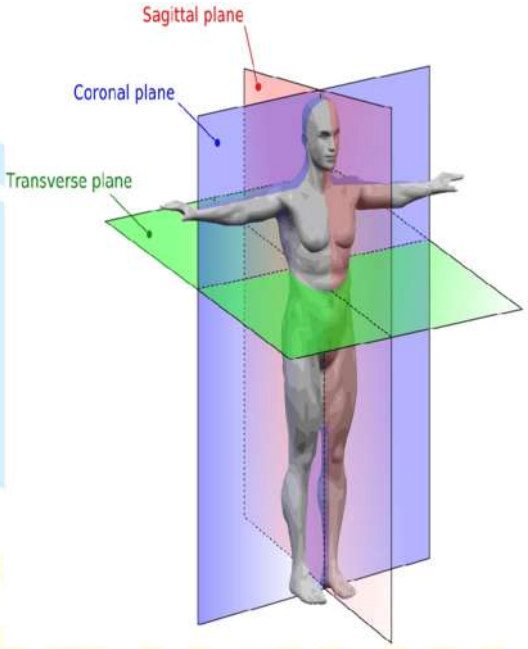


X. **Distal :** This position is the opposite of promixal. It means that a particular body
part is farther from the point of attachemrent.
for example , the fingers are distal to the wrist.

XI. **Superficial :** This position means situated near the surface.

XII. **Peripheral :** This position means outward or far away the surface.

2. Planes of the body



i. **Sagittal** : In this plane, an imaginary line slicing the body (from head to toes) into two halves with erratic proportion is drawn, from top to the down.

ii. **Horizontal** : This plane is parallel to the ground and passes through the body at the 90 degree angle to both coronal and medial plane.

iii. **Coronal** : This plane divided the body into anterior and posterior portion, by passing through the body at the right angle to the medial system.Anterior means the front portion and posterior means the back portion.

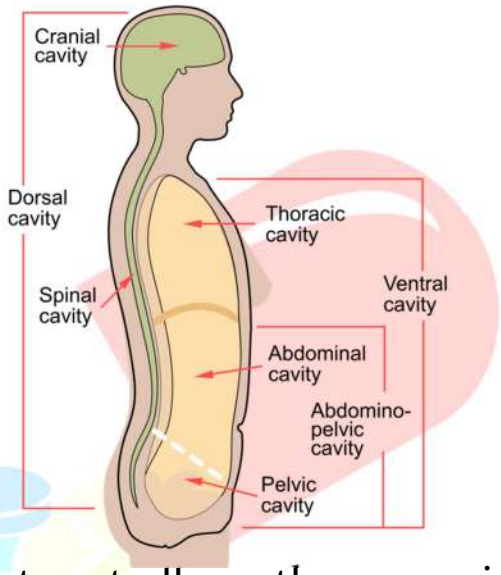
iv. **Lithotomy position** : In this position the individual is lying on the back with thighs fully stretched and knees directing towards the roof.

3. Body cavities

- Cavities are the spaces of the body, containing internal organ.

- The two main cavities of the body are Dorsal cavity and Ventral cavity.
- Ventral cavity is a largest cavity which is further sub divided into the **thoracic** and **abdominopelvic cavity.**
- Both these cavities are separated by dome shaped respiratory muscles called Diaphragm.

The Different types of Cavity



Thoracic cavity : This cavity is present ventrally on the upper side of the body. It also known as the chest cavity this cavity contain the trachea, lungs, heart large blood vessels etc.

Abdominal cavity : This cavity is laterally attached to the body wall posteriorly by the pelvic cavity anteriorly by the diaphragm. This cavity contain maximum part of the gastrointestinal tract, kidneys, etc .

Pelvic cavity : This is a body cavity that is bounded by the pelvic bones of the pelvis. This cavity contain urogenital system as well as the rectum.

Dorsal cavty : This is the smallest cavity. In this the organs are situated more posteiorly within the body. This Dorsal cavity is sub divided into 2 parts

1. The first part include Cranial cavity (upper portion which houses the Brain.
2. The Second part include spinal cavity (lower portion which houses the spinal cord.