

Human Body

Our body is comprised of multiple organs which work in tandem. Any problem in one part of the body has an impact on the rest of its functions. Therefore, a working knowledge of anatomy and physiology is mandatory before proceeding further. **Anatomy** deals with the structure of the human body while **Physiology** deals with its functions.

The fundamental structural and functional unit of our body is the **cell**. Groups of cells performing similar functions are called **tissues**. Tissues performing similar functions make up **organs**, which further group to form **organ systems**. The digestive system is one such organ system. It is made up of various organs like the esophagus, stomach, small intestine, large intestine, liver, gallbladder, pancreas, etc. Our body is a coordinated arrangement of these organ systems. In a healthy body, all our organ systems work harmoniously.

The human life starts with a single cell that is formed by the fusion of a sperm with an ovum. It further divides and specialises to form tissues, organs and ultimately the whole body. These embryonic cells which develop into different cell types to perform different functions are called **totipotent cells**.

Each cell is comprised of **organelles** and each organelle performs different functions. We have nearly 200 varieties of cells in our body, yet each cell has the same genetic material.

ORGAN SYSTEMS

- *Integumentary system:* Consists of skin, hair, sweat glands, oil glands and nails. It is the largest organ system of the body (**Fig. 1.1**).

Functions: Protects body from injury, bacteria and sunlight. Regulates body temperature, manufactures vitamin D and is an important sensory organ.

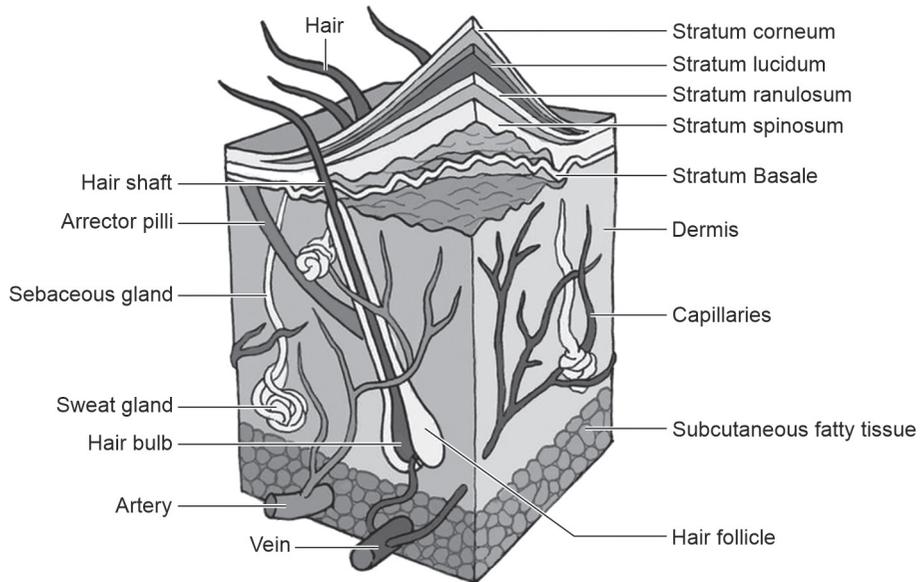


Fig. 1.1: Structure of skin

- **Skeletal system:** Comprises bones, cartilage, ligaments and tendons.
Functions: Provides support to organs, protects internal organs, movement of body, stores calcium and phosphorus (**Fig. 1.2**).

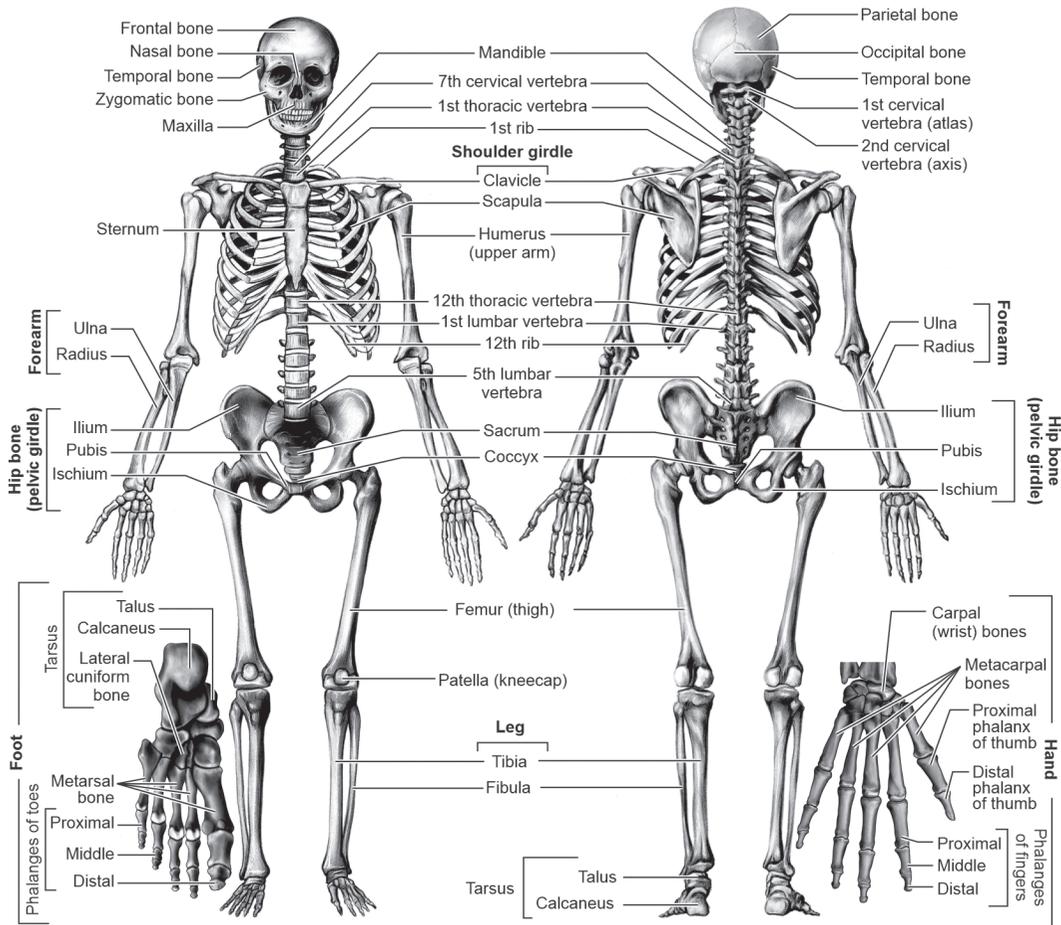


Fig. 1.2: Skeletal system

- *Cardiovascular system:* Consists of heart, blood vessels and blood (**Fig. 1.3**).
Functions: Transports oxygen, nutrients, hormones and waste products. Regulation of body temperature, pH and electrolytes. Functioning of the immune system.

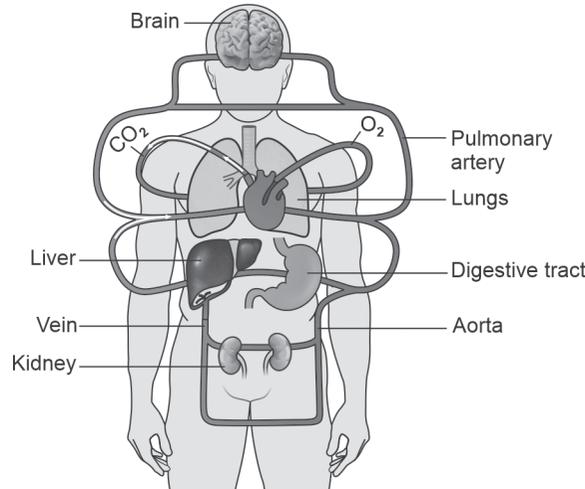


Fig. 1.3: Cardiovascular system

- *Lymphatic system and immune system:* Comprises lymph vessels, lymph nodes, spleen and thymus (**Fig. 1.4**).
Functions: Transport of white blood cells and immunoglobulins, transfer of interstitial fluid into blood stream and transporting fats from the digestive system into bloodstream.

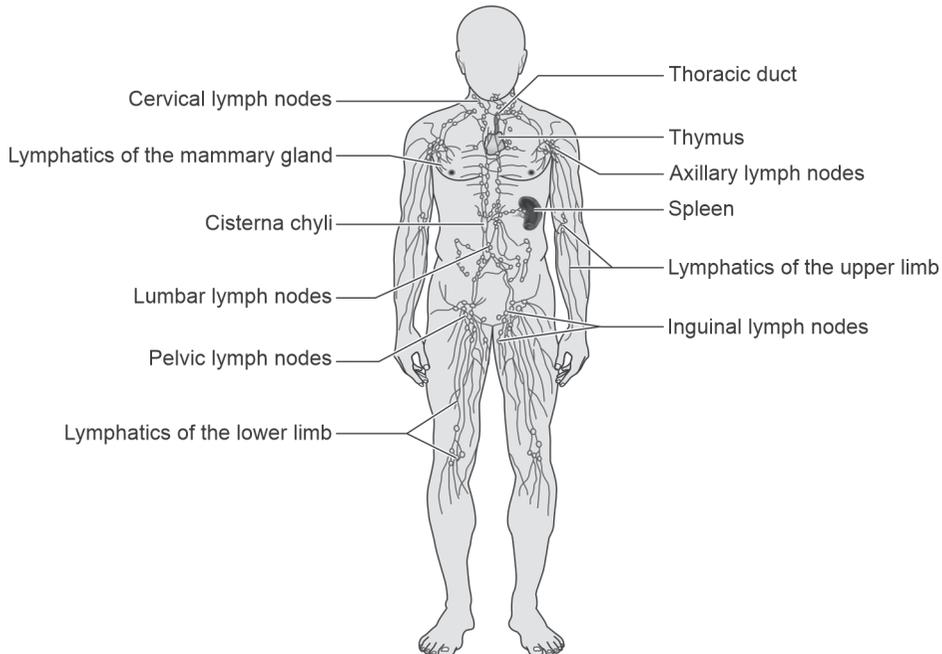


Fig. 1.4: Lymphatic system

- *Respiratory system:* Comprises lungs, trachea, bronchi and diaphragm (**Fig. 1.5**).
Functions: Exchange of oxygen and carbon dioxide between the body and air.

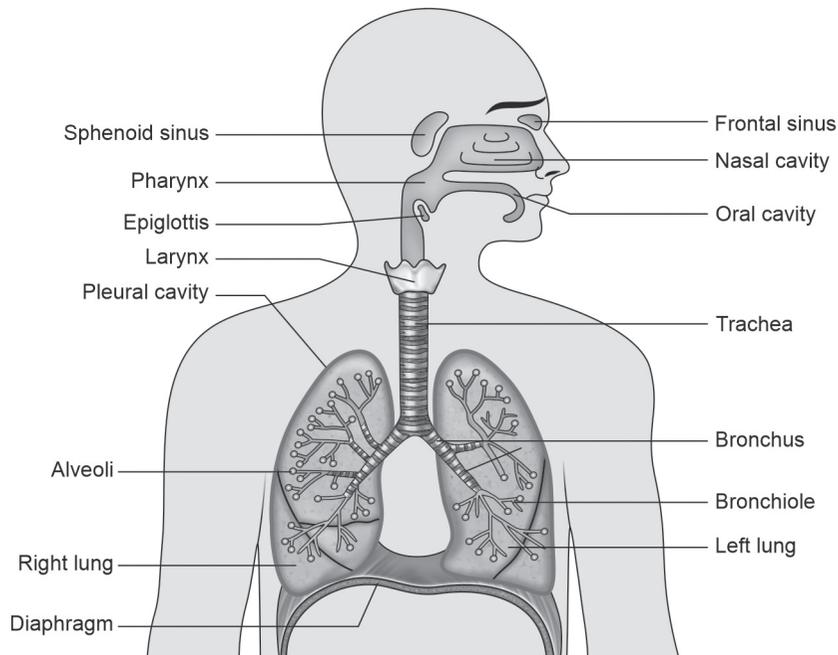


Fig. 1.5: Respiratory system

- *Nervous system:* Comprises brain, spinal cord and nerves (**Fig. 1.6**).
Functions: Controls all functions of the body by relaying messages through electric impulses, sensory perception, motor control and higher functions like thinking, memory and emotions.

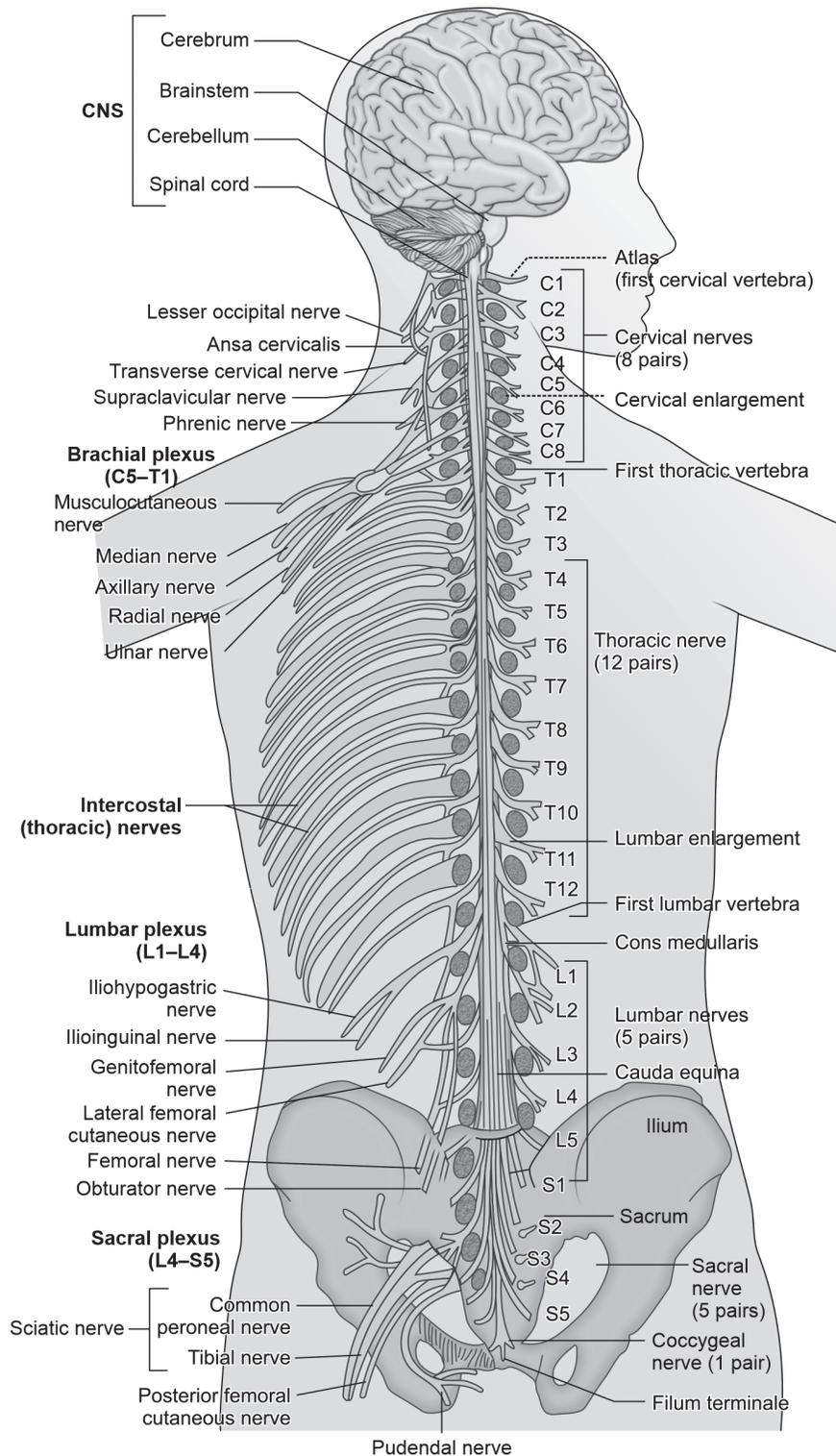


Fig. 1.6: Nervous system

- *Digestive system:* Comprises mouth, esophagus, stomach, small intestine, large intestine, liver and pancreas (**Fig. 1.7**).
Functions: Breakdown of food taken by mouth into small absorbable nutrients in the intestines. Excretion of waste products in the form of stools.

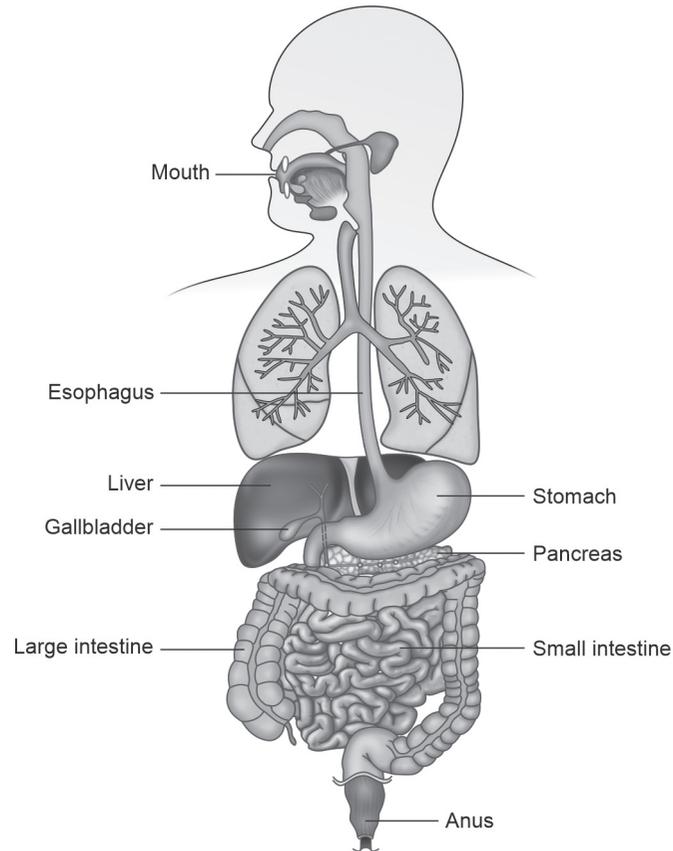


Fig. 1.7: Digestive system

- *Muscular system:* Comprises skeletal, smooth and cardiac muscles (**Fig. 1.8**).
Functions: Voluntary and involuntary movements, posture and generation of heat.

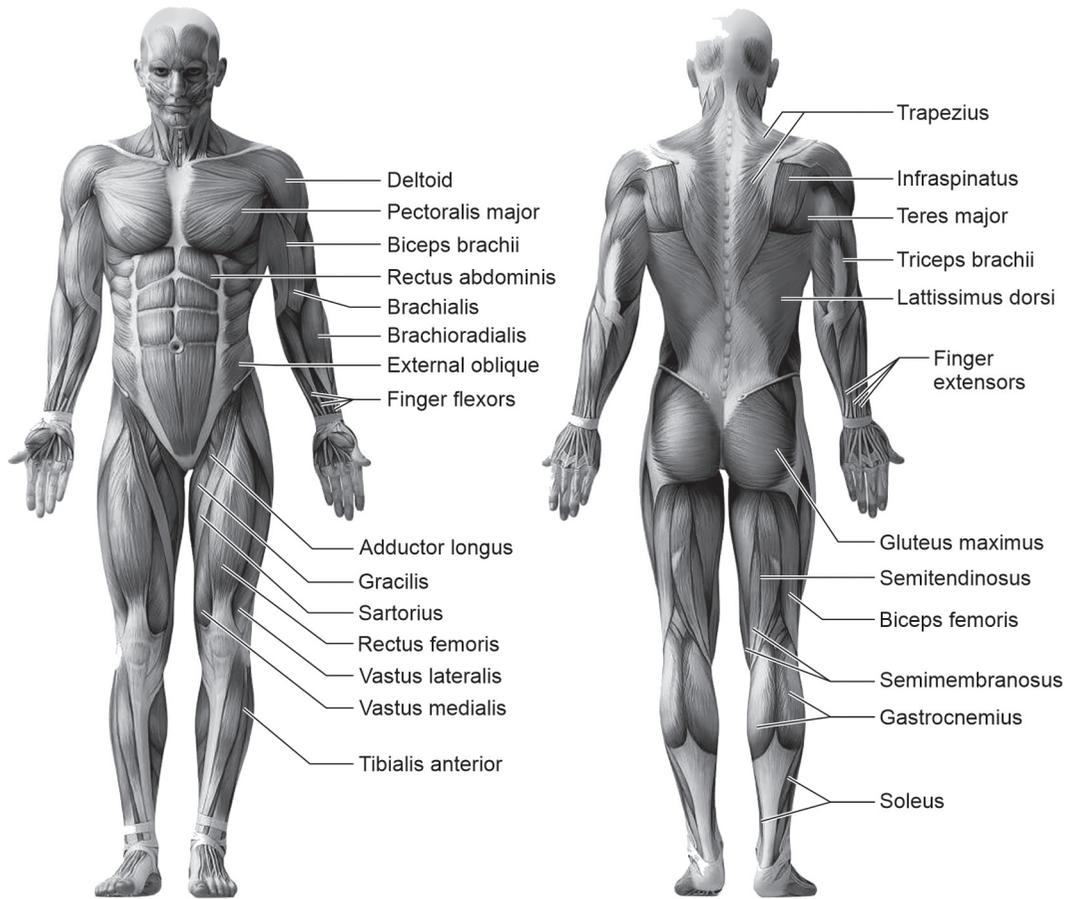


Fig. 1.8: Muscular system

- Urinary system:** Comprises kidneys, ureters, bladder and urethra (**Fig. 1.9**).
Functions: Filters blood and removes waste products, fluid and electrolyte balance, blood pressure regulation, producing erythropoietin, converting inactive vitamin D into active form.

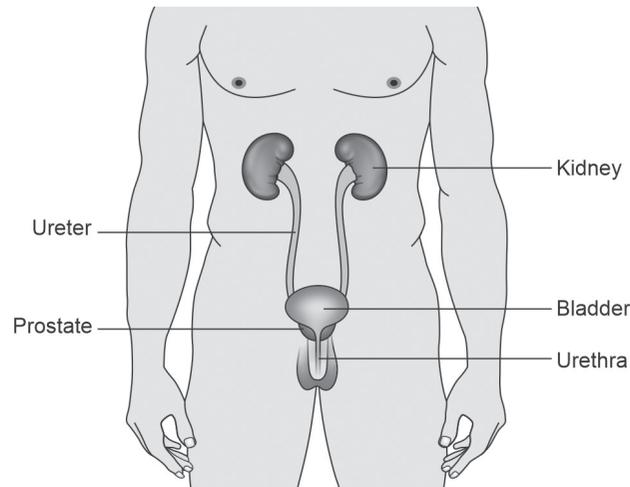


Fig. 1.9: Urinary system

- Reproductive system:** The reproductive system is different in males and females. In males it comprises testes, seminal vesicles, prostate, and penis. In females it comprises ovaries, uterus, fallopian tubes and vagina (**Fig. 1.10**).
Functions: Production of gametes (spermatozoa and ova) for reproduction.

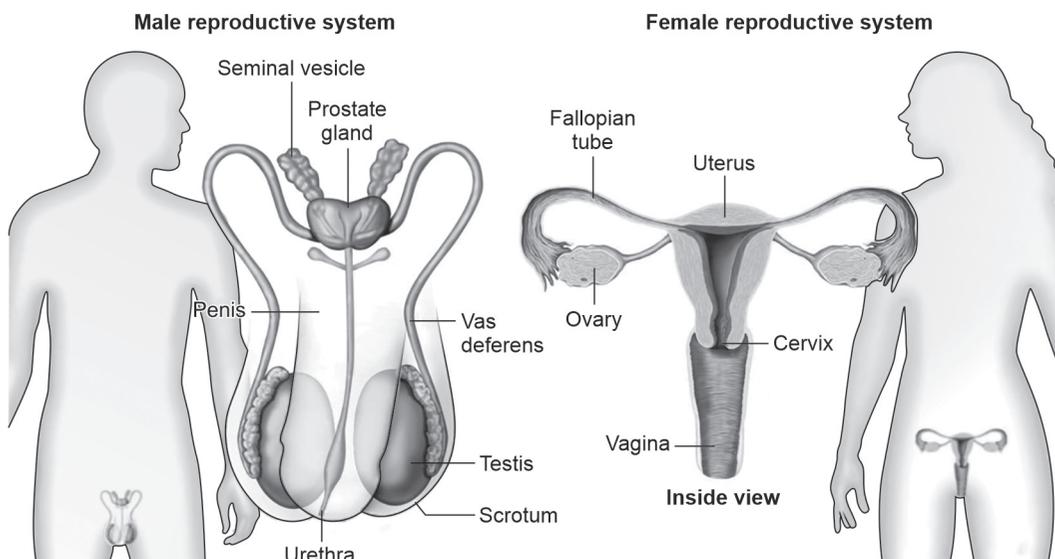


Fig. 1.10: Reproductive system

- *Endocrine system:* Comprises ductless glands like pituitary, thyroid, adrenal and reproductive glands (**Fig. 1.11**).

Functions: These glands produce hormones which regulate various functions like growth, development, metabolism and reproduction.

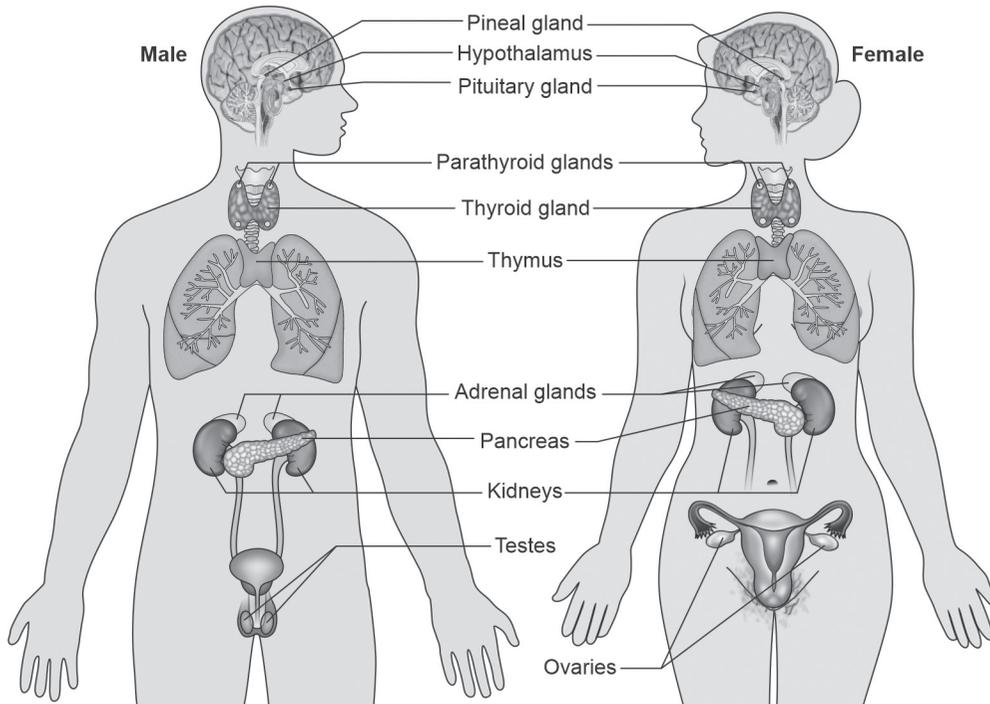


Fig. 1.11: Endocrine system

COMMONLY USED MEDICAL TERMS IN DESCRIBING ANATOMY (Fig. 1.12)

- *Coronal plane:* Frontal plane. This plane runs from the head to feet dividing the body into a front (anterior) and a back (posterior) portion.
- *Sagittal plane:* Lateral plane. This plane runs from front to back dividing the body into a left and a right half.
- *Axial plane:* Transverse plane. This plane runs horizontally dividing the body into upper and lower parts.
- *Superior (cranial):* Any structure that is directed towards the head.

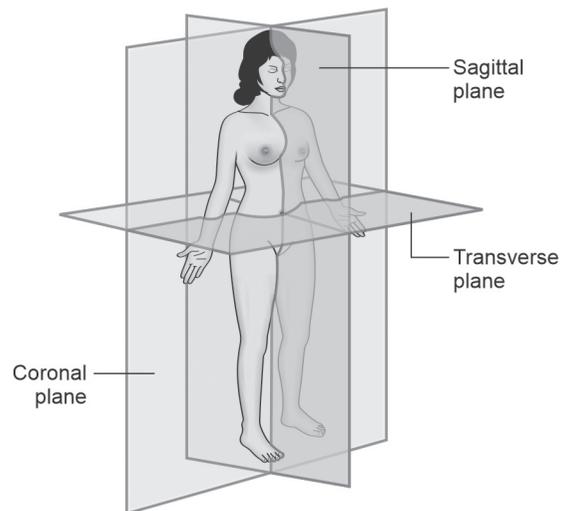


Fig. 1.12: Planes of the body

- *Inferior (caudal)*: Any structure that is directed towards the feet.
- *Anterior (ventral)*: Structures located towards the front.
- *Posterior (dorsal)*: Structures located towards the back.
- *Medial*: Structures directed towards the midline of the body.
- *Lateral*: Structures directed towards the sides of the body.
- *Intermediate*: Structures in between a medial and a lateral structure.
- *Proximal*: Structures close to the body.
- *Distal*: Structures away from the body.
- *Superficial*: Structures close to the surface.
- *Deep*: Structures inner to the surface.
- *Afferent*: Coming towards. For example, sensory nerves carrying sensations from skin to the brain.
- *Efferent*: Going away. For example, motor nerves carrying messages from the brain to the muscle.

IMPORTANT CAVITIES OF THE BODY

- *Thoracic cavity*: It is the cavity in the chest that houses the heart and its major blood vessels, the trachea and lungs, the esophagus and many nerves. It is surrounded by the pleura (**Fig. 1.13**).

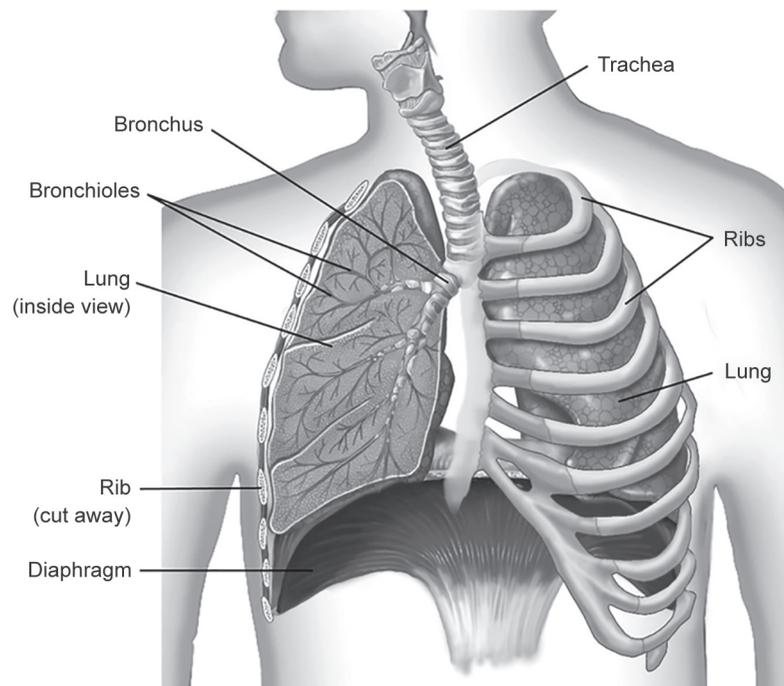


Fig. 1.13: Thoracic cavity

- *Abdominal cavity:* Its upper part is called the abdomen and the lower part is called the pelvis. It is separated from the thoracic cavity by diaphragms. The abdomen houses the major part of the gastrointestinal tract, kidneys adrenal glands, large blood vessels, nerves and lymph nodes. The pelvis contains the rectum and the urogenital system (**Fig. 1.14**).

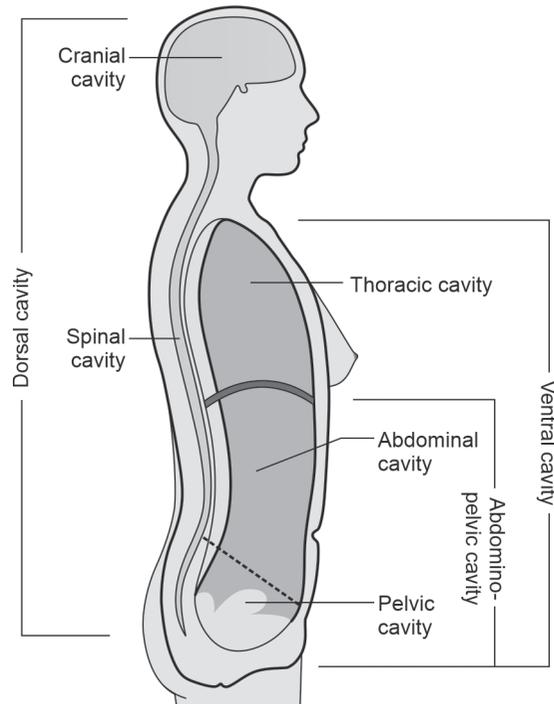


Fig. 1.14: Sagittal section showing body cavities

- *Cranial cavity:* It contains the brain and its blood vessels.
- *Vertebral canal:* It houses the spinal cord.