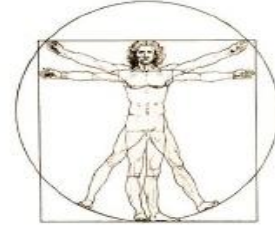


INTRODUCTION

Anatomy

- ◉ Studies of the body parts and their relationships.



Macroscopic (Gross) Anatomy

- ◉ Study of large body structure.
(e.g: heart, lungs, kidneys... etc.)
- ◉ can be further divided into:

1. Regional Anatomy

- all structures in one particular region.



2. Systemic Anatomy

- system by system



3. Surface Anatomy

- study of internal body structures

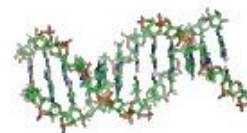


Microscopic Anatomy

- ◉ Very small structures that cannot be seen with naked eyes.

1. Cytology _____

- Study of body cells



2. Histology _____

- Study of body tissues



Developmental Anatomy

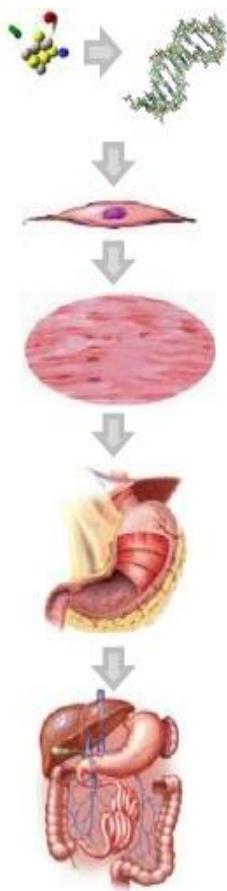
- ◉ **Structural changes to the body throughout lifespan.**

1. Embryology

- Development which occur before birth



STRUCTURAL LEVEL OF A BODY



Chemical

Combination of **atoms** to **form molecules**



Cell

Basic living units; have common characteristics, differ in structure and function



Tissue

A **group of cells with similar structure and function**: epithelial, connective, muscle, nervous



Organ

Two or more tissues work together perform one or more common function: eye, skin, stomach, heart.



Organ System

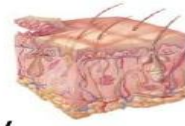
A **group of organs of a common function**:

Skeletal, Muscular, Nervous, Endocrine, Cardiovascular, lymphatic, respiratory, digestive.

SYSTEM OF THE BODY

◉ Integumentary System

- External cover of the body (skin)
- Protects deeper tissues from injury
- Site of cutaneous, receptors, sweat and oil glands.



◉ Skeletal System

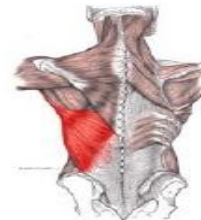
- Bones
- Protects and supports body organs



SYSTEM OF THE BODY

◉ Muscular System

- muscles
- produce body movement



◉ Nervous System

- consist of brain, sensory receptor, nerves, spinal cord
- control homeostasis by stimulating particular muscles contraction and glands secretion



SYSTEM OF THE BODY

◉ Endocrine System

- Hormones secretion to regulate body processes.

◉ Cardiovascular System

- Transport blood to the body

◉ Lymphatic/Immune System

- Protect the body by attacking foreign substances entering body system

SYSTEM OF THE BODY

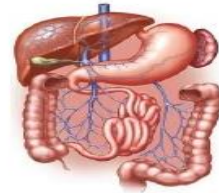
◉ Respiratory System

- supply blood with oxygen and removing carbon dioxide.



◉ Digestive System

- break down the food for absorption
- indigestible food will be removed as feces



SYSTEM OF THE BODY

◉ Urinary System

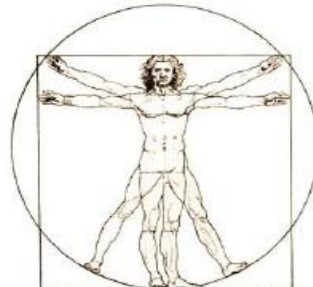
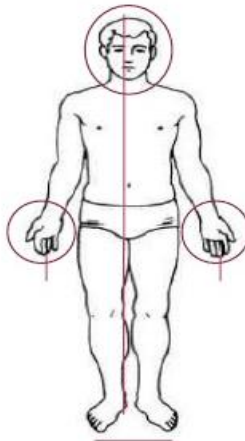
- regulation of water, electrolytes and acid-base balance in the body.

◉ Reproductive System

- production of babies

ANATOMICAL POSITION

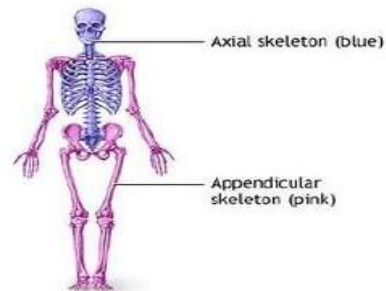
- ◉ Standing position with the body erect facing forward, feet slightly apart, arms hanging and palms also facing forward.



REGIONAL TERMS

◉ Axial Region

- axis of our body
- comprise of three parts: head, neck and trunk



◉ Perpendicular Region

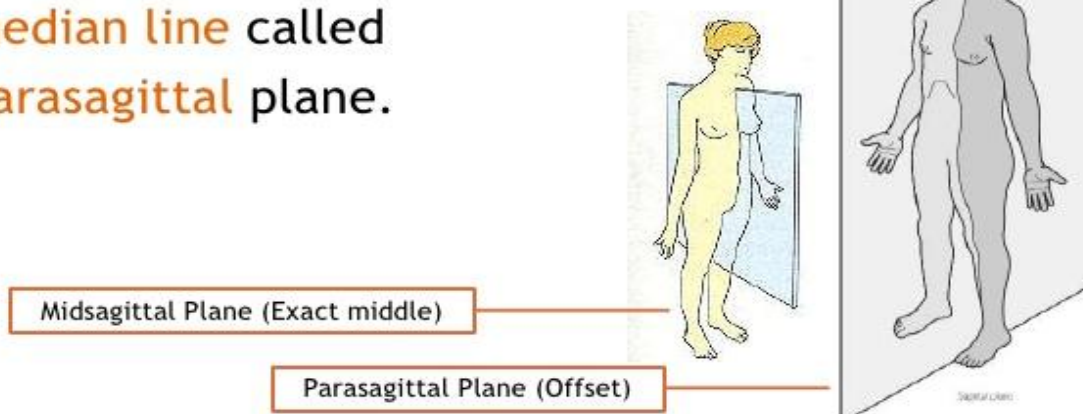
- limbs, or appendages
- body parts that attached to the axis.



BODY PLANES AND SECTIONS

◉ Sagittal plane

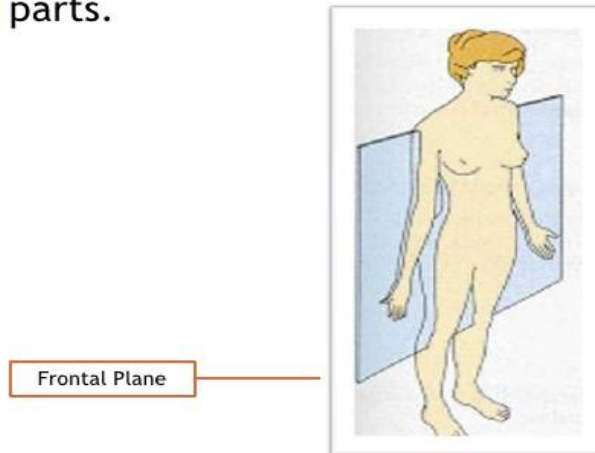
- Vertical plane divide body into **right and left**
- Sagittal plane that **exactly cut in the middle** called **midsagittal** or median plane.
- Sagittal plane that **offset from median line** called **parasagittal** plane.



BODY PLANES AND SECTIONS

● Frontal Plane

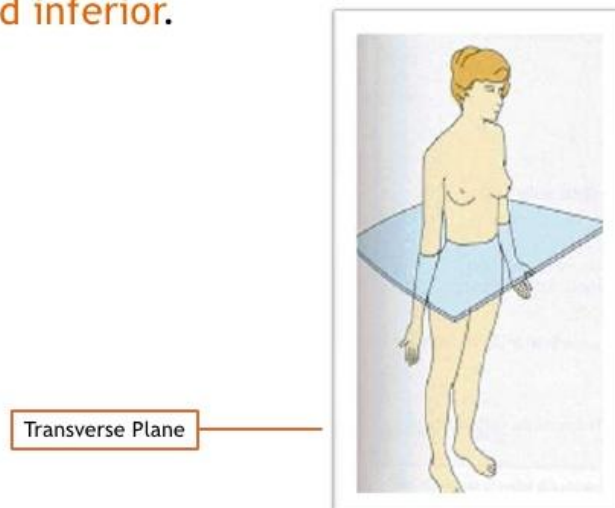
- vertical line that divide the body to **anterior** and **posterior** parts.



BODY PLANES AND SECTIONS

● Transverse Plane

- horizontal plane which divide body into **superior** and **inferior**.



BODY CAVITY

● Dorsal Cavity - protects nervous system

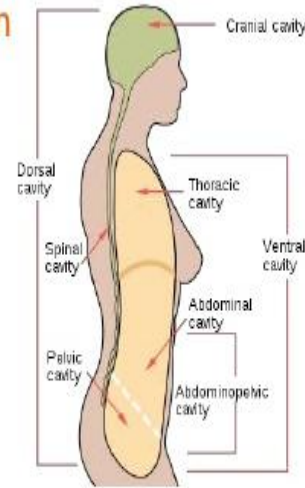
- two subdivisions:-

1. Cranial Cavity - brain
2. Spinal Cavity - spinal cord

● Ventral Cavity - houses visceral organs

- two subdivisions:-

1. Thoracic Cavity - pleural (lungs), mediastinum (heart, esophagus, trachea, etc...)
2. Abdominopelvic cavity - abdominal (stomach, intestines, spleen, liver, etc...), pelvic (bladder, reproductive system, rectum)



Anatomy

Introduction:

Anatomy: It is the science that studies the body structure. It covers a wide range of studies including the structure of body parts, their macroscopic organization and the processes by which they develop. In addition, anatomy examines the relationship between the structure of body part and its function.

Systemic anatomy: Is the study of body by systems (eg. Circulatory system, skeletal system...etc.).

Regional anatomy: Is the study of organization of body areas in each region, such as head, abdomen, arm...etc.

Surface anatomy: Is the study of external features, such as bony projections.

Anatomic imaging: Involves the use of X-rays, ultrasound, magnetic resonance imaging (MRI) and other technologies to create pictures of internal structures.

Both surface anatomy and anatomic imaging provide important informations that are useful in diseases diagnosis.

Body cavities: The body contains many cavities. Some of these cavities (such as the nasal cavity) open outside the body and some do not. The trunk contains three large cavities that do not open outside the body.

1. **Thoracic cavity:** Is surrounded by rib cage and is separated from the abdominal cavity by muscular diaphragm. It is divided into right and left parts by median structure called the **mediastinum** (the partition containing the heart, thymus, trachea and esophagus. The two lungs are located on either sides of the mediastinum.
2. **Abdominal cavity:** Is bounded by the abdominal muscles and contains the stomach, intestine, liver, spleen, pancreas and kidneys.

3. **Pelvic cavity:** Is a small space enclosed by the bones of pelvis and contains the urinary bladder, part of large intestine, and internal reproductive organs.

The abdominal and pelvic cavities are not physically separated and sometimes are called the abdominopelvic cavity.

Retroperitoneal organs include kidneys, adrenal glands, pancreas, part of intestine, urinary bladder.

Serous membranes: These membranes are serous membrane that line the trunk cavities and cover organs (the membrane lines the cavity wall called parietal, the membrane covers organs called visceral). The cavity between parietal and visceral membranes is normally filled with a thin, lubricating film of serous fluid produced by membranes to reduce effects of friction.

The **thoracic cavity** contains three serous membranes line cavities.

1. **Pericardial cavity:** (around heart) which contains pericardial fluid.
2. **Two pleural cavity:** Surrounds each lung which is covered by visceral pleura.

The **peritoneal cavity** is lined by peritoneum which lines both abdominal and pelvic cavities, it is serous membrane. Visceral peritoneum covers many abdominopelvic organs.

Terminology

Medical terminology: Medical terms are words that are used by medical staffs (physician, nurses...etc.) for active communication, that they include Greek and Latin terms. Medical terms are constant over the world.

Basic elements of medical term: The medical term is formed from:

1. **Root:** It is the main and effective part of the medical term that express an anatomical or physiological part of the body. The root is a word that can be coupled with other parts (suffix and prefix) to form meaningful term.
2. **Prefix:** That part where put in the beginning of the word. It is short, has special meaning, when added to the root it will change the meaning completely.
3. **Suffix:** The part where put in the end of the word, usually short, comes after root and has special meaning.
4. **Combining vowels:** Letters that connect the suffix with the root, or root with other root. These letters are: o, a, e, i, u. Usually (o) is used.

How to analyze medical term: We do this analysis to know meanings of its parts (root, prefix, suffix) to make us know meaning of whole term.

Ex.: 1. **Neurology.** Either analyzed as **neuro/logy** (neuro is combining form, logy is suffix), or analyzed as **neur/o/gy** (Neur is root, o is combining vowel, logy is suffix).

3. **Gastroenteritis.** Analyzed as **Gastro/enter/itis** (Gastro is combining form, enter is root, itis is suffix), or analyzed as **Gastr/o/enter/itis** (Gaster is root, o is combining vowel, enter is root, itis is suffix).

Anatomical Terms

They include the following:

Superior: Means a part is above another part or close to head (the thoracic cavity is superior to abdominopelvic cavity).

Inferior: Means a part is below another part or toward the feet (the neck is inferior to the head).

Anterior: (or ventral) means toward the front (the eyes is anterior to the brain).

Posterior: (or dorsal) is opposite to anterior, it means toward the back (the pharynx is posterior to oral cavity).

Medial: Relates to imaginary midline, dividing the body into equal right and left halves, (the nose is medial to the eyes).

Lateral: Means to toward the side (the ears are lateral to the eyes).

Proximal: Means that a part is closer to a specified point (of reference) than another part (the arm is proximal than forearm).

Distal: The opposite of proximal (forearm is distal than arm).

Superficial: Means situated near the surface (the epidermis is superficial layer of the skin).

Parietal: Relating to a body cavity wall

Visceral: Relating to organs within body cavities

Deep: Describes parts that are more internal (the dermis is the deeper layer of the skin).

Intermediate: Between two structures

Rostral: Toward the front

Caudal: Toward the back, toward the tail

Bilateral: Involving both sides of the body

Unilateral: Involving one side of the body

Ipsilateral: On the same side of the body

Contralateral: On opposite sides of the body

Anatomical Body Planes

Imagine a person standing in an upright position. Now imagine dissecting this person with imaginary vertical and horizontal planes. This is the best way to describe anatomical planes. Anatomical planes can be used to describe any body part or an entire body.

- ❖ **Lateral Plane or Sagittal Plane:** Imagine a vertical plane that runs through your body from front to back or back to front. This plane divides the body into right and left regions.
- ❖ **Median or Midsagittal Plane:** Sagittal plane that divides the body into equal right and left regions.
- ❖ **Parasagittal Plane:** Sagittal plane that divides the body into unequal right and left regions.

- ❖ **Frontal Plane or Coronal Plane:** Imagine a vertical plane that runs through the center of your body from side to side. This plane divides the body into front (anterior) and back (posterior) regions.
- ❖ **Transverse Plane:** Imagine a horizontal plane that runs through the midsection of your body. This plane divides the body into upper (superior) and lower (inferior) regions.

Anatomical Terms: Examples

Some anatomical structures contain anatomical terms in their names that help identify their position in relation to other body structures or divisions within the same structure. Some examples include the anterior and posterior [pituitary](#), superior and inferior [venae cavae](#), the median cerebral [artery](#), and the axial [skeleton](#).

Body Tissues and Membranes

A **tissue** is composed of similarly specialized cells that perform a common function in the body.

Epithelial Tissue

Epithelial tissues cover the body surface, line most cavities, and form glands. Functions include protection, absorption, secretion, and filtration. They may be classified according to cell shape (i.e., squamous, cuboidal, or columnar) and whether or not they form layers: unstratified (simple), stratified, or pseudostratified.

Connective Tissue

Connective tissues bind structures together, provide support and protection, fill spaces, and store fat. Which often contains fibers.

Fibers of the connective tissue provide support.

Connective tissues include loose connective tissue, fibrous connective tissue, cartilage, bone, and blood.

Membranes

- **Mucous membranes** line the interior walls of tubes that open to the outside of the body. The entire digestive tract is lined with mucous membranes. Other examples include the respiratory, excretory, and reproductive tracts.
- **Serous membranes** cover organs and line body cavities that do not open directly to the outside the serous membrane that lines the thoracic cavity and covers the lungs is called pleura.
- **Synovial membranes** are connective tissue membranes that line the cavities of the freely movable joints such as the shoulder, elbow, and knee.
- **Meninges** the connective tissue covering the brain and spinal cord, within the dorsal cavity, They provide protection
- **The cutaneous membrane** (or skin) covers the body surface.

Bones and skeletal tissues

Cartilages:

Cartilaginous structures are found throughout the adult human body. These cartilages, shown in, include (1) cartilage in the **external ear**; (2) cartilages in the **nose**; (3) **articular cartilages**, which cover the ends of most bones at movable joints; (4) **costal cartilages**, which connect the ribs to the sternum (breastbone); (5) cartilages in the **larynx** (voice box), including the *epiglottis*, a flap that keeps food from entering the larynx and the lungs; (6) cartilages that hold open the **air tubes of the respiratory system**; (7) cartilage in the discs between the vertebrae; (8) cartilage in the **pubic symphysis**; and (9) cartilages that form the **articular discs** within certain movable joints. **Three** types of cartilage tissue found in the body: *hyaline cartilage*, *elastic cartilage*, and *fibrocartilage*.

Bones:

The bones of the skeleton are *organs* because they contain several different tissues. bones also contain nervous tissue in nerves, blood tissue in blood vessels, cartilage in articular cartilages, and epithelial tissue lining the blood vessels.

Bones are classified by their shape as:

- 1. Long bones.** As their name suggests, long bones are considerably longer than they are wide. Most bones in the limbs are long bones.
- 2. Short bones.** Short bones are roughly cube-shaped. They occur in the wrist and the ankle.
- 3. Flat bones.** Flat bones are thin, flattened, and usually somewhat curved. Most cranial bones of the skull are flat, as are the ribs, sternum (breastbone), and scapula (shoulder blade).
- 4. Irregular bones.** Irregular bones have various shapes that do not fit into the previous categories. Examples are the vertebrae and hip bones.

Functions of Bones:

Bone carries out the following functions:

- 1. Support.** Bones provide a hard framework that supports the weight of the body.
- 2. Movement.** Skeletal muscles attach to the bones by tendons and use the bones as levers to move the body and its parts. The arrangement of the bones and the structure of the joints determine the types of movement that are possible.
- 3. Protection.** The bones of the skull form a protective case for the brain. The vertebrae surround the spinal cord, and the rib cage helps protect the organs of the thorax.
- 4. Mineral storage.** Bone serves as a reservoir for minerals, the most important of which are calcium and phosphate.
- 5. Blood cell formation and energy storage.** Bones contain red and yellow *bone marrow*. Red marrow makes the blood cells, and yellow marrow is a site of fat storage.
- 6. Energy metabolism.** The role of bone cells in regulating energy metabolism has just recently been identified.

Skeleton

The skeleton consists of **bones, cartilages, joints, and ligaments**. Joints, also called **articulations**, are the junctions between skeletal elements. Ligaments connect bones and reinforce most joints. The 206 named bones of the human skeleton are grouped into the axial and appendicular skeletons. **Appendicular skeleton** consists of the bones of the upper and lower limbs, including the pectoral (shoulder) and pelvic girdles that attach the limbs to the axial skeleton. The **axial skeleton**, which forms the long axis of the body. It has 80 named bones arranged into three major regions: the *skull*, *vertebral column*, and *thoracic cage*. This axial division of the skeleton supports the head, neck, and trunk, and protects the brain, spinal cord, and the organs in the thorax.

The skull:

The **skull** is the body's most complex bony structure. It is formed by cranial and facial bones. The *cranial bones*, or **cranium**, enclose and protect the brain and provide attachment sites for some head and neck muscles. The *facial bones*: (1) form the framework of the face; (2) form cavities for the sense organs of sight, taste, and smell; (3) provide openings for the passage of air and food; (4) hold the teeth; and (5) anchor the muscles of the face.

Most skull bones are flat bones and are firmly united by interlocking, immovable joints called sutures.

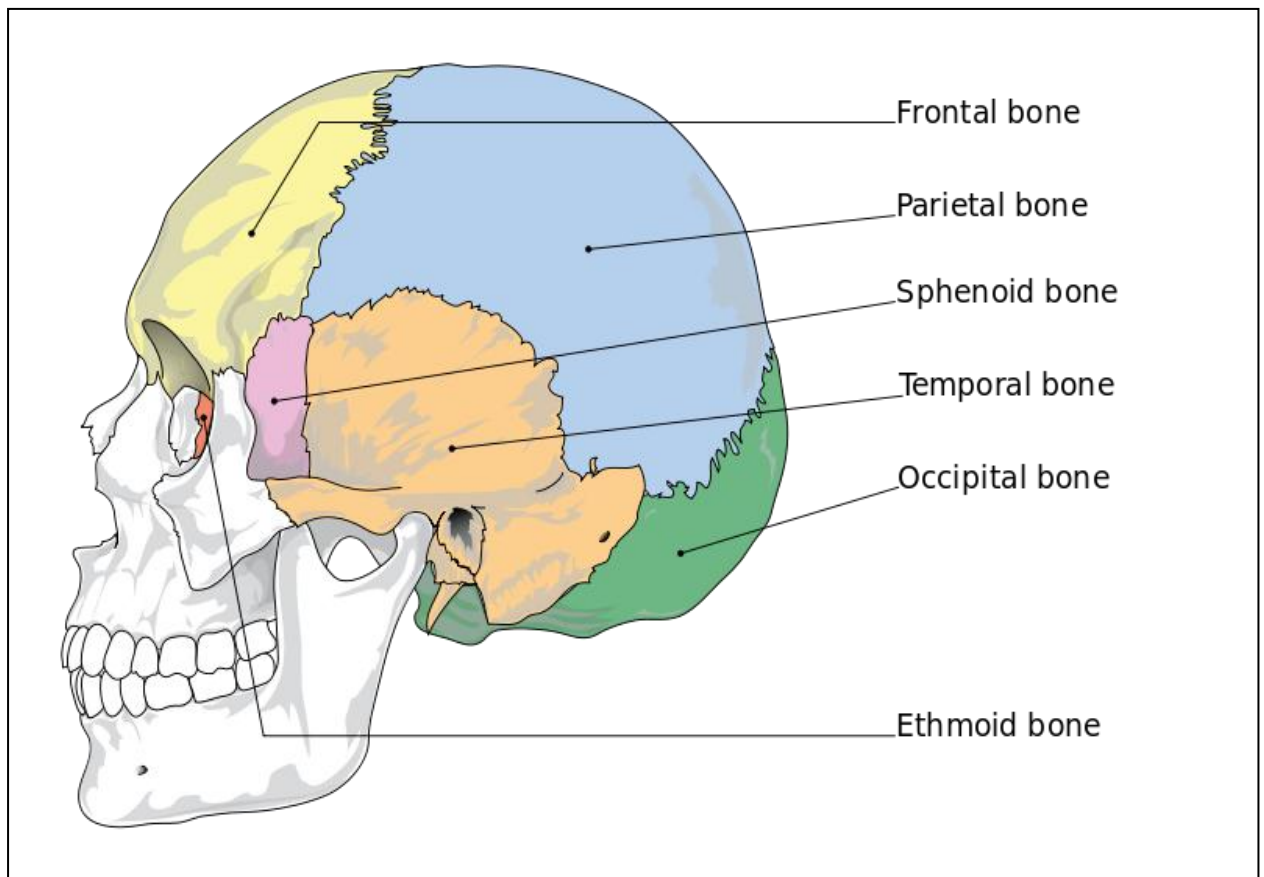
Cranial Bones:

The eight large bones of the cranium are the paired parietal and temporal bones and the unpaired frontal, occipital, sphenoid,. Together these bones form the brain's protective "shell."

The skeleton of the face consists of 14 bones. These are the unpaired mandible and the vomer, plus the paired maxillae, zygomatic, nasals, lacrimal, palatines, and inferior nasal conchae.

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The vertebral column

The **vertebral column**, also called the *spinal column* or *spine*, consists of **26** bones connected into a flexible, curved structure. The vertebral column extends from the **skull** to the **pelvis**. It surrounds and protects the delicate **spinal cord** and provides attachment points for the **ribs** and for **muscles** of the neck and back. In the fetus and infant, the vertebral column consists of **33** separate bones, or **vertebrae**. Inferiorly, nine of these eventually fuse to form two composite bones, the **sacrum** and the tiny **coccyx** (tailbone). The remaining **24** bones persist as individual vertebrae separated by *inter vertebral discs*.

Regions and Normal Curvatures:

The vertebral column, which is about 70 cm (28 inches) long in an average adult, has **five** major regions. The **7** vertebrae of the neck are the **cervical vertebrae**, the next **12** are the **thoracic vertebrae**, and the **5** that support the lower back are the **lumbar vertebrae**. The vertebrae become progressively larger from the cervical to the lumbar region. Inferior to the lumbar vertebrae is the **sacrum**, which articulates with the hip bones of the pelvis. The most inferior part of the vertebral column is the tiny **coccyx**. From a lateral view, four curvatures that give the vertebral column an **S** shape are visible. The **cervical** and **lumbar curvatures** are concave posteriorly, whereas the **thoracic** and **sacral curvatures** are convex posteriorly. Only the thoracic and sacral curvatures are well developed at birth.

Ligaments of the Spine: The vertebral column cannot stand upright by itself, it must be held in place by an elaborate system of supports. Serving this role are the straps like ligaments of the back and the muscles of the trunk. The major supporting ligaments are the **anterior** and **posterior longitudinal ligaments** that run vertically along the anterior and posterior surfaces of the bodies of the vertebrae, from the neck to the sacrum. Along with its supporting role, this thick anterior ligament prevents hyperextension of the back (bending too far backward). The posterior longitudinal ligament helps to prevent hyper flexion (bending the vertebral column too sharply forward). Several other posterior ligaments connect each vertebra to those immediately superior and inferior.

The Thoracic cage

The bony framework of the chest (thorax), called the **thoracic cage**, is roughly barrel-shaped and includes the **thoracic vertebrae** posteriorly, the **ribs** laterally, and the **sternum** and **costal cartilages** anteriorly. The **thoracic cage** forms a protective cage around the heart, lungs, and other organs. It also supports the shoulder girdles and upper limbs and provides attachment points for many muscles of the back, neck, chest, and shoulders. In addition, the *intercostal spaces* are occupied by the **intercostal muscles**, which lift and depress the thorax during breathing.

Sternum

The **sternum** (breastbone) lies in the anterior midline of the thorax. Resembling a dagger, it is a flat bone about 15 cm long consisting of three sections: the **manubrium**, **body**, and **xiphoid process**. The sternum has three important anatomical landmarks that can be palpated: the jugular notch, the sternal angle, and the xiphisternal joint .

Ribs

Twelve pairs of **ribs** form the flaring sides of the thoracic cage. All ribs attach to the thoracic vertebrae posteriorly and run anteroinferiorly to reach the front of the chest. The **superior seven** pairs, which attach directly to the sternum by their *costal cartilages*, are the **true ribs**, or *vertebrosternal ribs*. The **inferior five** pairs, ribs **8–12**, are called **false ribs** because they attach to the sternum either indirectly or not at all.

.....
.....

Terminology

Term	meaning
Gland	غدة
Fat	دهن
Air, gas	هواء، غاز
Blood vessel	وعاء دموي
Artery	شريان
Arteriole	شريان صغير
Joint	مفصل
Bronchus	شعبة هوائية
cerebellum	مخيخ
Cerebrum	مخ
Neck, cervix	عنق، عنق الرحم
Coccyx	عصعص
Colon	القولون
Rib	ضلع
Skull	جمجمة
Urinary bladder	مثانة بولية
Skin	جلد
Embryo	جنين
Brain	دماغ
Endocrine glands	الغدد الصماء
Intestine	امعاء
Red blood cells	خلايا الدم الحمراء

Appendicular skeleton

The pectoral girdles attach the upper limbs to the trunk, whereas the pelvic girdle secures the lower limbs.

Pectoral girdle (shoulder)

The **pectoral girdle**, or *shoulder girdle*, consists of a *clavicle* anteriorly and a *scapula* posteriorly. The paired pectoral girdles and their associated muscles form the shoulders. Besides attaching the upper limb to the trunk, the pectoral girdle provides attachment for many muscles that move the limb.

Clavicle

The **clavicles**, are slender, S-shaped bones that extend horizontally across the superior thorax on the anterior surface. The clavicles perform several functions. Besides providing attachment for muscles, they act as braces; that is, they hold the scapulae and arms out laterally from the thorax.

Scapula

The **scapulae**, are thin, triangular flat bones located on the dorsal surface of the rib cage, between rib 2 superiorly and rib 7 inferiorly. Each scapula has three borders. The **superior border** is the shortest and sharpest. The **medial border**, or *vertebral border*, parallels the vertebral column. The thick **lateral border**, *axillary border*. Like all triangles, the scapula has three corners, or *angles*.

Upper limb

Thirty bones form the skeleton of the upper limb. They are grouped into bones of the arm, forearm, and hand.

Arm

Arm or *brachium* ; the part of the upper limb between the shoulder and elbow. The **humerus** is the only bone of the arm (the largest and longest bone in the upper limb), it articulates with the scapula at the shoulder and with the radius and ulna (forearm bones) at the elbow. At the proximal end of the humerus is the hemispherical **head**. At the distal end of the humerus are two condyles; that articulate with radius and ulna.

Forearm

Forming the skeleton of the *forearm* are two parallel long bones, the radius and ulna that articulate with the humerus proximally, and the bones of the wrist distally. The radius and ulna also articulate with each other both proximally and distally at the small *radioulnar joints*. Furthermore, they are interconnected along their entire length by a flat ligament called the **interosseous membrane**. In the anatomical position, the radius lies laterally (on the thumb side), and the ulna medially.

Ulna- The **ulna**, which is slightly longer than the radius, is the main bone forming the elbow joint with the humerus. Distally, the shaft of the ulna narrows and ends in a knoblike **head** that articulates with the radius.

Radius- The **radius** is thin at its proximal end and widened at its distal end—the opposite of the ulna.

Whereas the ulna contributes heavily to the elbow joint, the radius is the primary forearm bone contributing to the wrist joint. When the radius rotates, the hand moves with it.

Hand

The skeleton of the hand includes the bones of the *carpus*, or wrist; the bones of the *metacarpus*, or palm; and the *phalanges*, or bones of the fingers

Carpus- The true wrist, or **carpus**, is the proximal region of the hand, just distal to the wrist joint. The carpus contains eight short bones, or **carpals**, closely united by ligaments. Gliding movements occur between the carpals, making the wrist rather flexible. The carpals are arranged in two irregular rows of four bones each.

Metacarpus- Five **metacarpals** radiate distally from the wrist to form the **metacarpus**, or palm of the hand. These small long bones are not named individually but instead are numbered 1 to 5, from thumb to little finger.

The *bases* of the metacarpals articulate with the carpals proximally. Distally, the *heads* of the metacarpals articulate with the proximal phalanges of the fingers.

Phalanges of the Fingers- The digits, or fingers, are numbered 1 to 5 beginning with the thumb. The fingers contain miniature long bones called **phalanges**. In most people, the third finger is the longest. With the exception of the thumb, each finger has three phalanges: *proximal*, *middle*, and *distal*. The thumb has no middle phalanx.

The pelvic girdle

The **pelvic girdle**, or *hip girdle*, attaches the lower limbs to the spine and supports the visceral organs of the pelvis.

The full weight of the upper body passes through this girdle to the lower limbs. The pelvic girdle attaches to the axial skeleton by some of the strongest ligaments in the body. The pelvic girdle consists of the paired **hip bones**

Each hip bone unites with its partner anteriorly and with the sacrum posteriorly. The deep, basinlike structure formed by the hip bones, sacrum, and coccyx is the *pelvis*

Ilium

The **ilium** is a large, that forms the superior region of the hip bone.

Ischium

The **ischium** forms the posteroinferior region of the hip bone. Shaped roughly like an L

Pubis

The **pubis**, or *pubic bone*, forms the anterior region of the hip bone. In the anatomical position, it lies nearly horizontally, and the bladder rests upon.

Thigh

The **femur** is the single bone of the thigh. It is the largest, longest, strongest bone in the body. The femur courses medially as it descends toward the knee.

Such a medial course places the knee joints closer to the body's center of gravity in the midline and thus provides for better balance.

The **patella** is a triangular seamed bone enclosed in the tendon that secures the quadriceps muscles of the anterior thigh to the tibia.

It protects the knee joint anteriorly and improves the leverage of the thigh muscles acting across the knee.

Leg

Leg refers to the part of the lower limb between the knee and the ankle.

Two parallel bones, the *tibia* and *fibula*, form the skeleton of the leg. The tibia is more massive than the sticklike fibula and lies medial to it. These two bones articulate with each other both proximally and distally, the *tibia fibular joints* allow almost no movement. An **interosseous**

membrane connects the tibia and fibula along their entire length. The tibia articulates with the femur to form the knee joint, and with the talus bone of the foot at the ankle joint. The fibula, by contrast, does not contribute to the knee joint and merely helps stabilize the ankle joint.

Tibia

The **tibia** receives the weight of the body from the femur and transmits it to the foot. It is the second bone after the femur in size and strength.

Fibula

The **fibula** is a thin long bone with two expanded ends. The fibula does not bear weight, but several muscles originate from it.

Foot

The skeleton of the foot includes the bones of the *tarsus*, the bones of the *metatarsus*, and the *phalanges*, or toe bones. The foot has two important functions: It supports the weight of the body, and it acts as a lever to propel the body forward during walking or running.

Tarsus

The **tarsus** makes up the posterior half of the foot and contains seven bones. The weight of the body is carried primarily by the two largest, most posterior tarsal bones: the **talus**, which articulates with the tibia and fibula superiorly, and the strong **calcaneus**, which forms the heel of the foot.

Metatarsus

The **metatarsus** of the foot, which corresponds to the metacarpus of the hand, consists of five small long bones called **metatarsals**. These bones are numbered 1 to 5 beginning on the side of the foot. The first metatarsal at the base of the big toe is the largest, and it plays an important role in supporting the weight of the body.

Phalanges of the Toes

The 14 phalanges of the toes are smaller than those of the fingers and thus are less nimble. Still, their general structure and arrangement are the same: There are three phalanges in each toe except the great toe, which has only two phalanges. As in the hand, these toe bones are named *proximal*, *middle*, and *distal phalanges*

Joint

The rigid elements of the skeleton meet at sites called **joints**, or **articulations**. and the scientific study of joints is called **arthrology**. It is the articulation of bones at joints and the contraction of skeletal muscles that attach to the bones, cause movement.

Classification of joints:

The joints are classified by structure and by function.

The **functional classification** ;focuses on the amount of movement allowed.

1- **synarthroses** are immovable joints.

2- **amphiarthroses** are slightly movable joints

3- **diarthroses** are freely movable joints.

Diarthroses predominate in the limbs, whereas synarthroses and amphiarthroses are largely restricted to the axial skeleton.

The **structural classification** is based on the material that binds the bones together and on the presence or absence of a joint cavity;

- 1- **fibrous joints**; The bones are connected by fibrous tissue, no joint cavity is present. Most fibrous joints are immovable or only slightly movable (Eg. sutures of the skull).
- 2- **cartilaginous joints**, the articulating bones are united by cartilage. Cartilaginous joints lack a joint cavity and are not highly movable, like pubic symphysis of the hip.
- 3- **Synovial joints** are the most movable joints of the body, and all are diarthroses (freely movable). Each synovial joint contains a fluid-filled *joint cavity*. Most joints of the body are in this class, especially those in the limbs.

Skeletal muscles tissue

Muscle is from a Latin word meaning “little mouse,” a name given because flexing muscles look like mice running under the skin.

Classification:

There are three types of muscle tissue: *skeletal*, *cardiac*, and *smooth*. Each type can be characterized by two main features: (1) the presence or absence of light and dark stripes, called *striations*, in the muscle cells and (2) whether control is voluntary or involuntary.

1-Skeletal muscle tissue; this tissue makes up a full 40% of body weight. The muscle cells of skeletal muscle tissue are striated, and its contraction is subject to voluntary control.

2-Cardiac muscle tissue found only in the wall of the heart. The muscle cells of cardiac muscle tissue are striated, but its contraction is involuntary, which means that as a rule, we have no direct conscious control over how fast our heart beats.

3- smooth muscle tissue in the body is found in the walls of hollow internal organs other than the heart, such as the stomach, urinary bladder, blood vessels, and respiratory passages. The muscle cells of smooth muscle tissue lack striations, and like cardiac muscle tissue, smooth muscle tissue is under involuntary control.

Skeletal muscles: Each muscle is an organ made of several kinds of tissue; In addition to skeletal muscle tissue, a muscle also contains connective tissue, blood vessels, and nerves.

Muscle Attachments: a muscle attachment is the location on a bone where a muscle connects to the bone. Each skeletal muscle extends from one bone to another, crossing at least one movable joint. When the muscle contracts, it causes one of the bones move while the other bone usually remains fixed.

Naming of skeletal muscles: Naming of skeletal muscle is according to :-

1. Location.
2. Shape.
3. Relative size.
4. Direction of fibers.
5. Location of attachments.
6. Action.

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.....

Central nervous system

Functions of the Nervous System:

The nervous system has three overlapping functions:

- (1) It uses its millions of sensory receptors (**sensory input**).
- (2) It processes and interprets the sensory input and makes decisions about what should be done.
- (3) It dictates a response by activating the effector organs, our muscles or glands; the response is called **motor output**.

Basic Divisions of the Nervous System:

Two anatomical parts: the central nervous system and the peripheral nervous system. The **central nervous system (CNS)** consists of the brain and the spinal cord, which occupy the cranium and the vertebral canal, respectively.

The CNS is the integrating and command center of the nervous system: It receives incoming sensory signals, interprets these signals, and dictates motor responses based. The **peripheral nervous system (PNS)**, the part of the nervous system outside the CNS, consists mainly of the *nerves* that extend from the brain and spinal cord. **Cranial nerves** carry signals to and from the brain, whereas **spinal nerves** carry signals to and from the spinal cord. These peripheral nerves serve as communication lines that link all regions of the body to the central nervous system. Also included in the PNS are **ganglia**, areas where the cell bodies of neurons are clustered. **Sensory**, or **afferent**, signals are picked up by sensory receptors located throughout the body and carried by nerve fibers of the PNS into the CNS. **Motor**, or **efferent**, signals are carried away from the CNS by nerve fibers of the PNS to innervate the muscles and glands, causing these organs either to contract or to secrete.

Both the sensory inputs and the motor outputs are further divided according to the body regions they serve: The *somatic body region* consists of the structures external to the ventral body cavity (skin, skeletal musculature, bones). The *visceral body region* (digestive tube, lungs, heart, bladder, and so on). This scheme results in the four

main subdivisions of the PNS: (1) **somatic sensory** (the sensory innervation of the skin, body wall, and limbs); (2) **visceral sensory** (the sensory innervation of the viscera); (3) **somatic motor** or voluntary motor (the motor innervations specifically skeletal muscles); and (4) **visceral motor** also called the **autonomic nervous system (ANS)** (the involuntary motor innervation of the smooth muscle, cardiac muscle, and glands, as well as smooth muscle in the vessels, and sweat glands).

NERVOUS TISSUE:

The nervous system consists mostly of **nervous tissue**, whose cells are densely packed and tightly intertwined. Although exceedingly complex, nervous tissue is made up of just two main types of cells: (1) *neurons*, the excitable nerve cells that transmit electrical signals, and (2) *neuroglia*, nonexcitable supporting cells that surround and wrap the neurons.

1. Neuron:

The human body contains many billions of **neurons**, or **nerve cells**, which are the basic structural units of the nervous system. Neurons are highly specialized cells that conduct electrical signals from one part of the body to another. In addition to their ability to conduct electrical signals, neurons have other special characteristics:

1. They *do not divide*.
2. They have an exceptionally *high metabolic rate*,

Neurons typically are large, complex cells. They all have *cell bodies* from which one or more *processes* project. These processes are of two types, *dendrites* and *axons*.

Dendrites: Most neurons have numerous dendrites; processes that branch from the cell body like the limbs on a tree.

Axons: A neuron has only one axon. Axons are thin processes of uniform diameter throughout their length. By definition, axons are impulse generators and conductors that transmit nerve impulses *away* from their cell body.

Synapses: The site at which neurons communicate is called a synapse. The neuron that conducts signals toward a synapse is called the **presynaptic**

neuron; the neuron that transmits signals away from the synapse is called the **postsynaptic neuron**, most neurons in the CNS function as both presynaptic (information-sending) and postsynaptic (information-receiving) neurons.

The respiratory system

The organs of the respiratory system include the nose, nasal cavity, and paranasal sinuses; the pharynx; the larynx; the trachea; the bronchi and their smaller branches; and the lungs, which contain the terminal air sacs, or alveoli. Functionally, these respiratory structures are divided into **conducting** and **respiratory** zones. The conducting zone includes the respiratory passageways that carry air to the sites of gas exchange. The respiratory zone, the actual site of gas exchange in the lungs, is composed of the terminal respiratory passageways that contain alveoli—namely, the respiratory bronchioles, alveolar ducts, and alveolar sacs.

Nose: External portion of the respiratory system, supported by bone and cartilage. Internal nasal cavity divided in half by midline nasal septum and lined with respiratory mucosa.

Nose produces mucus; filters, warms, and moistens incoming air;

Roof of nasal cavity contains olfactory mucosa (receptors for sense of smell).

Paranasal sinuses: Mucosa-lined hollow cavities within the sphenoid, ethmoid, maxillary, and frontal bones. Sinuses function the same as nasal cavity; and also lighten skull.

Pharynx: Passageway connecting nasal cavity to larynx and oral cavity to esophagus; three subdivisions: nasopharynx, oropharynx, and laryngopharynx.

It is a passageway for air and food.

Tonsils houses of Pharynx; Tonsils respond to inhaled or ingested antigens.

Larynx: Connects pharynx to trachea; it is a framework of cartilage and dense connective tissue; its opening can be closed by epiglottis or vocal folds.

Larynx functions as air passageway; prevents food from entering lower respiratory tract.

The function of vocal cords which are the voice production.

Trachea: Flexible tube running from larynx and dividing inferiorly into two main (primary) bronchi; their walls contain C-shaped cartilages that are incomplete

posteriorly where trachealis muscle occurs.

Its functions: Air passageway; filters, warms, and moistens incoming air

Bronchial tree: Consists of right and left main bronchi, which subdivide within the lungs to form (secondary) and (tertiary) bronchi, .

Bronchiolar walls contain complete layer of smooth muscle; constriction of this muscle impedes expiration.

Functions: Air passageways connecting trachea with alveoli; warms and moistens incoming air.

Alveoli: Microscopic chambers at end of bronchial tree. The wall lined by simple squamous epithelium underlain by thin basement membrane, their external surfaces intimately associated with pulmonary capillaries. They are the main sites of gas exchange.

Type II alveolar cells produce surfactant which reduces surface tension; helps to prevent lung collapse.

Lungs: Paired composite organs located within pleural cavities of thorax; composed primarily of alveoli and respiratory passageways; the stroma is fibrous elastic connective tissue, allowing lungs to recoil passively during expiration

The lungs house passageways smaller than main bronchi.

Pleurae: Serous membranes; parietal pleura lines thoracic cavity; visceral pleura covers external lung surfaces. Pleurae produce lubricating fluid and make compartments for lungs.

Endocrine system

The endocrine system is so called because the cells, tissues, and organs that comprise it, collectively called endocrine glands, secrete substance into internal environment. The secreted substances called hormones which diffuse from the interstitial fluid into the blood stream and eventually act on cells (target cells) some distance away. Other glands secrete substances into external environment, and substances which was secreted enter tubes or ducts that lead to body surface, called exocrine because secrete externally (eg. Sweat glands).

Pituitary gland: It is about 1 cm. in diameter, located on the base of the brain. It is attached to hypothalamus by pituitary stalk and lies in the (sella tursica) of sphenoid bone. The gland consists of 2 distinct portion; an anterior lobe (adenohypophysis) and posterior lobe (neurohypophysis).

Thyroid gland: It is very vascular structure that consists of 2 large lobes, connected by broad isthmus. It is located just below the larynx on either sides and anterior to trachea. Its structure is of a capsule of connective tissue covers the gland, the inner structure is made up of many secretory parts called (follicles), and the follicular cells produce hormones.

Parathyroid glands: Are located on the posterior surface of the thyroid gland, and secretes hormone that regulates concentration of calcium and phosphate in the blood.

Adrenal glands: Are closely associated with the kidneys, each gland sits on the top of the kidney, and embedded in the adipose tissue that enclose the kidney. The gland shape is like a pyramid. The gland is very

vascular and consists of 2 parts, the central portion is adrenal medulla, and the outer part is adrenal cortex.

Pancreas: Consists of 2 major types of secretory tissue, with dual function. As an exocrine gland that secretes digestive juice through a duct and an endocrine gland that releases hormones into body fluid.

Structure of the gland: The pancreas is an elongated, somewhat flattened organ that is posterior to the stomach, situated retroperitoneally. It is connected to the duodenum by a duct which transports its digestive juice into intestine. The endocrine portion consists of cells that are grouped around blood vessels. These groups called pancreatic islets (islets of langerhans), include 3 distinct types of hormone-secreting cells: alpha cells secrete glucagon, beta cells secrete insulin, and delta cells secrete somatostatin.

Pineal gland: It is small oval structure located deep between the cerebral hemispheres where it attaches to the upper portion of the thalamus near the roof of third ventricle. It largely consists of specialized pineal cells and supportive neuroglial cells. The pineal glands secretes hormone melatonin.

Cardiovascular system

Heart:

The heart is a muscular double pump with two functions: (1) Its right side receives oxygen-poor blood from the body tissues and then pumps this blood to the lungs, and (2) its left side receives the oxygenated blood returning from the lungs. The heart has two receiving chambers, the right atrium and left atrium, and has two main pumping chambers, the right and left ventricles that. The heart lies in the thorax posterior to the sternum and costal cartilages and rests on the superior surface of the diaphragm, between the two lungs.

Heart coverings: The **pericardium** is a triple-layered sac that encloses the heart. The outer layer of this sac, called the **fibrous pericardium**. Deep to is **parietal layer of the serous pericardium** which is continuous with the **visceral layer of the serous pericardium**, or **epicardium** (considered a part of the heart wall).

Layers of the Heart wall: The wall of the heart has three layers: a superficial epicardium, a middle myocardium, and a deep endocardium.

Heart Chambers:

The four heart chambers are the right and left atria superiorly, and the right and left ventricles inferiorly. Internally, the heart chambers are divided longitudinally by a the **interatrial septum** and **interventricular septum**.

Right Atrium: It is the receiving chamber for oxygen-poor blood returning from the systemic circuit. Inferiorly and anteriorly, the right atrium opens into the right ventricle through the tricuspid valve (right atrioventricular valve).

Right Ventricle: It receives blood from the right atrium and pumps it into the pulmonary circuit. Superiorly, the opening between the right ventricle and the pulmonary trunk contains the pulmonary semilunar valve (pulmonary valve).

Left Atrium: It receives oxygen-rich blood returning from the lungs. It opens into the left ventricle through the mitral valve (left atrioventricular valve).

Left Ventricle: It pumps blood into the systemic circuit. Superiorly, the left ventricle opens into (the aorta) through the aortic semilunar valve (aortic valve).

Blood vessels:

Three major types of blood vessels are arteries, capillaries, and veins. When the heart contracts it forces blood into the large arteries that leave the ventricles. The blood then moves into successively smaller branches of arteries, finally reaching the smallest branches, the arterioles, which feed into the capillaries of the organs. Blood leaving the capillaries is collected by venules; small veins that merge to form larger veins that ultimately empty into the heart.

Arteries: are vessels that carry blood away from the heart. Three main types; elastic arteries, muscular arteries, and arterioles.

Capillaries are the smallest blood vessels, with a diameter of 8–10 μm , just large enough to enable erythrocytes to pass through in single file. A capillary bed is a network of the body's smallest vessels.

Veins are the blood vessels that conduct blood from the capillaries toward the heart. At any given time veins hold fully 65% of the body's blood. Veins have less elastin in their walls than do arteries.

Blood vessels of the body:

1. Arteries:

The pulmonary circulation: pulmonary trunk, right and left

pulmonary arteries, lobar arteries. Oxygenated blood enters venules and then progressively larger veins. The four pulmonary veins empty into the left atrium.

Systemic circulation: Aorta: The largest artery in the body leaves the heart.

Brachiocephalic trunk, left common carotid and left subclavian arteries leave the **ascending aorta**. **Descending aorta** has two parts, the **thoracic aorta** and the **abdominal aorta**.

Common carotid arteries end by dividing into an **external and internal carotid** artery.

The **upper limb** is supplied by the **subclavian** artery which becomes the **axillary** artery that lead to brachial artery. **Brachial** artery immediately beyond the elbow joint splits into the **radial** and **ulnar** arteries.

Arteries of the **Abdomen**: The arteries to the abdominal organs arise from the abdominal Aorta: **Celiac trunk**, **superior mesenteric Artery**, **renal arteries**, **gonadal arteries**, **inferior mesenteric artery**.

Arteries of the **Pelvis and Lower Limbs**: Each **common iliac** artery forks into two branches: the **internal iliac** artery, and the **external iliac** artery. **External iliac arteries** enter the thigh and here called the **femoral** artery. **Popliteal artery** starts Just inferior to the head of the fibula, the popliteal artery splits into the **anterior and posterior tibial arteries**.

2. Veins:

Superior vena cava: It arises from union of **right and left brachiocephalic** veins, each of which is formed from union of **internal jugular and subclavian veins**.

Inferior vena cava: Larger vein in the body. It begins by union of 2 **common iliac** veins.

Veins of head and neck: Mainly 3 pairs; **internal jugular**, **external jugular**, and the **vertebral** arteries

Veins of the **Upper Limbs**: Deep Veins: **radial** and **ulnar veins** of the forearm, which unite just inferior to the elbow to form the **brachial vein** of the arm which empties into the **axillary vein**.

Superficial Veins: are larger than the deep veins and are visible beneath the skin. **cephalic vein** joins the axillary vein. **basilic vein**, In the axilla, joins the brachial vein to become the axillary. On the anterior aspect of the elbow joint, the **median cubital vein** connects the basilic and cephalic veins. The **median vein of the forearm** ascends in the center of the forearm.

Blood returning from the **abdominopelvic viscera** and the **abdominal wall** reaches the heart via the inferior vena cava.

Hepatic Portal System is a specialized part of the vascular circuit. It picks up digested nutrients from the stomach and intestines and delivers these nutrients to the liver for processing and storage.

Veins of the **Pelvis and Lower Limbs**: Deep Veins (**plantar veins**, the **posterior tibial vein**, **fibular or peroneal Vein**, **anterior tibial vein**, **popliteal vein** which becomes **femoral vein**, **external iliac vein**, **internal iliac vein**).

Superficial Veins: two large superficial veins, the **great and small saphenous veins**. Great saphenous vein is the longest vein in the body.

Lymphatic system:

Lymphatic capillaries, the highly permeable vessels that collect the excess tissue fluid, are located near blood capillaries in the loose connective tissue.

Lymphatic Collecting Vessels: From the lymphatic capillaries, lymph enters these vessels, which accompany blood vessels.

Lymph Nodes: Which cleanse the lymph of pathogens, are bean-shaped organs situated along lymphatic collecting vessels.

Lymph Trunks: After leaving the lymph nodes, the largest lymphatic collecting vessels converge to form lymph trunks.

Lymph Ducts: The lymph trunks drain into the largest lymphatic vessels, the lymph ducts.

Reproductive system

Male reproductive system:

From the testes, sperm travel to the outside of the body through a system of ducts in the following order: the duct of the epididymis, the ductus deferens, the ejaculatory duct, and finally the urethra, which opens at the tip of the penis. The accessory sex glands, which empty their secretions into the sex ducts during ejaculation, are the seminal vesicles, prostate, and bulbourethral glands.

Testis:

The paired, oval **testes** or testicles are located in the **scrotum**, a sac of skin and superficial fascia. Each testis averages about 2.5 cm (1 inch) in width and 4 cm in height. Within the scrotum, each testis is posterior to, and partially enclosed by, a serous sac called the **tunica vaginalis**. The tunica vaginalis consists of a superficial parietal layer, an intermediate cavity containing serous fluid (a remnant of the peritoneal cavity), and a deeper visceral layer that hugs the surface of the testis. Just deep to the visceral layer of the tunica vaginalis lies the **tunica albuginea**, the fibrous capsule of the testis. Septal extensions of the tunica albuginea project inward to divide the testis into 250–300 wedge-shaped compartments called **lobules**, each containing one to four coiled **seminiferous tubules**, the actual “sperm factories.” Posteriorly, the seminiferous tubules of each lobule converge to form a **straight tubule** that conveys sperm into the **rete testis**, a complex network of tiny branching tubes.

Microscopic Anatomy: A histological section through a lobule of the mature testis reveals numerous seminiferous tubules separated from each other by an areolar connective tissue. The sperm-forming tubules consist of a thick stratified epithelium surrounding a hollow central lumen. The epithelium consists of spherical spermatogenic (“sperm-forming”) cells embedded in columnar sustentocytes (supporting cells).

Epididymis:

Is where sperm mature. It is a comma-shaped organ that arches over the posterior and lateral side of the testis. The head of the epididymis contains the efferent ductules, which empty into the duct of the epididymis, a highly coiled duct that completes the head and forms all of the body and tail of this organ.

The Ductus Deferens:

The **ductus deferens**, or vas deferens, stores and transports sperm during ejaculation. It is about 45 cm (18 inches) long. From the tail of the epididymis, the ductus deferens runs superiorly within the spermatic cord. Its distal end expands as the **ampulla** (“flask”) of the **ductus deferens** and then joins with the duct of the seminal vesicle (a gland) to form the short **ejaculatory duct**. Each ejaculatory duct runs within the prostate, where it empties into the prostatic urethra.

Accessory Glands:

The accessory glands in males include the paired seminal vesicles, the single prostate, and paired bulbourethral glands. These glands produce the bulk of the **semen**, which is defined as sperm plus the secretions of the accessory glands and accessory ducts.

The Seminal Vesicles (or **seminal glands**): lie on the posterior surface of the bladder. These hollow glands are about the shape and length of a finger (5 to 7 cm).

The Prostate: This is of the size and shape of a chestnut, encircles the first part of the urethra just inferior to the bladder. The prostate consists of 20–30 compound tubuloalveolar glands.

The Bulbourethral Glands: are pea-sized glands situated inferior to the prostate, within the urogenital diaphragm.

Female reproductive system:

The gonads are the ovum-producing ovaries. The accessory ducts include the uterine tubes, where fertilization typically occurs; the uterus, where the embryo develops; and the vagina, which acts as a birth canal.

The Ovaries:

Gross Anatomy: The paired, almond-shaped **ovaries**, located on the lateral sides of the uterus, measure about 3 cm by 1.5 cm by 1 cm. Each

ovary lies against the bony lateral wall of the true pelvis.

The **mesentery** of the ovary, the horizontal **mesovarium**, is part of the **broad ligament**. The **suspensory ligament of the ovary** is a lateral continuation of the broad ligament. Finally, the ovary is anchored to the uterus medially by the **ovarian ligament**.

Microscopic Anatomy: The ovary is surrounded by a fibrous capsule called the **tunica albuginea**, which is much thinner than that of the testis. The tunica albuginea is covered by a simple cuboidal epithelium called the **germinal epithelium**. The main substance of the ovary is divided into an outer cortex and an inner medulla. The **ovarian cortex** houses the developing gametes, which are called **oocytes**. All oocytes occur within saclike **follicles**. The deep **ovarian medulla** is a loose connective tissue containing the largest blood vessels, nerves, and lymphatic vessels of the ovary.

Uterine tubes (oviducts or fallopian tubes):

Each uterine tube begins laterally near an ovary and ends medially, where it empties into the superior part of the uterus. The lateral region of the uterine tube, an open funnel called the **infundibulum**, opens into the peritoneal cavity. The margin of the infundibulum is surrounded by ciliated, fingerlike projections called **fimbriae**.

The Uterus:

The **uterus** lies in the pelvic cavity, anterior to the rectum and posterosuperior to the bladder. It is a hollow, thick-walled organ. In a woman who has never been pregnant, the uterus is about the size and shape of a small, inverted pear, but it is somewhat larger in women who have had children. Normally, the uterus is tilted anteriorly, or **anteverted**, at the superior part of the vagina. The major portion of the uterus is called the **body**, the rounded region superior to the entrance of the uterine tubes is the **fundus**, and the slightly narrowed region inferior to the body is the **isthmus**. Below this, the narrow neck of the uterus is the **cervix**.

Supports of the Uterus: Several ligaments and mesenteries help hold the uterus in place. The uterus is anchored to the lateral pelvic walls by the **mesometrium**, which is the largest division of the broad ligament. Inferiorly, there are the **lateral cervical (cardinal) ligaments**. The uterus

is bound to the anterior body wall by the paired **round ligaments of the uterus**,

The Uterine Wall: The wall of the uterus is composed of three basic layers: an outer perimetrium, a middle myometrium, and an inner endometrium.

Vagina:

Is a thin-walled tube that lies inferior to the uterus, anterior to the rectum, and posterior to the bladder. The vagina is often called the birth canal, because it provides a passageway for delivery. The highly distensible wall of the vagina consists of three coats: an outer adventitia of fibrous connective tissue, a muscularis of smooth muscle, and an inner mucosa.

Mammary glands (breasts):

The base of the cone-shaped breast in females extends from the second rib superiorly to the sixth rib inferiorly. Its medial border is the sternum, and its lateral boundary is the midaxillary line. The **nipple**, the central protruding area, is surrounded by a ring of pigmented skin, the **areola**. Internally, the mammary gland consists of 15 to 25 **lobes**. The lobes of the breast consist of smaller units called **lobules**, which are composed of tiny alveoli or acini. The walls of the alveoli consist of a simple cuboidal. From the alveoli, the milk passes through progressively larger ducts until it reaches the largest ducts, called **lactiferous ducts**. Just deep to the areola, each lactiferous duct has a dilated region called a **lactiferous sinus**, where milk accumulates.

Digestive system

The various organs of the digestive system can be divided into two main groups: the *alimentary canal* and the *accessory digestive organs*. The organs of the **alimentary canal** are the *mouth*, *pharynx*, *esophagus*, *stomach*, *small intestine* (small bowel), and *large intestine* (large bowel), the last of which leads to the terminal opening, or *anus*. The **accessory digestive** organs are the *teeth* and *tongue*, plus the *gallbladder* and various large digestive glands—the *salivary glands*, *liver*, and *pancreas*. The accessory digestive glands secrete saliva, bile, and digestive enzymes.

Digestive Processes:

- 1. Ingestion** is the taking of food into the mouth.
- 2. Propulsion** is the movement of food through the alimentary canal. It includes swallowing, which is initiated voluntarily, and peristalsis, an involuntary process.
- 3. Mechanical digestion** physically prepares food for chemical Digestion, by breaking it into smaller pieces.
- 4. Chemical digestion** is a series of steps in which complex food molecules are broken down to their chemical building blocks.
- 5. Absorption** is the transport of digested end products from the lumen of the alimentary canal into the blood.
- 6. Defecation** is the elimination of indigestible substances from the body as feces.

Peritoneum:

The **visceral peritoneum** covers the external surfaces of most digestive organs, it is continuous with the **parietal peritoneum**, which lines the body wall. Between the visceral and parietal peritonea is the **peritoneal cavity** that contains a lubricating serous fluid that is secreted by the peritoneum and allows the digestive organs to glide easily along one another and along the body wall as they move during digestion.

A **mesentery** is a double layer of peritoneum—a sheet of two serous membranes fused back to back—that extends to the digestive organs from the body wall. Mesenteries hold the organs in place, are sites of fat storage, and provide a route by which circulatory vessels and nerves reach the organs in the peritoneal cavity.

The Mouth: **mouth**, or **oral cavity**, is a mucosa-lined cavity whose boundaries are the lips anteriorly, the cheeks laterally, the palate superiorly, and the tongue inferiorly. Its anterior opening is the **oral orifice**.

The Tongue: The **tongue**, which occupies the floor of the mouth, is predominantly a muscle constructed of interlacing fascicles of skeletal muscle fibers.

The Salivary Glands: The salivary glands produce *saliva*. Small *intrinsic salivary glands* are scattered within the mucosa of the tongue, palate, lips, and cheeks. *Extrinsic salivary glands*, which lie external to the mouth, but connect to it through their ducts. These paired extrinsic glands are the *parotid*, *submandibular*, and *sublingual glands*.

The Pharynx: From the mouth, swallowed food passes posteriorly into the **oropharynx** and then the **laryngopharynx**, both of are passageways for food, fluids, and inhaled air.

The Esophagus: The esophagus is a muscular tube that propels swallowed food to the stomach. The esophagus begins as a continuation of the pharynx in the midneck, descends through the thorax on the anterior surface of the vertebral column, and passes through the *esophageal hiatus* in the diaphragm to enter the abdomen. Its abdominal part joins the stomach at the **cardiac orifice**.

The Stomach: The stomach extends from the esophagus to the small intestine. The stomach lies in the superior left part of the peritoneal cavity. It is directly inferior to the diaphragm and anterior to the spleen and pancreas. The main regions of the stomach are: The **cardiac region**, the **fundus**, the, the **body**; ends at the funnel-shaped **pyloric region** that is composed of the wider **pyloric antrum** and the narrower **pyloric canal**.

The Small Intestine: The small intestine is the longest part of the alimentary canal and the site of most enzymatic digestion and virtually all absorption of nutrients. The small intestine is a convoluted tube that runs from the pyloric sphincter to the first part of the large intestine. The small intestine has three subdivisions: the **duodenum**, almost (5%), the **jejunum** (40), and the **ileum** almost(60%) of the small intestine.

The Large Intestine: The large intestine is the last major organ in the alimentary canal. The large intestine frames the small intestine on 3.5 sides, forming an open rectangle. This organ, which is wider than the

small intestine but less than half as long (1.5 meters), has the following subdivisions: *cecum*, *vermiform appendix*, *colon*, *rectum*, and *anal canal*. The **Cecum** and **Vermiform Appendix**: The large intestine begins with the saclike **cecum**. The **vermiform appendix** is a blind tube that opens into the wall of the cecum.

The **Colon** has several distinct segments. From the cecum, the **ascending colon** ascends along the right side of the posterior abdominal wall and reaches the level of the right kidney, where it makes a right angle turn, the **right colic flexure**. From this flexure, the **transverse colon** extends intraperitoneal to the left across the peritoneal cavity. Directly anterior to the spleen, it bends acutely downward at the **left colic (splenic) flexure** and descends along the left side of the posterior abdominal wall again as the **descending colon**. Inferiorly, the colon enters the true pelvis as the S-shaped **sigmoid colon**.

The Rectum In the pelvis. The sigmoid colon joins the rectum, which descends along the inferior half of the sacrum in a secondarily retroperitoneal position.

The anal Canal: The last subdivision of the large intestine is the **anal canal** (About 3 cm long).

The Liver:

The ruddy **liver** is the largest gland in the body, weighing about 1.4 kg (3 pounds) in an average adult. The liver lies inferior to the diaphragm in the right superior part of the abdominal cavity. It lies almost entirely within the rib cage, which protects this highly vascular organ. The liver is shaped like a wedge, the wide base of which faces right and the narrow apex of which lies just inferior to the level of the left nipple. The liver has two surfaces: the *diaphragmatic* and *visceral* surfaces. The **diaphragmatic surface** faces anteriorly and superiorly, whereas the **visceral surface** faces posteroinferiorly. The liver has a **right lobe** and a **left lobe**,

Gallbladder: is a muscular sac, resting in a shallow depression on the visceral surface of the right lobe of the liver.

Terminology Combining forms

Combining form	Meaning	بالعربي
Trache/o	trachea	رغام
Tympan/o	Tympanic membrane	غشاء الطبلة
Ur/o	Urine	بول
Ureter/o	ureter	حالب
Urethr/o	Urethra	احليل
Urin/o	urine	بول
Uter/o	uterus	رحم
Vagin/o	vagina	مهبل
Vas/o	vessel	وعاء
Ven/o	vein	وريد
Ventricul/o	Ventricle	بطين
Viscer/o	viscera	احشاء
Vir/o	virus	فيروس