Technical Practice

Ministry of Health

Course title: Human Anatomy Course Specification

A. Basic information:

- **Course code: MED 111**
- **Credit hours: 2**
- **Course duration: 14 weeks**
- **Course level: 1st semester/1st year**
- **Allocated marks: 100 marks**

B. Professional information:

- **Aim of the course**

1. Provide the technical nurse with scientific knowledge concerning with the basic normal anatomy of the human body, at the level of organs and systems.
2. Show professional skills to provide safe nursing care adequate for health needs of the individual and families.
3. Implement the nursing theoretical and methodological fundamentals and principles, basing nursing interventions on scientific evidence.

- Learning Objectives

A. Knowledge and understanding: *By the end of the course, the licensed Technical nurse should be able to:*

1. Identify the main anatomical terms of the human body.
2. Describe the basic principles of structure of the different types of tissues in the human body.
3. Point out the anatomical structure and organization of the different organs and systems of the human body.

B. Intellectual skills: *By the end of the course, the licensed Technical nurse should be able to:*

1. Explain the cellular organization into tissue, organs and systems of the body.
2. Identify the different surface markings of bones and vessels.
3. Point out the surface landmarks of the underlying bones, joints and vessels of the human body.
4. Determine the anatomical organization of internal viscera of the human body.
5. Understand the relationship between the state of health and the physical environment of the human being.
6. Identify the anatomical structure and normal aging changes of the different body systems.

C. Professional and practical skills: *By the end of the course, the licensed Technical nurse should be able to:*

1. Interpret the basic anatomical knowledge while dealing with patient in order to provide him/her with appropriate care.
2. Demonstrate safe transfer, positioning and turning using effective body mechanics.
3. Correlate between the state of health and the physical environment of the human being.
4. Apply the national code of ethics issued by the National Academic Reference Standards (NARS) during delivery of nursing care.
5. Follow the institutional code of conduct.

D. General and transferable skills: *By the end of the course, the licensed Technical nurse should be able to:*

1. Adopt the principles of lifelong learning needs of the nursing profession.
2. Present information clearly in written, electronic and verbal forms.
3. Communicate ideas and arguments effectively.
4. Establish effective communication with inter-professional team and others. .
5. Demonstrate knowledge and ability to apply verbal and non-verbal communication techniques to create therapeutic relationships.
6. Maintain a safe environment for the resident and others.

7. Collaborate with research team to plan, conduct and evaluate nursing research.
8. Apply critical thinking and critical inquiry in research.
9. Demonstrate knowledge to implement best practices and research into evidence informed practice.

Course content:

	Topics	Lectures (hrs)	Clinical	Practical/ Skills lab	%
1	Anatomical terms of positions, planes and movements of the human body	1	---	---	3.5
2	Different types of tissues	1	---	---	3.5
3	Anatomical structure of skeletal system: - Bones of the human body - Joints of the human body - Vertebral column	5	---	---	18
4	Anatomical structure of muscular system: - Muscles of the head and neck - Muscles of the shoulder girdle - Muscles of the upper and lower limbs - Muscles of the trunk - Muscles of the abdomen - Cardiac muscle	6			21
5	Anatomical structure of respiratory and cardiovascular system	3	---	---	10.5
6	Anatomical structure of nervous and sensory system	3	---	---	10.5
7	Anatomical structure of urinary system	3	---	---	10.5
8	Anatomical structure of integumentary system	4	---	---	14
9	Anatomical structure of gastrointestinal system	3	---	---	10.5
	Total	**28**	**---**	**---**	**100**

Teaching methods:

- Interactive lectures
- PowerPoint presentation
- Human skeleton
- Videos
- Role play
- Free reading

Facilities required for teaching and learning:

- Lecture halls.
- Rooms for small groups.
- Audio-visual aids (Data show, Blackboard, Computers, CDs, overhead projection and videos).
- Dry bone of human skeleton
- Anatomy museum

List of references:

- Lecture notes provided by staff members.
- Essential books (text books):
  Cunningham's Anatomy
  Gray's Anatomy
  Snell clinical Anatomy
- Periodicals & Websites etc.

Assessment

Attendance criteria:

The prerequisite for sitting to the final exam is 75% attendance of the lectures and fulfilling all the credit points specified for the scientific activities.

Assessment tools:

- Continuous assessment is carried throughout the course as illustrated in the log book.
- Assignment
- Final written examination will be carried at the end of the course

Tool	(ILOs)
Written examination	To assess knowledge and Understanding and Intellectual skills
Midterm and midyear examination	To assess Practical, transferable and Intellectual skills
Assignment	To assess General and transferable skills

Grading System:

Examination	Marks allocated	% of Total Marks
1. Midterm exam	20	20
2. Mid-year written exam	20	20
3. Final written exam	60	60
Total	100	100

Formative assessment: Feedback is given to student after the Formative exams.

Examination description:

Examination	Description
1-Continuous assessment	formative assessment
2- Midterm exam	- Quiz exam - written exam including MCQ, case scenarios
2- Mid-year exam	- Written exam including short essay questions, MCQ, case scenarios.
3- Final written exam (2hrs duration)	short essay question, MCQ, case scenarios, cross matching questions and filling in the space

Weighing of assessment:

Exams	Mark	ILOs
Final written examination	**100**	A1- 3, B1-6, C1-5, D1-9
Oral	---	---
Clinical	---	---
Total	100	

By: Dr. Walaa Mohamed Sayed

Associate professor of Anatomy & Embryology

Kasr Al-Ainy Faculty of Medicine

Cairo University

Education Development Fund

Dr. Walaa Mohamed Sayed

Associate Professor of Anatomy and Embryology
Kasr Al-Ainy Faculty of Medicine
Cairo University

[Anatomy Course Material]

INTRODUCTION TO HUMAN ANATOMY

General Nursing Program

1. ANATOMICAL TERMINOLOGY

A. Anatomical positions of the human body:

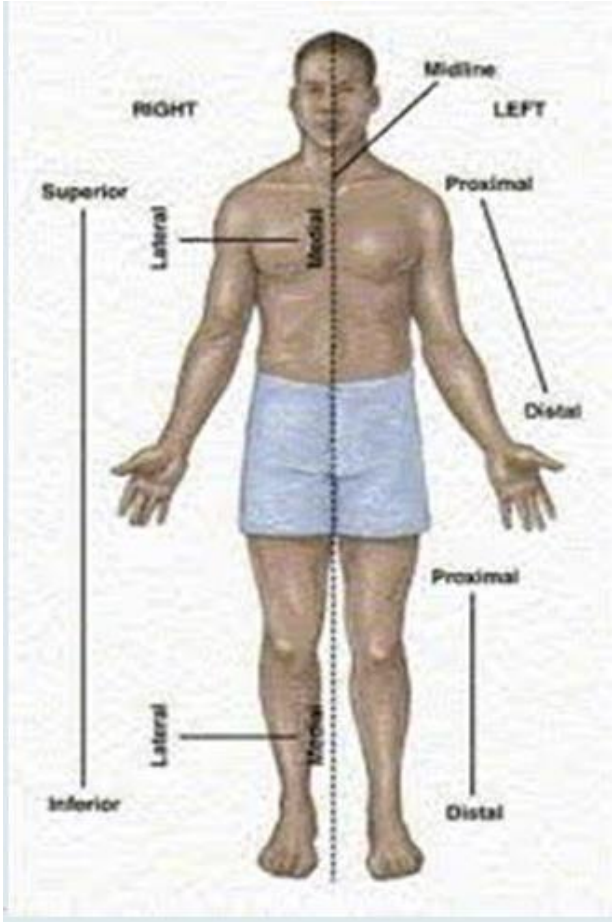
1. **Anatomical erect position:**
   This position is used in describing the anatomy of the body:
   - Human body is regarded as standing erect.
   - Eyes are looking forwards.
   - Upper limbs are hanging by the sides.
   - Palms are facing forwards.
   - Thumbs are directed laterally.

2. **Supine position:**
   The human body lies on its back.

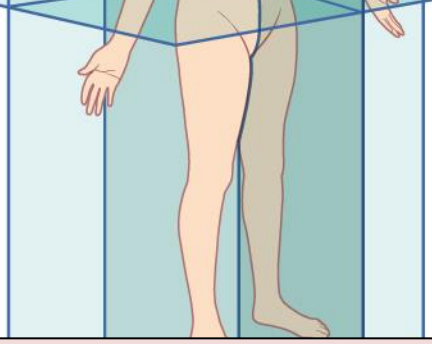
3. **Prone position:**
   The human body lies on its face.

4. **Lateral decubitus position:**
   The human body lies on its side (right or left).

5. **Lithotomy position:**
   The human body lies on its back with flexion
   of hip and knee and abduction of hip joints.

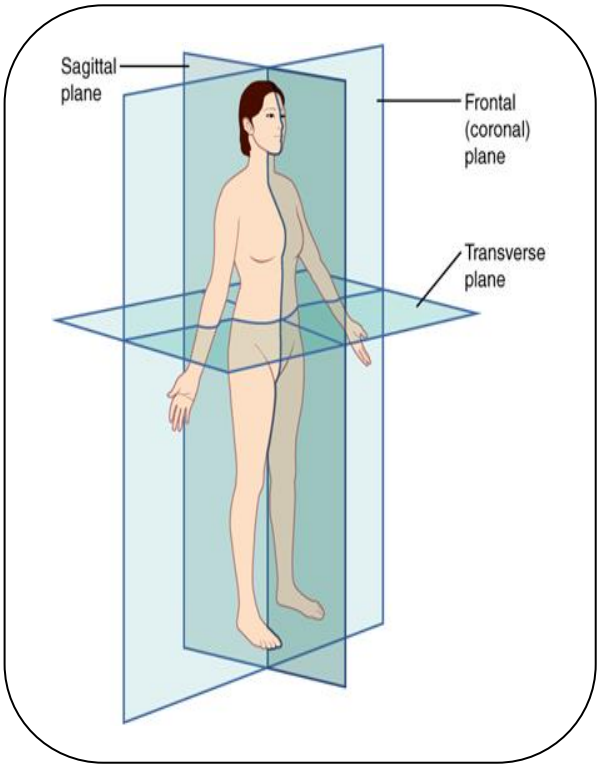


Anatomical Erect Position



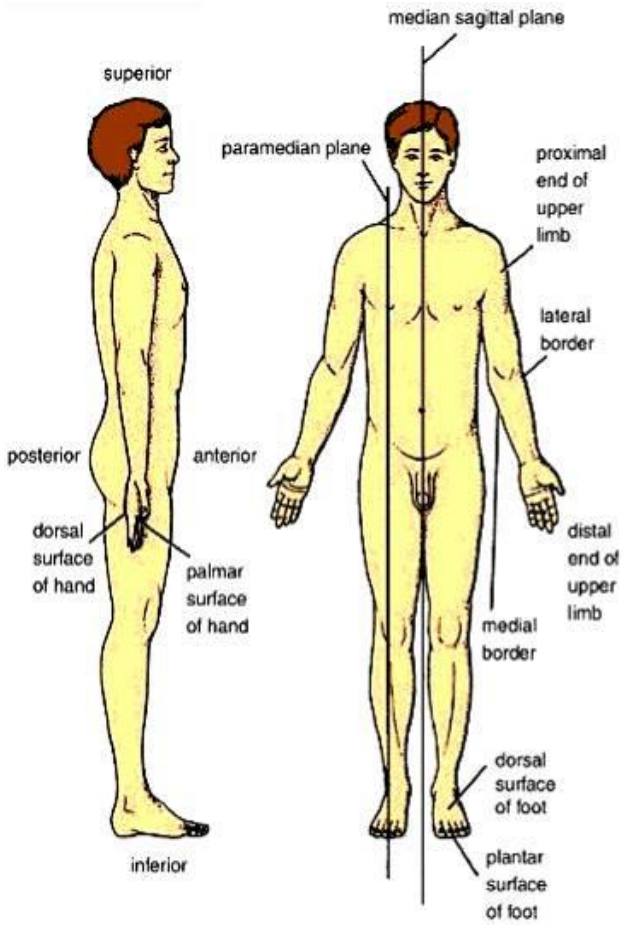
ın anatomy:

1. **Sagittal (parasagittal) plane:**
   - It divides the body or an organ vertically into right and left sides.
   - If this plane runs directly down the middle of the body, it is called the midsagittal or median plane.
   - If it divides the body into unequal right and left sides, it is called a parasagittal plane or less commonly a longitudinal section.
2. **Coronal (frontal) plane:**
   - It divides the body or an organ vertically into an anterior part towards the front of the body and a posterior part towards the back.
3. **Horizontal plane:**
   It divides the human body horizontally into an upper (superior) and lower (inferior) parts.



C. Human body using directional terms:

1. **Anterior (Ventral):** in front (nearer to the front of the body)
2. **Posterior (Dorsal):** behind (nearer to the back of the body)
3. **Superior (upper or cranial):** nearer to the upper end of the body.
4. **Inferior (lower or caudal):** nearer to the lower end of the body.
5. **Median:** exactly in the middle line or median plane.
6. **Medial:** nearer to the median plane.
7. **Lateral**: away from the median plane.
8. **Proximal:** nearer to the root of the limb.
9. **Distal**: away from the root of the limb.
10. **Superficial**: towards the skin or the surface of the body.
11. **Deep**: further away from skin or the surface of the body.
12. **Internal (inner)**: inside the organ or the body.
13. **External (outer)**: near or on the surface of an organ or body.



2. INTEGUMENTARY SYSTEM

Structure of the skin:

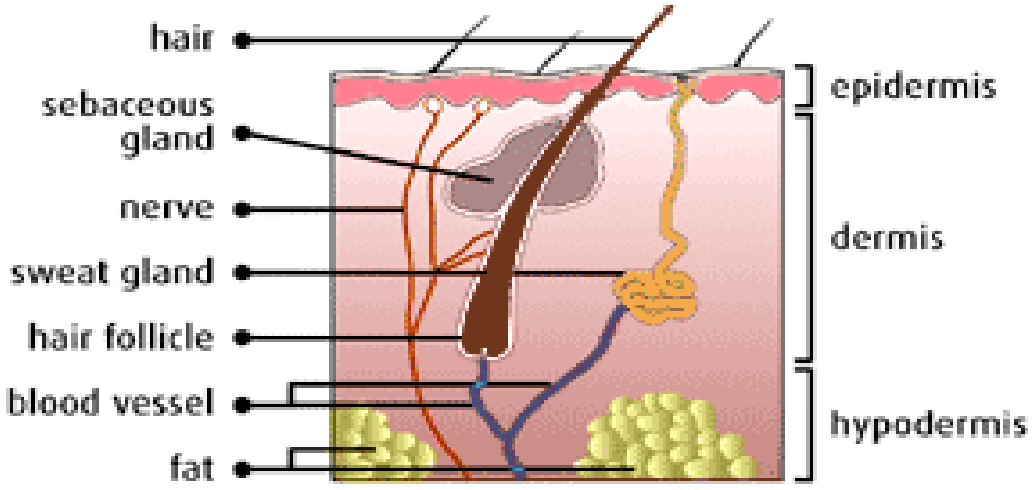
The skin consists of two layers:

I. Epidermis:

- It is covered by a keratin layer making it waterproof.
- Epidermal ridges are seen on the palmar aspect of hands and fingers (prints).

II. Dermis: it consists of:

1. Collagen fibers.
2. Elastic fibers
3. Blood vessels.
4. Lymphatic vessels.
5. Nerves.



Structure of skin

Skin appendages:

1- Hairs.

2- Nails: develop from epidermis. It is formed of a root, body, and free border.

3- Sebaceous glands: their ducts open in the hair follicles.

4- Sweat glands: open on the surface of the skin.

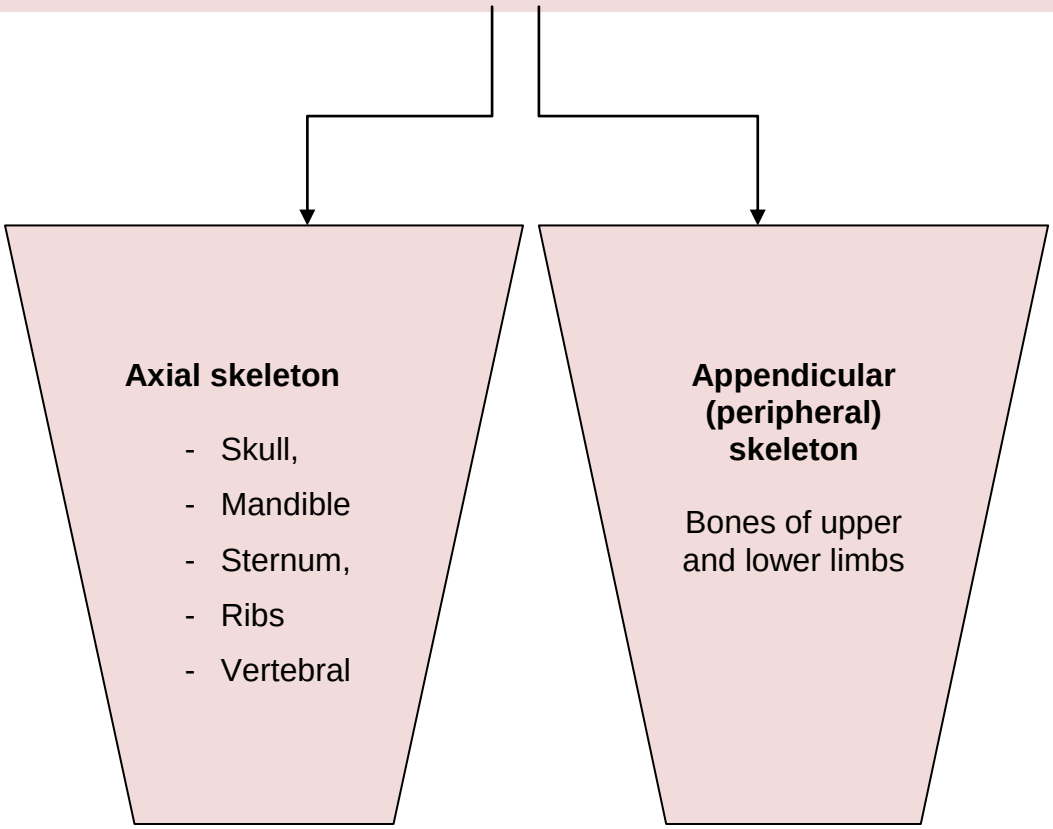
3. SKELETAL SYSTEM

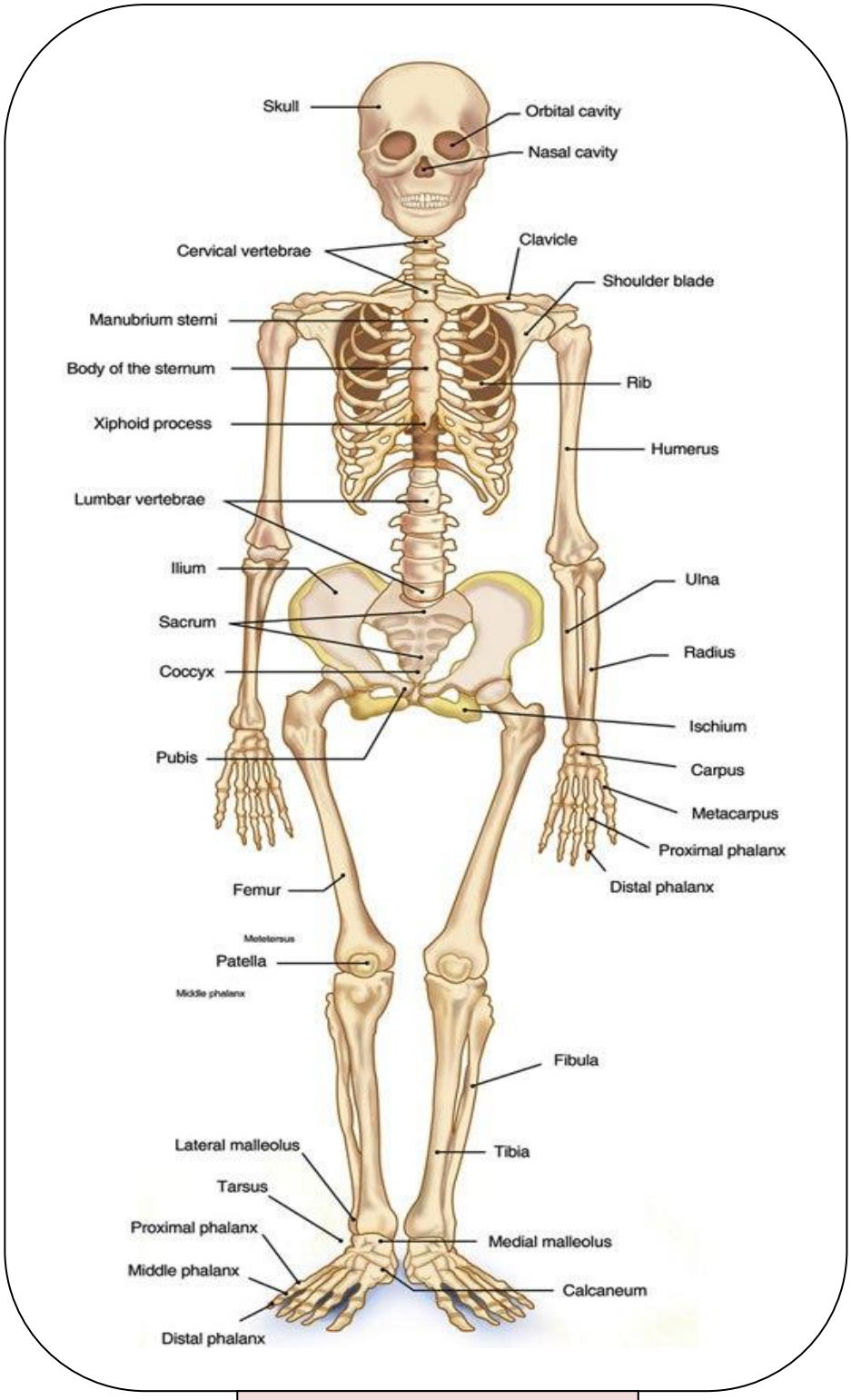
Functions of Skeletal system:

1. It provides a specific shape to the human body.
2. It provides the human body with a central axis.
3. It transmits and supports the human body weight.
4. It forms the joints of the locomotor system of the human body.
5. It protects the vital organs eg. the skull protects the brain
6. It provides a wide surface area for muscular attachment.
7. It forms the blood elements in the bone marrow.
8. It stores calcium salts.

Classification of bones (Skeleton):

I. According to their position in the body:





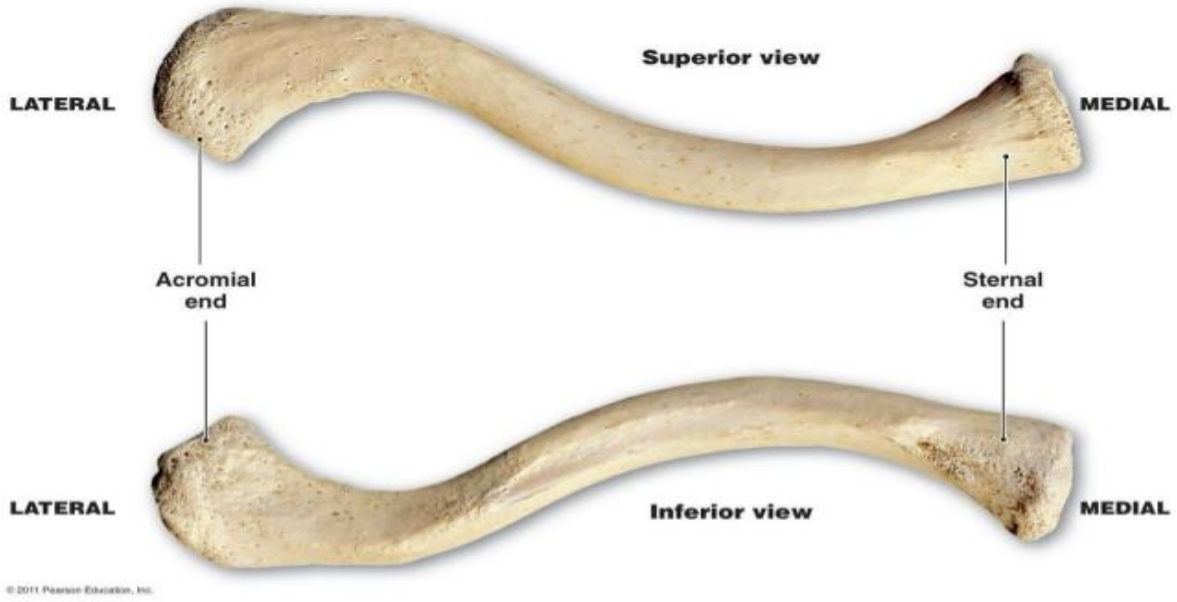
The human skeleton

II. According to their shape:

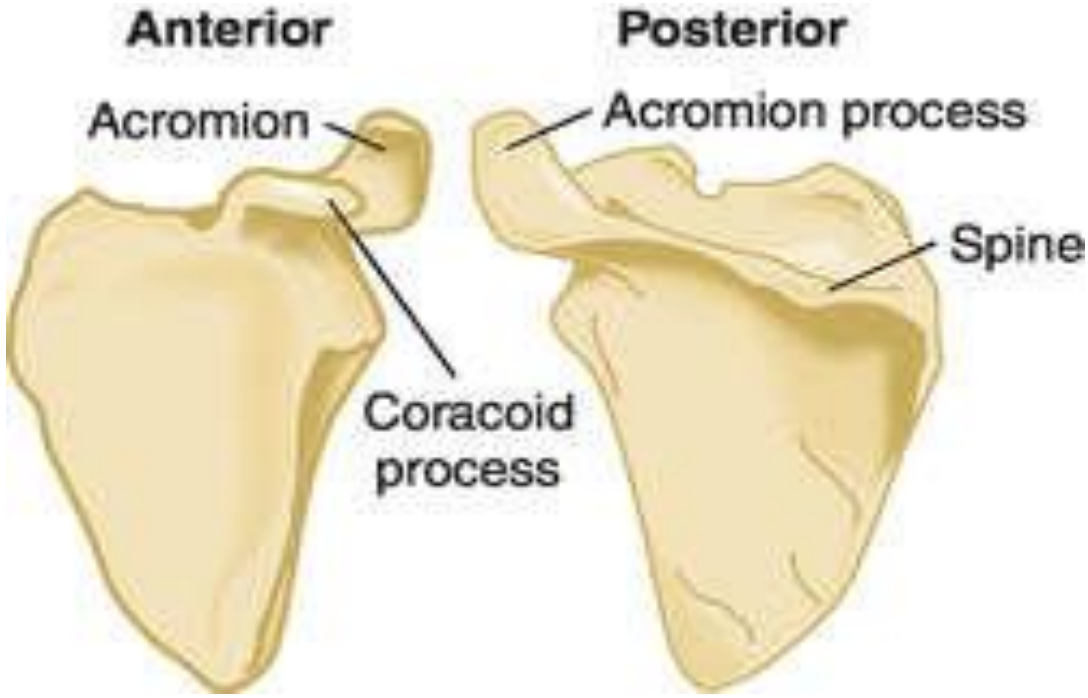
	Structure and Site	Example of bones	Function
1. Long bone	In upper and lower limbs	- Hummers - Femur	Movement
2. Short bone	In hand and foot	- Carpal bone (in hand) - Tarsal bones in foot	Resist compression forces
3. Flat bone	Skull	Bones of skull roof	Protection
4. Pneumatic bone	- Bones containing air called air sinuses. -They are present in skull bones surrounding the nose.	Para-nasal sinuses in the skull	1- They decrease the weight of skull. 2- Resonance of voice.
5. Irregular bone	Bones with projecting processes	Vertebrae	Muscle attachment
6. Sesamoid bone	Small nodules of bones which are embedded in some muscle tendons near their insertion or origin	Patella (largest sesamoid bone), embedded in the tendon of the quadriceps femoris muscle in front of knee joint.	They diminish friction between tendons and underlying bones

A. The Bones of the Upper Limb

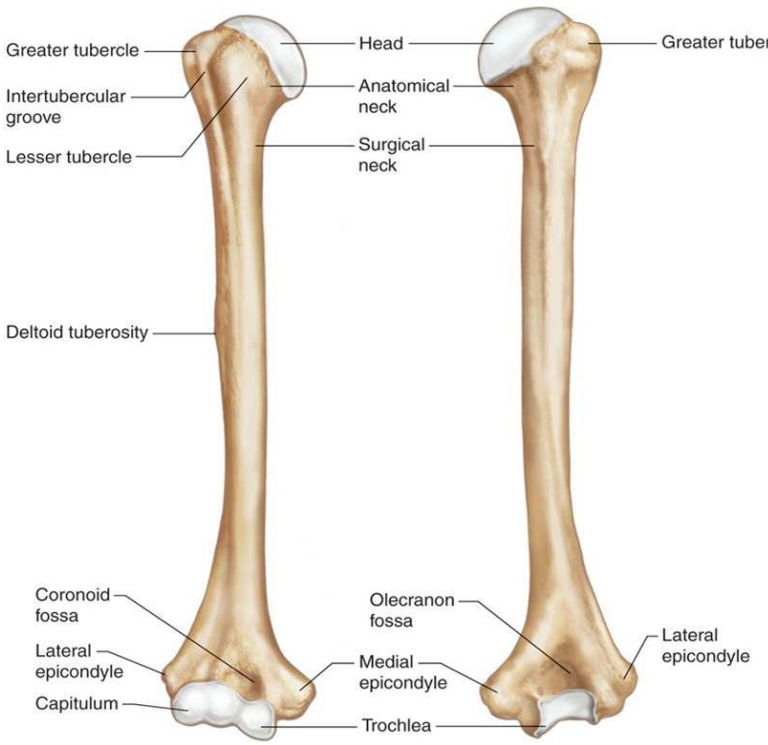
Bone	Site	Structure	Joints related
Clavicle	Anterior bone of shoulder girdle	- It is formed of medial and lateral ends. - It lies horizontally in the human body.	**1.** ***Sternoclavicular joint:*** saddle synovial joint between the medial end of the clavicle and the manubrium of the sternum. **2.** ***Acromioclavicular joint:*** plane synovial joint between the lateral end of the clavicle and the acromial process of the scapula.
Scapula	Posterior bone of shoulder girdle	It is a triangular flat bone.	**1.** ***Shoulder joint:*** Ball and socket synovial joint between the glenoid cavity and the head of humerus. **2.** ***Acromio-claviuclar joint:*** plane synovial joint between the acromial process and the lateral end of the clavicle.
Humerus	Bone of the arm	- It is formed of upper end including head, Shaft and lower end. - It lies vertically in the Human body.	**1.** ***Shoulder joint:*** as mentioned above. **2.** ***Elbow joint:*** Hinge synovial joint between: Lower end of humerus articulating with trochlear notch of ulna and superior surface of head of radius.
Radius	Lateral bone of the forearm	- It is formed of upper end including head, shaft and lower end. - It lies vertically in the Human body.	**1.** ***Elbow joint:*** Mentioned before. **2.** ***Superior radioulnar joint:*** It is pivot synovial joint between the head of radius and ulna. **3.** ***Wrist joint:*** It is ellipsoid synovial joint between lower end of radius and carpal bones (scaphoid and lunate). **4.** ***Inferior radioulnar:*** It is formed by head of ulna articulating with the ulnar notch of radius.
Ulna	Medial bone of the forearm	- It is formed of upper end including trochlear notch, shaft and lower end including head. - It lies vertically in the Human body.	**1.** ***Elbow joint:*** Mentioned above. **2.** ***Superior radioulnar joint:*** Mentioned above. **3.** ***Inferior radioulnar joint:*** Mentioned above.
Bones of the hand	**1**. **Carpus** (Bones of Wrist) **2.Metacarpus** (Bones of Palm) **3**.**Phalanges** Bones of Fingers)	1. **Carpus** (8 bones) 2. **Metacarpus** (5 bones) 3. **Phalanges** (14 bones)	- In the medial 4 fingers there are 3 phalanges for each finger (proximal, middle and distal) with 2 interphalangeal joints in between. - The thumb has 2 phalanges (proximal and distal) with interphalangeal joint in between.



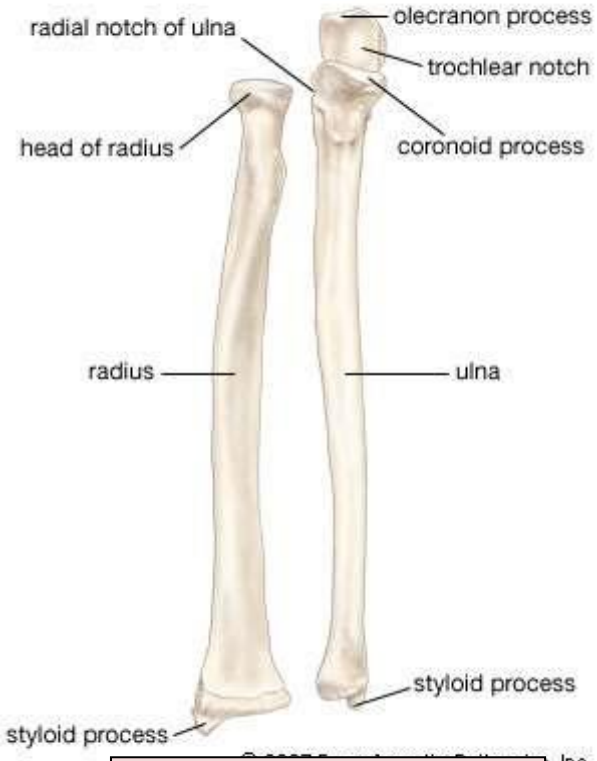
The clavicle



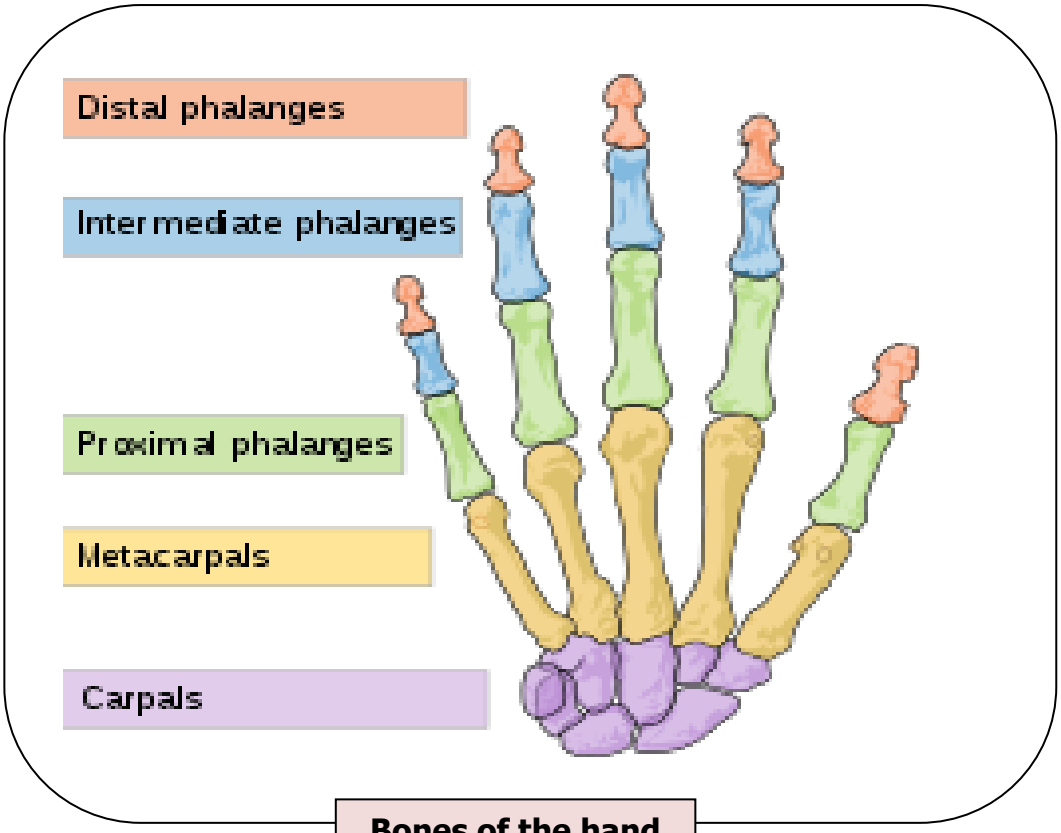
The scapula



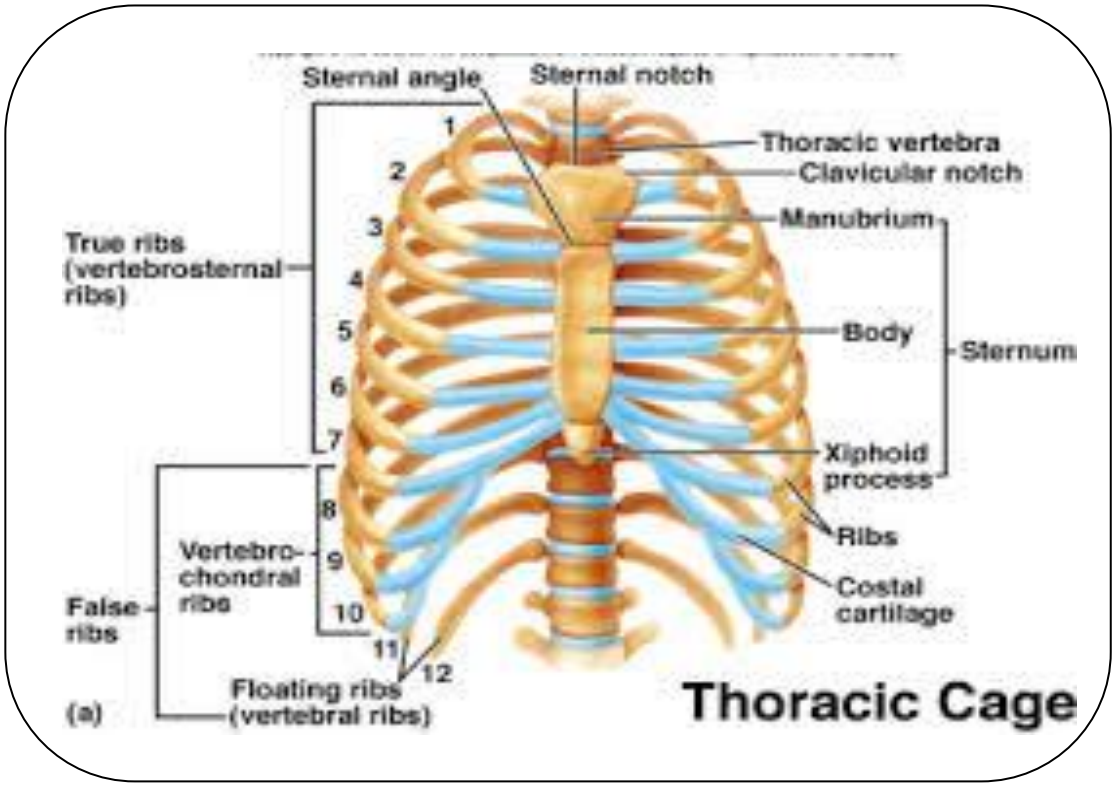
The humerus



The radius and ulna



Bones of the hand



B. The Bones of the lower Limb

Bone	Site	Structure	Joints related
Hip	Bone of pelvic girdle	- It is formed of 3 parts: ilium, ischium and pubis. -The 3 parts meet at a cup-shaped depression called acetabulum.	**1- *Sacro-iliac joint:*** between the articular surfaces of the ilium and sacrum. **2- *Symphysis pubis:*** between the bodies of the 2 pubic bones. **3- *Hip joint:*** between the acetabulum and the head of the femur.
Femur	Bone of the thigh	- It is the longest and strongest bone in the human body - It is formed of upper end including the head and lower end including 2 condyles and shaft.	1- ***Hip joint:*** Ball and socket synovial joint between the head of femur and the acetabulum. 2- ***Knee joint:*** Bicondylar synovial joint between the condyles of femur above and the condyles of tibia below and patella infront.
Fibula	Lateral bone of the leg	- It is formed of upper end including the head, shaft and lower end including the lateral malleolus. - It lies vertically in the human body.	**1. *Superior tibiofibular joint:*** It is plane synovial joint between the head of fibula and lateral condyle of tibia. **2. *Inferior tibiofibular joint:*** It is fibrous joint (syndesmosis) between the lateral malleolus and lower end of tibia. **3. *Ankle joint:*** It is hinge synovial joint between the lateral malleolus and talus of foot.
Patella	It is the largest sesamoid bone in the body	is triangular in shape	It articulates with the femoral condyles to form part of knee joint.
Tibia	Medial bone of the leg	**- I**t is formed of upper end including 2 condyles, shaft and lower end including the medial malleolus.. - It lies vertically in the human body.	**1- *Knee joint:*** The upper surfaces of tibial condyles articulate with the femoral condyles. **2- *Superior tibiofibular joint:*** A facet on the lateral condyle of tibia articulates with head of fibula. **3- *Inferior tibiofibular joint.:*** The lateral surface of the lower end of tibia articulates with the lower end of fibula. **4- *Ankle joint***: The inferior surface of the lower end of tibia and the medial malleolus articulate with the talus of the foot.
Bones of the foot	**1. The Tarsus: 2.Metatarsus:** skeleton of middle part of the foot, **The 3- Phalanges:** skeleton of the toes.	***1.* The Tarsus*:*** 7 bones arranged into two rows. **2.Metatarsus:** 5 bones	- Each toe has 3 phalanges except the big toe which has 2 phalanges. - Each tarsal bone is formed of base, shaft and head.

C.Thoracic Cage

Boundaries:

1. ***Anteriorly:*** Sternum.
2. ***Posteriorly:*** 12 thoracic vertebrae.
3. ***On both sides:*** 12 pairs of ribs with their costal cartilages.

I. The Sternum

It has 3 parts:

A- ***Manubrium:***

- It articulates with the body of the sternum to form Manubriosternal angle (sternal angle).
- It articulates with the clavicle forming sternoclavicular joint and with first and second costal cartilages.

B- ***Body:***

- Above: it articulates with manubrium above and with xiphoid process below.
- Laterally: it articulates with 2-7 costal cartilages.

C- ***Xiphoid process:***

- Above: it articulates with the body of the sternum.
- On both sides: it articulates with 7th costal cartilages.

II. The Ribs

They are 12 pairs of ribs, they are classified into:

1- ***True ribs:*** The upper 7 ribs are attached to the sternum by costal cartilages.

2- ***False ribs:*** The lower 5 ribs are not attached to the sternum.

3- ***Floating: Ribs:*** The last 2 ribs "No. 11 and 12". They have free anterior ends (not attached anteriorly).

III. The Vertebral Column

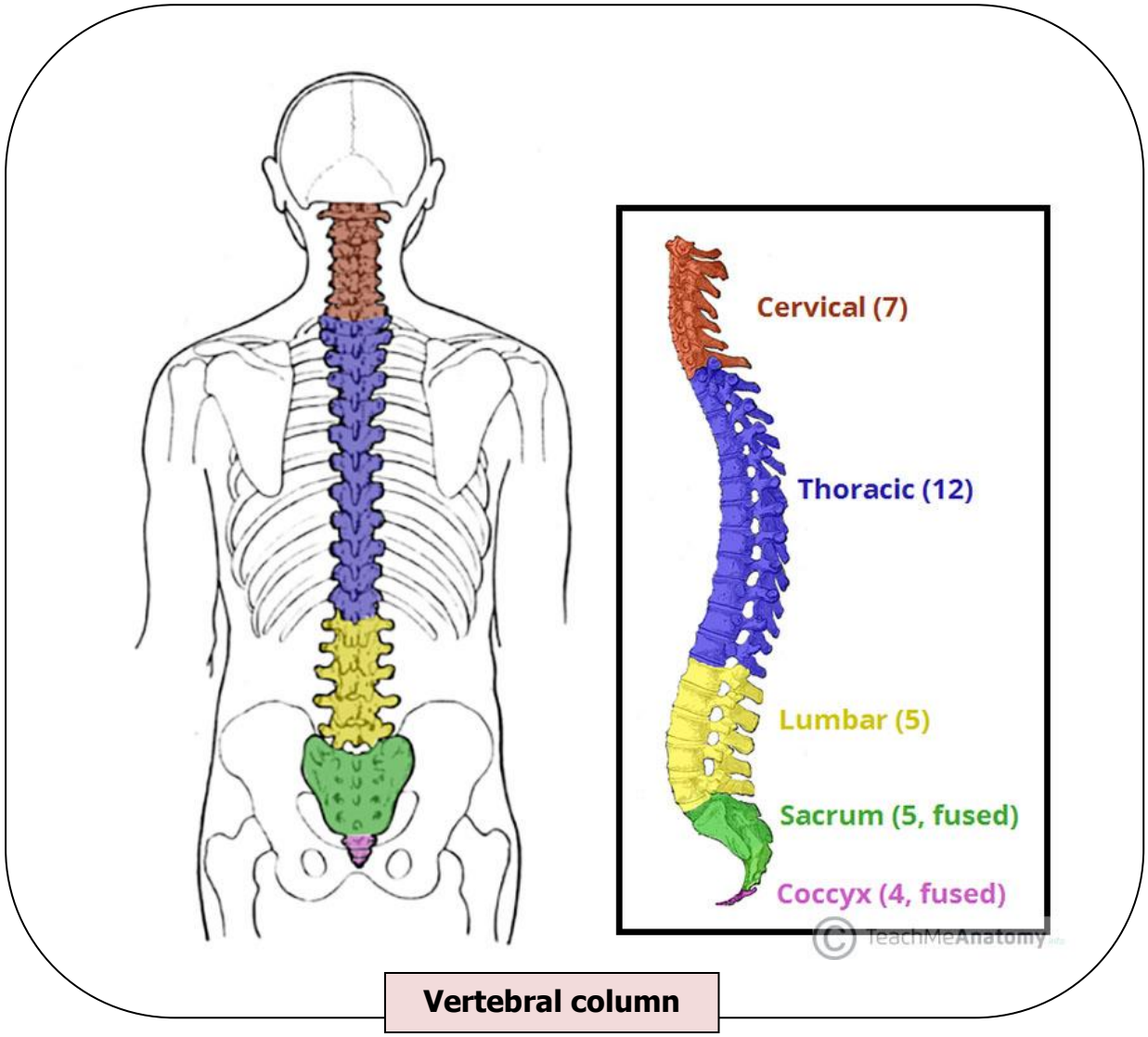
Average adult length:

A- ***In male:*** about 70 cms.

B- ***In female:*** about 65 cms.

Components of the vertebral column:

1. **Vertebrae:** comprise about 3/4 of its length. They are divided into:
   a- ***Separate vertebrae:*** 7 cervical, 12 thoracic and 5 lumbar.
   b- ***Fused vertebrae:*** 5 sacral vertebrae (sacrum) and 3(±1) coccygeal vertebrae (coccyx).
2. **Intervertebral discs:** comprise about 1/4 of its length, each disc is formed of 2 parts:



Vertebral column

D. The Skull

The skull is the skeleton of head, it is formed of 21 bones (5 single and 8 paired) articulating together, by fibrous joints called sutures.

1- Frontal, 2 parietal and occipital.

2- ***Three sutures:***

a- Sagittal suture: Between the 2 parietal bones.

b- Coronal suture: Between the frontal and the 2 parietal bones.

c- Lambdoid suture: Between the occipital and the 2 parietal bones.

3- ***Two points:***

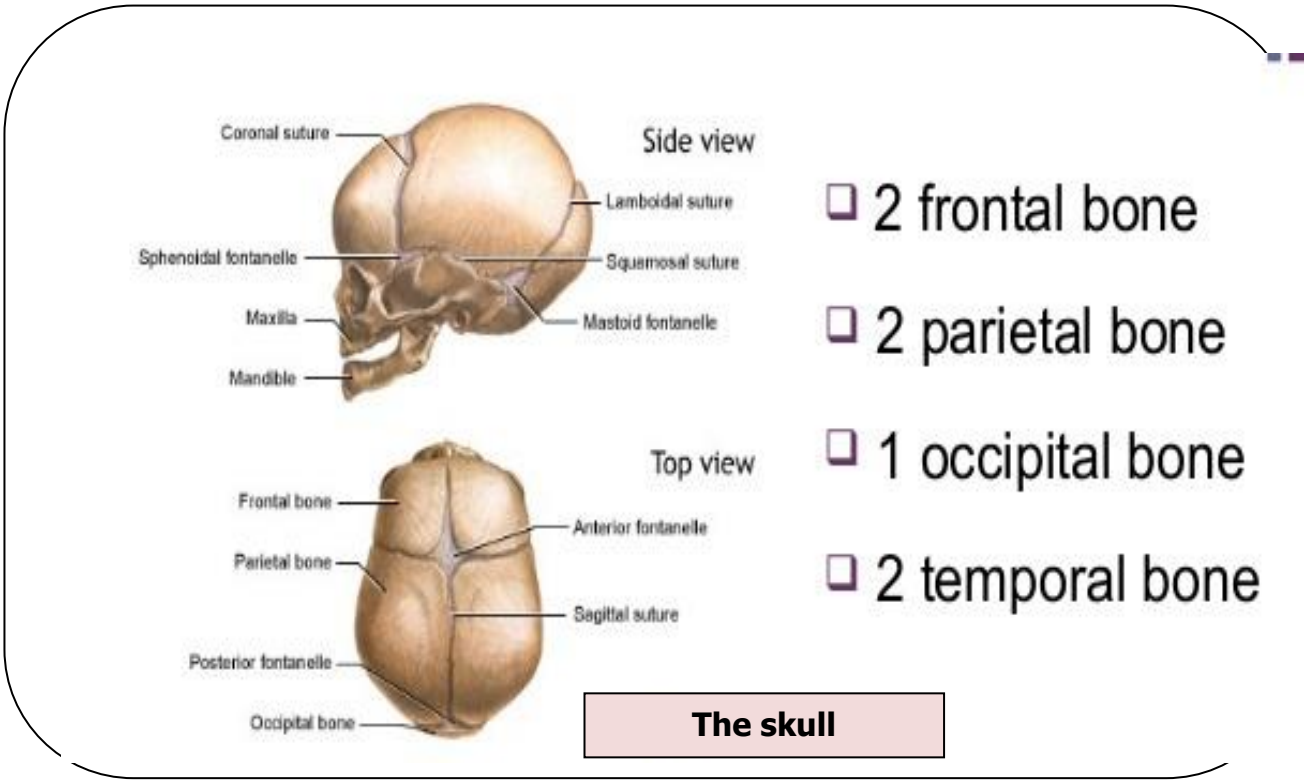
a- Bregma: Between the coronal and sagittal suture, it the site of the anterior fontanelle in the foetus which ossifies at 18 months after birth.

b- Lambda: Between the lambdoid suture and the sagittal suture, it the site of the posterior fontanelle in the foetus which ossifies at the 3 months after birth.

The Mandible

It is the skeleton of the lower jaw which is formed of a body and 2 rami.

- The junction between the ramus and the body of mandible called angle of mandible.



The skull

4. ARTICULAR SYSTEM (JOINTS)

The joint is the contact between two bones or more together:

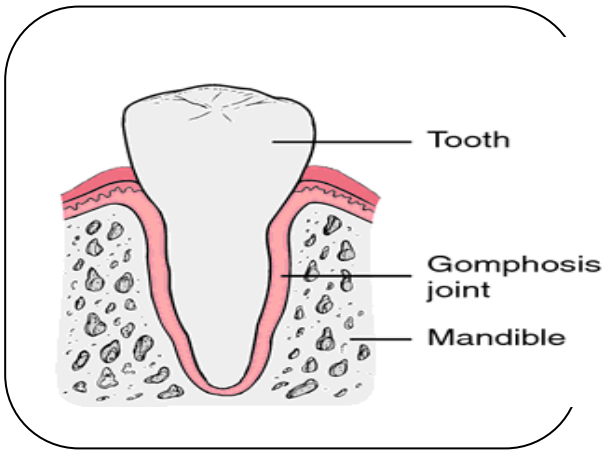
Classification of Joints

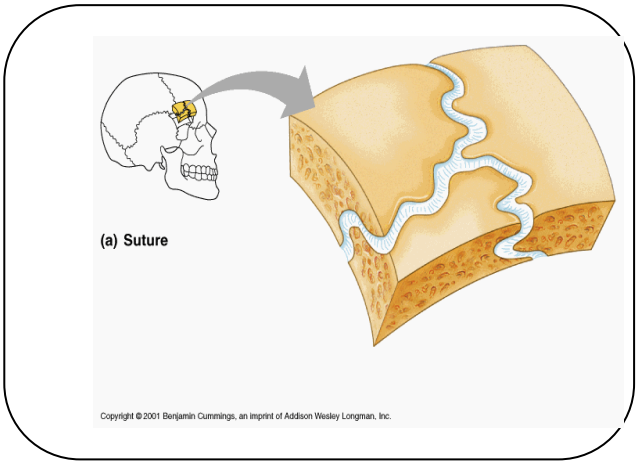
There are 3 types of joints.

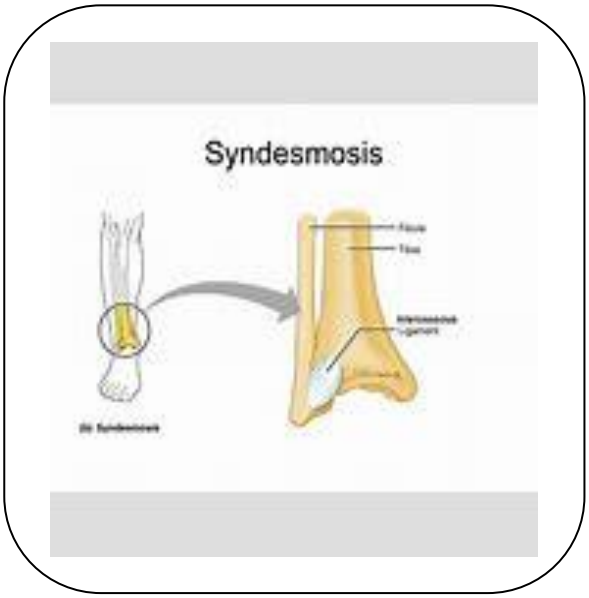
I. Fibrous Joints:

Fixed joints in which the surfaces of bones are connected together by fibrous tissue.
There are 3 types:

Syndesmosis	Gomphosis	Sutures
▪ Present in inferior tibio-fibular joint. ▪ The lower end of tibia and fibula are connected together by fibrous tissue called interosseous ligament	▪ Present in teeth. ▪ The roots of teeth are connected to their sockets in mandible and maxilla by fibrous tissue called periodontal ligament.	▪ Present in skull. ▪ The bones of skull are connected together by a thin layer of fibrous tissue called sutural ligament. ▪ They obliterated in old age







II. <u>The Cartilaginous Joints</u>: In these joints the surfaces of the articulating bones are connected together by cartilagenous tissue.

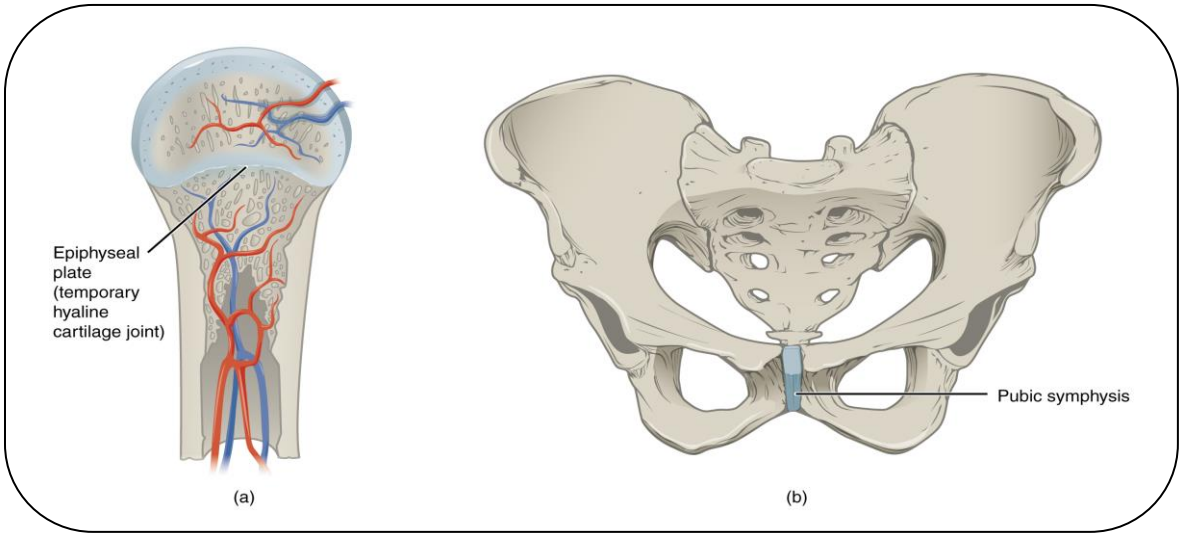
They are 2 types:

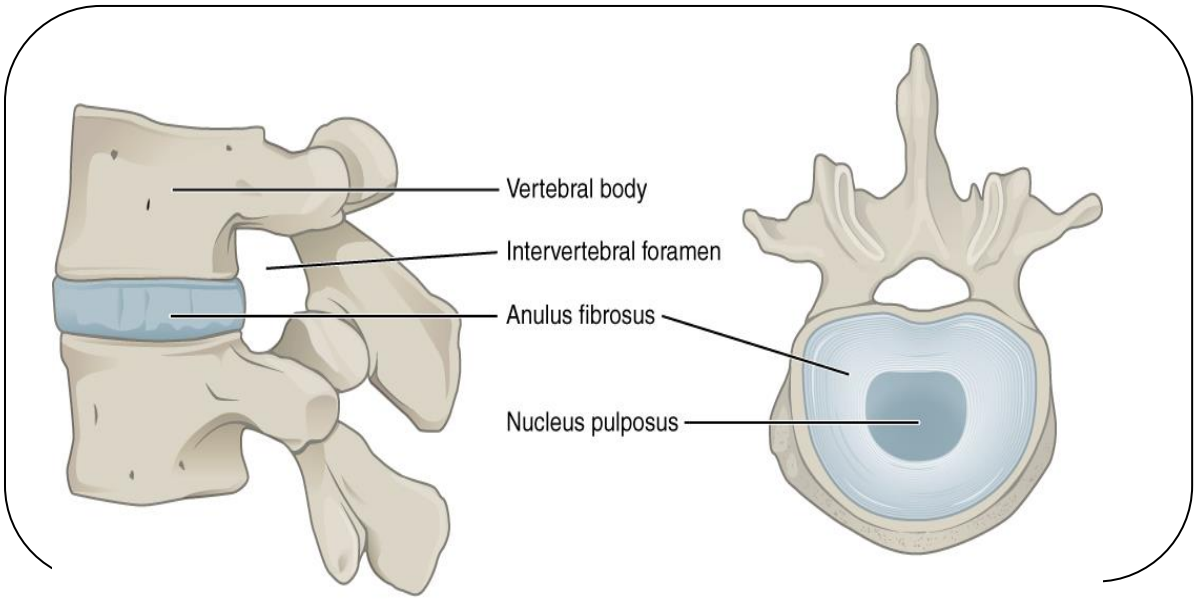
a- ***Primary cartilaginous joint:*** It is a temporary joint formed of plate of hyaline cartilage between the articulating bones (epiphysis and diaphysis).

Site: At the ends of the growing long bones between the epiphysis and diaphysis. It is immobile joint which disappears in adulthood by ossification.

b- ***Secondary cartilaginous joint:*** The articulating bones are separated by a disc of white fibrocartilage which is permanent. The surfaces of the articulating bones are covered by a thin layer of hyaline cartilage. It is slightly mobile joint present in the midline.

- **Sites:** Intervertebral discs and symphysis pubis.





III. Synovial Joints: They are freely mobile joints present mostly in the limbs

Characteristics (structure) of synovial joints:

A- Fibrous capsule: The synovial joint is surrounded completely by a strong fibrous capsule which is lined by synovial membrane. This capsule is supported and strengthened by strong ligaments.

B- Articular cartilage: Hyaline cartilage covers the articular surfaces of bones. It is very smooth and is lubricated by the synovial fluid. It has no blood and nerve supply.

C- Joint cavity: It is a potential cavity containing very small amount of synovial fluid.

D- Synovial membrane: Thin, moist and glistening membrane that covers all structures inside the joint except the articular surfaces, it also lines the fibrous capsule. It secretes and absorbs the synovial fluid.

E- Synovial fluid:

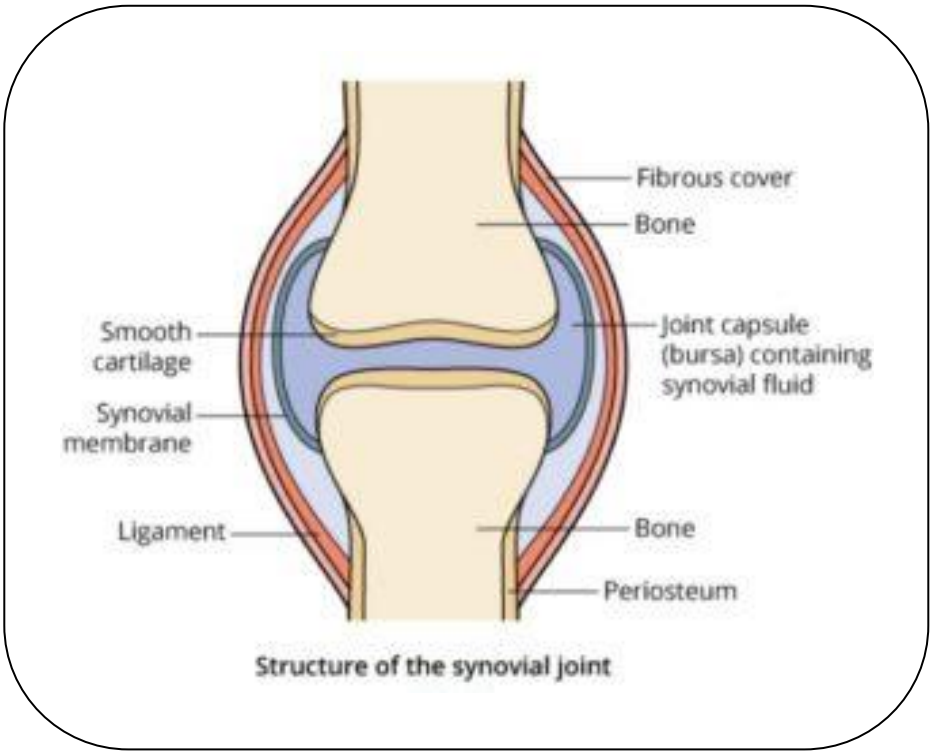
Pale yellow viscous fluid similar to egg-albumin. It has 3 functions:

1- Lubricates the articular cartilage. 2- Reduces erosion of articular cartilage.

3- Helps nutrition of articular cartilage.

F- Ligaments:

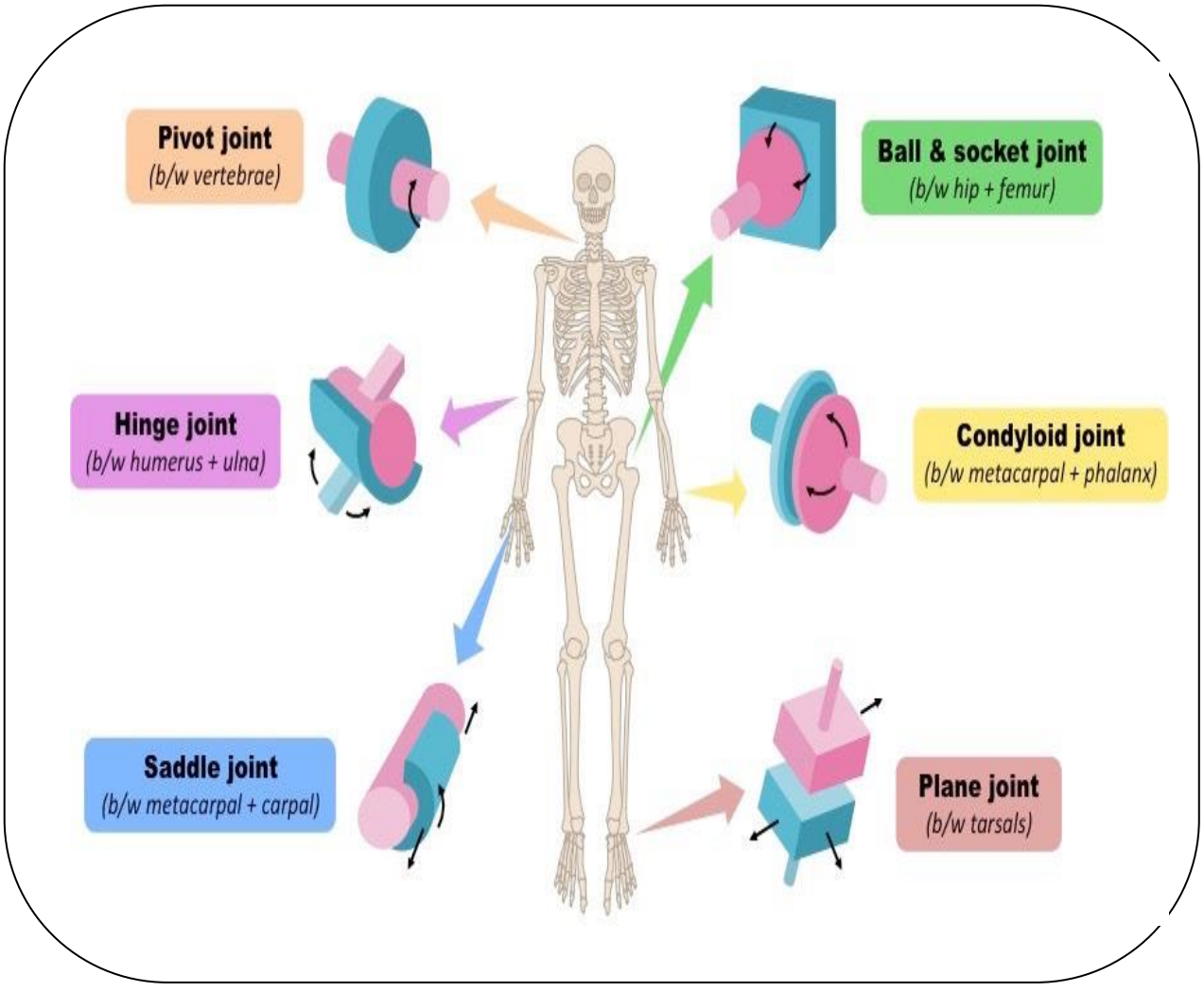
Extracapsular and intracapsular ligaments which support and strength the joint.



Structure of the synovial joint

Types (varieties) of Synovial Joints

According to the axis of movement.	According to shape of the articular surface
I. Uni-axial joints	1- Hinge e.g. elbow joint-ankle joint 2- Pivot e.g. superior R.U. joint
II. Bi-axial joints	1- Condylar e.g. knee - T.M. joint 2- Ellipsoid e.g. wrist joint 3- Saddle e.g. carpometacarpal joint of thumb-sternoclavicular joint
III. Multi-axial joints	• Ball and socket e.g. Hip-shoulder
IV. Non-axial joints	• Plane joints e.g. superior tibio-fibular joint.



Movements of the Synovial Joints

1- **Flexion:** Approximation of two ventral aspects (bending).
2- **Extension:** Straightening; the two ventral surfaces move away from each other.
3- **Abduction:** Movement of the limb away from the middle line. In the fingers moving away from the middle finger, in the toes moving away from the 2nd toe.
4- **Adduction:** Movement of the limb towards the middle line. In the fingers moving towards the middle finger, in the toes moving towards the second toe.
5- **Rotation:** Medial or lateral rotation of the limb around a vertical axis.
6- **Circumduction:** Combination of all above movements.
7- **Supination:** The lateral rotation of the forearm.
8- **Pronation:** The medial rotation of the forearm.
9- **Inversion:** The sole of foot is directed inwards.
10- **Eversion:** The sole of foot is directed outwards.
11- **Opposition:** The thumb is opposing (come in contact) the other 4 fingers.

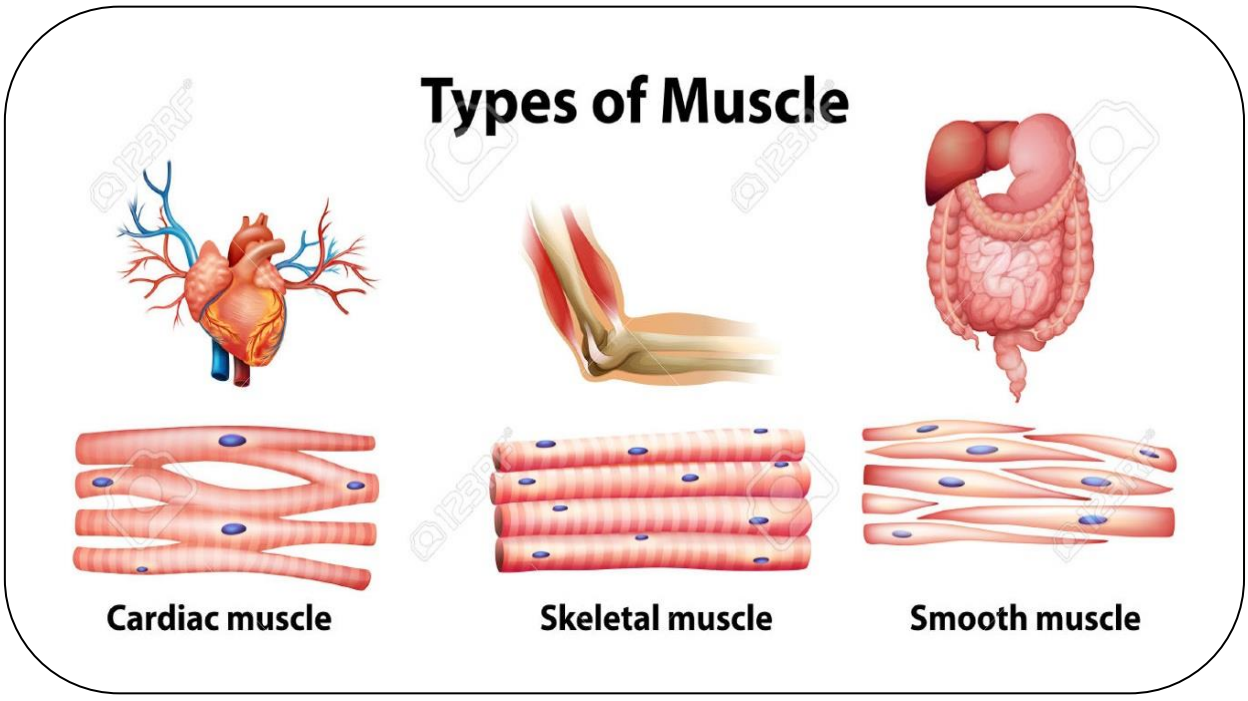
5. MUSCULAR SYSTEM

- Contraction of the muscle tissue is defined as the capacity of the muscle fibers to become short.

Classification of the Muscles

According to the structure and function, there are 3 types:

Muscle	Skeletal	Smooth	Cardiac
1. Site	Attached to skeleton (bones)	In the wall of blood vessels and viscera	In the myocardium (cardiac muscle) of heart
2. Contraction	Voluntary	Involuntary	Involuntary
3. Striations	Present	Absent	Present but less than skeletal muscle
4. Nerve supply	Somatic nerve	Autonomic nerve	Autonomic nerve
5. Muscle cell (fiber)	Multinucleated with peripheral nuclei	Spindle-shaped with single nucleus	Branch and fuse together with single nucleus.



6. CARDIOVASCULAR SYSTEM

It consists of heart and blood vessels.

A. The heart

- The heart is covered by 2 types of pericardial membranes. Fibrous pericardium and serous pericardium.
- **Site of the heart:** It lies behind the sternum and costal cartilages, extending from the 2nd to the 6th costal cartilages. About 2/3 of the heart lies to the left and 1/3 of the heart lies to the right of median plane.
- **Structure of the heart:** The heart consists of 4 chambers; 2 atria and 2 ventricles:

1. ***Right Atrium:***

- It receives the deoxygenated blood from all parts of the body by 2 large veins (superior vena cava and inferior vena cava).
- It sends its blood to the right ventricle through the right atrioventricular orifice (the tricuspid valve).

2. ***Right ventricle:***

- It sends the deoxygenated blood through the pulmonary valve to the pulmonary artery which divides into 2 branches for each lung where oxygenation of blood occurs.

3. ***Left atrium:***

- It receives the oxygenated blood from both lungs through 4 pulmonary veins.
- It pumps blood to the left ventricle via the left atrioventricular orifice (the mitral valve).

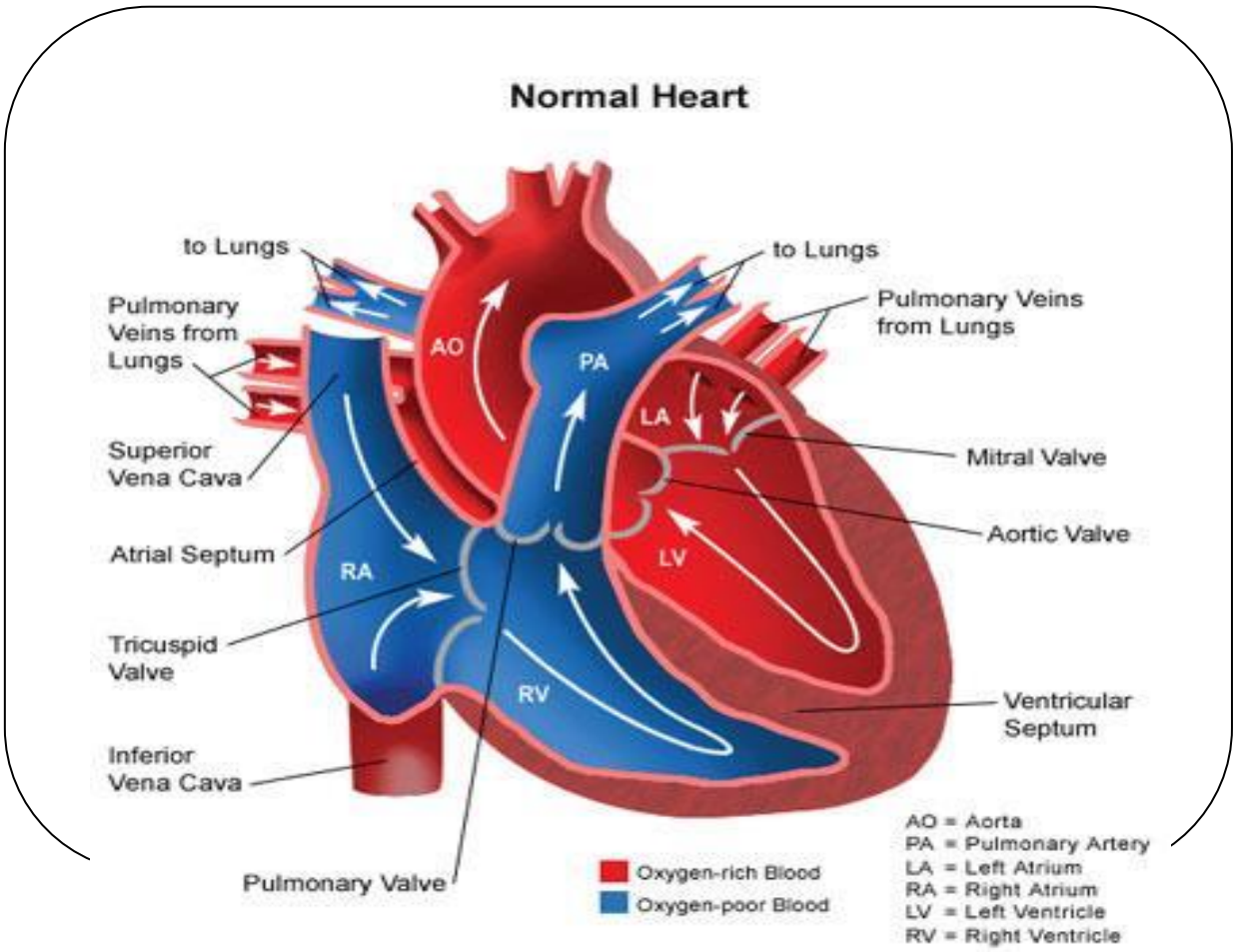
4. ***Left ventricle:***

- It pumps its oxygenated blood to all parts of the body through the aortic orifice (valve), to the aorta and its branches.

- **Valves of the heart*:*** the heart contains 4 valves:

2. Tricuspid valve and Pulmonary valves in the right ventricle.

3. Mitral and aortic valves in the left ventricle.



B. Blood Vessels

I. Arteries:

- The artery is the blood vessel which carries the oxygenated blood from the heart to the periphery.
- It carries oxygenated blood except the pulmonary artery, which carries deoxygenated blood.

Arteries of the human body:

1. Aorta*:* It has three parts:

a- ***Ascending*** aorta: supply the heart.
b- ***Arch of aorta:*** it supplies head, neck, brain & upper limb.
c- ***Descending aorta:*** it supplies the thorax. It is continued in the abdomen as abdominal aorta.

2. Arteries of abdomen and pelvis:

a- ***Abdominal aorta:*** It supplies the abdominal contents. It is divided into 2 common iliac arteries.
b- ***Common iliac artery:*** it is divided into external and internal iliac arteries.

c- *Internal iliac arteries:* it supplies the pelvic viscera.

d- *External iliac arteries:* It continues in lower limbs as femoral arteries.

3. Arteries of lower limb:

a- *Femoral artery*: it supplies the front of the thigh and it continues as popliteal artery in the back of knee.

b- *Popliteal artery*: it is divided into anterior and posterior tibial arteries.

c- *Anterior tibial artery:* it lies in front of the leg and passes on the dorsum of foot as dorsalis pedis artery.

d- *Posterior tibial artery*: it passes in the back of the leg and is divides in the sole of foot into medial and lateral planter arteries.

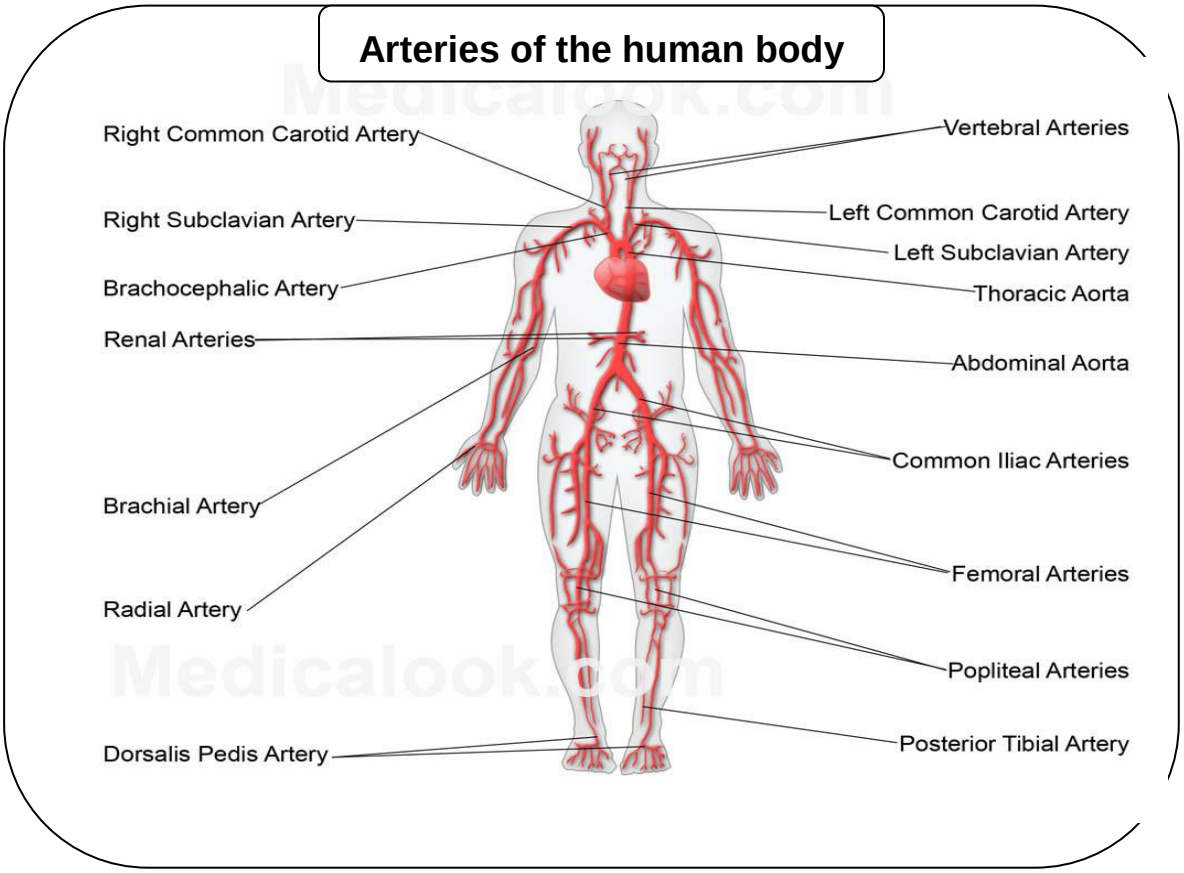
4. Arteries of Upper Limb:

a- ***Axillary artery:***
- It is the continuation of subclavian artery.
- It lies in the axilla and passes in the arm as brachial artery.

b- ***Brachial artery:***
- It is the artery of the arm.
- It divides in the cubital fossa into ulnar artery medially and radial artery laterally.

c- ***Ulnar artery:*** it descends on medial side of forearm (with ulnar nerve) and in the hand it forms the superficial palmar arch.

d- ***Radial artery:*** it descends on the lateral side of forearm and its pulsation is felt on the front of the lower end of the radius. It is continued in the hand as the deep palmar arch.



II. Veins

- The vein is a blood vessel which carries the blood from the periphery to the heart. It carries deoxygenated blood except the pulmonary veins, which carry oxygenated blood.
- Characters:
  1. It has thin wall and wide lumen.
  2. It does not pulsate.
  3. It has low blood pressure.
  4. Most of the veins especially those of the lower limbs contain valves which prevent the reflux (back flow) of the blood by gravity.

Big veins of the human body:

1. Veins of Head and Neck

- **a.** ***External jugular vein:*** superficial to sternomastoid muscle.
- **b.** ***Internal jugular vein:*** deep to the sternomastoid muscle.

2. Veins of Thorax:

- **a.** ***Brachiocephalic veins:*** formed by union of subclavian and internal jugular veins.
- **b.** ***Superior vena cava:*** formed by union of the right and left brachiocephalic veins, and it ends into the right atrium of the heart.

3. Veins of and abdomen and pelvis:

- **a.** ***Common iliac vein:*** It is formed in the abdomen by the union of external iliac vein which drains the lower limb and internal iliac vein which drains the pelvis.
- **b.** ***Inferior vena cava:*** the largest vein in the body, it begins by the union of the two common iliac veins and.

4. Veins of the Upper Limb:

A- Superficial veins: They start by dorsal venous arch on the dorsum of the hand:

1. ***Basilic vein:*** On the medial side of forearm.
2. ***Cephalic vein:*** On the lateral side of forearm. In the cubital fossa, it is connected with the basilic vein by the median cubital vein.

B- Deep veins:

1. ***Venae comitantes*** of radial, ulnar and brachial arteries.
2. ***Axillary vein.***

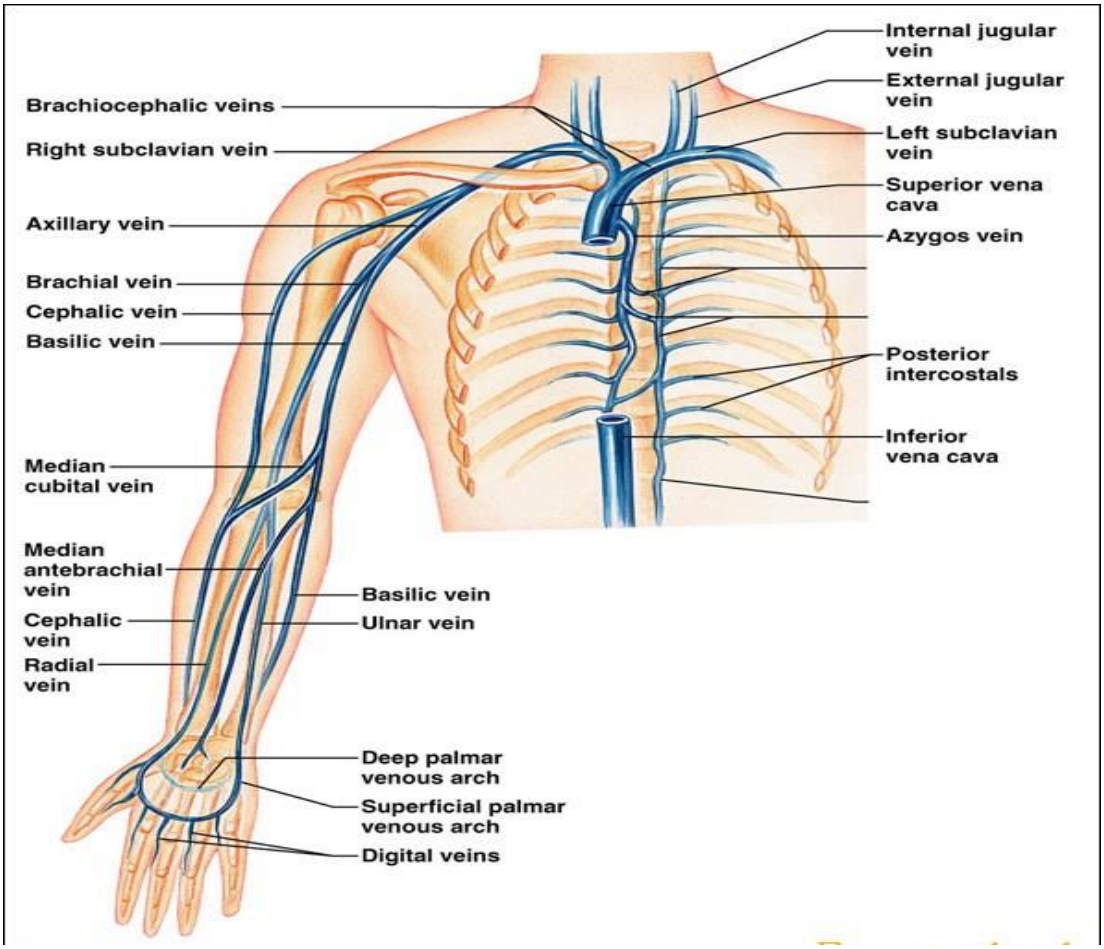
5. Veins of Lower Limb:

A- Superficial veins:

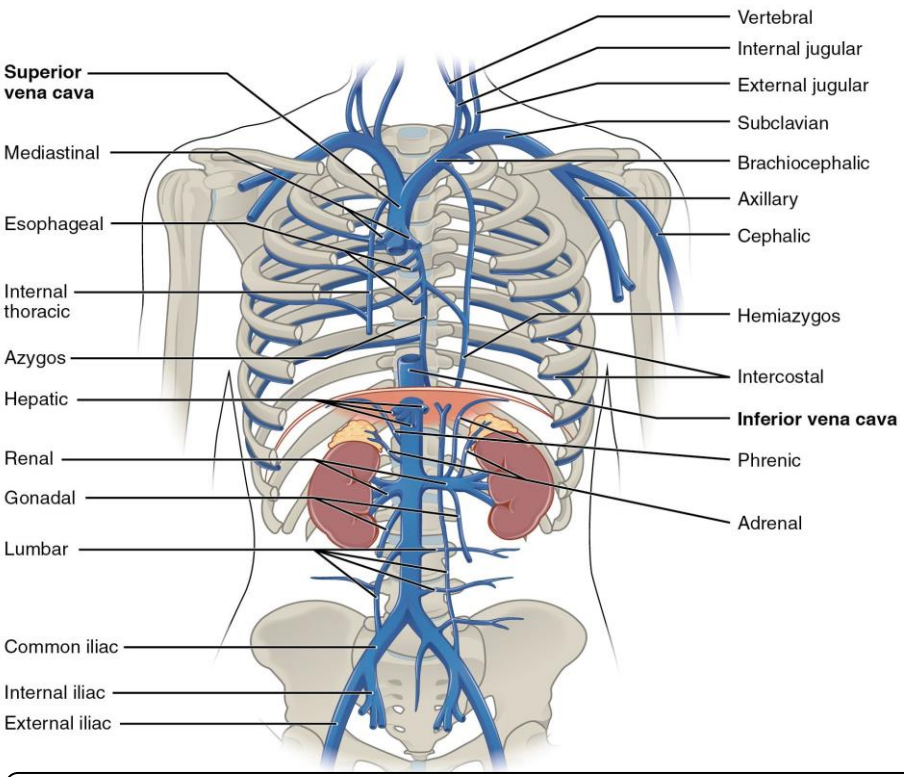
1. ***Dorsal venous arch:*** on the dorsum of the foot.
2. ***Long saphenous vein:*** on the medial side of leg and knee to end in the femoral vein.
3. ***Short saphenous vein:*** on the lateral side of the leg to end in the popliteal vein.

A- Deep veins:

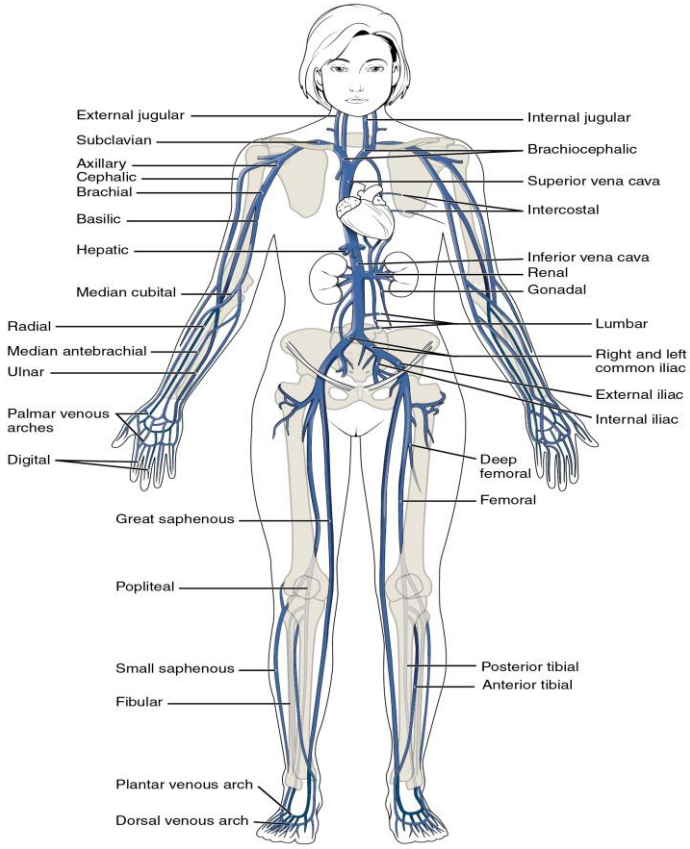
1. ***Popliteal vein:*** It lies in the back of the knee and is formed by the union of the vena comitantes of the anterior and posterior tibial arteries.
2. ***Femoral vein:*** It lies in front of thigh, it is the continuation of the popliteal vein. It enters the abdomen and continues as external iliac vein.



Veins of head, neck, thorax and upper limb



Veins of head, neck, thorax, abdomen and pelvis



Veins of the human body

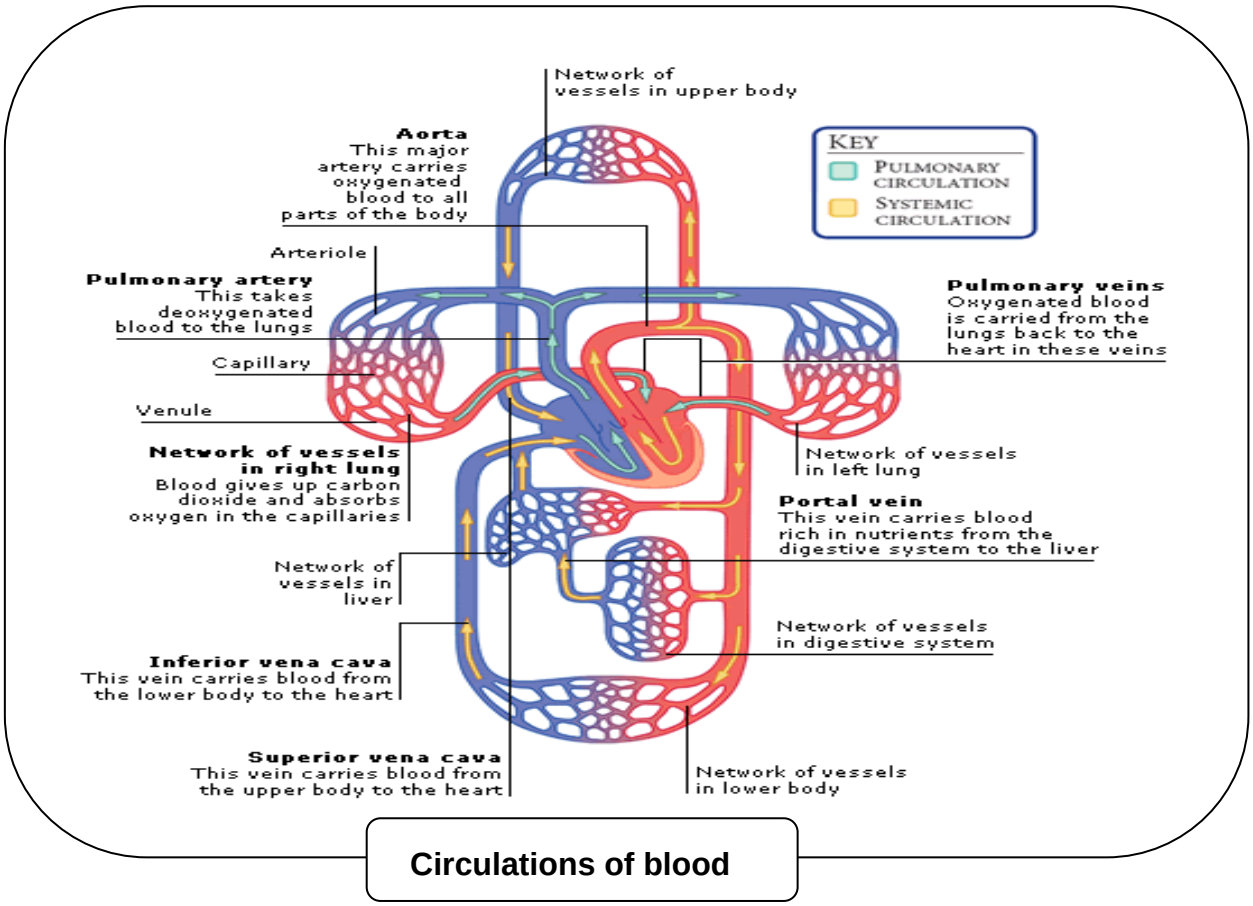
7. CIRCULATORY SYSTEM

There are 3 types of circulations:

A. ***Systemic circulation:*** It begins in the left ventricle where the oxygenated blood passes through the aorta and its branches to reach all the tissues of the body, where exchange of gases and materials occur. The deoxygenated blood is collected by small veins, then by large veins and finally by superior vena cava and inferior vena cava into the right atrium. The blood passes from the right atrium to the right ventricle where this circulation ends and a new cycle starts.

B. ***Pulmonary circulation:*** It starts from the right ventricle where the venous blood passes through the pulmonary artery and its 2 branches to reach both lungs, where exchange of gases occurs. The oxygenated blood returns to the left atrium via the 4 pulmonary veins, then to the left ventricle, where a new cycle occurs.

C. ***Portal circulation:*** The venous blood from stomach, spleen, pancreas and intestine, is collected into the portal vein which enters the liver (through the porta hepatis) and divides into many branches which end in liver sinusoids. The blood leaves the liver sinusoids by the hepatic veins which end in inferior vena cava, then to right atrium.

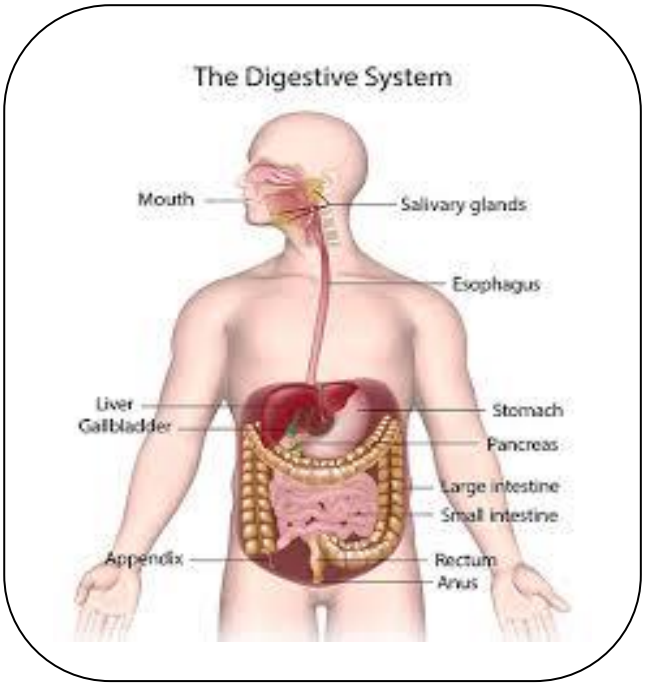


Circulations of blood

8. DIGESTIVE SYSTEM

The digestive system consists of the following parts:

1- Mouth cavity and salivary glands.
2- Pharynx.
3- Oesophagus.
4- Stomach.
5- Small intestine.
6- Large intestine.
7- Liver and biliary system
8- Pancreas.



1. Mouth Cavity & Salivary glands

Contents of the mouth:

Tongue-teeth-openings of the salivary glands.

A. The Tongue

- It is a muscular organ covered by mucous membrane.
- It consists of 3 parts: tip, root and body.

Functions of the tongue:

1. Chewing.
2. Speech.
3. Taste.
4. Swallowing.

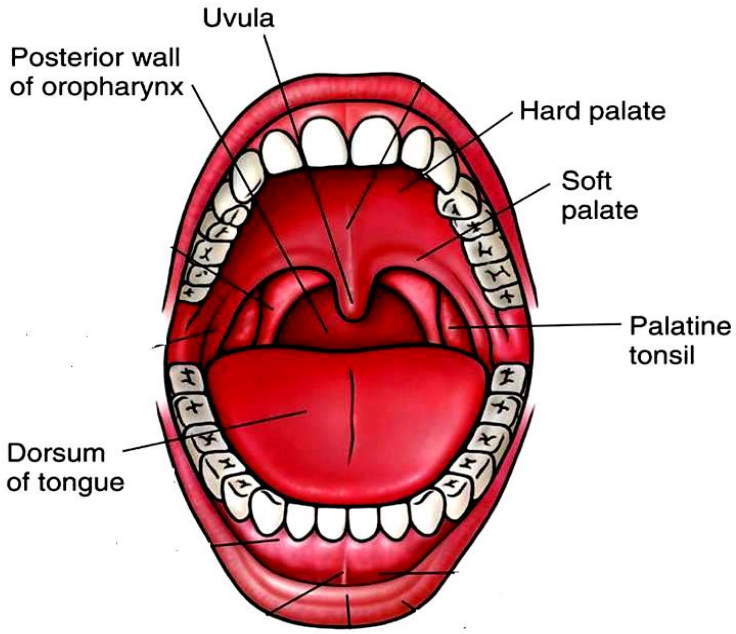
B. Teeth

Two types:

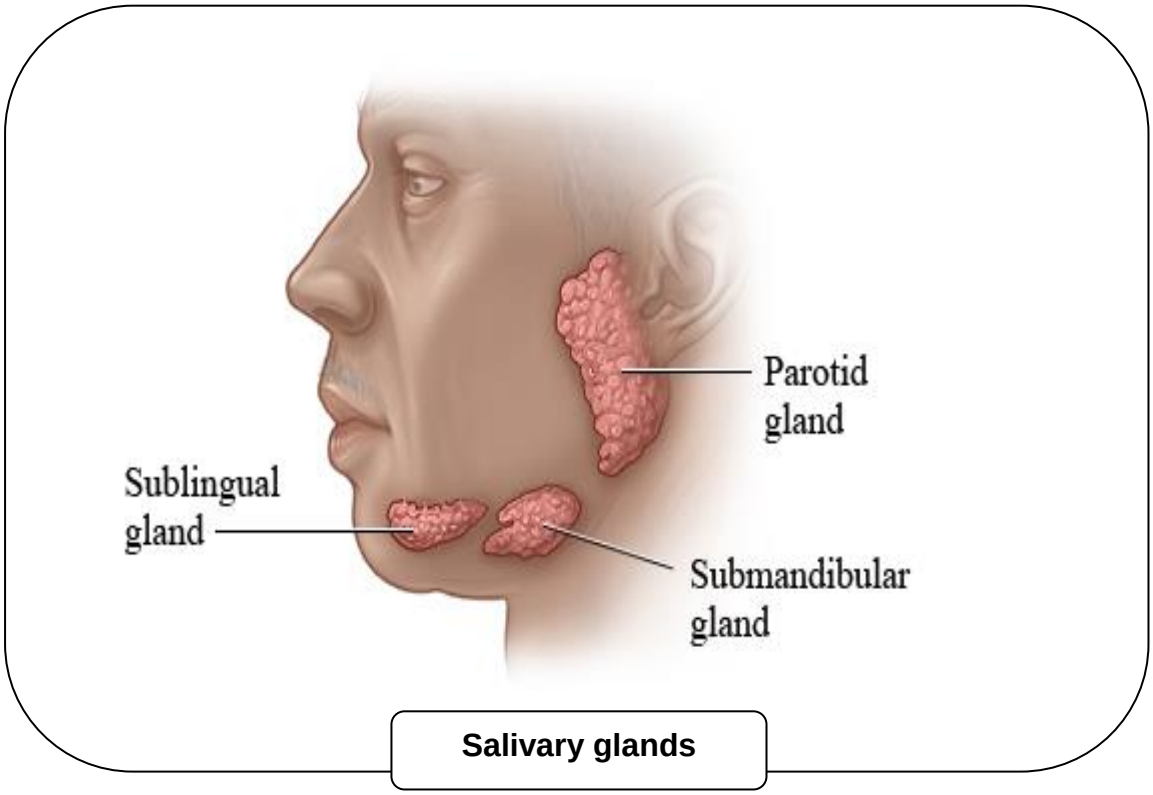
I. ***Milk (deciduous) teeth:*** Temporary teeth present in the children, 20 in number 10 above and 10 below.

II. ***Permenant teeth:*** They are 32 teeth, 16 above and 16 below, arranged in each half of jaw as follows: 2 incisors, canine, 2 premolars, 3 molars.

Milk (Deciduous) Teeth



Mouth cavity and permanent teeth



Salivary glands

C. Salivary Glands:

1- ***Parotid gland:*** It is the largest salivary gland, wedge-shaped, lies below the external auditory meatus. It has nearly a horizontal duct which pierces the cheek to open in the vestibule of the mouth opposite the upper 2nd molar tooth.

2- ***Submandibular gland:*** It is about 1/2 the parotid size, lies deep to and below the mandible. Its duct opens in the floor of the mouth in the sublingual papilla on either side of the frenulum of tongue.

3- ***Sublingual gland:*** It is the smallest salivary gland, lies under the mucous membrane of the floor of the mouth called sublingual fold. It has 12-15 small ducts which open in the sublingual fold and few of them open into the duct of submandibular gland.

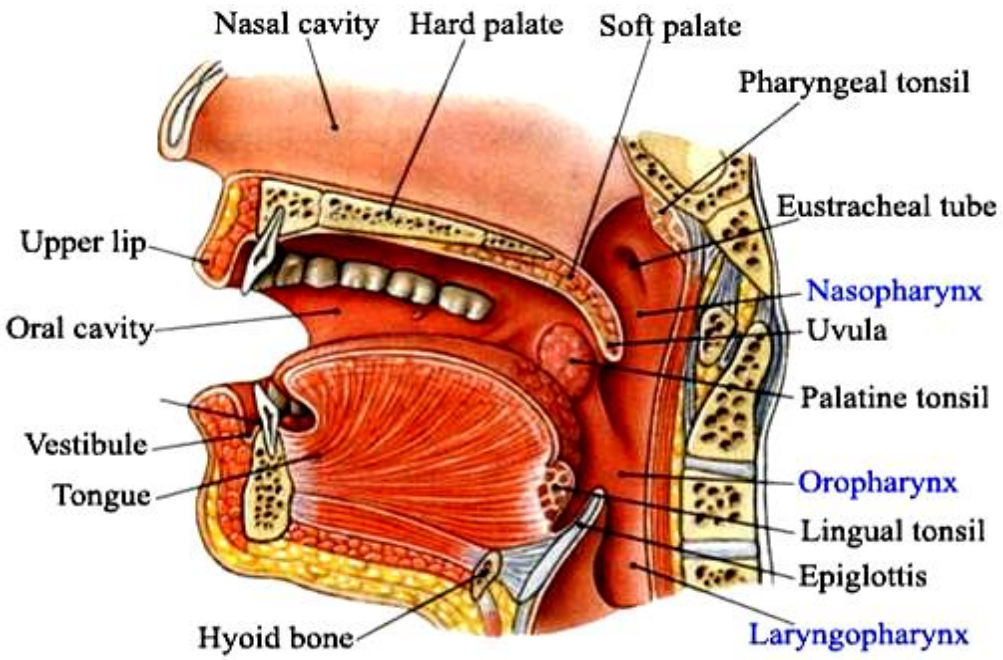
2. Pharynx

Funnel-shaped muscular tube about 5 inches long, lies behind the nasal cavity, oral cavity and larynx. It lies infront of the upper 6 cervical vertebrae and is divided into 3 parts:

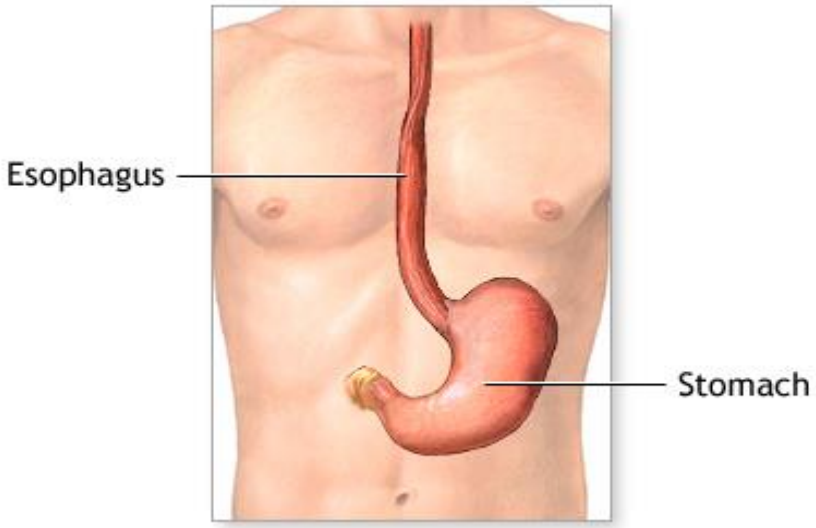
1. ***Nasopharynx:*** It lies behind the nasal cavity, above the soft palate and acts as a passage for air only. Its upper part contains the nasopharyngeal tonsil while the lower part shows the opening of the pharyngotympanic (Eustachian) tube.
2. ***Oropharynx:*** It lies behind the oral (mouth) cavity, below the soft palate and acts as a passage for food and air. Its lateral wall contains the palatine tonsil.
3. ***Laryngopharynx:*** It lies behind the larynx and acts as a passage for food only.

3. Oesophagus

- **Length:** It is a muscular tube 25 cm long
- **Beginning:** it begins in the neck as continuation of the pharynx.
- **Course and end:** It descends for a short course in the neck, then it enters the thoracic cavity, then it passes through the diaphragm to enter the abdomen where it ends in the cardiac end of the stomach.
- **Parts:** the oesohagus has 3 parts; short cervical part, long thoracic part and very short abdominal part.



Pharynx



Esophagus and stomach

4. Stomach

- It is the most dilated part of the digestive tract.
- **Position:** It lies in the upper part of the abdominal cavity behind the left lobe of liver and anterior wall of abdomen. It lies infront of the left kidney, pancreas and spleen.

5. Small intestine

It has 3 parts:

A- *Duodenum:* The shortest and widest part of the small intestine. It is C-shaped tube, 25 cm in length with its concave part directed to the left side and is occupied by the head of the pancreas.

B- *Jejunum*.

C- *Ileum*.

6. Large Intestine

Parts:

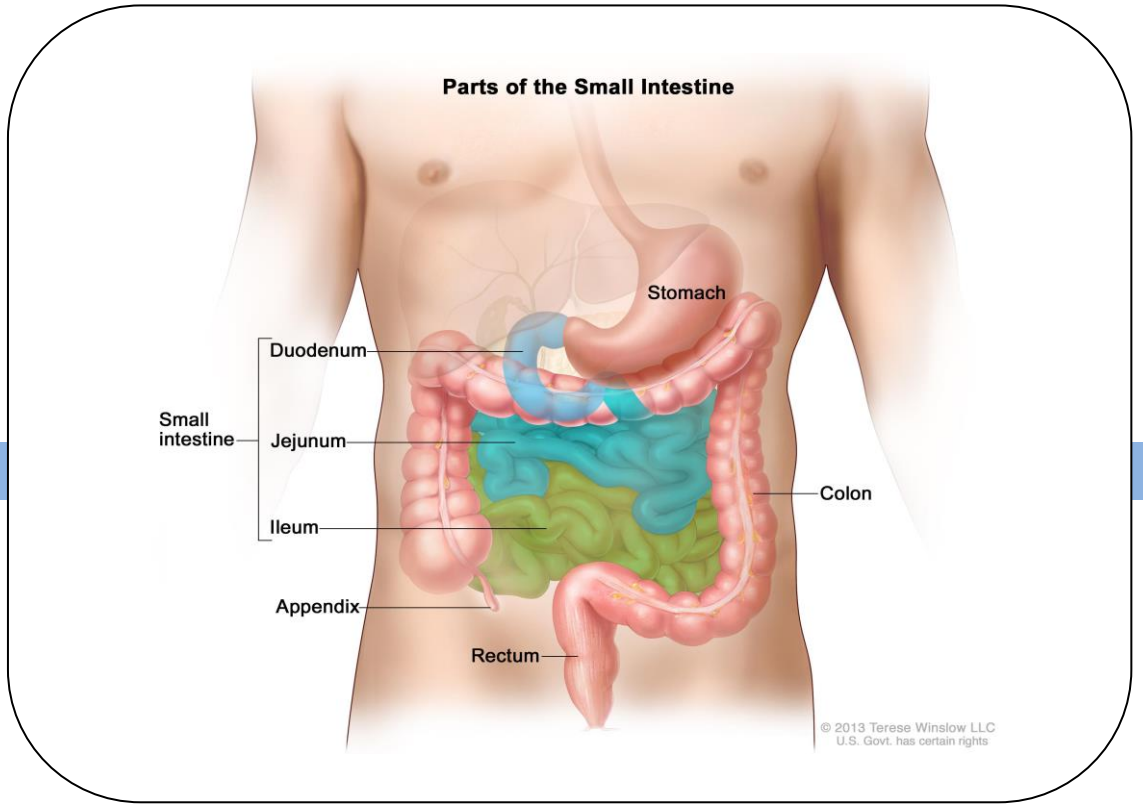
1- *Caecum:* It lies in the lower right part of the abdominal cavity. It has lower blind end and it is continuous with ascending colon. The lower end of the ileum and the appendix open into it.

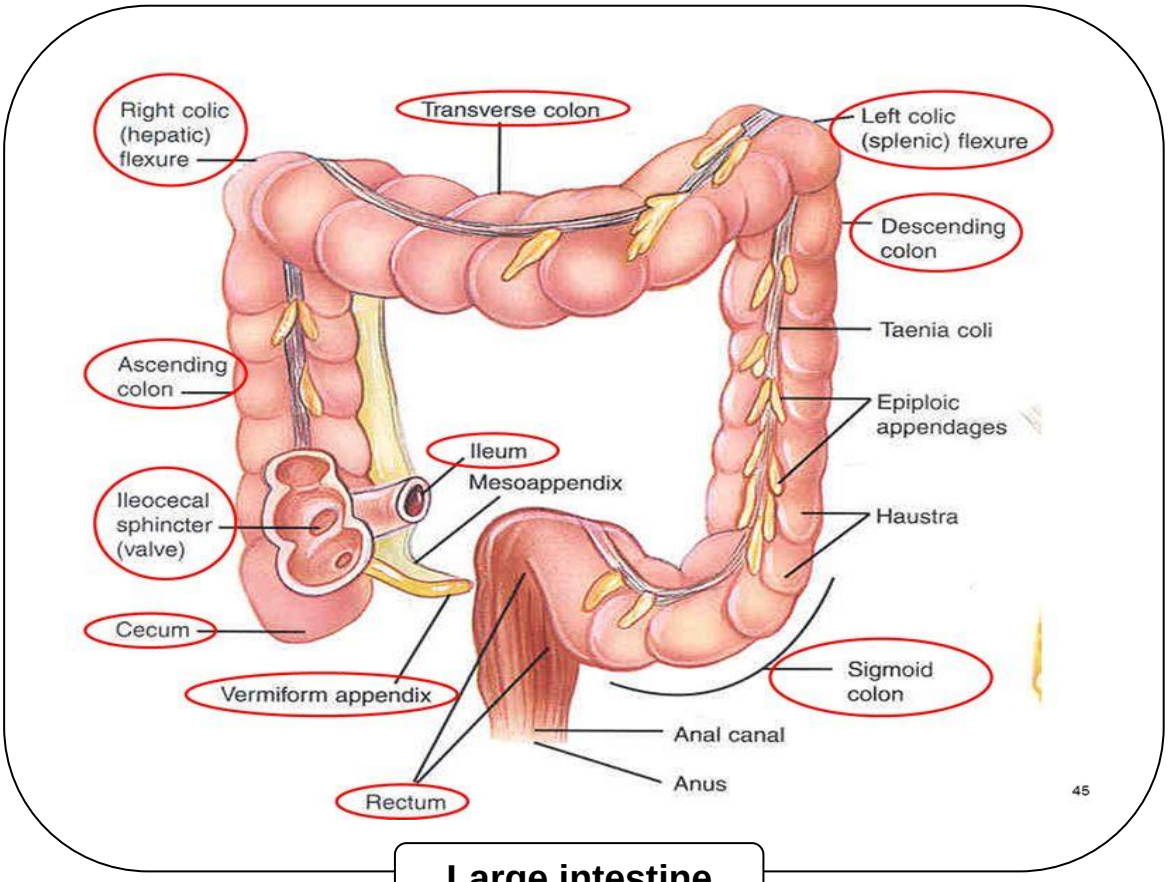
2- *Vermiform appendix:* It is variable in length and in position and it opens into the caecum below the opening of the ileum.

3- Ascending colon. **4- Right colic flexure.** **5- Transverse colon.**

6- Left colic flexure. **7- Descending colon.** **8- Sigmoid (pelvic) colon.**

9- Rectum. **10- Anal canal** which opens below by the anus.





Large intestine

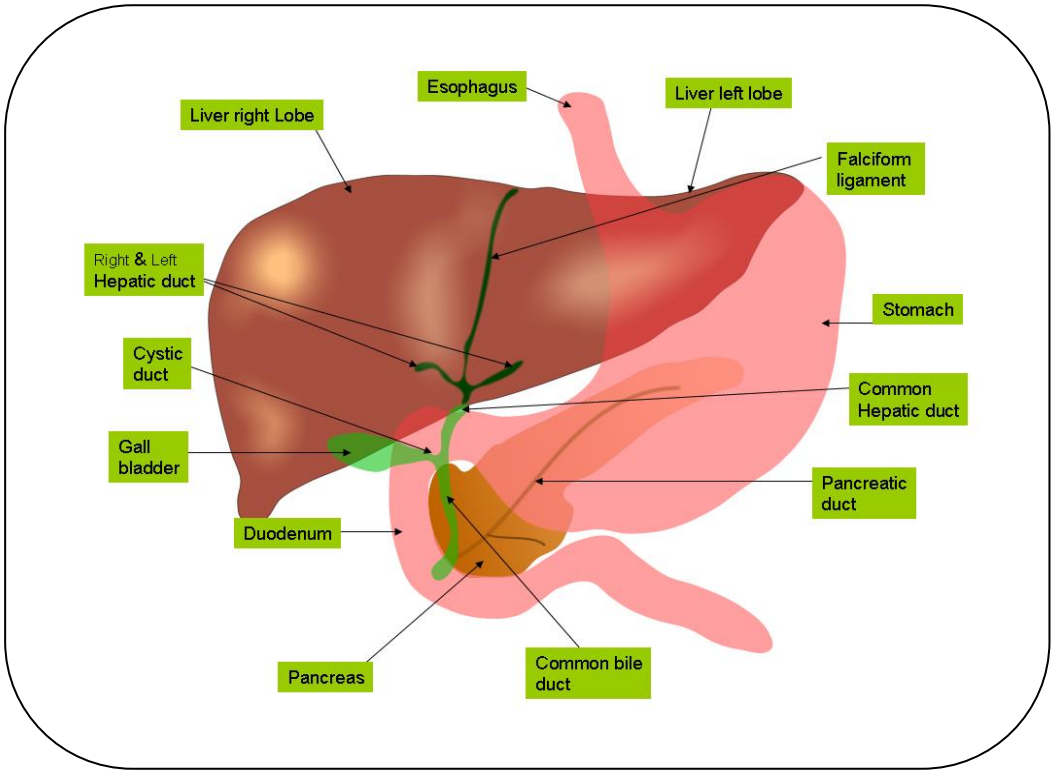
Liver

- **Site, size, shape**: Large wedge-shaped organ about 1.5 Kg in weight lies in the upper right part of the abdominal cavity below the diaphragm.
- **Structure:** It consists of large right lobe and small left lobe. It also shows special fossa for gall bladder.
- **Porta hepatis:** it is the hilum of the liver through which the hepatic artery and portal vein enter and the common hepatic duct leaves the liver.

Gall bladder: A piriform sac that lies in special fossa in the lower surface of the right lobe of the liver. It stores and concentrates the bile which is secreted from liver. The bile leaves the gall bladder through the cystic duct which unites with the common hepatic duct of liver to form the bile duct.

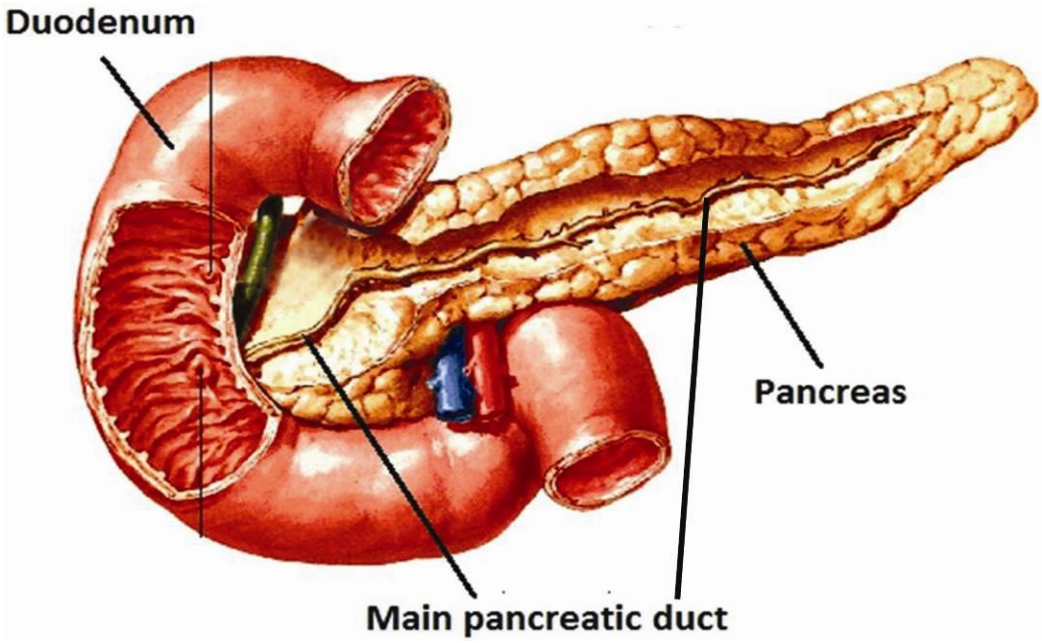
Biliary System

1- Liver secretes the bile through the right and left hepatic ducts which unite together forming the common hepatic duct.
2- Gall bladder receives the bile and evacuates it through the cystic duct.
3- The common hepatic duct unites with the cystic duct to form the bile duct.
4- The bile duct unites with the pancreatic duct to form the hepatopancreatic duct which opens into the middle of the posteromedial surface of the second part of the duodenum.



Pancreas

- Soft lobulated gland, 12-15 cm long lies transversely on the posterior wall of the abdomen. It extends from the duodenum on the right side to the spleen on the left side behind the stomach on the surface of the left kidney.
- It consists of 4 parts: head, neck, body, tail.
- **Function*:***
  1. ***Endocrine function:*** It secretes 2 hormones which regulate the level of the blood glucose, they are:
     a- Insulin hormone: lowers the blood glucose level.
     b- Glucagon hormone: Elevates the blood glucose level.
  2. ***Exocrine function:*** secretes pancreatic enzymes in the pancreatic juice which helps the digestion of food.
     The pancreatic juice is secreted through the pancreatic duct which unites with the bile duct and open together into the duodenum.



9.RESPIRATORY SYSTEM

It consists of the following parts:

A- Nose:

It is formed of external nose and nasal cavity.

- ***External nose:*** Pyramidal in shape having a root and free apex, formed of upper bony part and lower cartilaginous part.
- ***Nasal cavity:***

  There are two nasal cavities separated by a nasal septum. Each cavity opens on the face through the anterior nasal opening and opens posteriorly in the nasopharynx through the posterior nasal opening.

  Each nasal cavity is partially divided by three curved bony projections from the lateral wall called nasal conchae into a localized spaces called nasal meatuses.

  Functions of the nose:

  1- Smell.

  2- Filtration and warming of the inspired air.

  3- Nasal conchae increase the surface area of the nasal cavity which magnifies the turbulence of air and thus improves olfaction.
- ***Paranasal sinuses:*** They are air-filled spaces in the skull bones surrounding the nose (pneumatic bones) and open in the nasal meatuses.
- ***Functions:***

  1- Decrease the weight of the skull.

  2- Increase the resonance of voice.

  3- They act as air cushions for the brain, eye and pituitary gland.

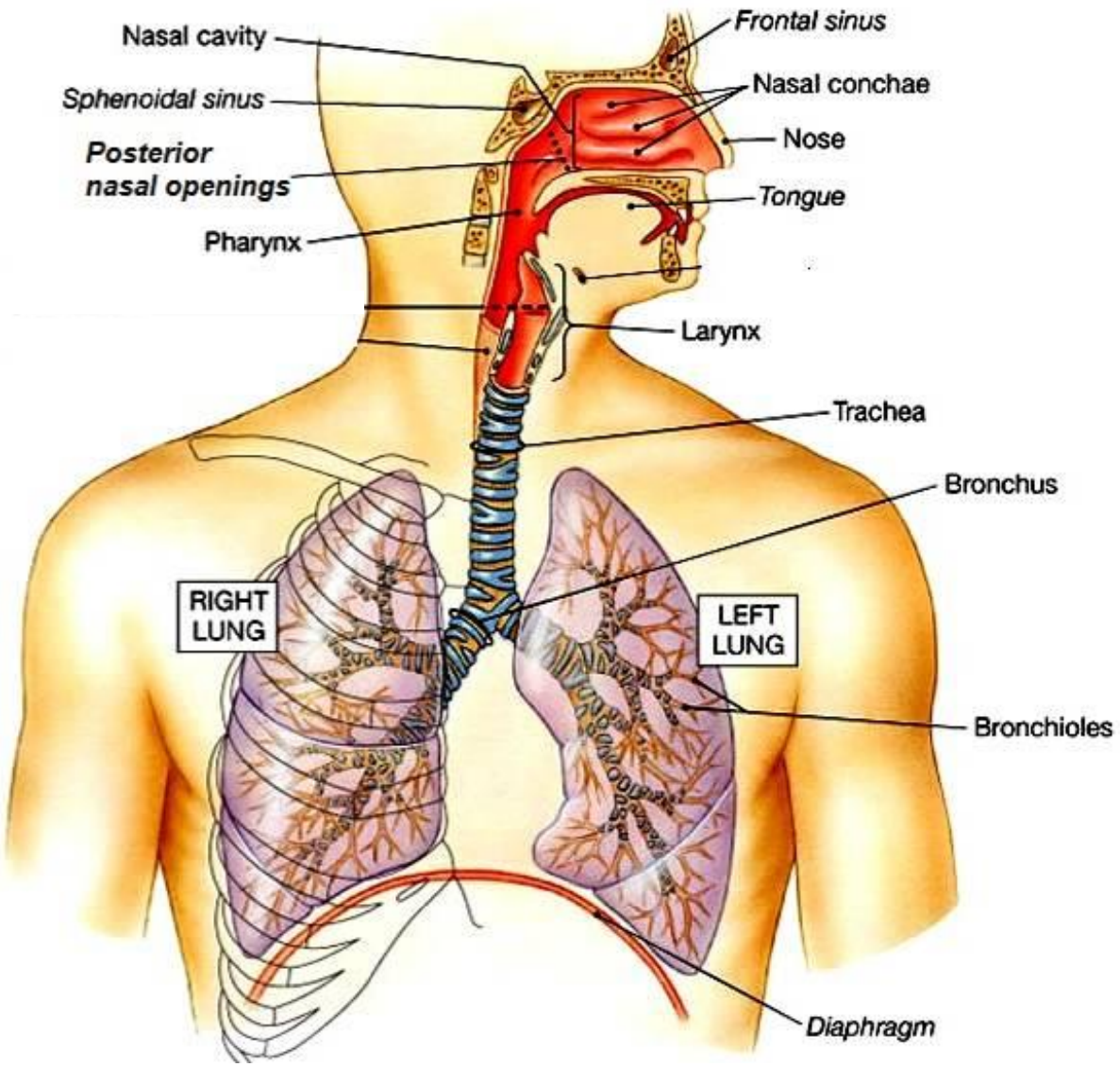
  Paranasal sinuses are:

  1- Frontal sinus present in the frontal bone.

  2- Maxillary sinus: The largest air sinus present in the maxilla.

  3- Sphenoidal sinus: It occupies the body of the sphenoid bone below pituitary gland.

  4- Ethmoidal sinuses: 3 groups of sinuses (anterior middle-posterior) present in the ethmoid bone in the medial wall of the orbit.



Respiratory system

B- Pharynx. (See digestive system)

C- Larynx:

It is a tube consisting of 9 cartilages (3 single and 3 paired) connected together by membranes and ligaments and moved by special muscles.

The large and single cartilages of the larynx are: thyroid, cricoid and epiglottis.

It extends from the root of the tongue till the beginning of trachea at the level of C6 vertebra. It contains the vocal cords which are responsible for production of voice.

Function:

1. Passage of air to trachea and lungs.
2. Production of voice by vocal cords.
3. Reflex expulsion of foreign bodies.

D- Trachea:

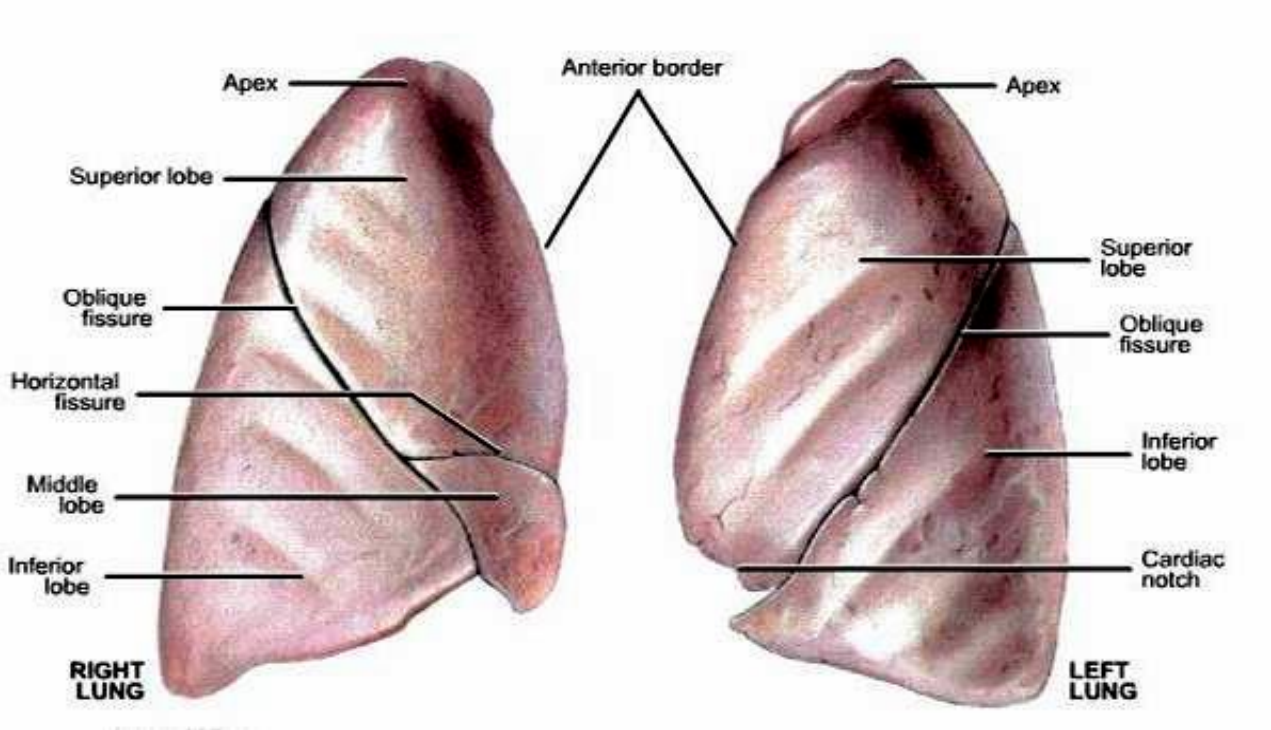
- 10 cm patent tube, transmits the air from the larynx to the lungs. It consists of 16-20 C-shaped cartilages.
- It lies in the midline, its upper 1/2 in the neck while its lower 1/2 in thorax.
- It ends in thorax behind the sternal angle (lower border of T4 vertebra) by dividing into two bronchi.

E- Lungs:

Each lung is nearly half cone shaped structure having an apex above and base below and 2 surfaces (lateral convex and medial concave containing the hilum through which the structures enter and leave the lung). It is covered by the pleura which is a closed sac formed of 2 layers: visceral and parietal with pleural cavity in-between.

A- Right lung	B- Left lung
1. Short and wide	1. Long and narrow
2. weight: 625 g	2. weight: 565 g
3. Formed of three lobes (upper, middle and lower)	3. Formed of two lobes (upper and lower)
4. Has two fissures (oblique-horizontal)	4. Has one fissure (oblique)
5. Has 10 segments	5. Has 8-segments
6. Has no cardiac notch	6. Has cardiac notch

Lungs


Apex
Superior lobe
Oblique fissure
Horizontal fissure
Middle lobe
Inferior lobe
RIGHT LUNG
Anterior border
Apex
Superior lobe
Oblique fissure
Inferior lobe
Cardiac notch
LEFT LUNG

10. URINARY SYSTEM

It has the following parts:

1- Kidney: Right and left kidney present on the upper part of the posterior abdominal wall extends from the last rib till the level of L3 vertebra.

Shape: Kidney is bean shaped, it has:

- 2 ends (upper and lower).
- 2 margins (lateral convex and medial concave containing the hilum).
- 2 surfaces (anterior and posterior) both one convex.
- Hilum of kidney: the site where the renal artery enters and the renal vein and ureter leave the kidney.

Size: 12 x 6 x 3 cm.

2- Ureter: It is a muscular tube about 25 cm long, extending from the hilum of the kidney to the urinary bladder, transmitting the urine.

It has many sites of narrowing or constrictions: at its beginning, at its end (in the wall of the urinary bladder) and two constrictions inbetween.

3- Urinary bladder: it is the reservoir of urine, the empty bladder is pyramidal in shape present inside the pelvic cavity behind the symphysis pubis. It receives the 2 ureters and its urine leaves it through the urethra.

4- Urethra*:* The tube which carries the urine to outside the body

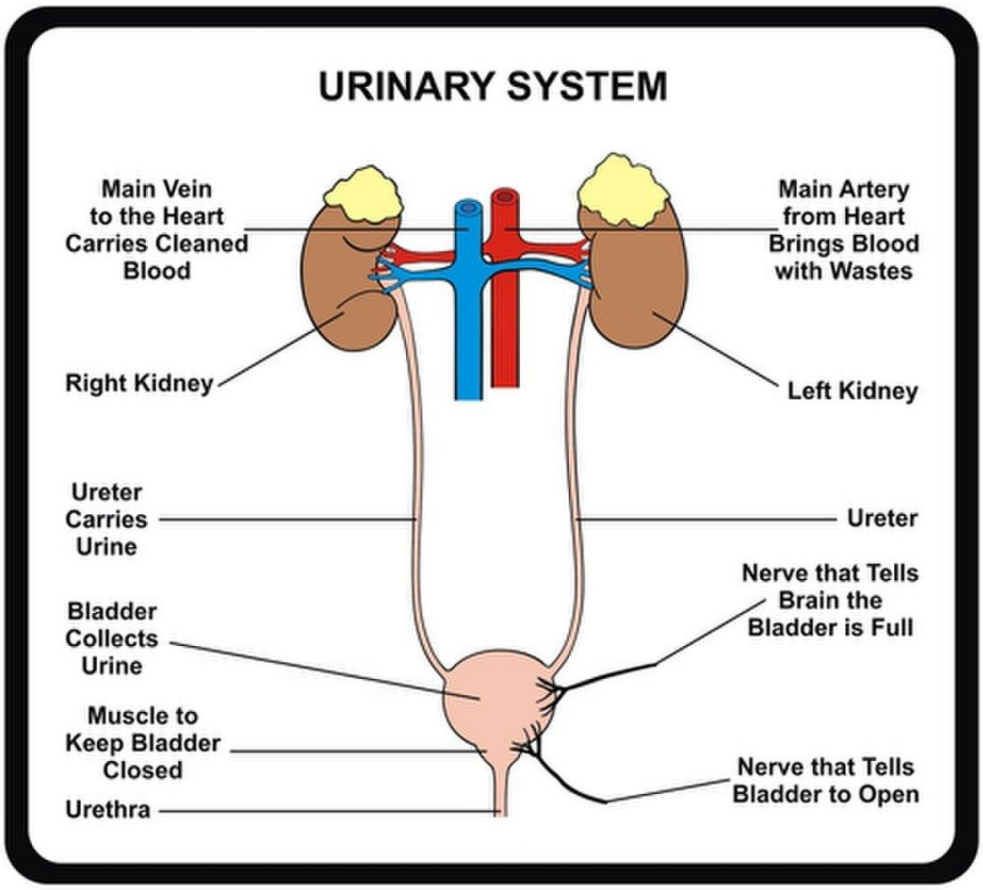
Female urethra: short and wide tube about 4 cm long, embedded in the anterior wall of vagina.

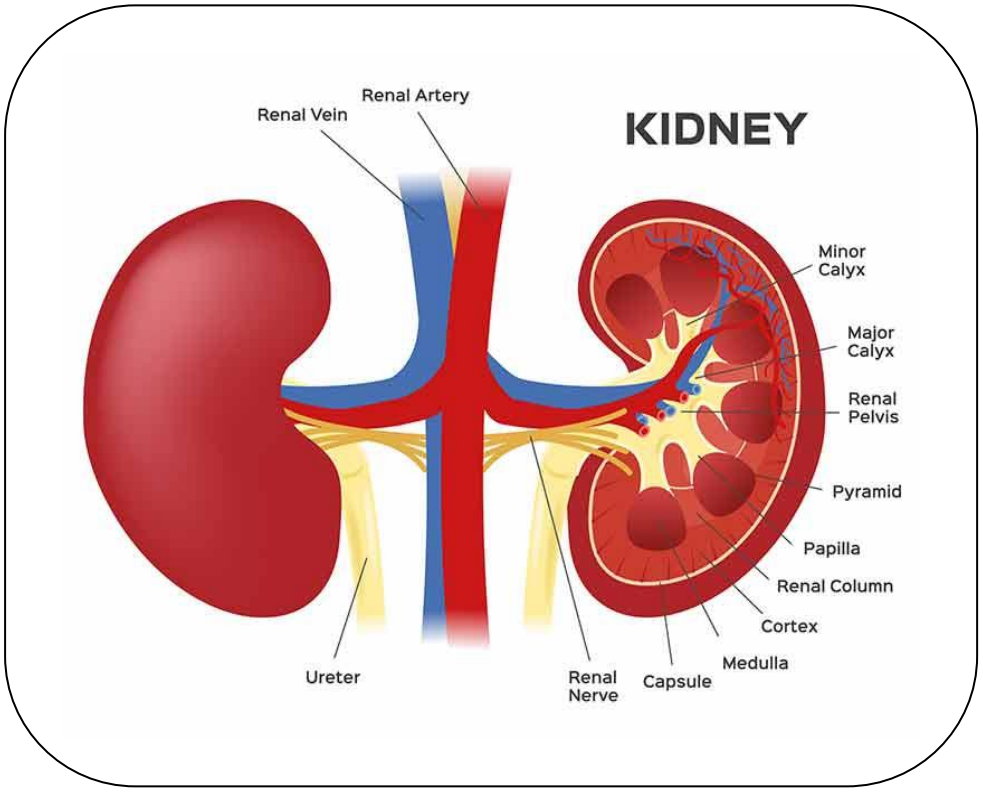
Male urethra: It is about 20 cm long, has 3 parts:

a- ***Prostatic urethra***: the widest part about 3 cm long lies within the prostate.

b- ***Membranous urethra:*** the narrowest part about 2 cm long.

c- ***Penile urethra:*** the longest part about 15 cm long lies within the penis.


URINARY SYSTEM
Main Vein to the Heart Carries Cleaned Blood
Main Artery from Heart Brings Blood with Wastes
Right Kidney
Left Kidney
Ureter Carries Urine
Ureter
Nerve that Tells Brain the Bladder is Full
Bladder Collects Urine
Muscle to Keep Bladder Closed
Nerve that Tells Bladder to Open
Urethra


KIDNEY
Renal Artery
Renal Vein
Minor Calyx
Major Calyx
Renal Pelvis
Pyramid
Papilla
Renal Column
Cortex
Medulla
Capsule
Renal Nerve
Ureter

11. GENITAL SYSTEM

MALE GENITAL SYSTEM

It consists of:

A- Testis. **B-** Genital ducts. **C-** Accessory sex glands. **D-** Penis.

A- Testis:

An oval organ (5 x 3 x 2.5 cm) present inside skin sac called scrotum.

Function:

1- Formation of the sperms (spermatozoa).

2- Secretion of male sex hormone (testosterone hormone).

B- Genital Ducts:

1- ***Epididymis:*** An extremely coiled tubule forming coma-shaped structure lies on the posterior surface of the testis.

Function:

a- Storage and maturation of the sperms.

b- Secretion of nutritive substance for the sperms.

2- ***Vas deferens:*** A thick-walled narrow lumen duct, about 45 cm in length. It is the continuation of the epididymis, enters the abdomen where it unites with the seminal vesicle behind the urinary bladder to form the ejaculatory duct. Function: It transport the sperms to urethra.

3- ***Urethra:*** It transports the sperms to the vagina.

C- Accessory Sex Glands:

1- ***Seminal vesicle:*** A highly tortuous tube, lies on the back of the urinary bladder. It unites with vas deferens to form the ejaculatory duct which opens in the prostatic part of the urethra.

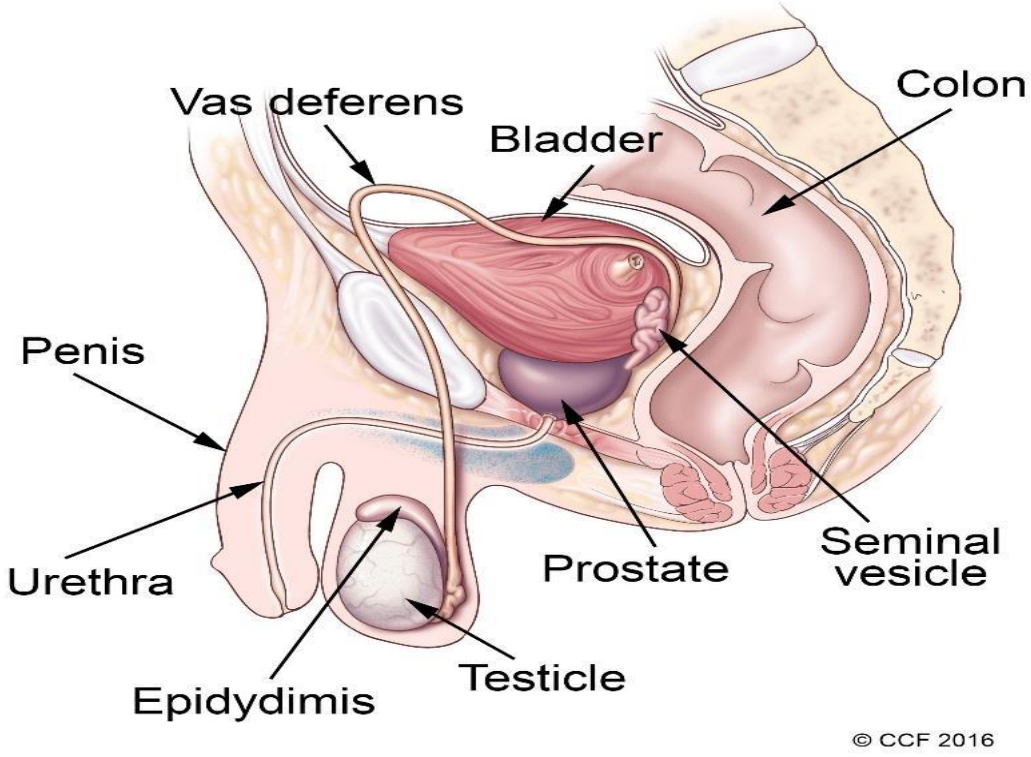
Function: It secretes nutritive substances rich in protein, fructose and vitamin C.

2- ***Prostate:*** It is a cone-shaped glandular organ surrounding the upper part of the urethra below the neck of the urinary bladder, it opens by many ducts on the urethra and it secretes alkaline secretion to neutralize the acidity in vagina.

3- ***Bulbourethral gland:*** A small gland lies beside the membranous urethra. It secretes mucous to lubricate the urethra.

N.B.: Sperms, seminal vesicle secretion, prostatic secretion and secretion of epididymis, all together form the semen.

D- Penis: It is an erectile organ for copulation (sexual intercourse). It consists of 3 elongated erectile masses, 2 dorsally: corpora cavernosa and one ventrally corpus songiosum which contains the penile urethra. The penis is has 2 parts: Root (the hidden part) and body the free pendulous part). The distal expanded part of the body is called glans penis which is covered by skin fold called prepuce.



Male genital system

FEMALE GENITAL SYSTEM

1- Ovary: Oval (almond) shaped, measuring 3 x 2 x 1 cm attached to the lateral margin of the uterus by the ligament of ovary.

Function:

a- Production of ova (female germ cells).
b- Production of female sex hormones: oestrogen and progesterone.

2- Uterine (Fallopian) tubes: 10 cm tube opens in the upper lateral part of uterine cavity connecting it with the ovary. Its lateral end is called infandibulum (funnel) which has many finger like processes (fimbriae) descend around the ovary.

Function:

a- It receives the ovum from the ovary.
b- Passage for the sperms from uterus to the ovum.
c- Fertilization (the union of one sperm and ovum) occurs in its lateral 1/3.

3- Uterus: A hollow pear-shaped organ with thick muscular wall. It measures 3 x 2 x 1 incl **Ligament of ovary** rts:

a- ***Fundus:*** the part of uterus above the level of uterine tubes.
b- ***Body:*** the part below the level of the uterine tubes.
c- ***Cervix:*** the lower narrow part which enters the vagina.

Function: Reception, retention and nutrition of the fertilized ovum (zygote) until the formation of full term foetus. It is the site of the menstrual cycle.

4- Vagina:

- Muscular tube, extends upwards and backwards from the vulva (♀ external genital organ) to the uterus.
  Its anterior wall is 7½-8 cm and its posterior wall is 9-10 cm.
- The upper end is pierced by the cervix of uterus and the lower end is the vaginal orifice.
- ***Functions:*** a- Passage of menstrual blood. b- Birth canal.
  c- Sexual intercourse to introduce the sperms.

5- Female External Genital Organs (Vulva): consists of the following parts:

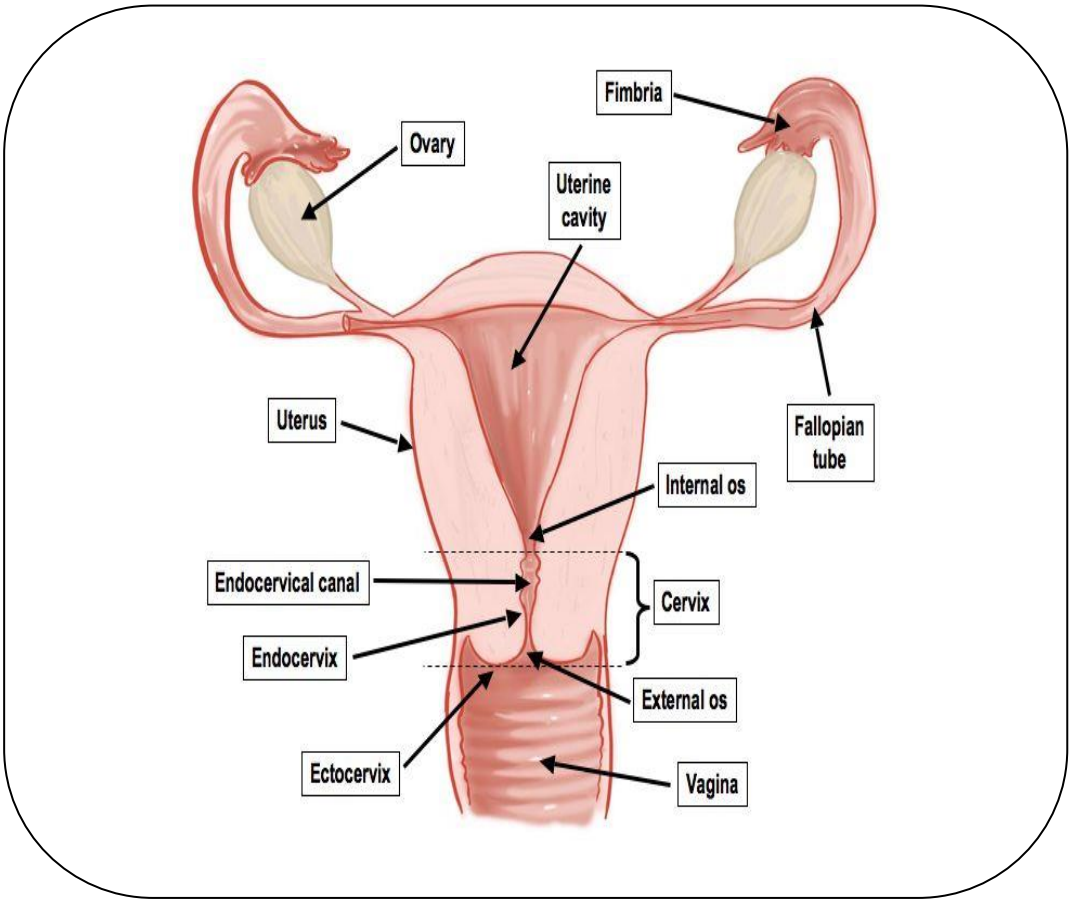
a- ***Labia majora:*** Two prominent skin folds containing hairs and fat. They unite above to form mons pubis which is rounded elevated part of subcutaneous fat over the symphysis pubis.

b- ***Labia minora:*** Two thin skin folds with no hairs and fat, lie on the inner surfaces of the labia majora. The space between the 2 labia minora is called vestibule of vagina.

c- ***Vestibule of vagina***: It receives 2 orifices:

1. Urethral orifice.
2. Vaginal orifice: Median opening lies below the urethral orifice. It is closed by perforated fold of mucous membrane in virgin called the hymen.

d- ***Clitoris:*** A small erectile organ similar to penis lies one inch above the urethral orifice.



12. LYMPHATIC SYSTEM

The system which is responsible for the circulation of the lymph from the tissue spaces (intercellular spaces) to the blood stream. The lymph is a clear colorless fluid, rich in proteins, which circulates in the lymph vessels.

Lymphatic system consists of 3 parts:

a- Lymph vessels.

b- Lymphoid tissues as lymph nodes, spleen, tonsils and thymus.

c- Free cells (lymphocytes).

Lymph Vessels:

They are closed end fine vessels present in the tissue spaces uniting together to form larger lymph vessels which join the lymph nodes. All the lymph vessels in the body are collected into 2 large lymph ducts in the root of the neck, they are:

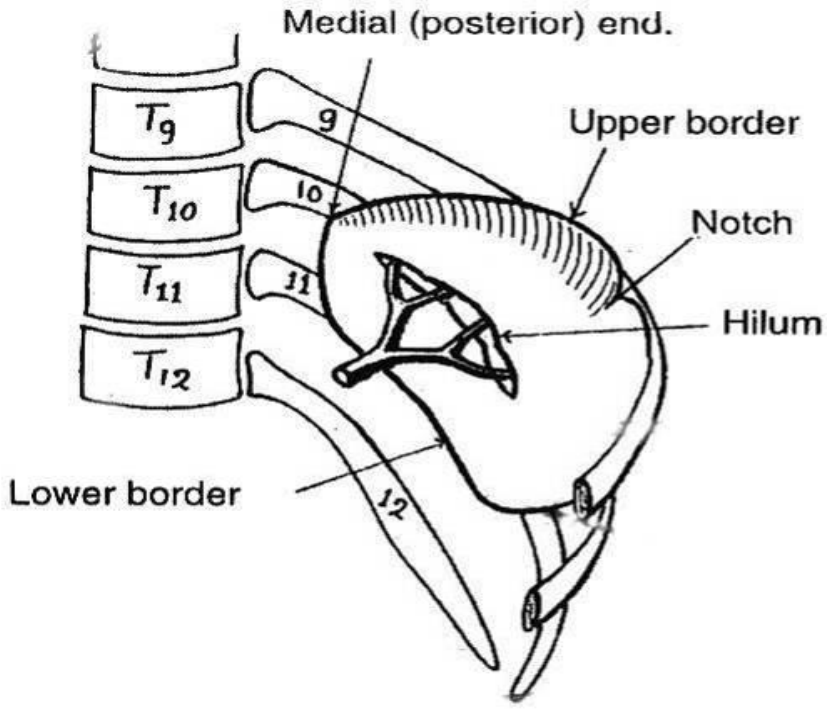
A- Thoracic duct drains the left side of head, neck and left upper limb, left half of thorax and whole body below diaphragm.

B- Right lymphatic duct drains the right side of head and neck, right half of thorax and right upper limb.

The 2 ducts open into 2 large veins present at the root of the neck.

Spleen

Position: Wedge-shaped organ lies in the upper left part of the abdominal cavity, below the diaphragm deep to the 9th, 10th and 11th ribs.



Lymph Nodes

Lymph nodes are oval or kidney-shaped small bodies situated along the course of lymph vessels. Lymph node consists of cortex and medulla.

They are present in groups in special and fixed sites, they are:

A- In the neck, on both its sides and at its junction with the head.

B- In the chest, close to trachea and bronchi.

C- At the root of upper limb (in axillary lymph nodes).

D- In the abdomen: Around abdominal aorta and close to abdominal organs.

E- In the pelvis: Around blood vessels of pelvis and close to pelvic organs.

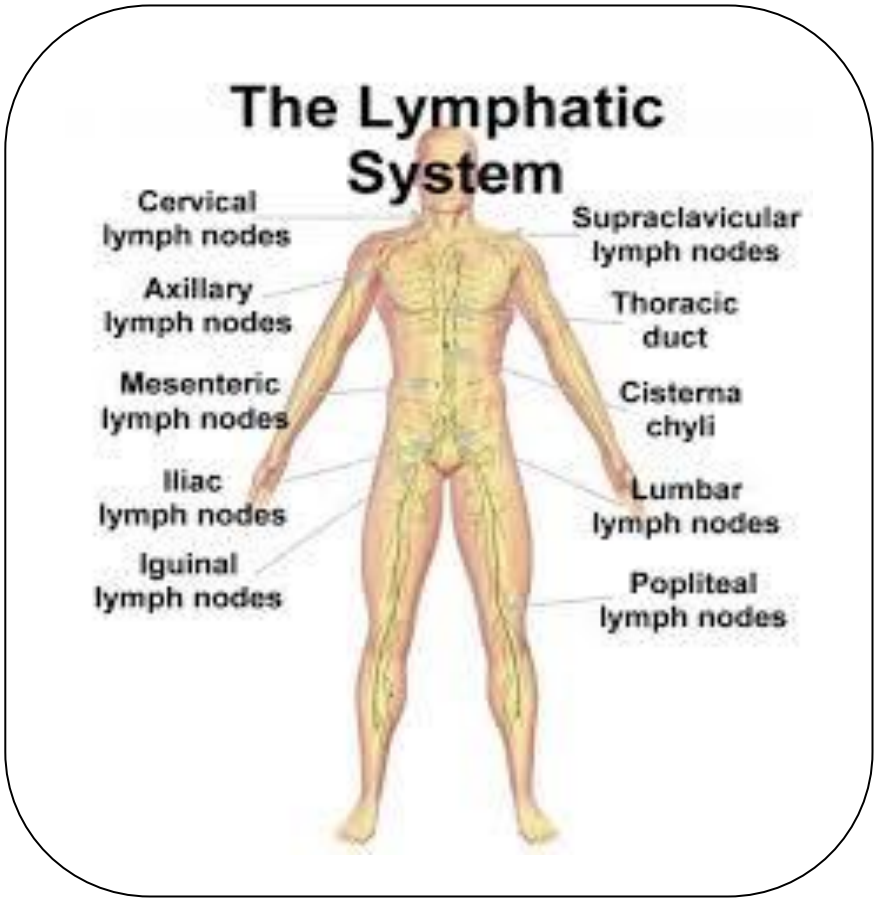
F- Root of lower limb (inguinal lymph nodes).

Functions:

1- Filtration of lymph from bacteria and foreign bodies.

2- Formation and production of lymphocytes.

3- They are the sites of interaction between micro-organisms (antigens) and phagocytes and lymphocytes (antibodies). So they play an important role in the defense mechanism.



13. ENDOCRINE SYSTEM

A group of ductless glands that secrete hormones directly into the blood stream. They are:

1- ***Pituitary gland:*** A small gland 1/2 gm in weight which lies in a special fossa in the middle part of the base of the skull, below the brain. It secretes many hormones which circulate in the blood and control the secretion of all the remaining endocrine glands, as TSH, ACTH, prolactine hormone and growth hormone.

2- ***Thyroid gland:*** Butterfly gland which lies in front of the lower part of larynx and upper part of trachea in the lower part of the neck. It consists of 2 pyramidal-shaped lobes which are connected together by a transverse band called isthmus. It moves up and down with the movement of larynx during swallowing. It secretes thyroxin hormone.

3- ***Parathyroid glands:*** 4 small yellowish glands embedded in the posterior surface of the thyroid gland and responsible for secretion of parathyroid hormone (PTH) which regulates the calcium and phosphorus metabolism.

4- ***Suprarenal glands (Adrenals):*** Two semilunar or triangular glands present at the upper poles of the kidneys. Each gland has cortex and medulla, the cortex secretes cortisone and aldosterone hormones while the medulla secretes adrenaline and noradrenaline hormones.

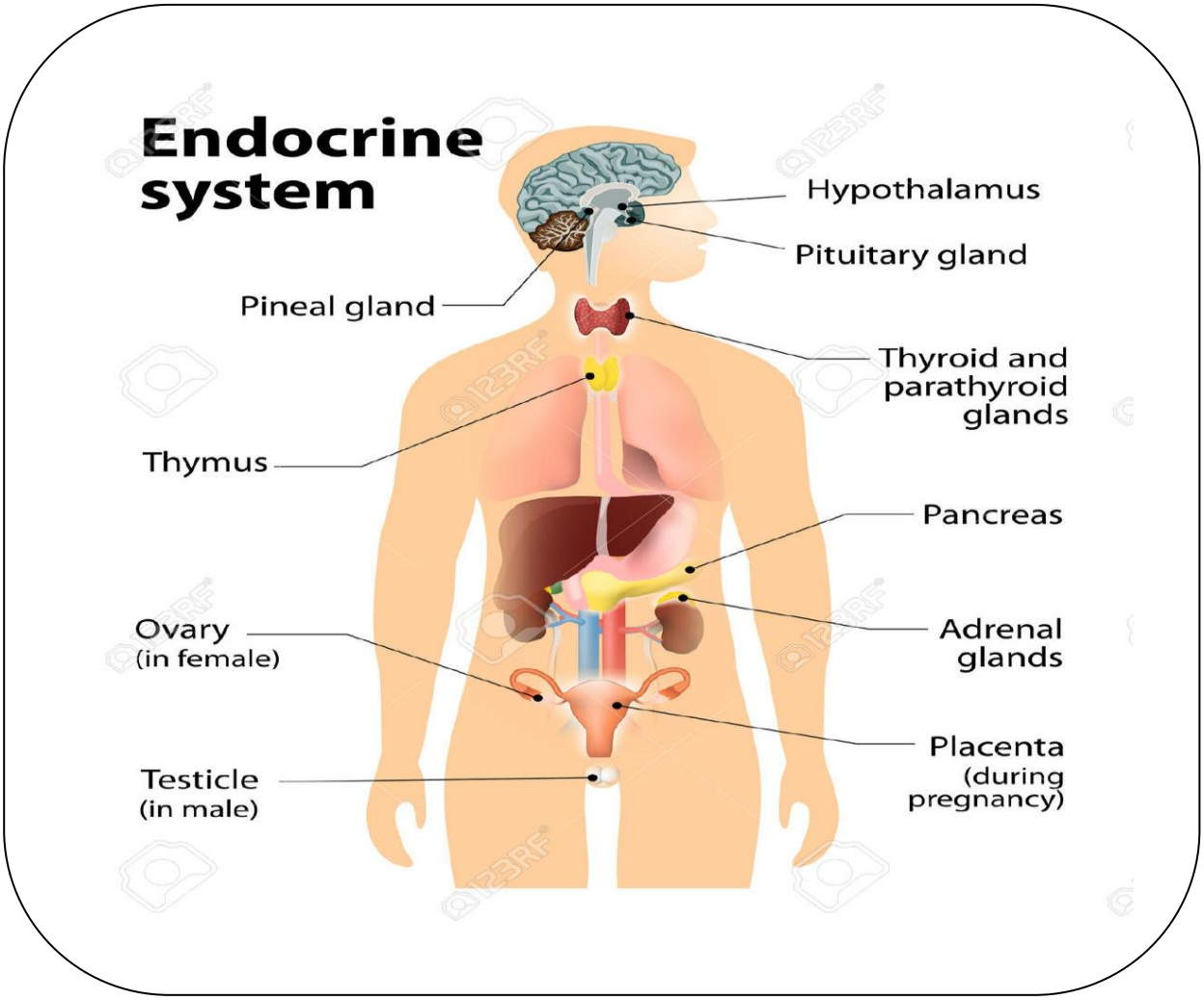
5- ***Pancreas:*** A mixed endocrine and exocrine gland which lies transversely on the posterior abdominal wall extending from the duodenum till the spleen.

Its endocrine part is called islets of Langerhans, which secretes insulin and glucagon hormones that regulate the blood glucose level.

6- ***Gonads:*** Two testes in male and two ovaries in female:

a- Testis in male secretes testosterone hormone.

b- Ovary in female secretes oestrogen and progesterone hormones.


Endocrine system
Hypothalamus
Pituitary gland
Pineal gland
Thyroid and parathyroid glands
Thymus
Pancreas
Ovary (in female)
Adrenal glands
Placenta (during pregnancy)
Testicle (in male)

14. NERVOUS SYSTEM

Nervous system is divided into:

I. Central nervous system:

A- Brain.

B- Spinal cord.

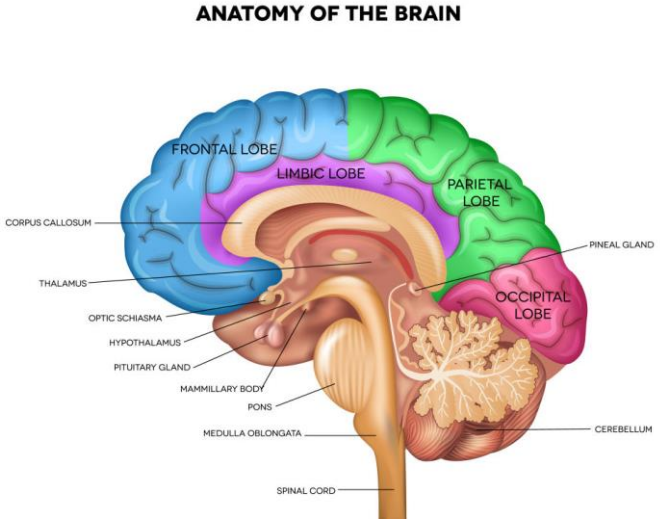
II. Peripheral nervous system:

A- ***Nerves:***

1. Spinal nerves (31 pairs).
2. Cranial nerves (12 pairs).

B- ***Autonomic nervous system:***

1. Sympathetic.
2. Parasympathetic.



Brain

It is present inside the skull.

Parts:

A- ***Fore brain:*** consists of two cerebral hemispheres and diencephalons.

B- ***Mid brain.***

C- ***Hind brain:*** consists of pons, medulla oblongata and cerebellum.

Diencephalons:

Consists of five parts, the most important of them is the thalamus & hypothalamus.

Brain stem: consists of 3 parts: **1-** Midbrain. **2-** Pons. **3-**Medulla oblongata.

Cerebral hemisphere: has 4 lobes

1- ***Frontal lobe:*** It lies infront of the central sulcus.

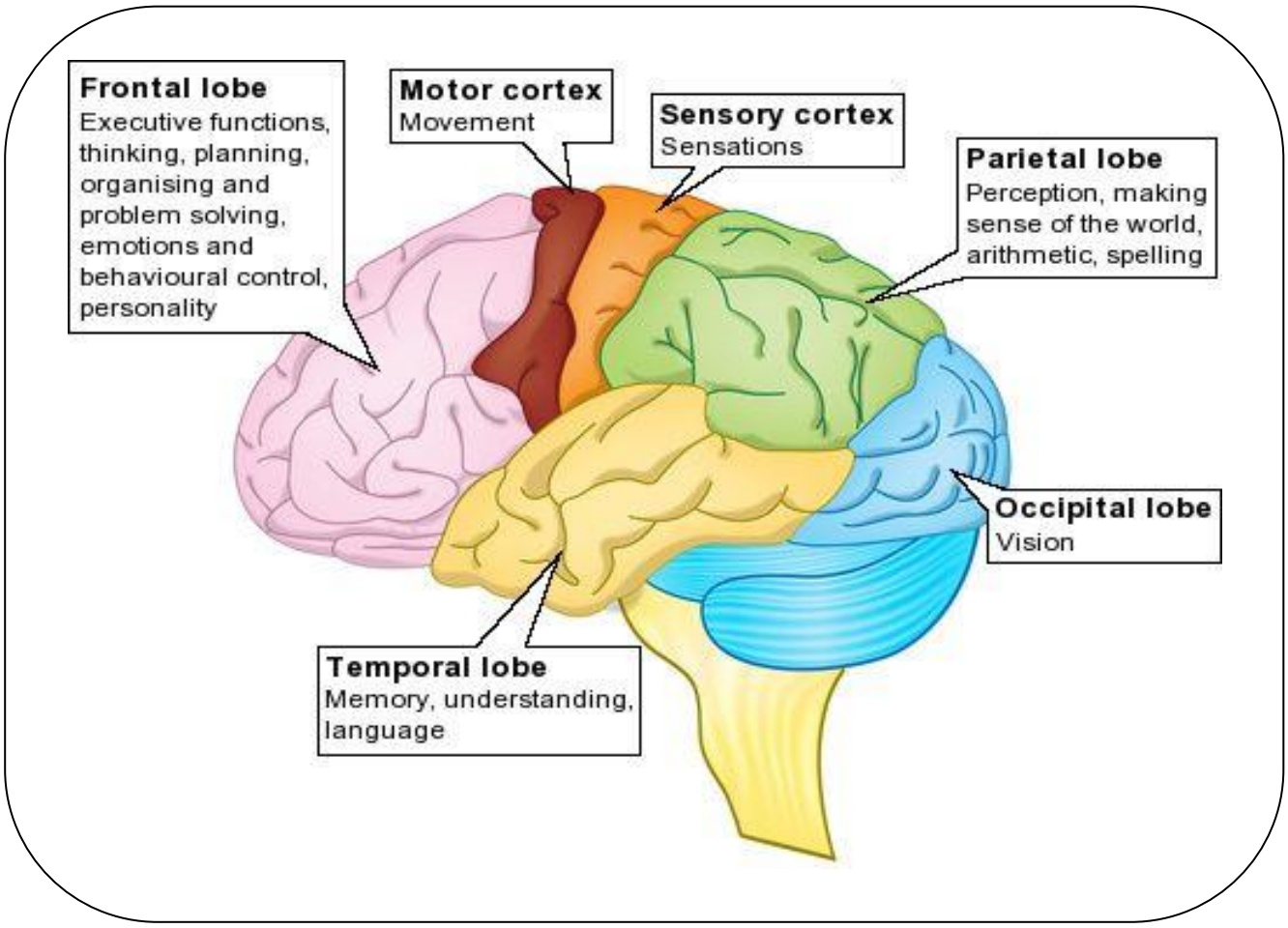
- It contains motor area (area 4) which controls the movement of the opposite half of the body.
- Brocha's area (motor speech area) (area 44) which control the speech and it present in the left hemisphere of the right handed person.

2- ***The parietal lobe:*** It lies behind the central sulcus.

It contains the sensory area (area 3, 1, 2) which receives the sensation from the opposite half of the body.

3- ***Temporal lobe:*** It lies below the lateral sulcus and contains the auditory area (area 41, 42).

4- ***Occipital lobe:*** It lies posterior to the temporal and parietal lobes. It contains the visual area (area 17, 18, 19).



Spinal Cord

Length: 45 cm.

Site: present inside the vertebral column.

Segments: 31 (8 cervical, 12 thoracic, 5 lumbar, 5 sacral and one coccygeal). Each segment gives origin to a pair of spinal nervous.

Meninges

They are the coverings of central nervous system, and they are arranged from inside outside:

1- Pia mater. **2-** Arachnoid mater. **3-** Dura mater.

The space which lies between the pia and arachnoid mater is called subarachnoid space. It contains C.S.F. and the blood vessels of the brain.

Cerebral Spinal Fluid (CSF)

It is a clear fluid circulating inside the cavities of the CNS and in subarachnoid space outside it. It supports and protects the brain and spinal cord.

Nerves

They arise from:

A- ***Spinal cord:*** (spinal nerves):

They are 31 pairs (8 cervical, 12 thoracic, 5 lumbar, 5 sacral and one coccygeal).

B- ***Brain (cranial nerves)***, they are 12 pairs.

Superficial attachment of the cranial nerves:

- 1 and 2 are attached to cerebral hemisphere.
- 3 and 4 are attached to midbrain.
- 5, 6, 7 and 8 are attached to pons.
- 9, 10, 11 and 12 are attached to medulla oblongata.

Cranial nerves and their functions:

1- **Olfactory nerve:** Smell.
2- **Optic nerve:** vision.
3- **Oculomotor:** Supplies all muscles of eye except 2 muscles.
4- **Trochlear nerve:** Supplies superior oblique muscle of the eye.
5- **Trigeminal nerve:**
   a- Sensory to face and scalp and anterior 2/3 of tongue.
   b- Motor for the 4 muscles of mastication and another 4 muscles.
6- **Abducent nerves:** Supplies the lateral rectus muscle of eye.
7- **Facial nerve:**
   a- Motor to muscles of face (facial expression).
   b- Sensory carries taste from the anterior 2/3 of the tongue.
8- **Auditory nerve:** Hearing and equilibrium.
9- **Glossopharyngeal nerve:**
   a- Motor to one muscle of pharynx.
   b- Sensory carries sensation from pharynx and general sensation and taste from posterior 1/3 of tongue.
10- **Vagus:**
   a- Motor: To muscles of larynx, pharynx and palate.
   b- Parasympathetic: To heart, respiratory system and gastrointestinal tract.
11- **Accessory nerve:**
   Supplies two muscles: trapezius and sternomastoid muscle.
12- **Hypoglossal nerve:**
   Supplies all muscles of tongue except one muscle.

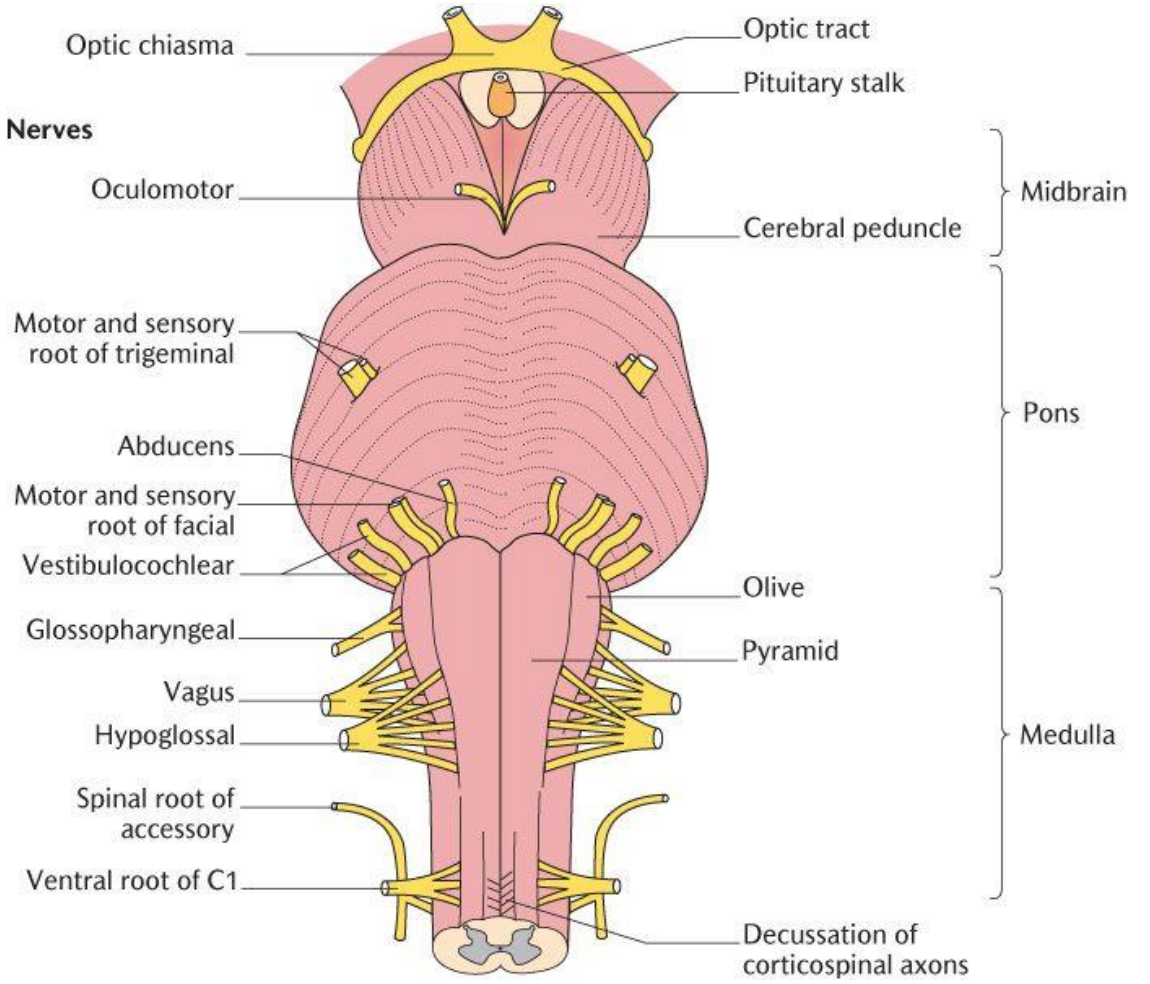
Autonomic Nervous System

It is concerned with involuntary activities. It supplies the heart, the smooth muscles of the G.I.T, respiratory and urinary system and it stimulates the secretion of the glands.

It has 2 parts:

A- Sympathetic nervous system.

B- Parasympathetic nervous system.



Attachment of cranial nerves

Functions of cranial nerves

Number	Name	Function
I	Olfactory	Sense of smell
II	Optic	Vision
III	Oculomotor	Motor control of some eye muscles and eyelid
IV	Trochlear	Motor control of some eye muscles
V	Trigeminal	Chewing muscles and some facial sensation
VI	Abducent	Motor control of some eye muscles
VII	Facial	Motor control of facial muscles, salivation. Taste and cutaneous sensations.
VIII	Acoustic	Equilibration, static sense and hearing
IX	Glossopharyngeal	Salivation, sensations of skin, taste and viscera
X	Vagus	Motor control of the heart and viscera, sensation from the thorax, pharynx and abdominal viscera
XI	Accessory	Motor impulses to the pharynx and shoulder
XII	Hypoglossal	Motor control of the tongue, some skeletal muscles, some viscera, sensation from skin and viscera

List of references:

- https://opentextbc.ca/anatomyandphysiology/chapter/1-2-structural-organization-of-the-human-body-2/
- Anatomy and Physiology for Nurses- 13th Edition-Elsevier
- Fundamentals of Anatomy and Physiology for Student Nurses 1st Edition
- Gray's anatomy, 40th edition