Before starting.....

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Bone

 \triangleright Bone is a living tissue capable of changing its structure as the result of the stresses.

Bone consists of cells, fibers, and matrix.
 It is hard because of the calcification of its extracellular matrix.

Function:

- 1. has a protective function
- 2. It serves as a lever
- 3. important storage area for calcium salts
- 4. It houses the delicate blood-forming bone marrow

Layers: Cortical Cancellous



Layers: Cortical Cancellous



Classification of Bones:

1.long bones
2.Short bones
3.Flat bones
4.Irregular bones
5.Sesamoid bones

Long bones





Long bones



Short Bones:



Flat Bones:



Irregular Bones:

the skull, the vertebrae the pelvic bones



Sesamoid Bones :Patella

small nodules of bone that are found in certain tendons where they rub over bony surfaces. The greater part of a sesamoid bone is buried in the tendon, and the free surface is covered with cartilage

Function:

1. reduce friction on the tendon

2. alter the direction of pull of a tendon.









Development of Bone:

membranous endochondral.

the bone is developed directly from a connective tissue membrane; a cartilaginous model is first laid down and is later replaced by bone.

The bones of the vault of the skull are developed rapidly by the membranous method

The long bones of the limbs are developed by endochondral ossification

Cartilage

Types : **Hyaline cartilage**

Fibro cartilage

Elastic cartilage





Blood Vessels Types: arteries, veins, and capillaries **Arteries** transport blood from the heart and distribute it to the body **branches**.

The smallest arteries, <0.1 m esenteric artery in diameter, are referred to as arterioles.

The joining of branches of arteries is called an **anastomosis.**



Arteries do not have valves

> Anatomic end arteries are vessels whose terminal branches do not anastomose with branches of arteries supplying adjacent areas.



➤Functional end arteries are vessels whose terminal branches do anastomose with those of adjacent arteries, but the caliber of the anastomosis is insufficient to keep the tissue alive should one of the arteries become blocked. **Veins** are vessels that transport blood back to the heart many of them possess valves. The smallest veins are called **venules**. The smaller veins, or tributaries, unite to form larger veins, which commonly join with one another to form **venous** plexuses.



Medium-size deep arteries are often accompanied by two veins, one on each side, called **venae comitantes.**



Veins leaving the gastrointestinal tract do not go directly to the heart but converge on the portal vein; this vein enters the liver and breaks up again into veins of diminishing size, which ultimately join capillarylike vessels, termed sinusoids, in the liver. A portal system is thus a system of vessels interposed between two capillary beds





Capillaries are microscopic vessels in the form of a network connecting the arterioles to the venules.

Sinusoids resemble capillaries in that they are thinwalled blood vessels, but they have an irregular cross diameter and are wider than capillaries. found in the bone marrow, the spleen, the liver, and some endocrine glands.



In some areas of the body, principally the tips of the fingers and toes, direct connections occur between the arteries and the veins without the intervention of capillaries. The sites of such connections are referred to as arteriovenous anastomoses.



Lymphatic System

Lymphatic tissues are a type of connective tissue that contains large numbers of lymphocytes. The thymus, the lymph nodes, the spleen, and the lymphatic nodules.

Lymphatic vessels are tubes that assist the cardiovascular system in the removal of tissue fluid from the tissue spaces of the body; the vessels then return the fluid to the blood. The lymphatic system is essentially a drainage system, and there is no circulation. Lymphatic vessels are found in all tissues and organs of the body except the central nervous system, the eyeball, the internal ear, the epidermis of the skin, the cartilage, and the bone. **Lymph** is the name given to tissue fluid once it has entered a lymphatic vessel. **Lymph capillaries** are a network of fine vessels that drain lymph from the tissues. The capillaries are in turn drained by small lymph vessels, which unite to form large lymph vessels.



Before lymph is returned to the bloodstream, it passes through at least one lymph node and often through several. The lymph vessels that carry lymph to a lymph node are referred to as afferent vessels; those that transport it away from a node are **efferent** vessels. The lymph reaches the bloodstream at the root of the neck by large lymph vessels called the right lymphatic duct and the thoracic duct.





Enumerate the types of bones and give an example of each type