

An anatomical illustration of the human skeleton and muscles, shown from both posterior and anterior views. The posterior view on the left shows the spine, ribs, and muscles of the back and legs. The anterior view on the right shows the chest, abdomen, and muscles of the front of the body. The word "ANATOMY" is written in large, bold, black capital letters across the center of the illustration.

ANATOMY

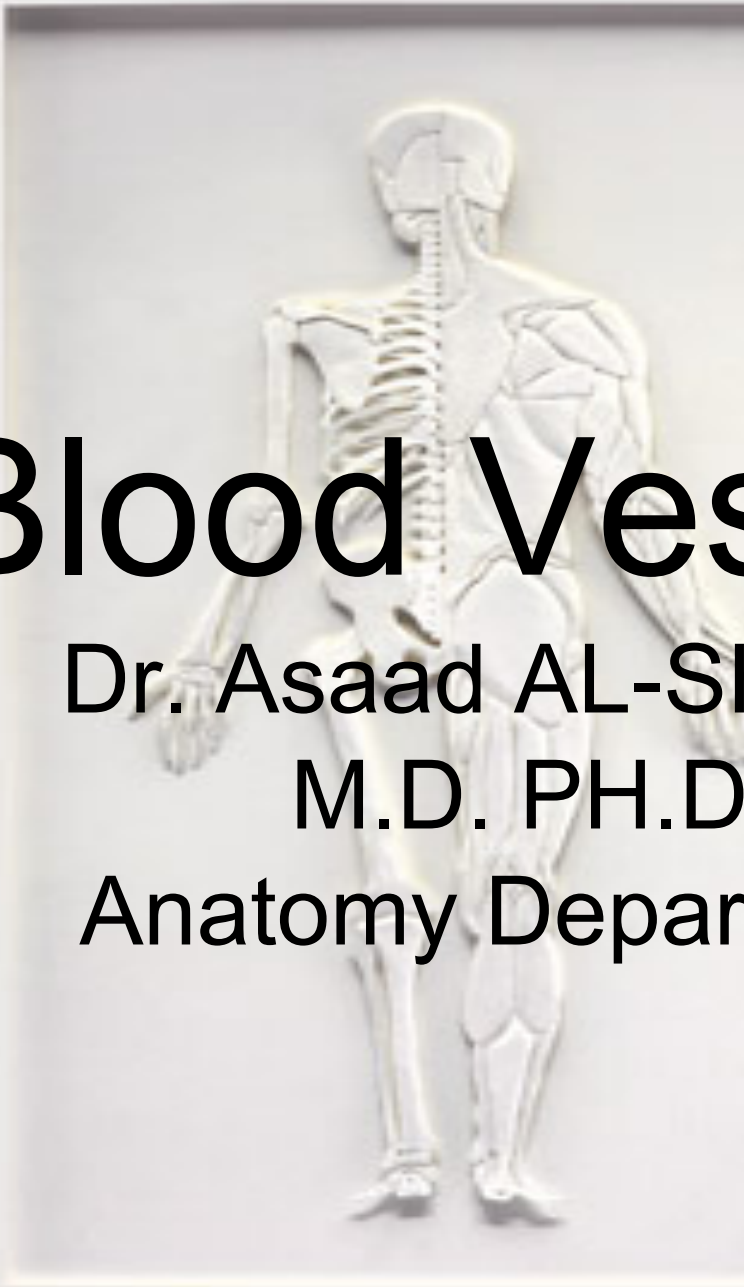
introduction

Blood Vessels

Dr. Asaad AL-SHOUK

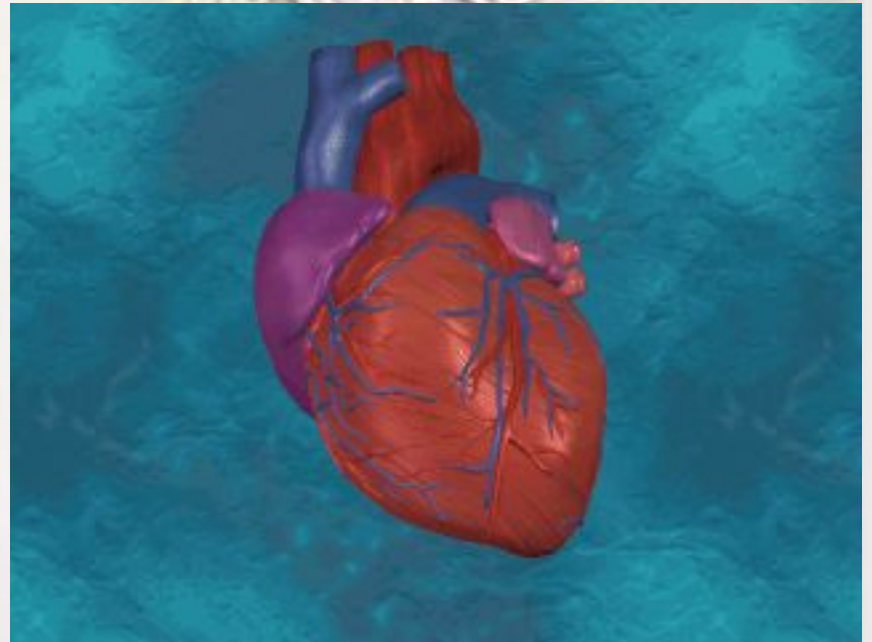
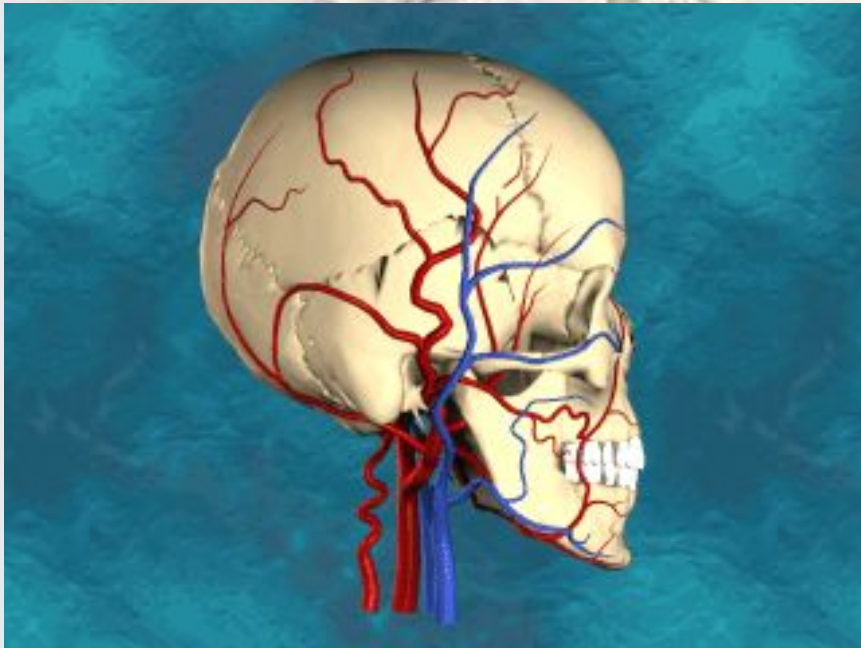
M.D. PH.D.

Anatomy Department



Blood vessels:

The blood vessels and the heart make the cardiovascular system, through this system the heart pumps blood through the body via blood vessels. The blood carry nutrients, oxygen and waste products to and from the cells.



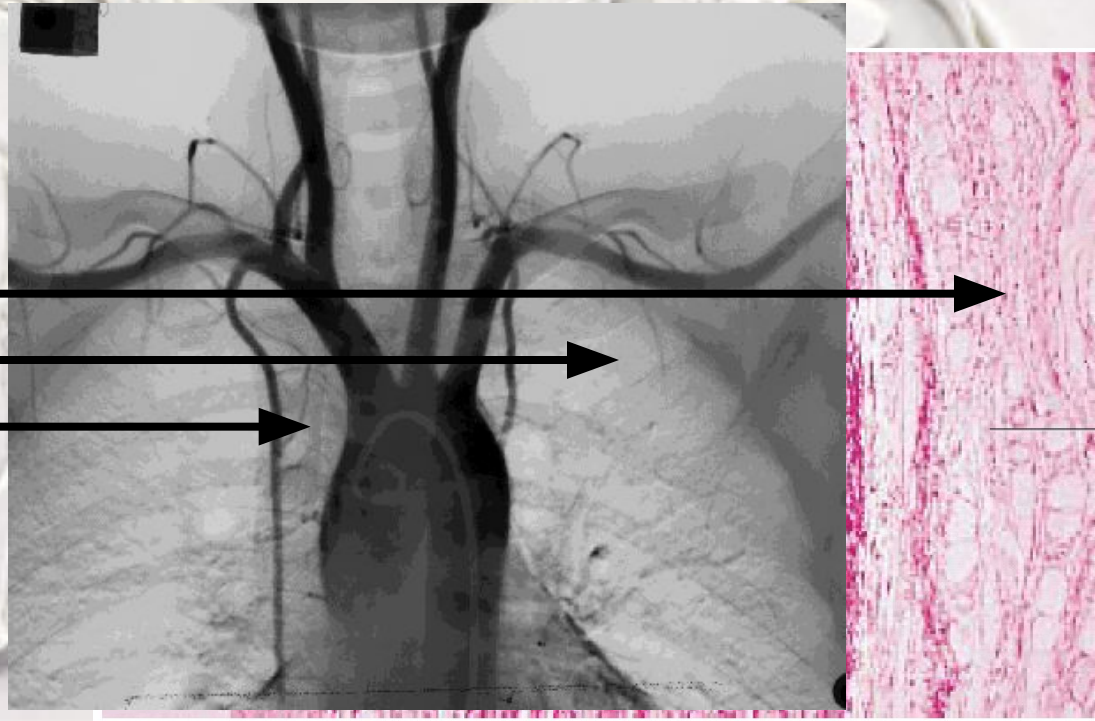
There are three types of blood vessels:

1. Artery:

Which carry the blood from the heart and distribute it into the body. The arteries are of decrease caliber as they become far from the heart. The final distributing vessels called the arterioles, which deliver the blood to the capillaries which form the capillary bed where exchange take place.

The arterial wall consist from three coats or tunics:

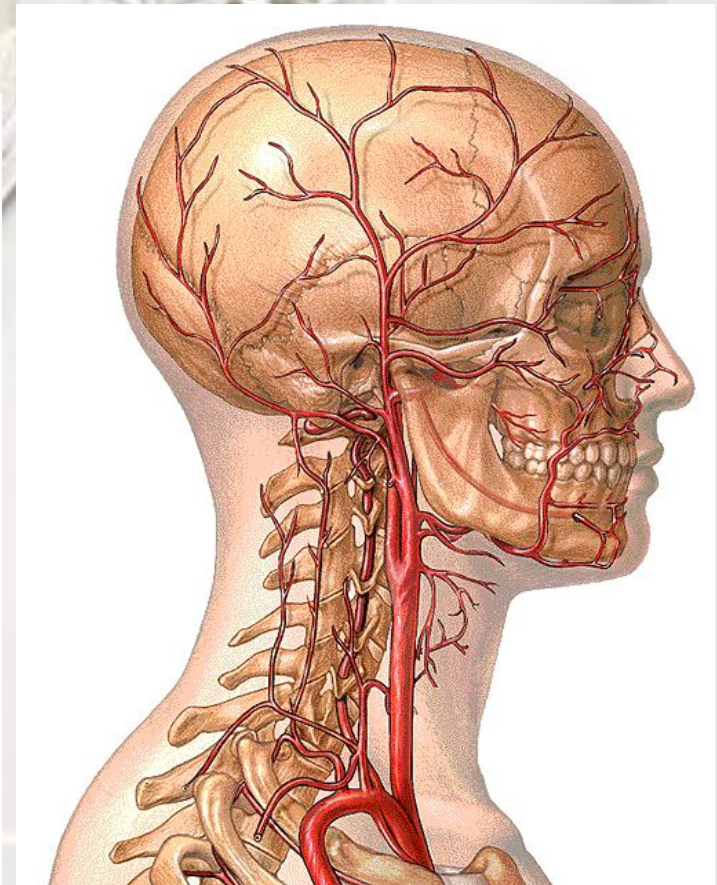
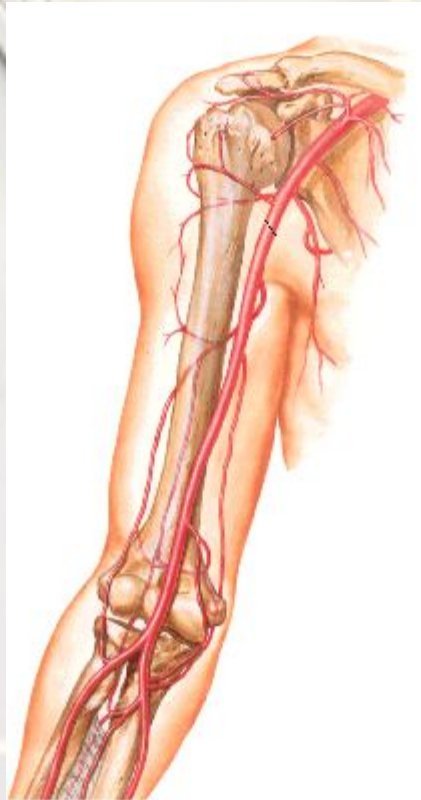
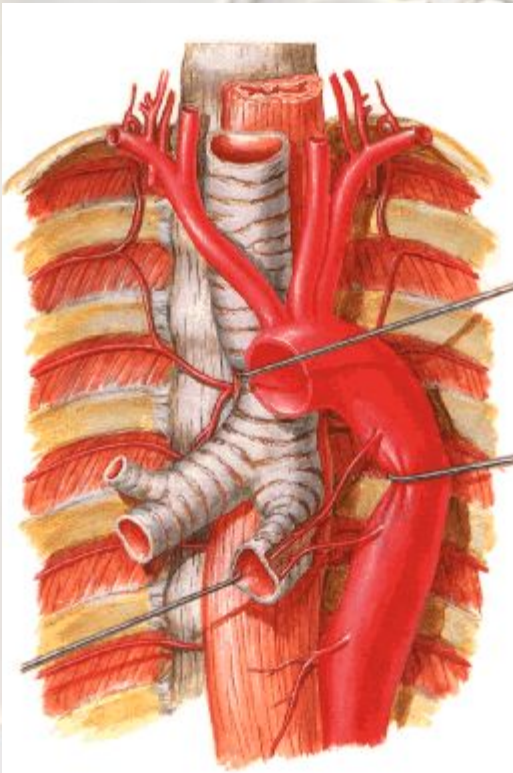
- Tunica adventitia.
- Tunica media.
- Tunica intima.



The different types of arteries are distinguished from each other on the basis of the thickness and differences in these coats.

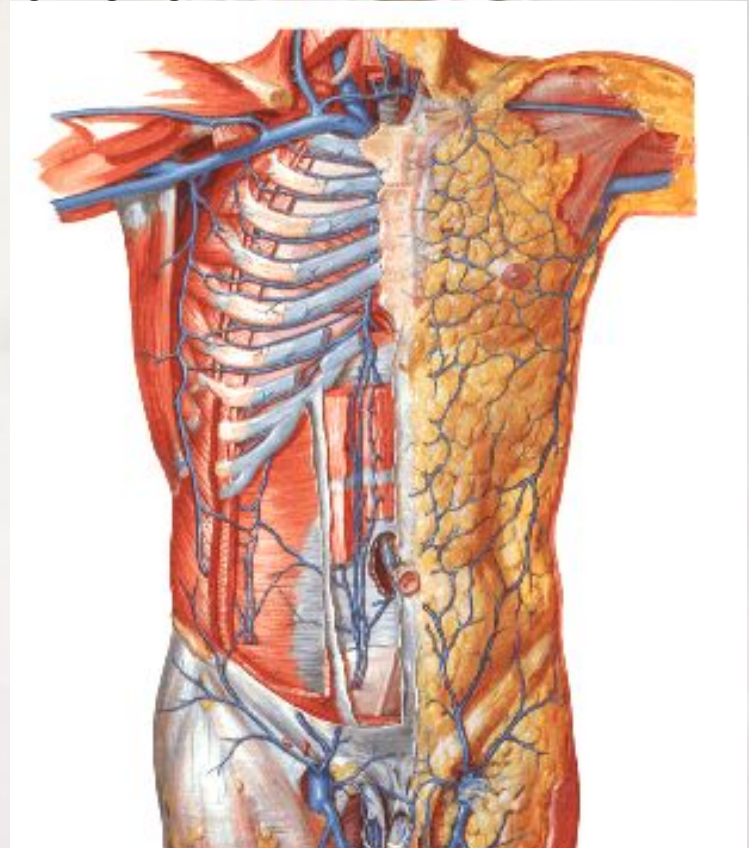
There are three types of arteries:

- Elastic arteries (conducting arteries): which are the largest type.
- Muscular arteries (distributing arteries): distribute blood to various parts of the body.
- Arterioles: are the smallest type.

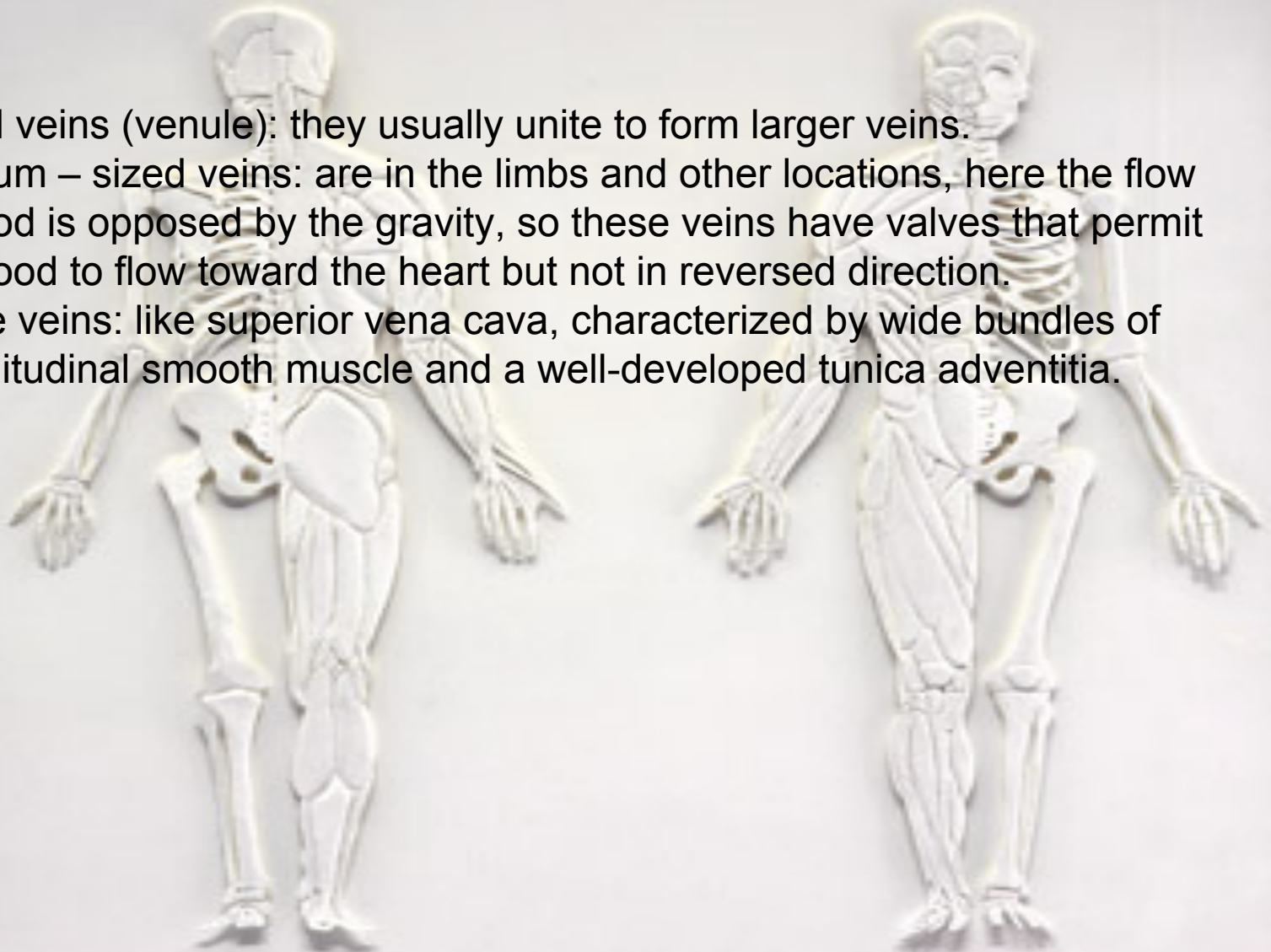


2. Veins:

Veins return blood from the capillary bed to the heart. They generally have a thinner wall and larger diameter than their corresponding arteries. Veins have the same three layers in their walls as arteries, but there is much less muscle in the media. There are three sizes of veins:



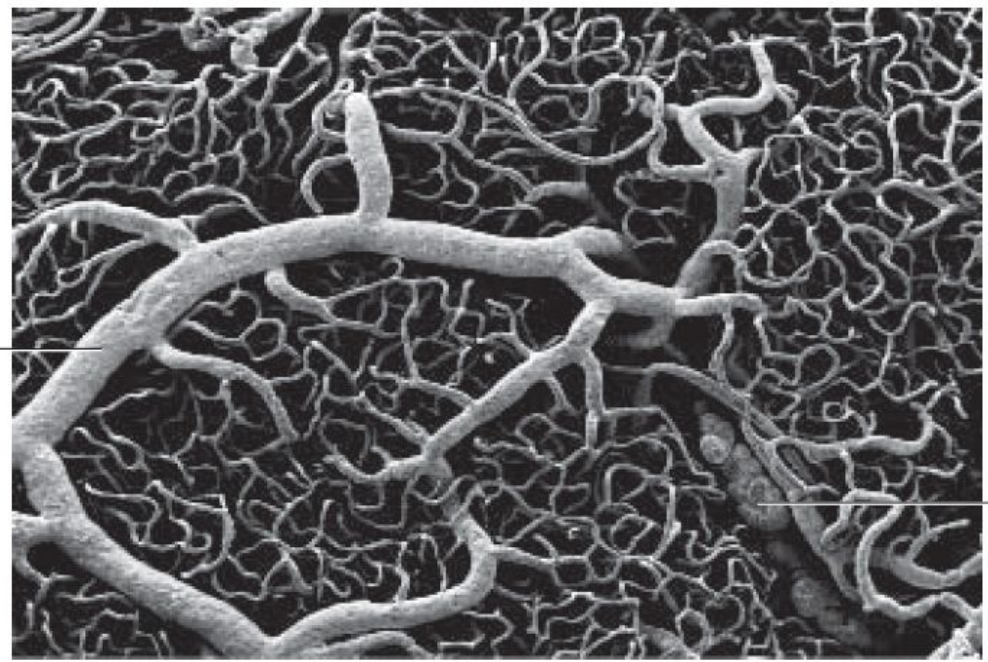
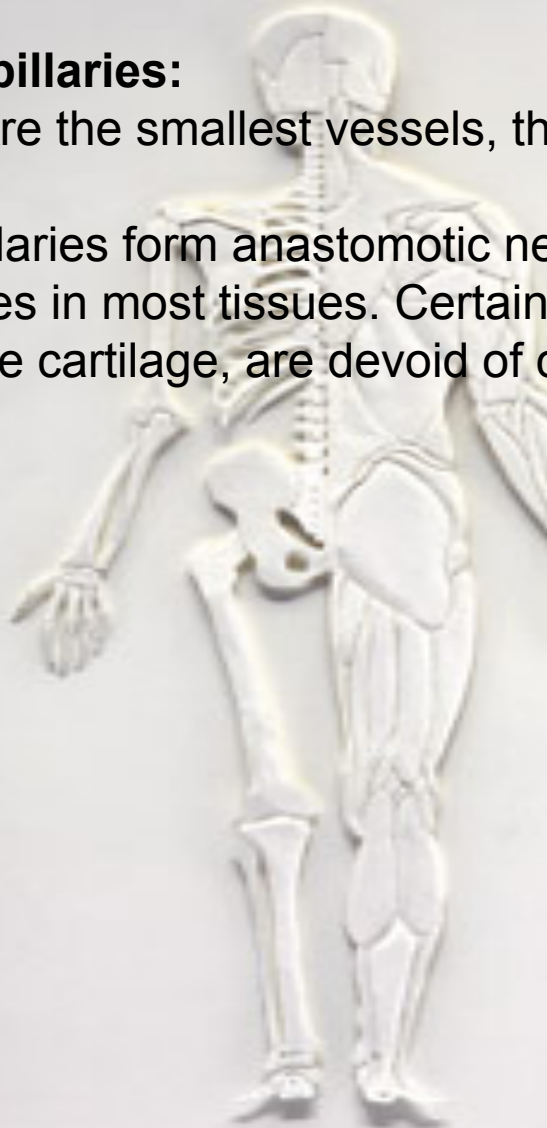
- Small veins (venule): they usually unite to form larger veins.
- Medium – sized veins: are in the limbs and other locations, here the flow of blood is opposed by the gravity, so these veins have valves that permit the blood to flow toward the heart but not in reversed direction.
- Large veins: like superior vena cava, characterized by wide bundles of longitudinal smooth muscle and a well-developed tunica adventitia.



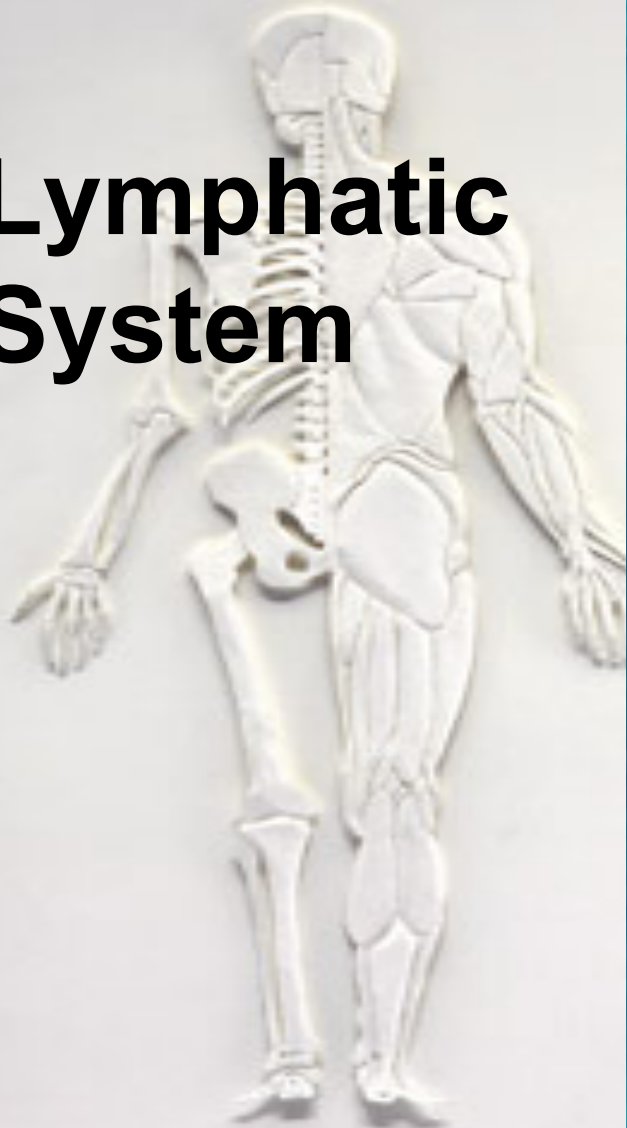
3. Capillaries:

Are the smallest vessels, their walls consist of only flattened endothelial cells.

Capillaries form anastomotic network (capillary bed) between arterioles and venules in most tissues. Certain structures, such as the cornea of the eye and hyaline cartilage, are devoid of capillaries.

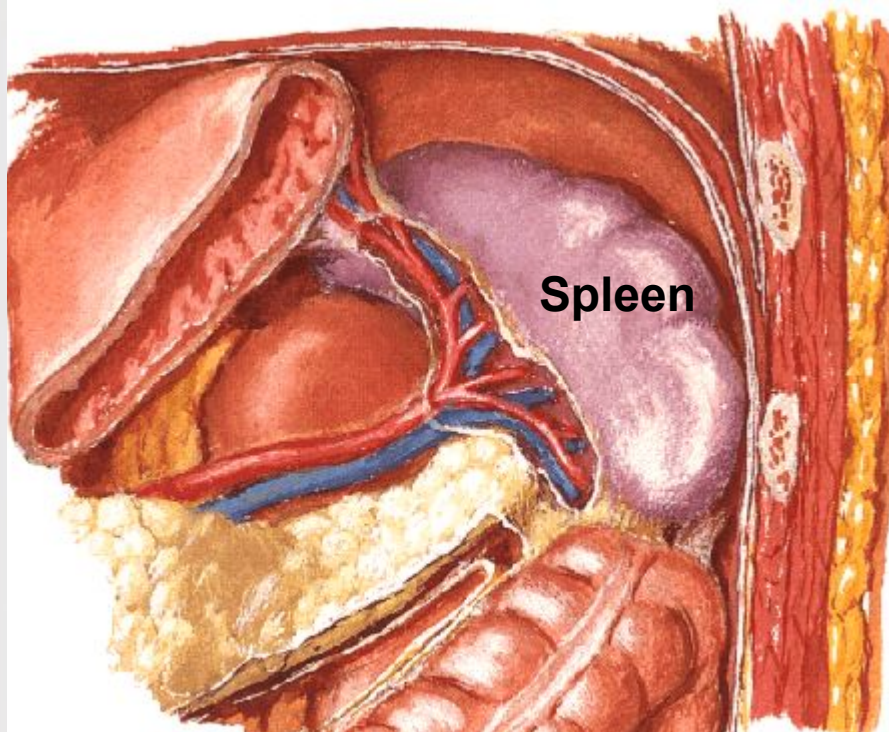


Lymphatic System

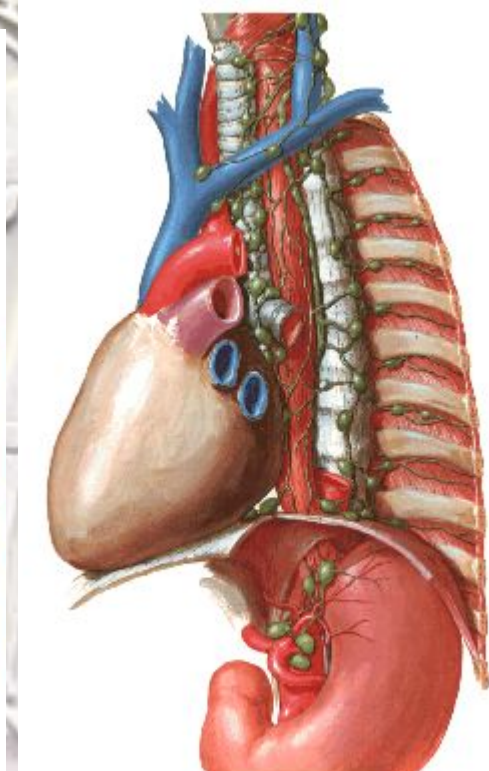
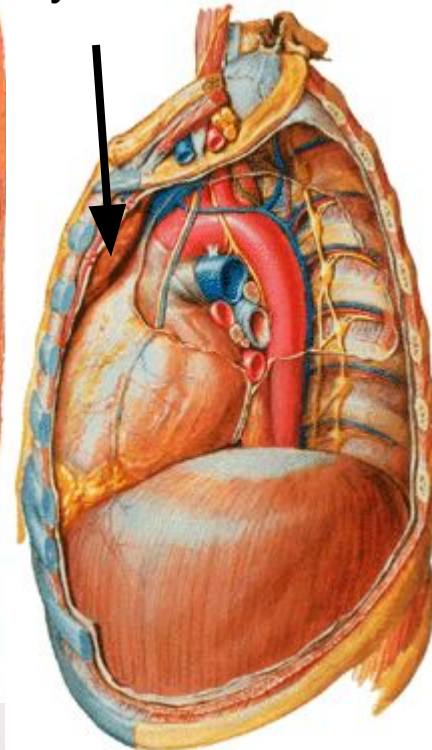


Lymphatic System:

The lymphatic system is part of circulatory system, the other part is the cardiovascular system. Not all the blood that enter a part returns by way of veins; much of it becomes tissue fluids and return by way of lymphatic vessels. The lymphatic plexuses, lymphatic vessels, lymph nodes and lymph organs (such as the spleen and thymus) constitute the lymphatic system.

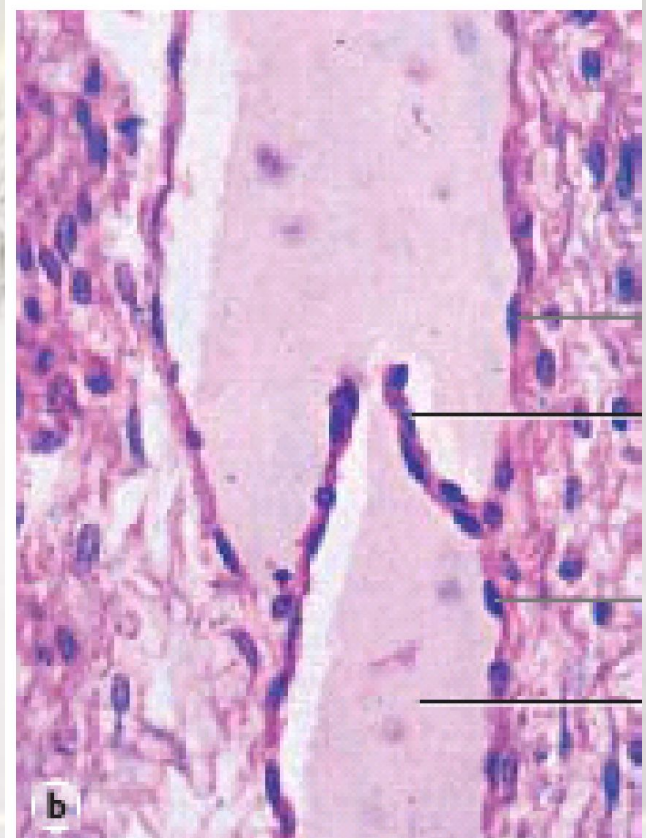
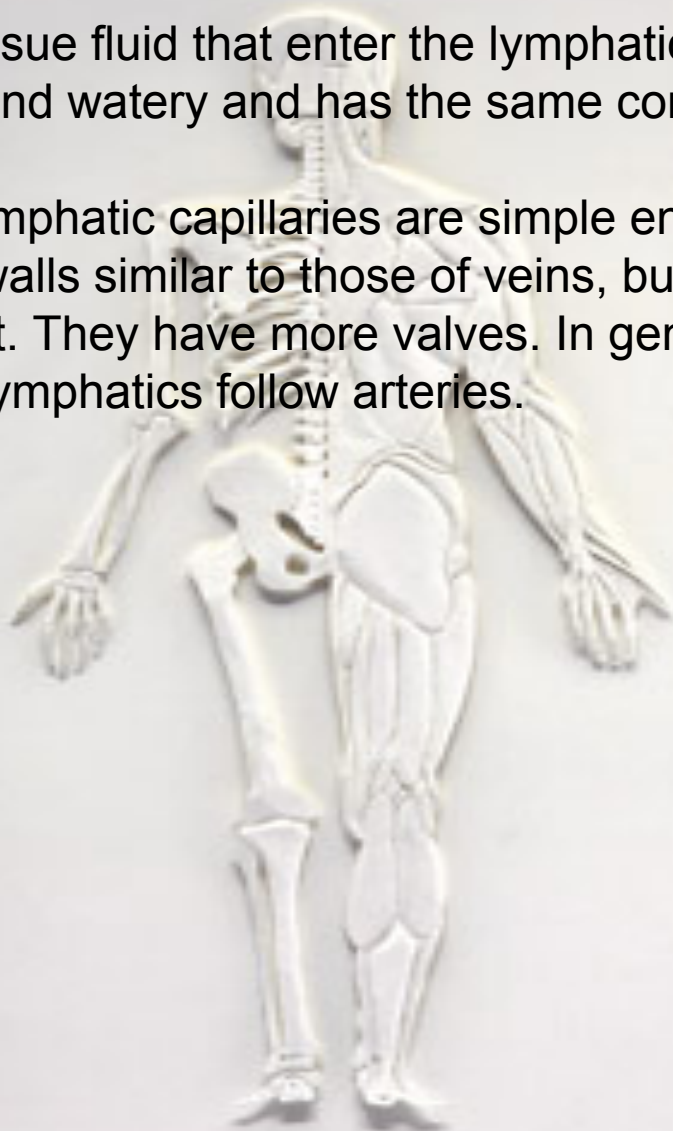


Thymus



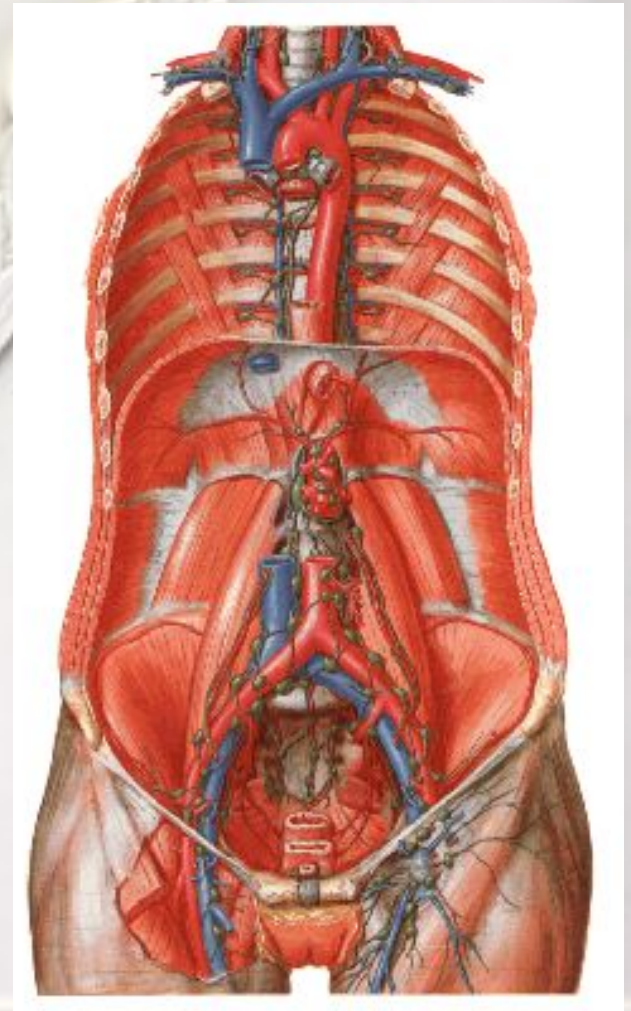
The tissue fluid that enters the lymphatic vessels is called **lymph**, which is usually clear and watery and has the same constituents as blood plasma.

The lymphatic capillaries are simple endothelial tubes. Larger collecting channels have walls similar to those of veins, but the specific tunics, or layers, are less distinct. They have more valves. In general superficial lymphatics follow veins, while deep lymphatics follow arteries.



Function of Lymphatic:

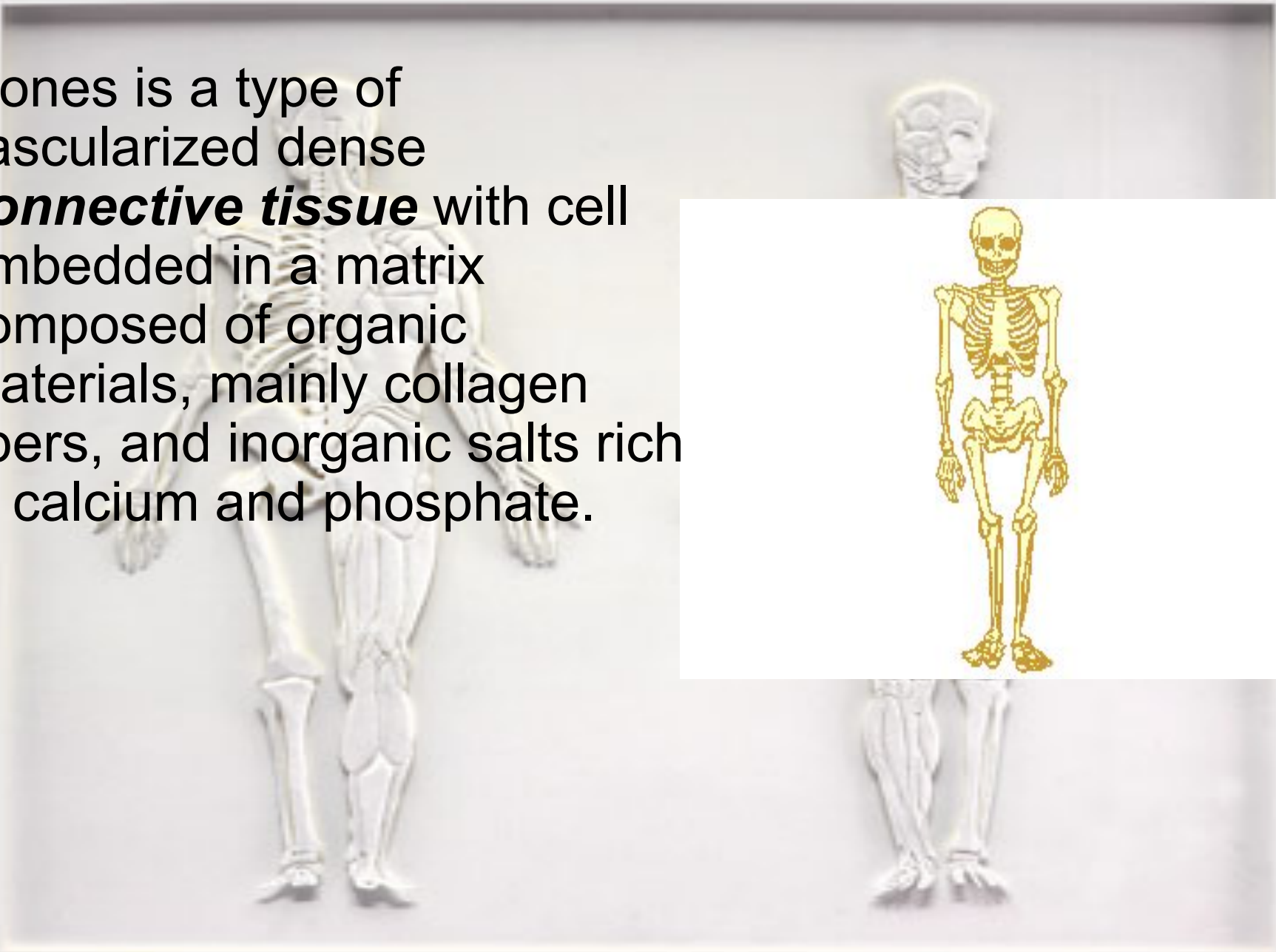
- Drainage of tissue fluids, collecting the lymph from tissue spaces and transport it to venous system.
- Absorption and transport of fat.
- Defense mechanism for the body.



Bones and Joints



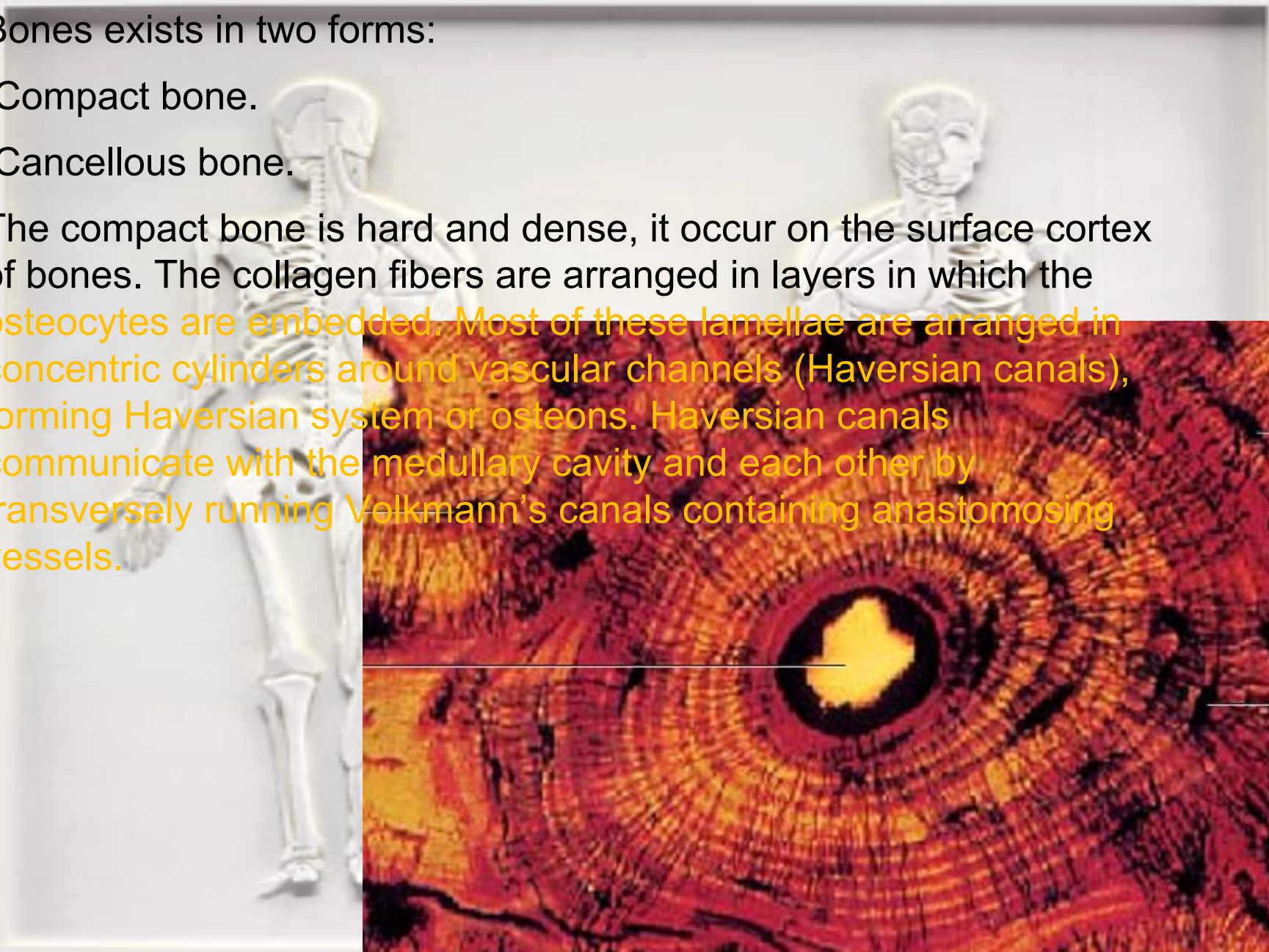
Bones is a type of vascularized dense ***connective tissue*** with cell embedded in a matrix composed of organic materials, mainly collagen fibers, and inorganic salts rich in calcium and phosphate.



Bones exist in two forms:

- Compact bone.
- Cancellous bone.

The compact bone is hard and dense, it occurs on the surface cortex of bones. The collagen fibers are arranged in layers in which the osteocytes are embedded. Most of these lamellae are arranged in concentric cylinders around vascular channels (Haversian canals), forming Haversian system or osteons. Haversian canals communicate with the medullary cavity and each other by transversely running Volkmann's canals containing anastomosing vessels.



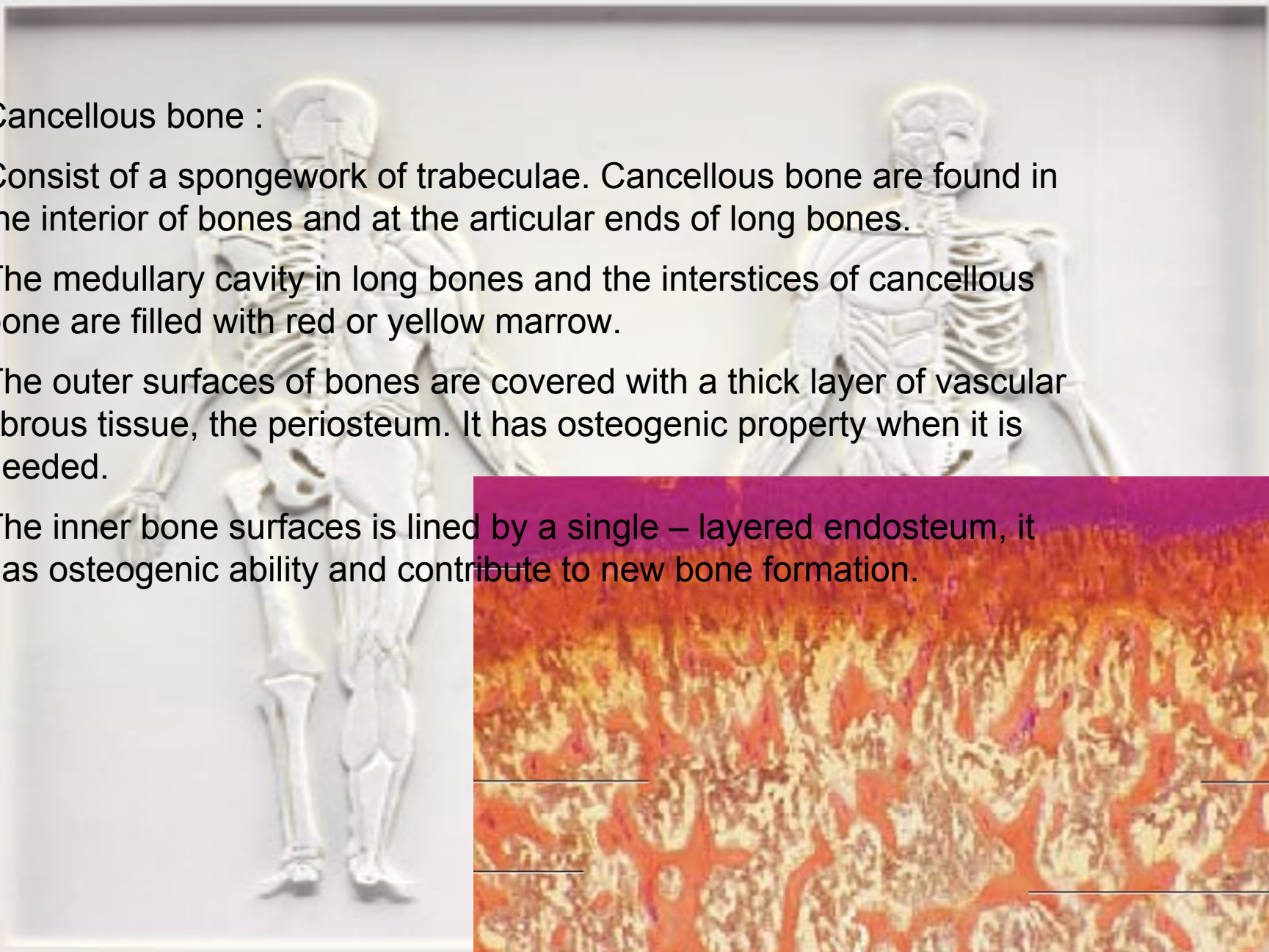
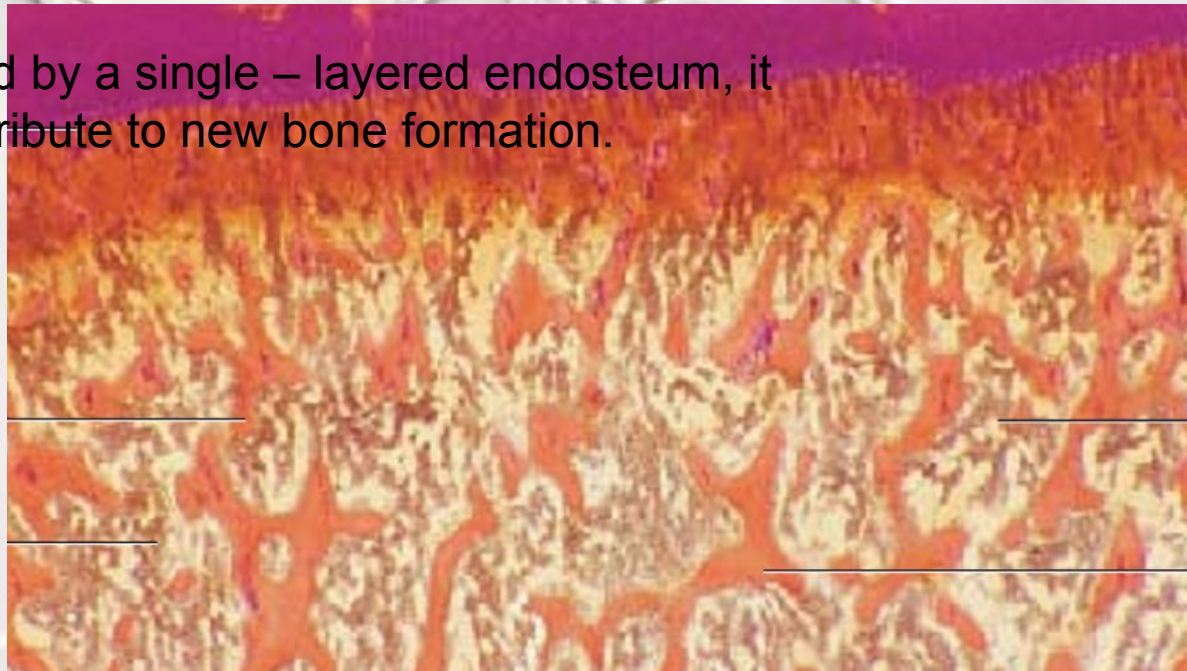
Cancellous bone :

Consist of a spongework of trabeculae. Cancellous bone are found in the interior of bones and at the articular ends of long bones.

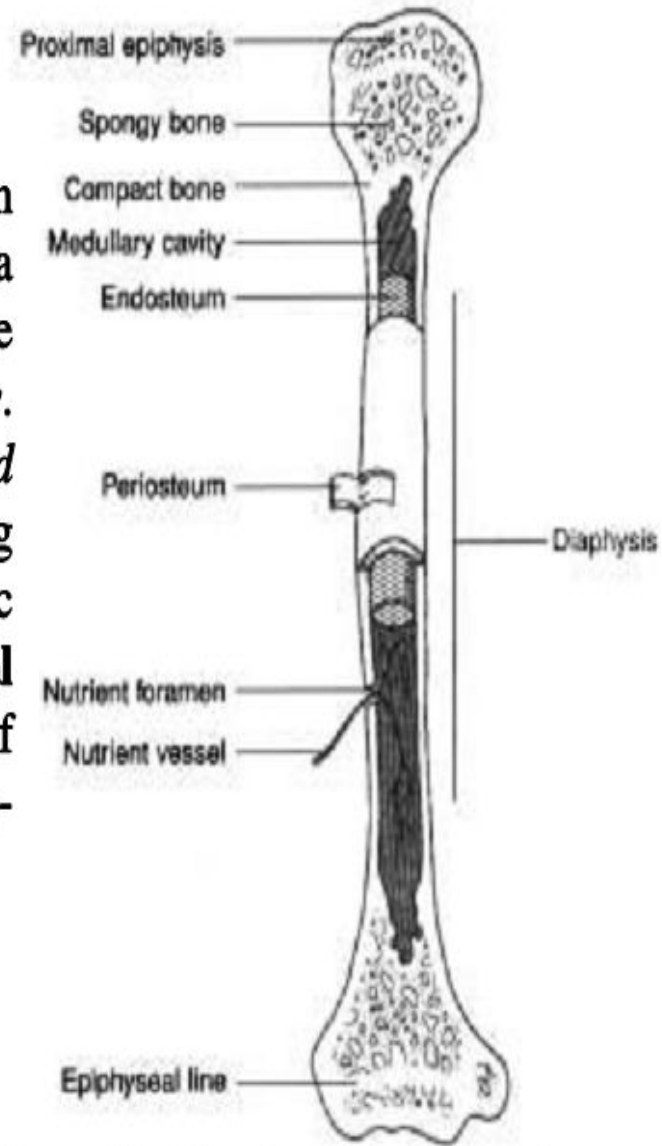
The medullary cavity in long bones and the interstices of cancellous bone are filled with red or yellow marrow.

The outer surfaces of bones are covered with a thick layer of vascular fibrous tissue, the periosteum. It has osteogenic property when it is needed.

The inner bone surfaces is lined by a single – layered endosteum, it has osteogenic ability and contribute to new bone formation.



A long bone consists of a **diaphysis** (or shaft) in the center and an **epiphysis** on either end . Within the diaphysis is a **medullary cavity** that is lined with a thin layer of connective tissue, the **endosteum**. The medullary cavity contains fatty *yellow bone marrow*. The epiphyses consist of *spongy bone* surrounded by *compact bone*. *Red bone marrow* is found within the pores of the spongy bone. Separating the diaphysis and epiphysis is an **epiphyseal plate**, a region of mitotic activity responsible for linear bone growth (elongation); an **epiphyseal line** replaces the plate when bone growth is completed. A **periosteum** of dense regular connective tissue covers the bone and is the site of tendon-muscle attachment and diametric bone growth (widening).



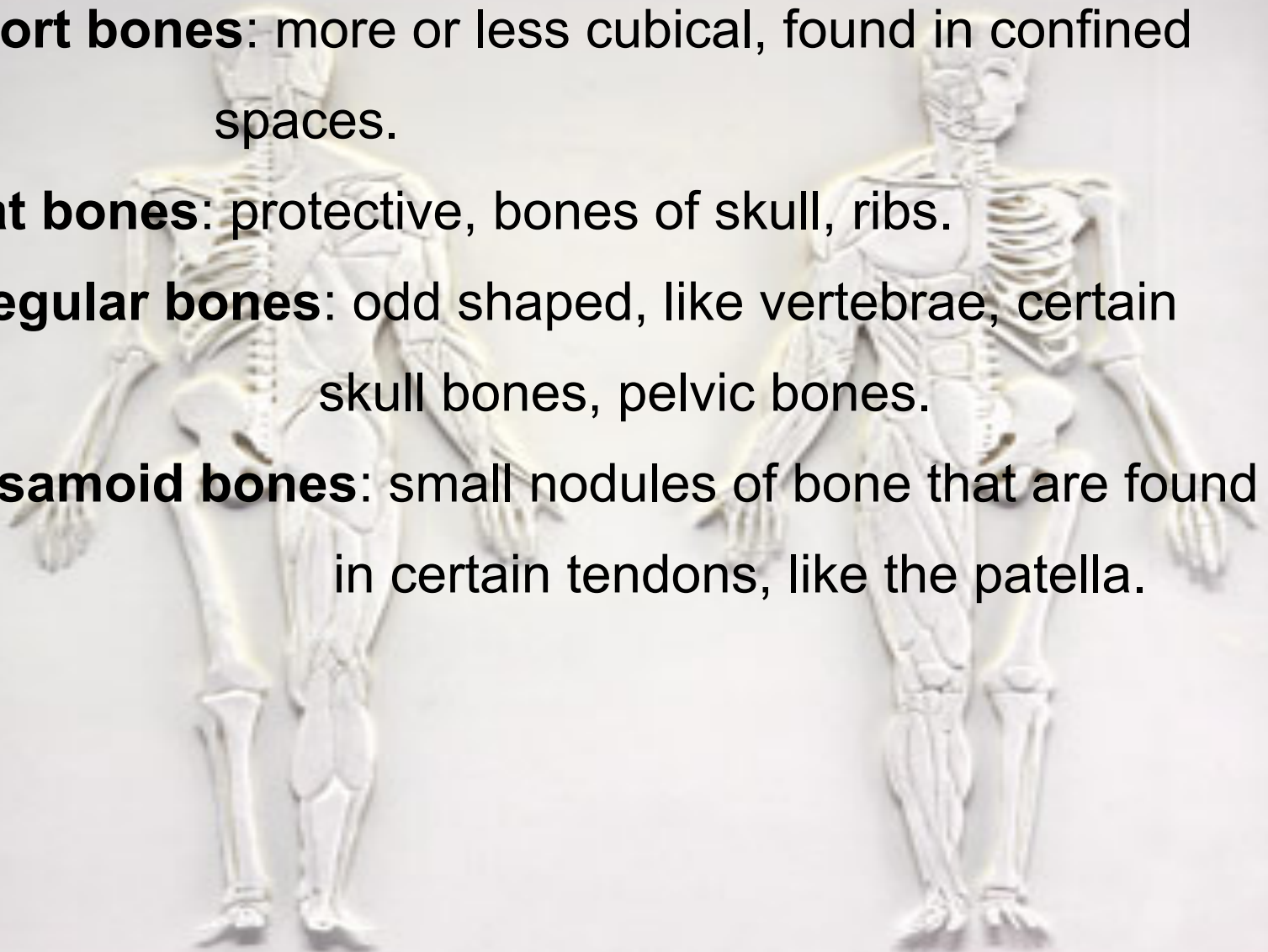
Long bones: longer than wide, found in appendages.

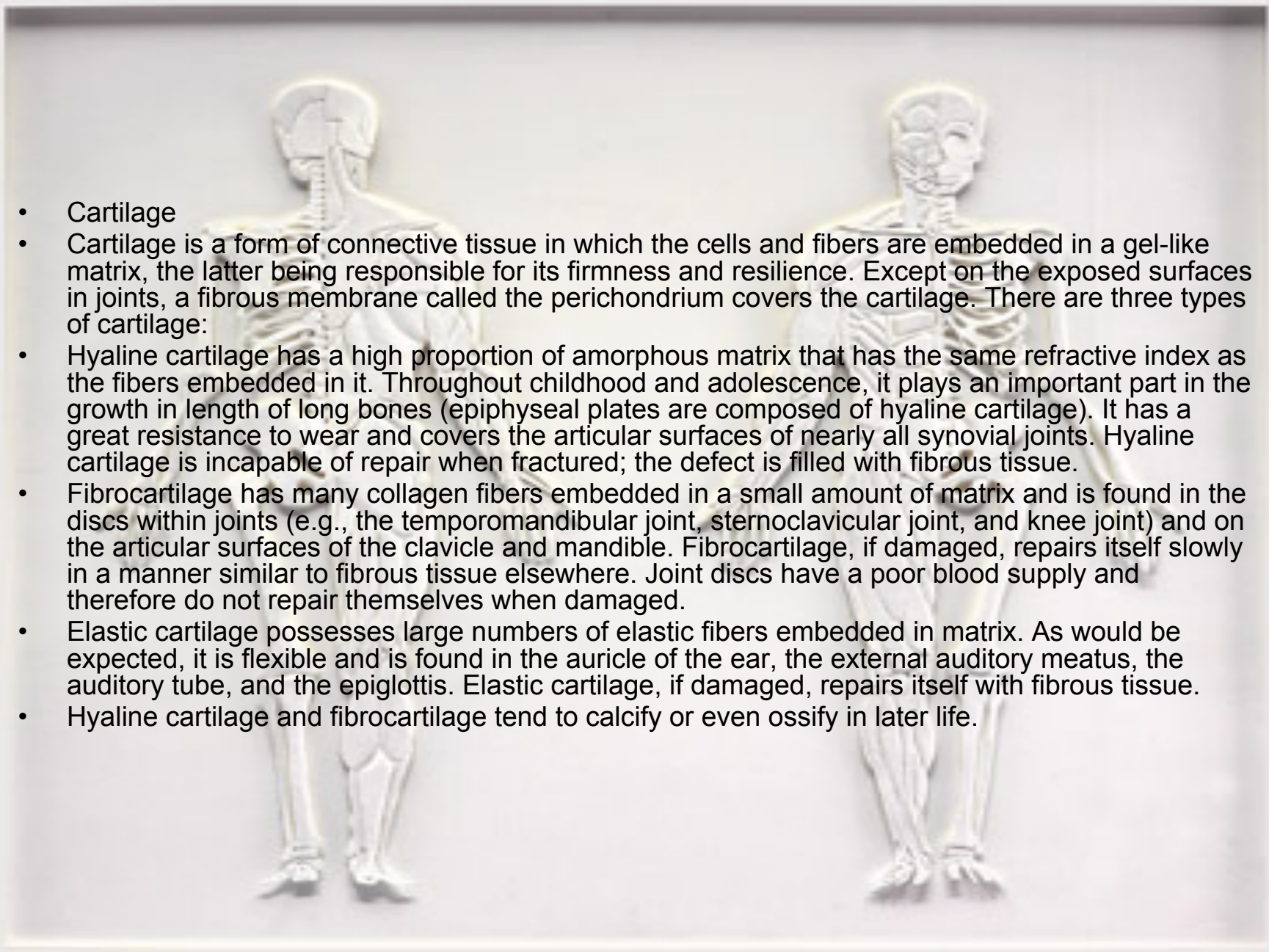
Short bones: more or less cubical, found in confined spaces.

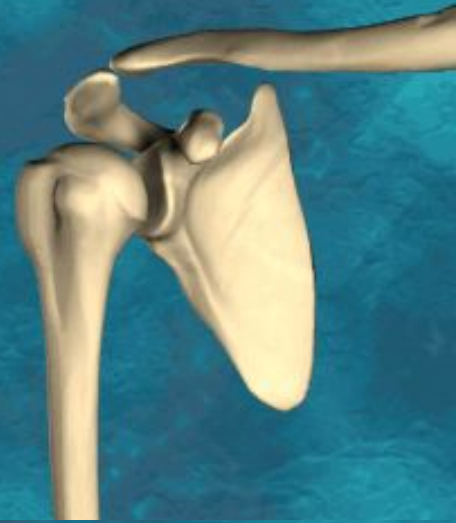
Flat bones: protective, bones of skull, ribs.

Irregular bones: odd shaped, like vertebrae, certain skull bones, pelvic bones.

Sesamoid bones: small nodules of bone that are found in certain tendons, like the patella.



- 
- Cartilage
 - Cartilage is a form of connective tissue in which the cells and fibers are embedded in a gel-like matrix, the latter being responsible for its firmness and resilience. Except on the exposed surfaces in joints, a fibrous membrane called the perichondrium covers the cartilage. There are three types of cartilage:
 - Hyaline cartilage has a high proportion of amorphous matrix that has the same refractive index as the fibers embedded in it. Throughout childhood and adolescence, it plays an important part in the growth in length of long bones (epiphyseal plates are composed of hyaline cartilage). It has a great resistance to wear and covers the articular surfaces of nearly all synovial joints. Hyaline cartilage is incapable of repair when fractured; the defect is filled with fibrous tissue.
 - Fibrocartilage has many collagen fibers embedded in a small amount of matrix and is found in the discs within joints (e.g., the temporomandibular joint, sternoclavicular joint, and knee joint) and on the articular surfaces of the clavicle and mandible. Fibrocartilage, if damaged, repairs itself slowly in a manner similar to fibrous tissue elsewhere. Joint discs have a poor blood supply and therefore do not repair themselves when damaged.
 - Elastic cartilage possesses large numbers of elastic fibers embedded in matrix. As would be expected, it is flexible and is found in the auricle of the ear, the external auditory meatus, the auditory tube, and the epiglottis. Elastic cartilage, if damaged, repairs itself with fibrous tissue.
 - Hyaline cartilage and fibrocartilage tend to calcify or even ossify in later life.

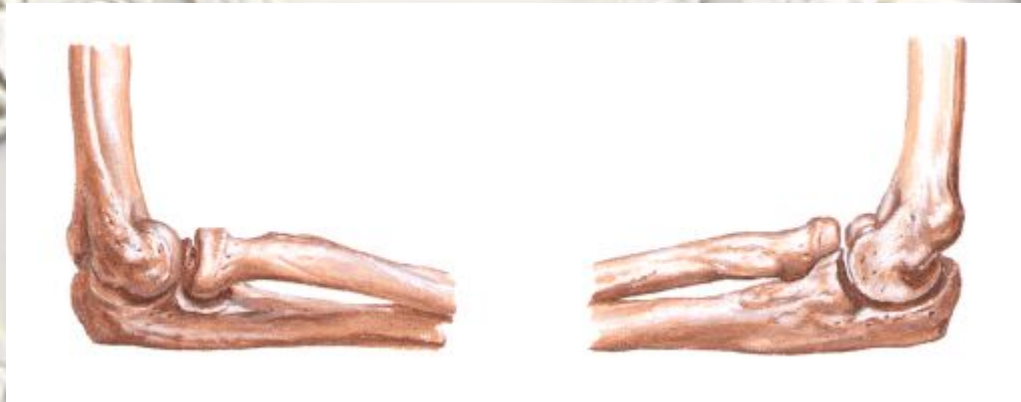


Joints



Joints:

Joints are an articulation (the place of union or junction between two or more bones). They exhibit a variety of form and function. Some joints have no movement, others have slight movement, while other permit a free movement.



Classification of Joints:

There are three types of joints classified according to the manner or type of material by which the articulating bones are united.

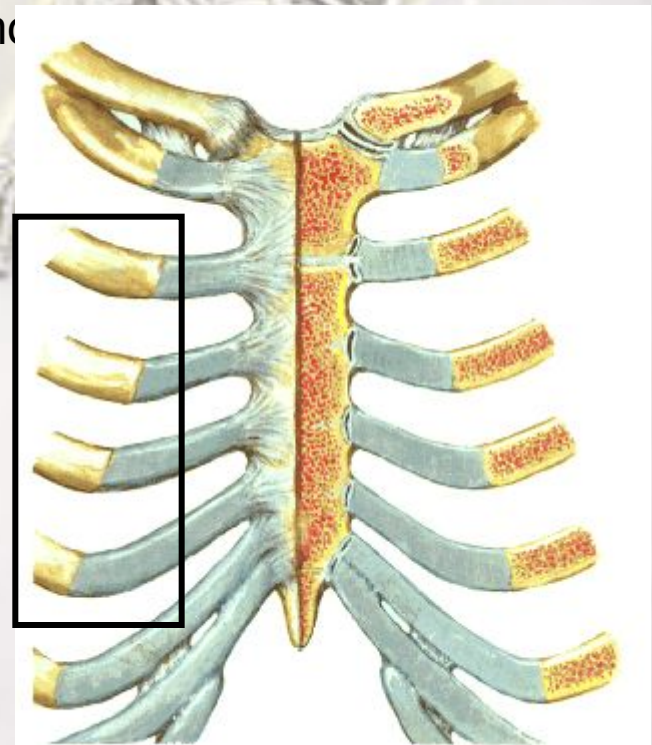
1. **Fibrous joints:** the bones are united by fibrous tissue, the amount of movement is negligible. The bones are separated only by connective tissue. Examples of this type is the sutures and the syndesmosis between the lower end of the tibia and fibula.



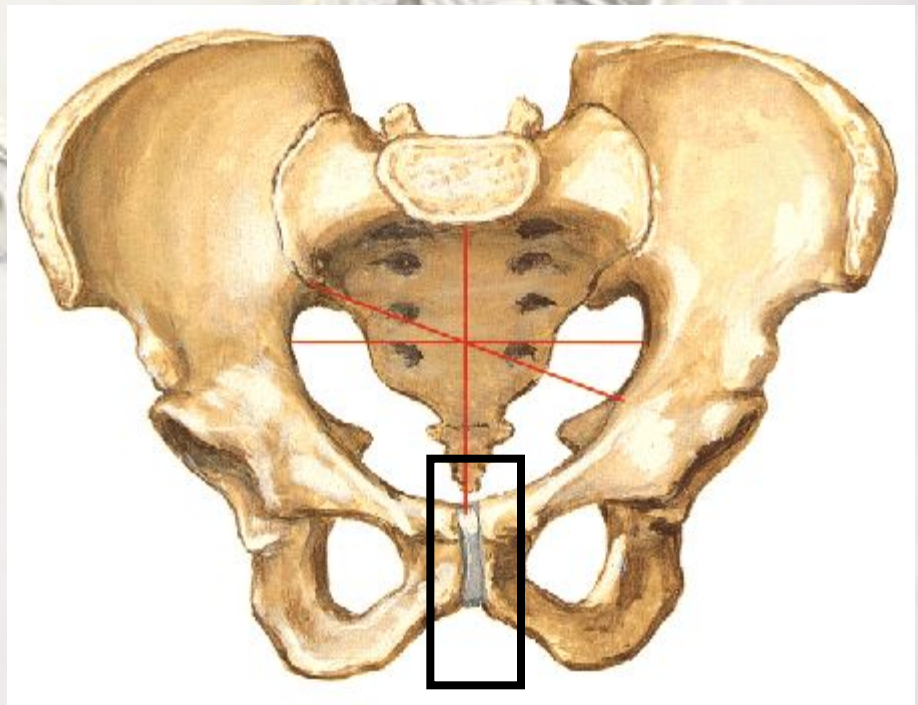
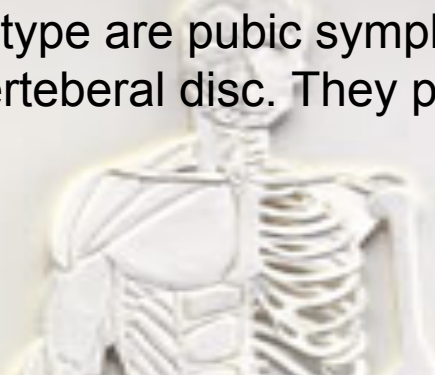
2. Cartilaginous joints: the bones are unite by hyaline or fibrocartilage. They are of two varieties:

- Primary cartilaginous joints (synchondrosis): where bone and hyaline cartilage meet.

Examples of this type are the epiphyses of bones and the costochondral junctions (junction between rib and its own costal cartilage). This type is strong and immo



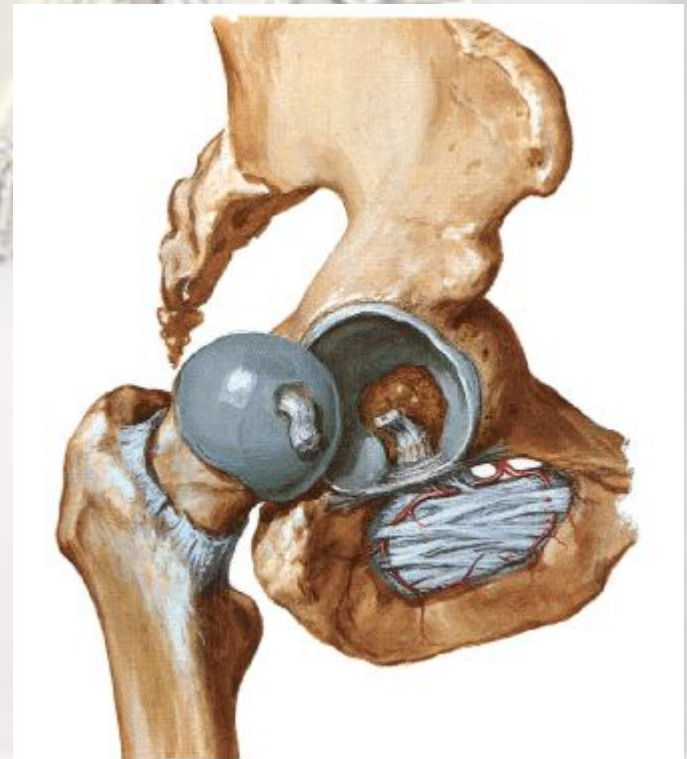
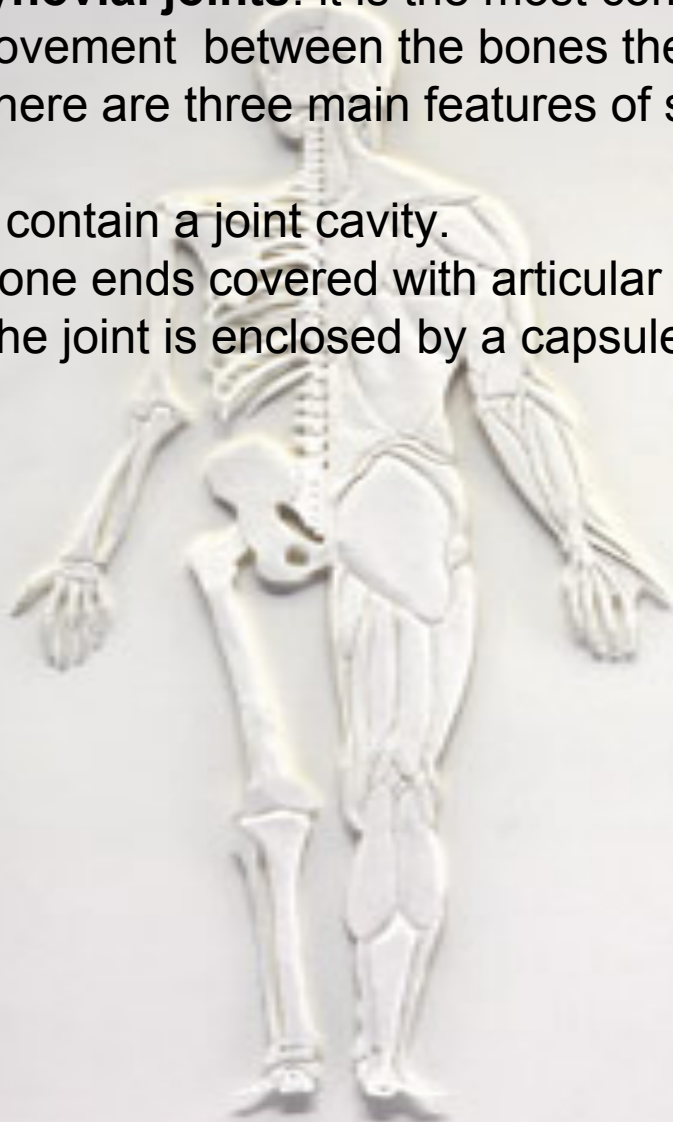
- Secondary cartilaginous joints (symphysis): where the bones are united by fibrocartilage. Example of this type are pubic symphysis, the joint of the sternal angle, and intervertebral disc. They permit a limited amount of movement.



3. **Synovial joints:** it is the most common type of joints, they provide a free movement between the bones they join.

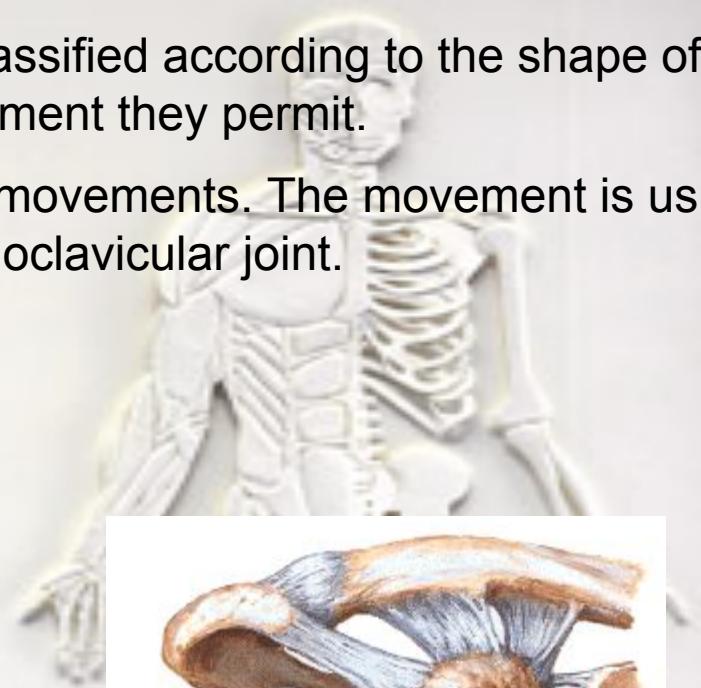
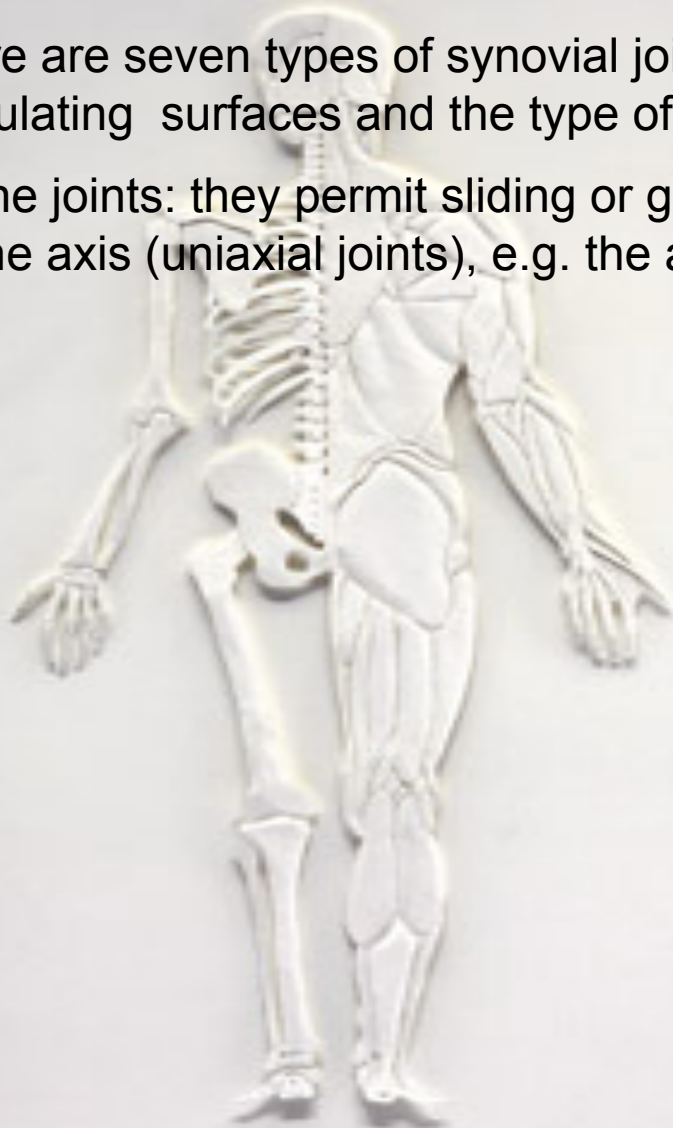
There are three main features of synovial joints which are:

- It contain a joint cavity.
- Bone ends covered with articular cartilage.
- The joint is enclosed by a capsule.



There are seven types of synovial joints classified according to the shape of the articulating surfaces and the type of movement they permit.

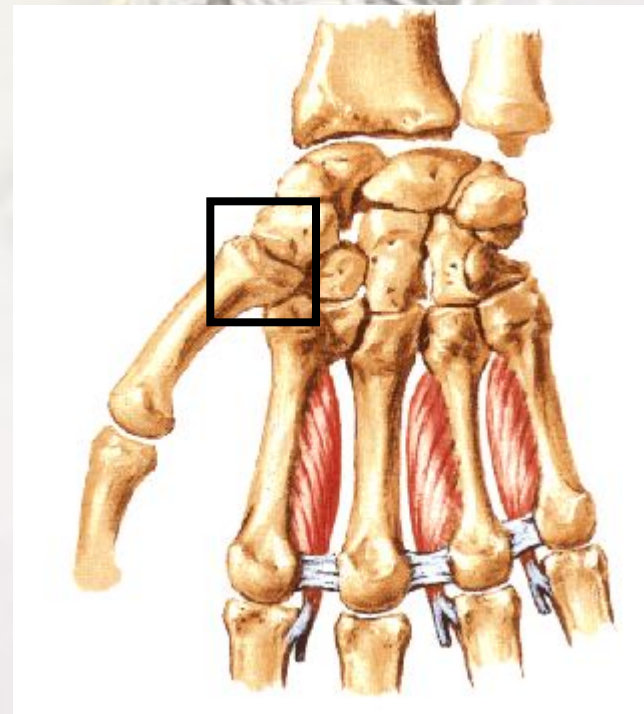
- Plane joints: they permit sliding or gliding movements. The movement is usually in one axis (uniaxial joints), e.g. the acromioclavicular joint.



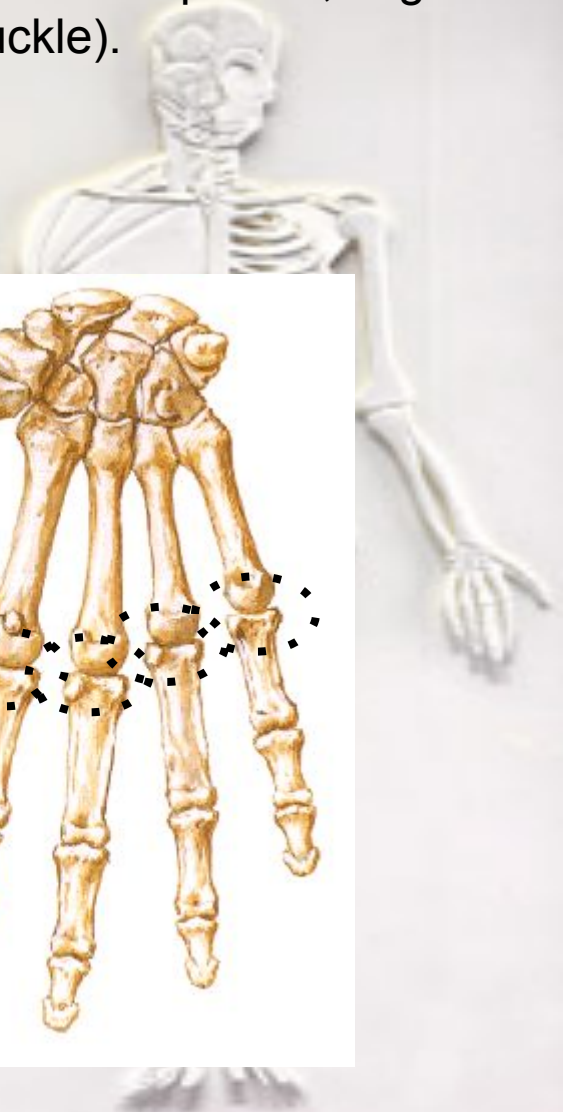
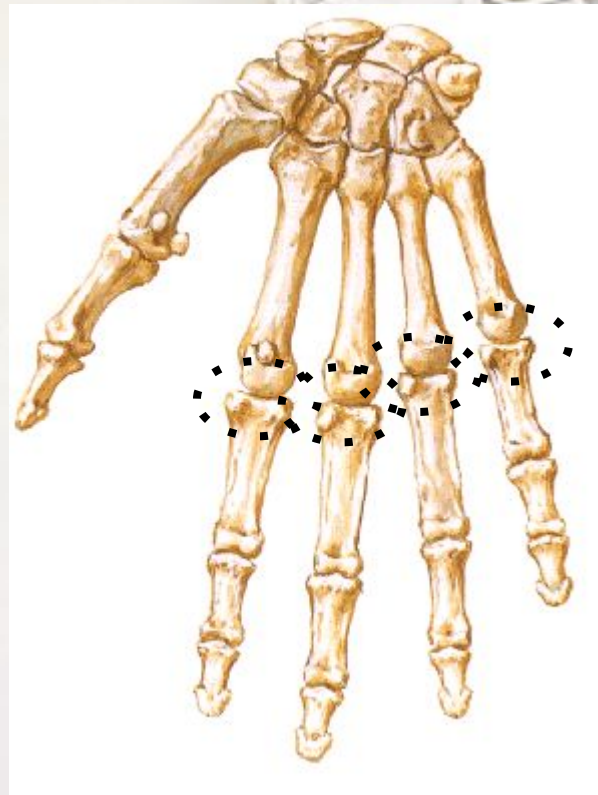
- Hinge joints: it is uniaxial joint, permit flexion and extension only, e.g. elbow joint.



- Saddle joints: they are biaxial with opposing surfaces shaped like a saddle. e.g. the carpometacarpal joint of the thumb.



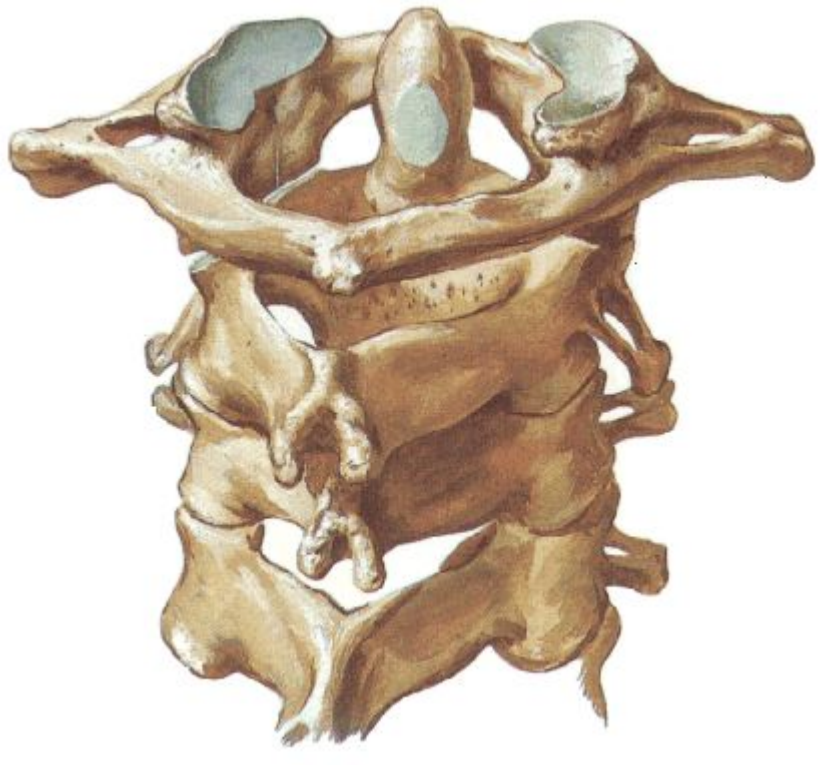
- Condylloid joints: are biaxial also, allow movement in two planes; sagittal and coronal, e.g. metacarpophalangeal joints (knuckle).



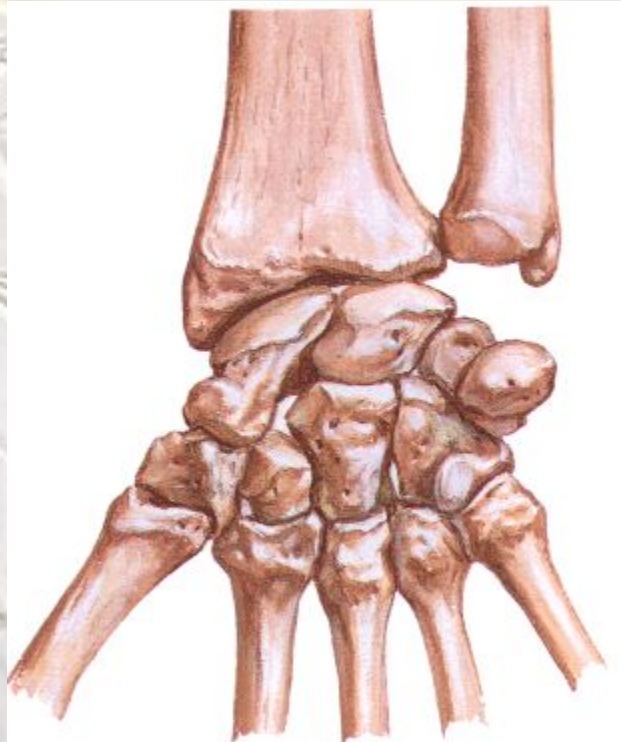
- Ball and socket joints: are multiaxial, they are highly movable joints. e.g. hip joint.



- Pivot joints: are uniaxial and allow rotation, e.g. atlantoaxial joint.



- Ellipsoid joints: are biaxial with no ability of rotation movement, e.g. wrist joint





**The
End**

