

Connective Tissue

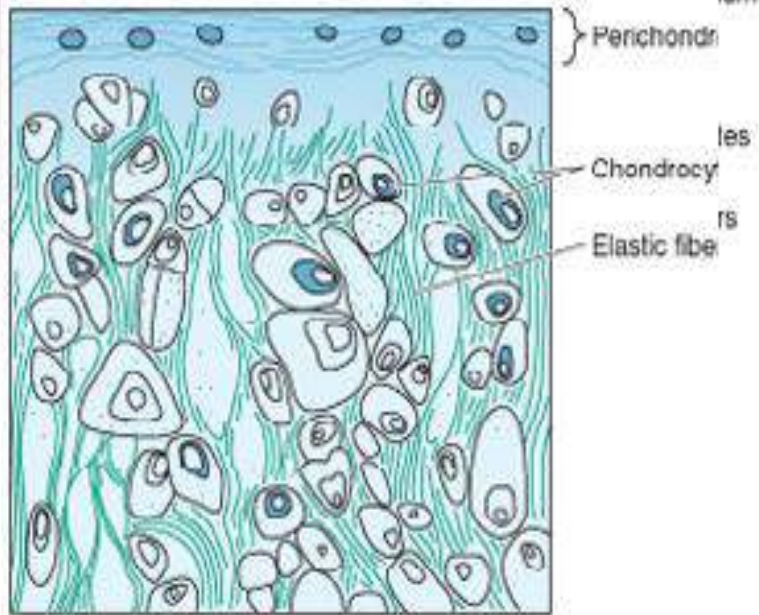
. Specialized connective tissue

1. Cartilage
2. Bone
3. Blood

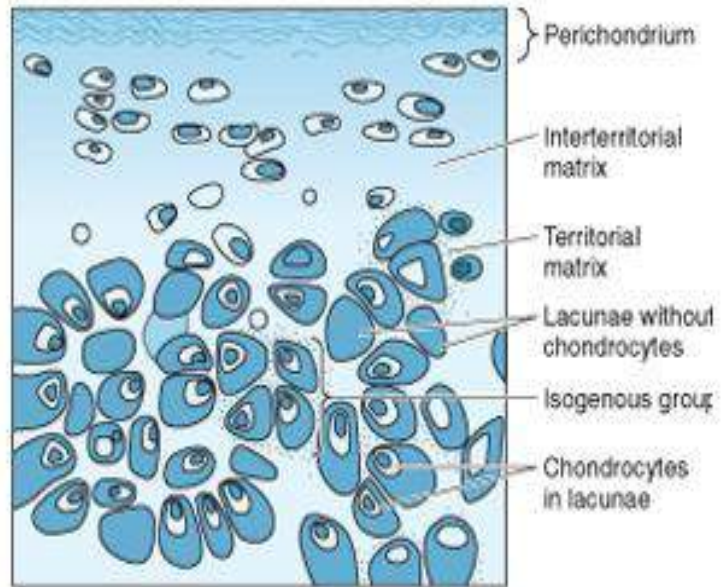
- **1-Cartilage:** *There are three types of cartilage according to the fibers present in the matrix :*

- **Hyaline cartilage** contains **type II** collagen in its matrix; it is the most abundant cartilage in the body and serves many functions.
- **Elastic cartilage** contains **type II** collagen and abundant elastic fibers scattered throughout its matrix, giving it more pliability.
- **Fibrocartilage** possesses dense, coarse **type I** collagen fibers in its matrix, allowing it to withstand strong tensile forces.

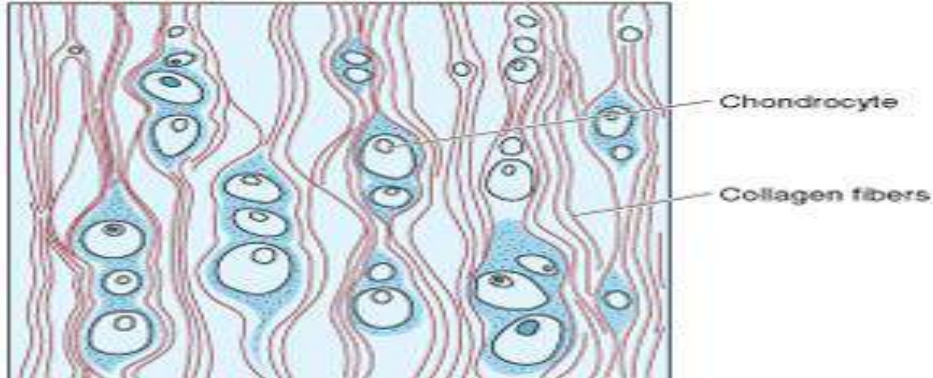
ELASTIC CARTILAGE



HYALINE CARTILAGE



FIBROCARTILAGE



Bones

- Bone is a specialized connective tissue whose extracellular matrix is calcified, incarcerating the cells that secreted it.
- Bone is the primary structural framework for support and protection of the organs of the body, including the brain and spinal cord and the structures within the thoracic cavity, namely the lungs and heart.

- The bones also serve as levers for the muscles attached to them, thereby multiplying the force of the muscles to attain movement.

- Bone is a reservoir for several minerals of the body; for example, it stores about 99% of the body's calcium. Bone contains a central cavity, the **marrow cavity**, which houses the **bone marrow**

- ***Bones are classified according to their shape:***
- Long bones display a shaft located between two heads (e.g., tibia).
- Short bones have more or less the same width and length (e.g., carpal bones of the wrist).
- Flat bones are flat, thin, and plate-like (e.g., bones forming the brain case of the skull).
- Irregular bones have an irregular shape that does not fit into the other classes (e.g., sphenoid and ethmoid bones within the skull).
- Sesamoid bones develop within tendons, where they increase the mechanical advantage for the muscle (e.g., patella) across a joint.

➤ Functions of the bones :

- 1. **Support** :- bones and muscles of the legs support the body.
- 2. **Locomotion** :- bone joints permit movement of one bone with respect to another.
- 3. **Protection** :-
 - *The skull protect the brain, eyes and ears .*
 - *The ribs protect heart and lungs .*
 - *Spinal column protect spinal cord*
- 4.

- Storage of chemicals:- Ca storage in the bone which is released when it needed.
- 5. Nourishment:- Teeth (incisors, canines and molars) for cutting ,tearing and grinding
- 6. Sound transmission :- Ossicles in the middle ear (the smallest bone in the body). ..the three bones of the middle ear which transmit the sound vibration to inner ear.
- 7.production of red blood cells.(haemopoiesis :production of (R.B.C,W.B.C & plate) which occur in the

➤ Bone Remodeling :

- A slow continuous process of destroying old bone and building new bone.
- So we have a new skeleton about every seven years.

▶ *There are two types of cells in bone remodeling :*

- 1. **Osteoblasts** : cells specialized in bone building.
- 2. **Osteoclasts** : cells specialized in bone destroying.
- Each day the osteoclast destroy bone containing about 0.5 gm of Ca , and Osteoblast builds a new bone using nearly the same amount of Ca.

Osteoblast > Osteoclast in young. ■

Osteoblast < Osteoclast after the age 35- 40 years ■

old ,which resulting in continuous decrease in bone mass and lead to serious problem of weak bones results in spontaneous fractures especially in the spine and hips, this is called **Osteoporosis** (Porous bones).(This appeared to be more in women than in men) .

Note : *the bones have about 1000gm of Ca .*

➤ What is Bone Made Of ?

- Bone consist of two different materials plus water :
- 1. **Collagen** :- the major organic fraction is about 40% of the weight of solid bone and 60% of it's volume .
- 2. **Bone Mineral** :- Inorganic material , which is about 60% of the weight and 40% of volume of solid bone.

➤ Type of the bone:

- 1.**Solid or compact bone**: this is found in central shaft of the bone.
- 2.**Spongy bone(Trabecular bone)** ._this bone is found in the end of the long bones.

Blood is composed of a fluid component (plasma) and formed elements consisting of the various types of blood cells as well as platelets.

