specialized Connective Tissue: They include :-

1- Skeletal (Supporting) Connective Tissue

2- Fluid (Vascular) Conecctive tissue

I / Skeletal Connective Tissue:

Cartilage & Bone called supporting (skeletal) connective tissue because they provide strong and supporting into the body , in these connective tissue , the matrix contain numerous fibers and (in some cases) deposits of insoluble calcium salts.

A- Cartilage : It form the skeleton of **early mammalian fetuses** but it is gradually replaced in the growing by bone matrix of cartilage is firm but pliable . It is composed of amorphous ground substance , fibers and characteristics cells .

Cartilage is surrounding by connective tissue region called **perichondrium** which composed of two distinct layer:

*** outer fibrous region of dense irregular connective tissue**

*** inner cellular (chondrogenic) layer composed of chondorogenic cell**.

many cells found in cartilage included :

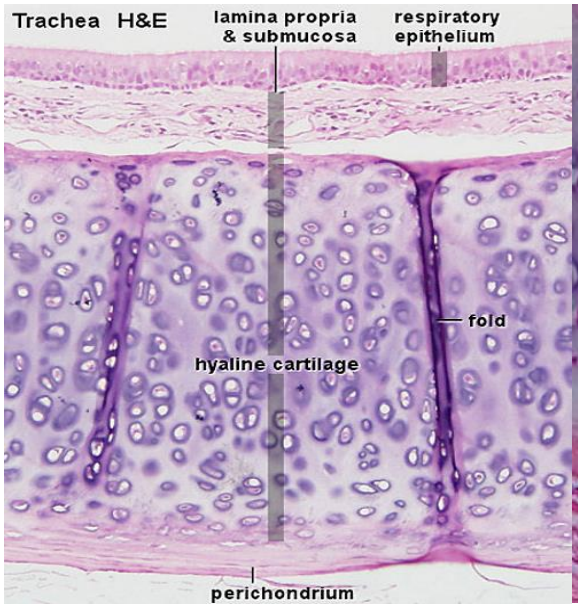
● **Chondrogenic cell** : found in the inner layer of the perichondrium differentiate into

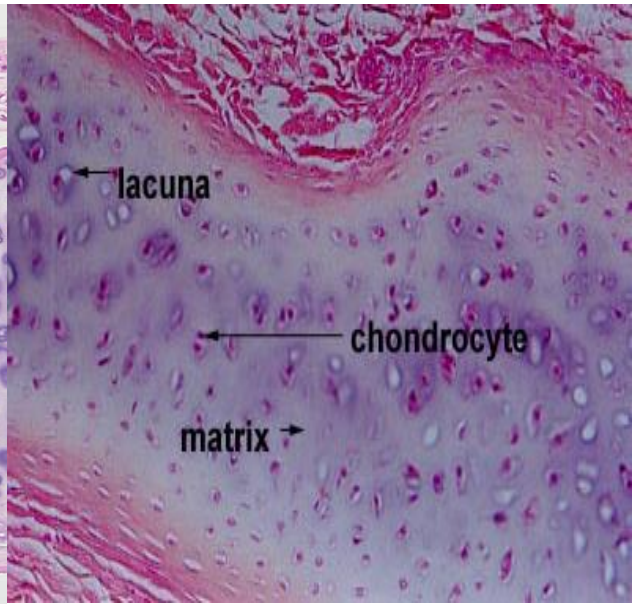
● **chonroblasts** which produce cartilage .

●**Condrocytes** (matured chondoblasts) : chondrocytes is located in the cavities called **lacunae** in single or groups (when found in groups formed **cell nests**)

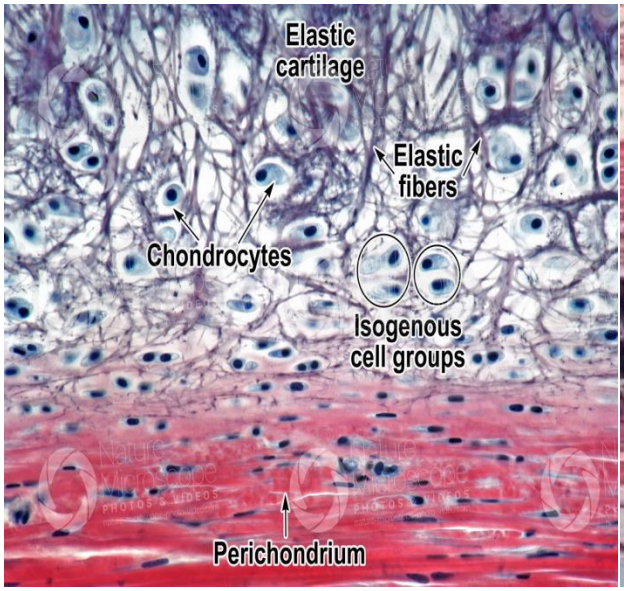
There are three type of cartilage:

Hyaline cartilage : resembles glass and very rubbery, soft cartilage contains collagen but it is very spread out and widely dispersed , In the embryo, bones form first as hyaline cartilage before ossifying as development progresses. is found connecting the ribs to the sternum, on the ends of long bones where they come together to form a joint, in the trachea holding it open, and within the larynx , surround by perichondrium .

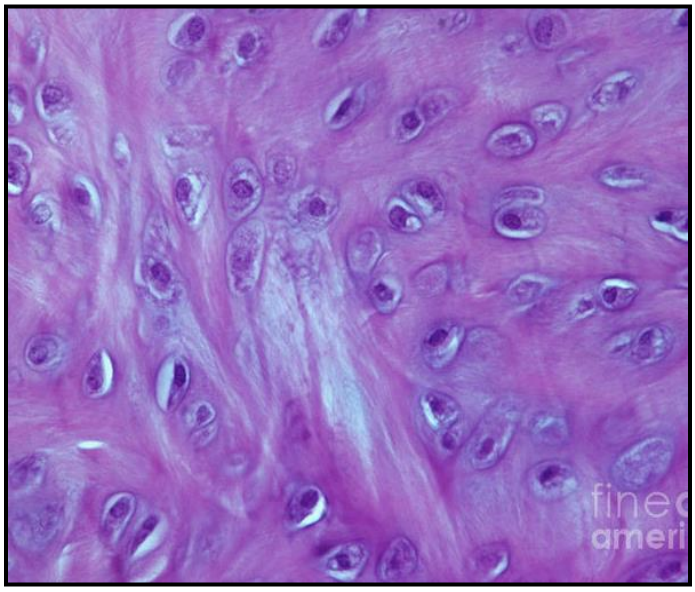


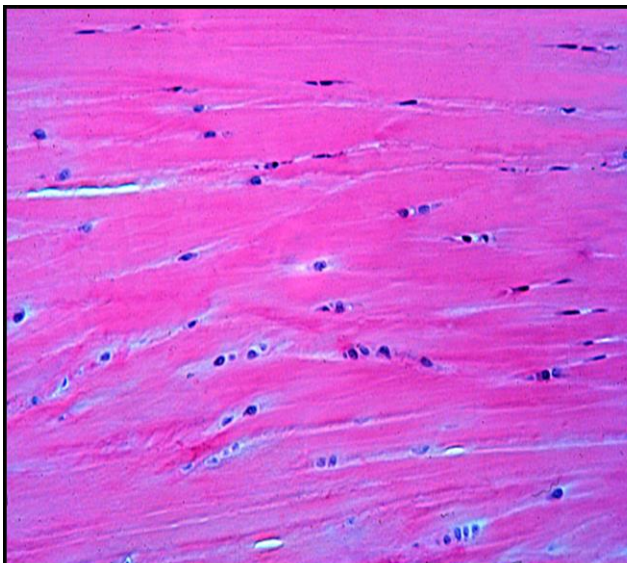


2-Elastic or Yellow cartilage : contains lots of elastic protein fibers (elastin) this type of cartilage allows for flexibility and makes structures elastic found in the external ear and epiglottis . contain perichondrium .



3-White – fibro cartilage : this is the most tough of the three , it is very very densely packed with collagen fibers it is very useful for resisting compressive forces and physical shock found in three places: intervertebral disks, menisci of the knee, and the pubic symphisis .there is no perichondrium in this type .





Bone

Bone is part of The skeletal system, serves three primary functions:

- Mechanical support for sites of muscle attachment
- Protection of vital organs
- Ion reserve of Ca^{+2} and PO for metabolic functions

The main components of bone, like all connective tissues, are **cells and matrix**. There are three type of cells in bone tissue. They each have unique functions and are derived from two different cell lines.

- **Osteoblasts**:synthesize the bone matrix and are responsible for its mineralization. They are derived from osteoprogenitor cells, a mesenchymal stem cell line.
- **Osteocytes**: are inactive osteoblasts that have become trapped within the bone they have formed. Always this cell found in cavities called **lacunae** .

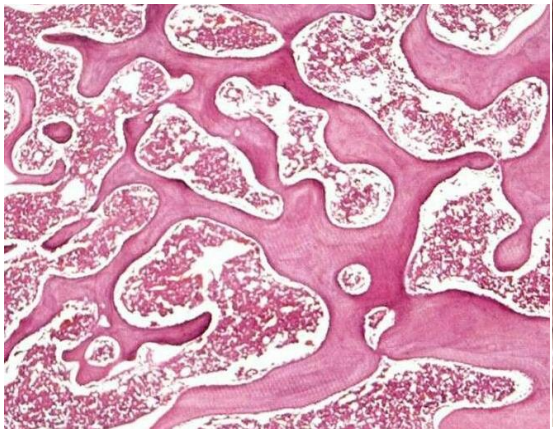
- **Osteoclasts** : break down bone matrix through phagocytosis., they are derived from the monocyte (macrophage) cell line. the space between the osteoclast and the bone is known as **Howship's lacuna**.

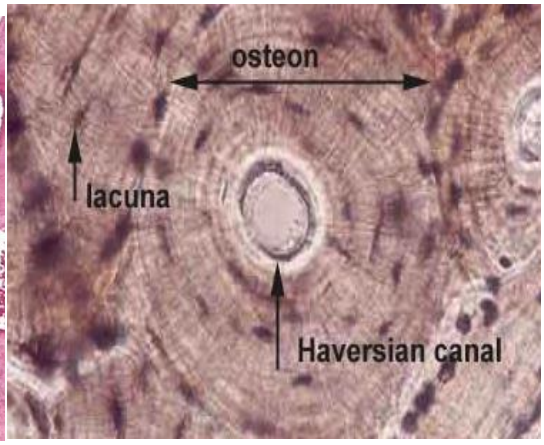
Bone is divided into two types that are different structurally and functionally. Most bones of the body consist of both types of bone tissue:

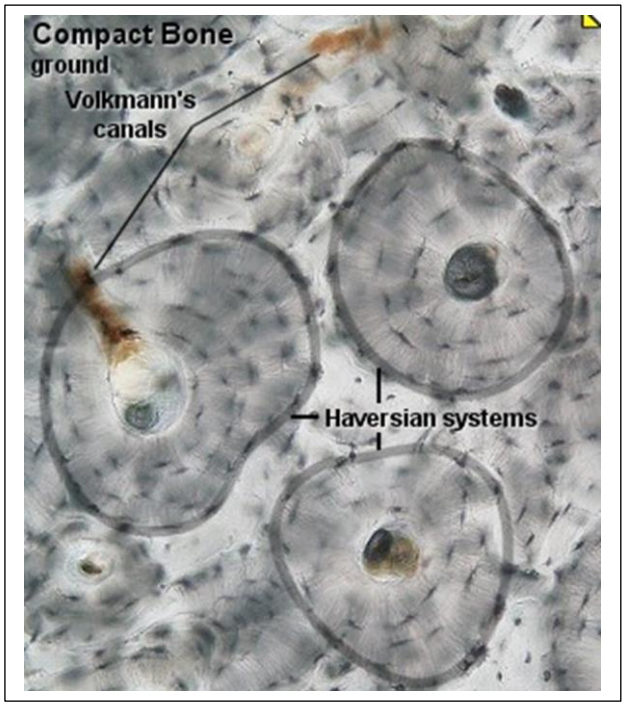
1. **Compact bone**: or cortical bone, mainly serves a mechanical function.. It is **thick and dense.** is organized as parallel columns, known as Haversian systems or called (osteon), which run lengthwise down the axis of long bones. These columns are composed of lamellae, concentric rings of bone, surrounding a central channel, or **Haversian canal**, that contains the nerves, blood vessels, and lymphatic system of the bone. The parallel Haversian canals are connected to one another by the perpendicular **Volkmann's canals**.

The lamellae of the Haversian systems are created by osteoblasts. As these cells secrete matrix, they become trapped in spaces called lacunae and become known as osteocytes. Osteocytes communicate with the Haversian canal through cytoplasmic extensions that run through **canaliculi**, small interconnecting canals.

3.Spongy bone: (also called **cancellous or trabecular bone**) matrix (lamella) of spongy bone consists of bars or trabeculae (septum) and sheets of bone(trabeculae) , which branch and intersect to form a sponge like network. mainly serves a metabolic function. This type of bone is located between layers of compact bone and is **thin and porous**. Located within the trabeculae is the **bone marrow**.




osteon
lacuna
Haversian canal


Compact Bone
ground
Volkmann's
canals
Haversian systems