



Faculty of Biological Science and Technology
Zoology and Botanical Department
Practical Histology

Connective Tissue

Cartilage

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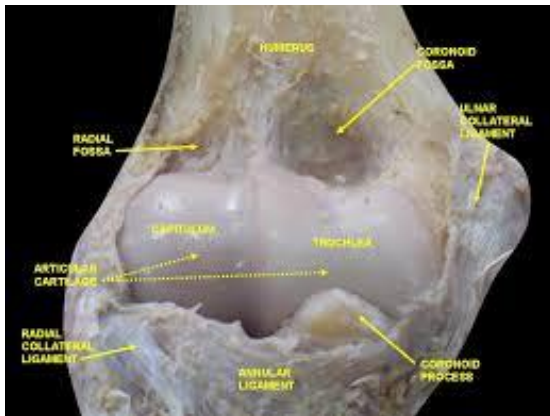
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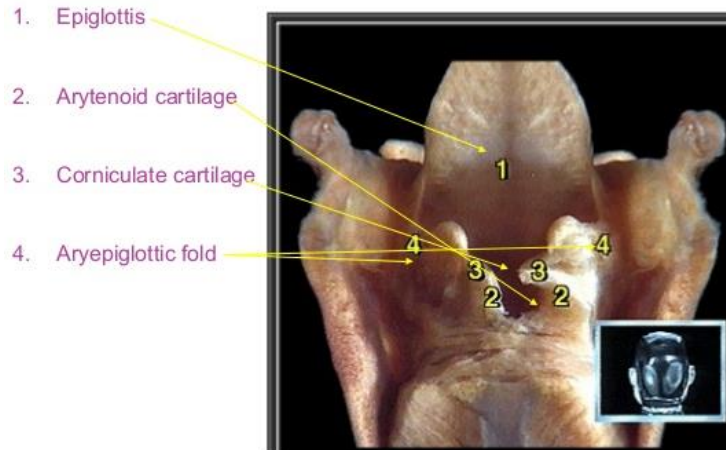


Introduction

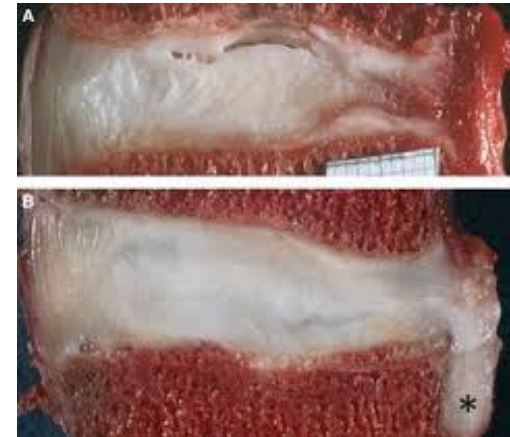
- ▶ Cartilage is a special, tough but flexible connective tissue
- ▶ Cartilage is an avascular and aneural connective tissue. Its matrix composed of special proteoglycan, glycoprotein and collagen fibers
- ▶ There are three type of cartilage:
 - ▶ Hyaline cartilage
 - ▶ Elastic cartilage
 - ▶ Fibrous cartilage



Joint cartilage is a kind of hyaline cartilage



Some of larynx cartilages are elastic cartilage

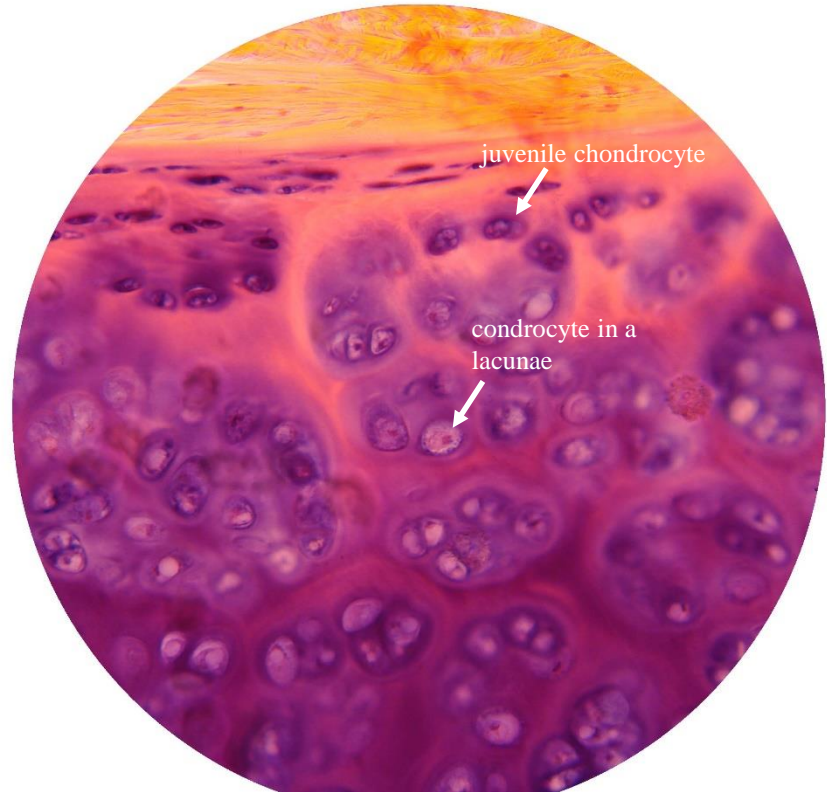


Intervertebral disc is a kind of fibrous cartilage



Hyaline cartilage

- ▶ Hyaline cartilage is a Bluish-white, glassy appearance cartilage, which is found in joint, respiratory tracts and immature bone
- ▶ It has an extracellular matrix (ECM) contains compressed collagen fiber type II, aggrecan and chondronectin
- ▶ Chondroblasts are special cells that produce ECM. Chondroblasts surrounded by ECM and become chondrocyte. Chondrocytes play a role in maintenance of cartilage ECM
- ▶ Lacunae is a space to settle down chondroblasts and chondrocytes and provide a microenvironment for keeping cell alive
- ▶ Juvenile chondrocytes are elliptical and found in the surface of cartilage. As cartilage grows, they shift inward and their shape take a round form

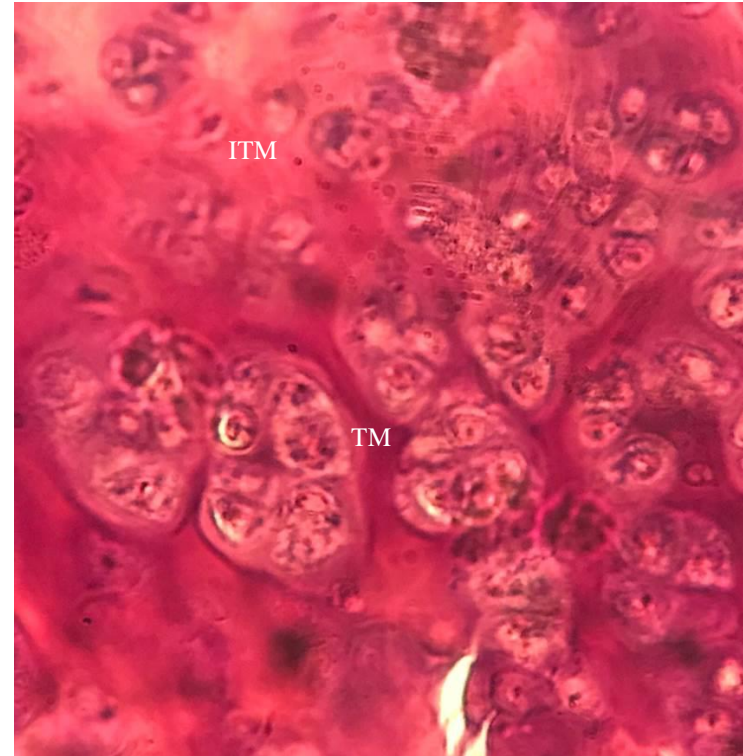


Histological structure of hyaline cartilage. H&E, 10X. This picture is taken from histological slide in histology laboratory of Isfahan University



Hyaline cartilage

- ▶ The darker staining matrix, immediately surrounding the lacunae is called territorial matrix. Territorial matrix has a higher concentration of glycosaminoglycans, so it has basophilic property and it will stain darker when it is stained and viewed under a microscope
- ▶ The matrix that occupies the majority of space between chondrocytes is called interterritorial matrix



Territorial matrix (TM) and interterritorial matrix (ITM) in hyaline cartilage. H&E, 40X. This picture is taken from histological slide in histology laboratory of Isfahan University



Isogenous group

- ▶ A cluster of up to eight chondrocytes, arising from mitosis of one chondroblast and located in a lacunae is known as isogenous group
- ▶ Isogenous group can be found in hyaline and elastic cartilage

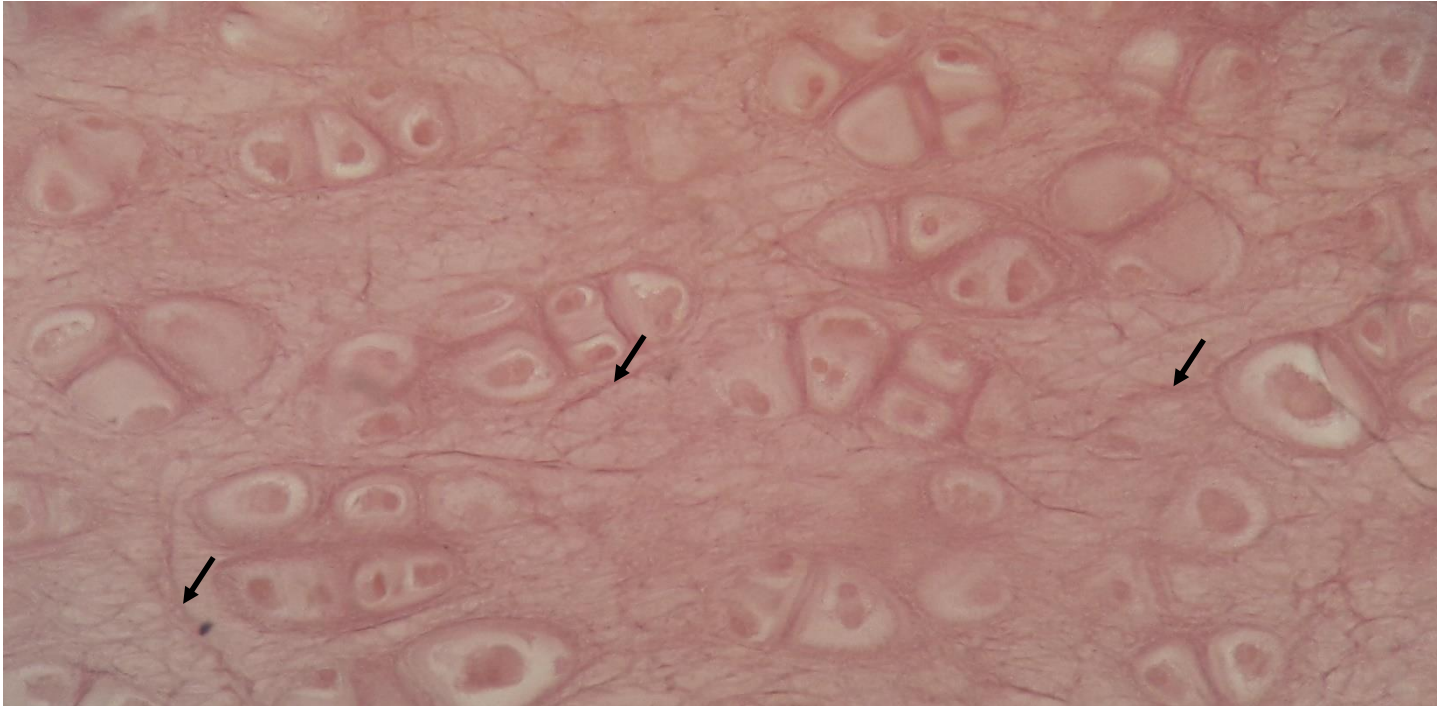


Circles show two isogenous group in hyaline cartilage. H&E, 10X. This picture is taken from histological slide in histology laboratory of Isfahan University



Elastic cartilage

- ▶ Elastic cartilage is similar to hyaline cartilage histologically, However, contains a large amount of elastic fibers. These fibers form bundles that appear darker under a microscope

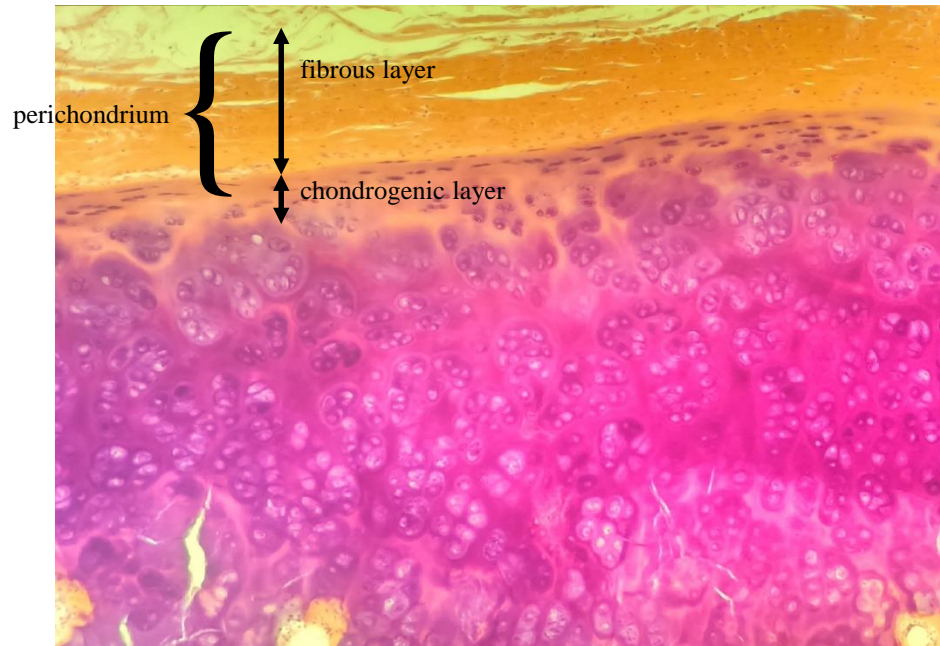


Elastic cartilage. Black arrows show elastic fibers. H&E, 72X. This picture is taken from histological slide in histology laboratory of Isfahan University



Perichondrium

- ▶ Except for articular surface of cartilage, all other hyaline and elastic cartilage is enveloped by irregular dense connective tissue which is called perichondrium. It consists of two layers:
 - ▶ 1) outer fibrous layer which contain fibroblasts and collagen type I
 - ▶ 2) inner chondrogenic layer which contain chondroblasts



Perichondrium. Star depicts cartilage mass. H&E, 4X. This picture is taken from histological slide in histology laboratory of Isfahan University