

HISTOLOGY OF THE CARTILAGE

INTRODUCTION

➤ It is a specialized connective tissue designed to give support, bear weight and withstand tension, torsion and bending.



General Features

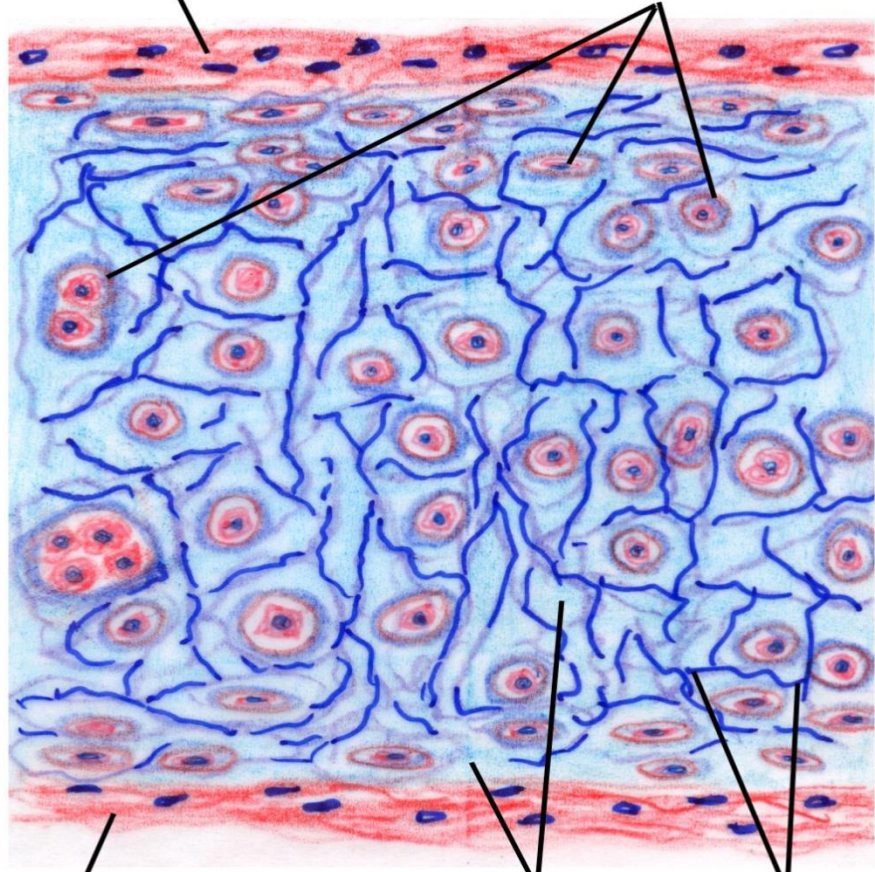
- Avascular tissue
- Non nervous structure
- Poor regeneration capacity
- Usually surrounded by perichondrium (except articular cartilage and fibro cartilage)

PERICHONDRIUM

Cartilage is covered by dense irregular connective tissue known as **Perichondrium** except articular cartilage and fibro cartilage.

- Has two layers:
 - Outer **fibrous layer** (vascular)
 - Inner **chondrogenic layer** (cellular)
- Has cells which can regrow cartilage to some extent if the cartilage is damaged.

Perichondrium **Chondrocytes in lacunae**



Perichondrium

Matrix

**Elastic
Fibers**

COMPONENTS

- **Cells:**
 - **Chondroblasts**
 - **Chondrocytes**
- **Extra cellular matrix**
- **Fibres-collagen and elastic**
- **Ground substance- mucopolysaccharides (chondroitin sulphate, Keratan sulphate and hyaluronic acid)**

CELLS

- They are derived from undifferentiated mesenchymal cells
- **Young cells** are small with branched cytoplasmic processes known as **chondroblasts**, they multiply to chondrocytes
- Older and mature cells are known as **chondrocytes**

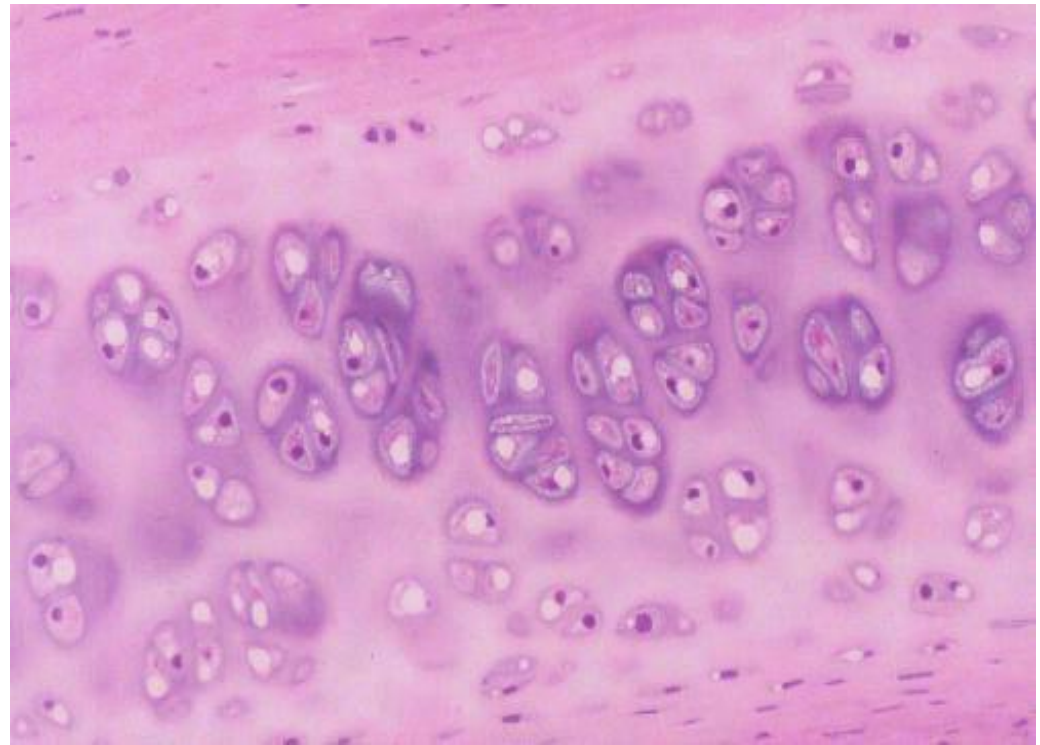
- **Chondrocytes are bigger in size and are found in spaces called as **lacunae****
- **They are found either groups of 2-4 cells together known as cell nest or individual cells**
- **They are responsible for production of fibres and ground substance of the cartilage**
- **Old mature cells are incapable of multiplication**

TYPES

- HYALINE CARTILAGE
- ELASTIC CARTILAGE
- FIBRO CARTILAGE

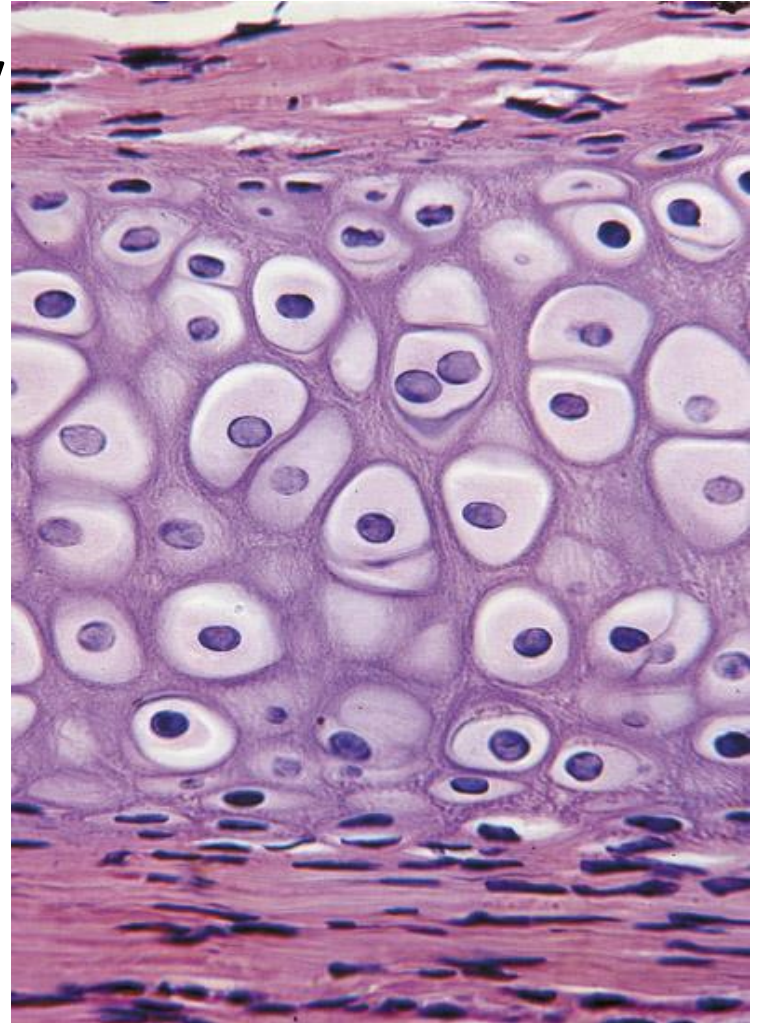
HYALINE CARTILAGE

Hyaline cartilage is the most common type, found in several places.



Hyaline Cartilage

The hyaline cartilage is covered by perichondrium except for articular cartilage of synovial joints.

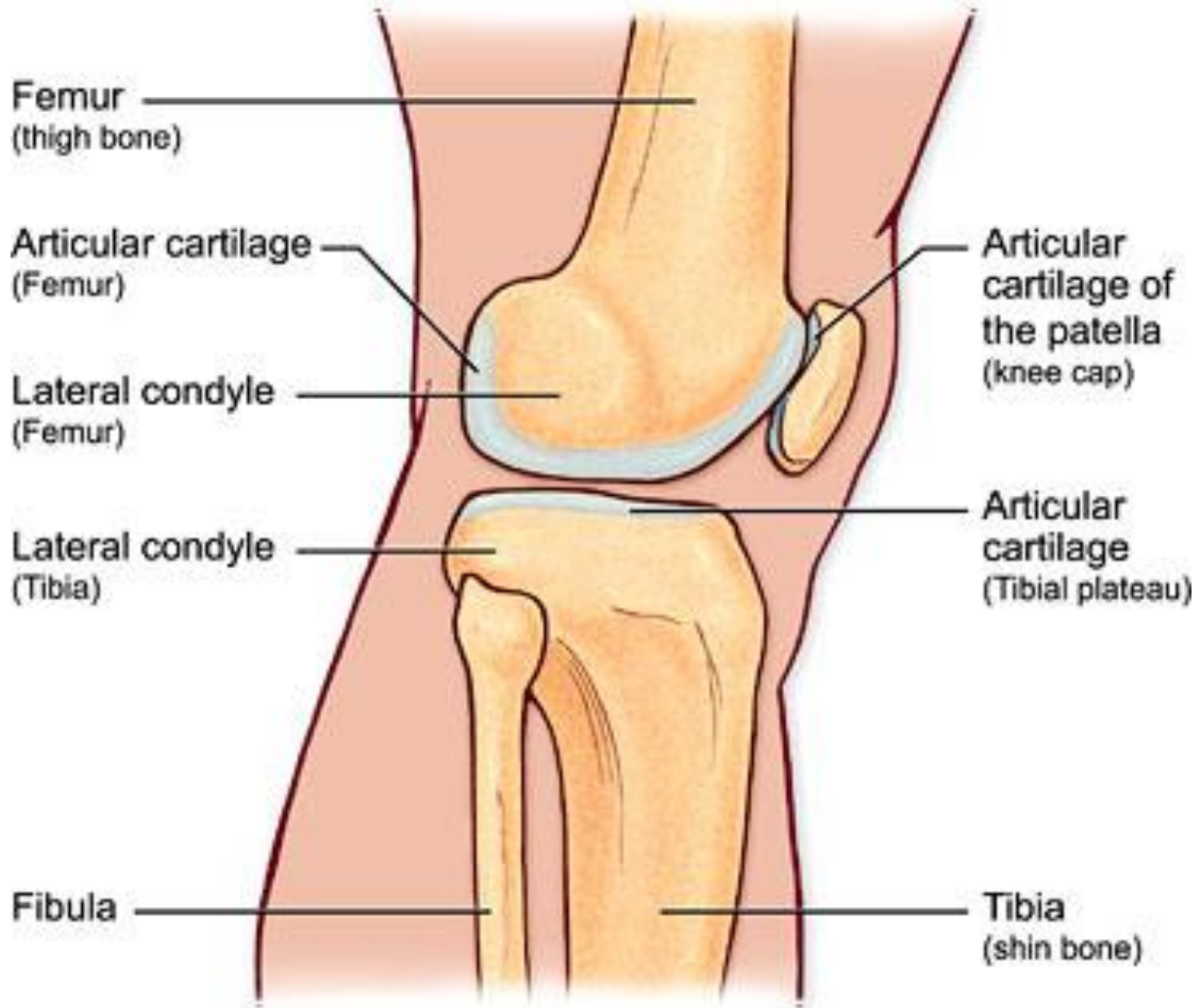


- Cells encapsulated in groups of 2-4 cells
- Matrix around the cells is brighter and deep in color than other areas, this matrix is known **territorial matrix**.
- Two groups of cells are separated by a lightly colored matrix known **inter-territorial matrix**

TYPES OF HYALINE CARTILAGE

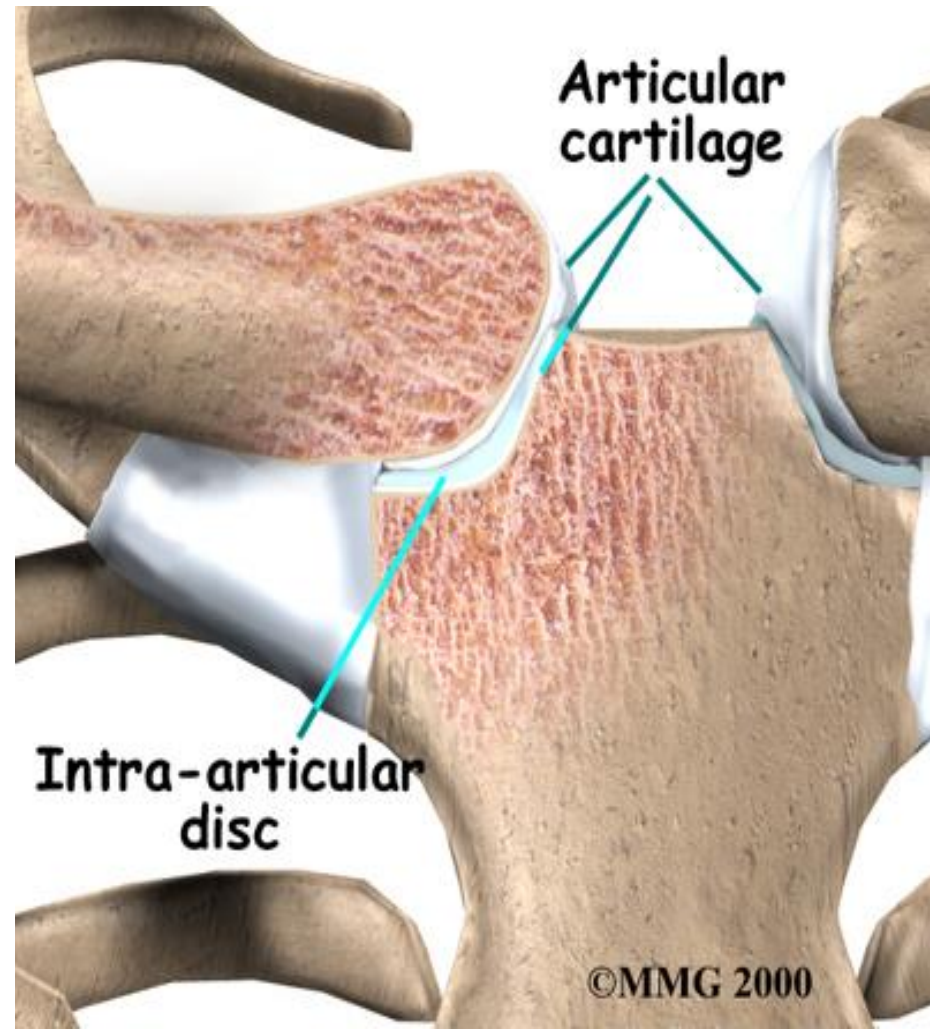
It has two types

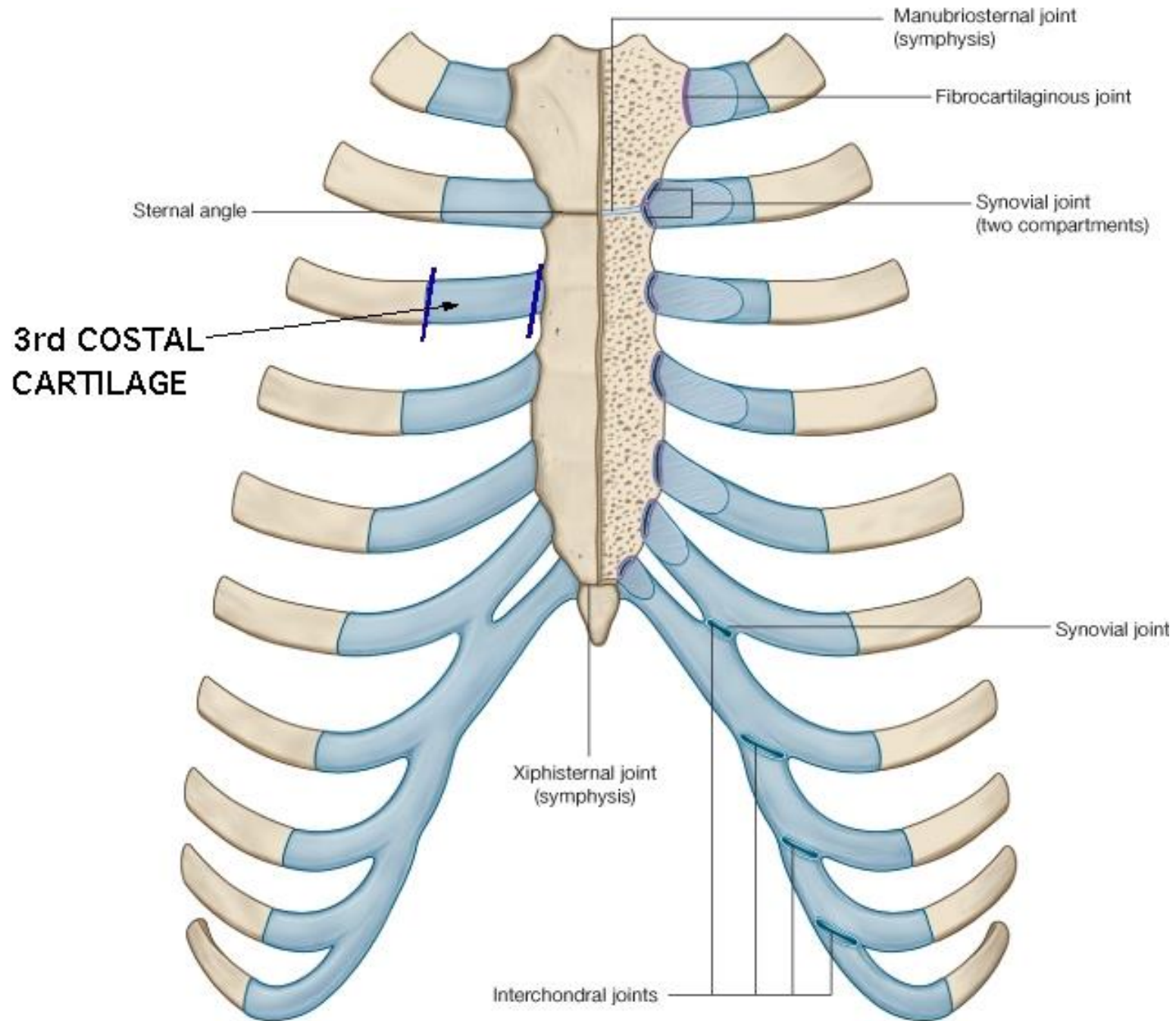
1. Articular
2. Costal



ARTICULAR CARTILAGE

Covers articular areas of bones forming synovial joints.

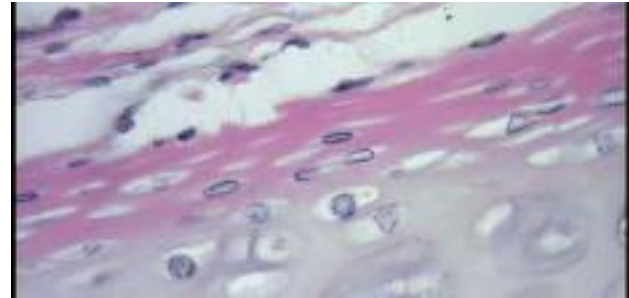




CARTILAGE GROWTH

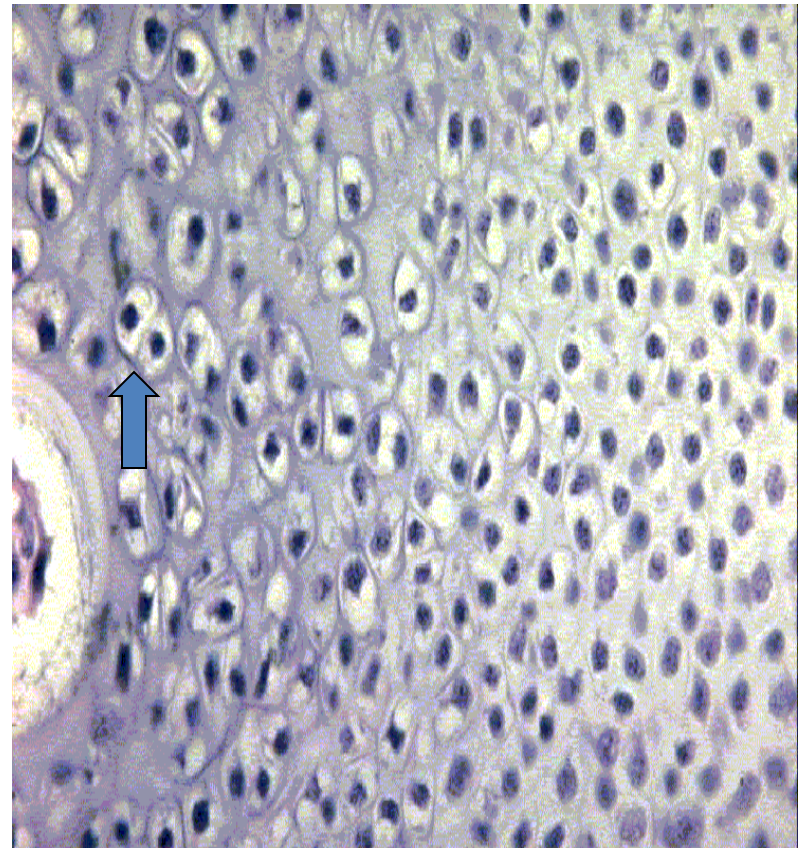
Appositional

Increasing in WIDTH;
chondroblasts deposit
matrix on surface of pre-
existing cartilage



Interstitial

Increasing in LENGTH;
chondrocytes divide and
secrete matrix from w/in
lacunae



EXAMPLES

- Costal cartilages
- Articular cartilages (devoid of perichondrium)
- Nasal cartilage
- Cartilage of trachea and bronchi

Hyaline cartilage, trachea

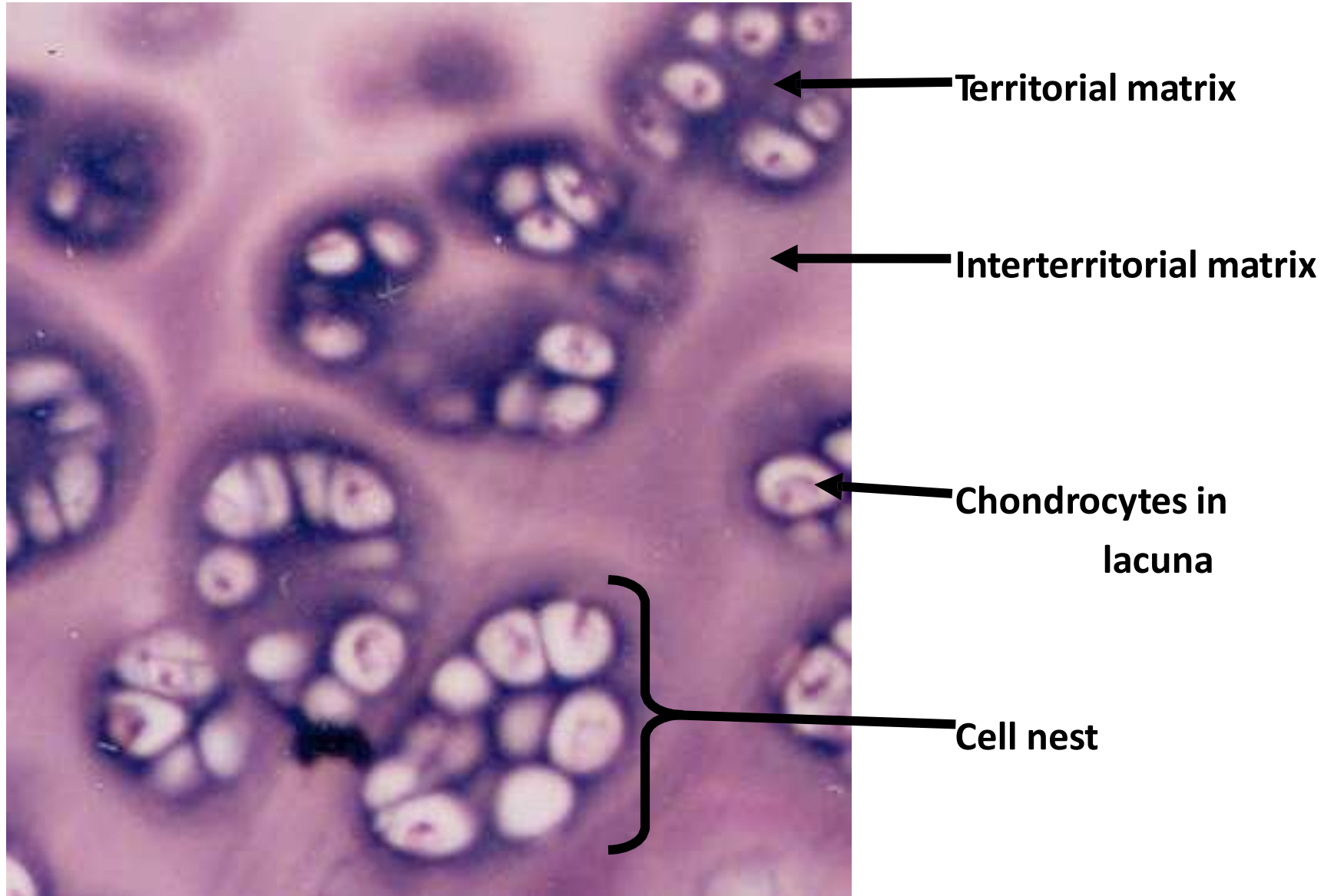
Perichondrium

Chondroblasts

Isogenous (nest) cells

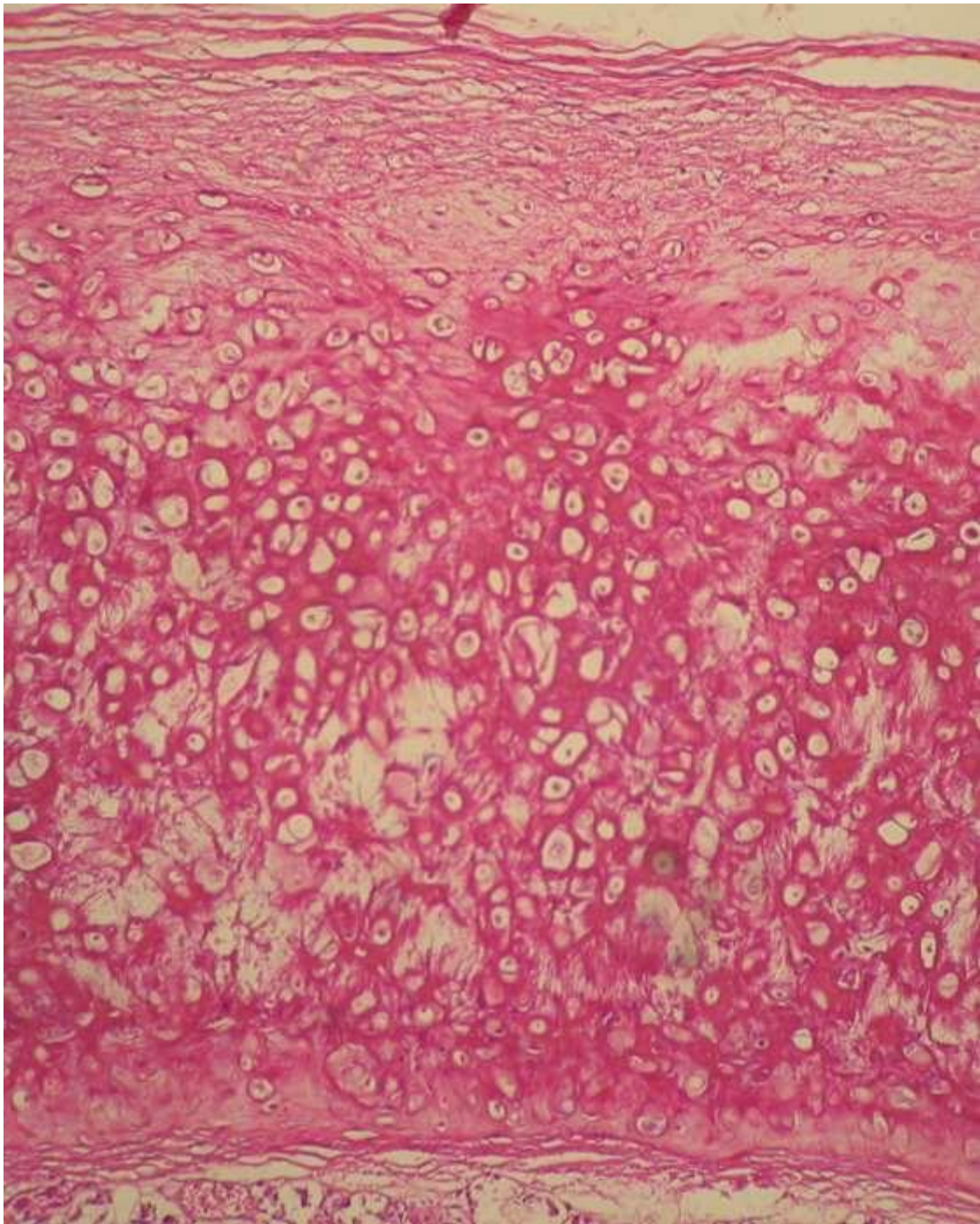


Hyaline cartilage- magnified



ELASTIC CARTILAGE

- Perichondrium present
- Characterized by the presence of **elastic fibers** in abundance.
- Chondrocytes are larger than those of hyaline cartilage
- Chondrocytes are found in **singles or in twos in lacuna.**



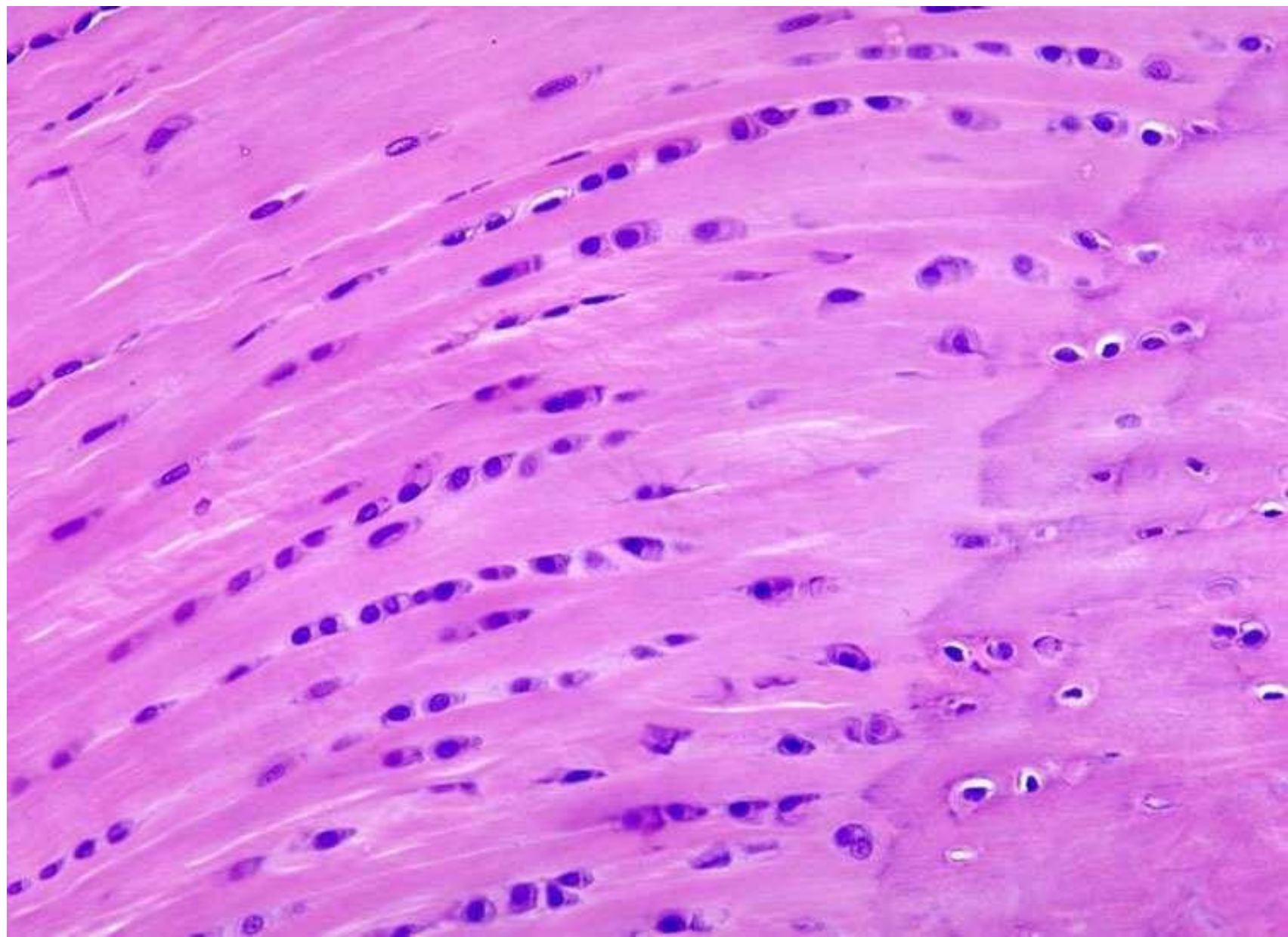
EXAMPLES

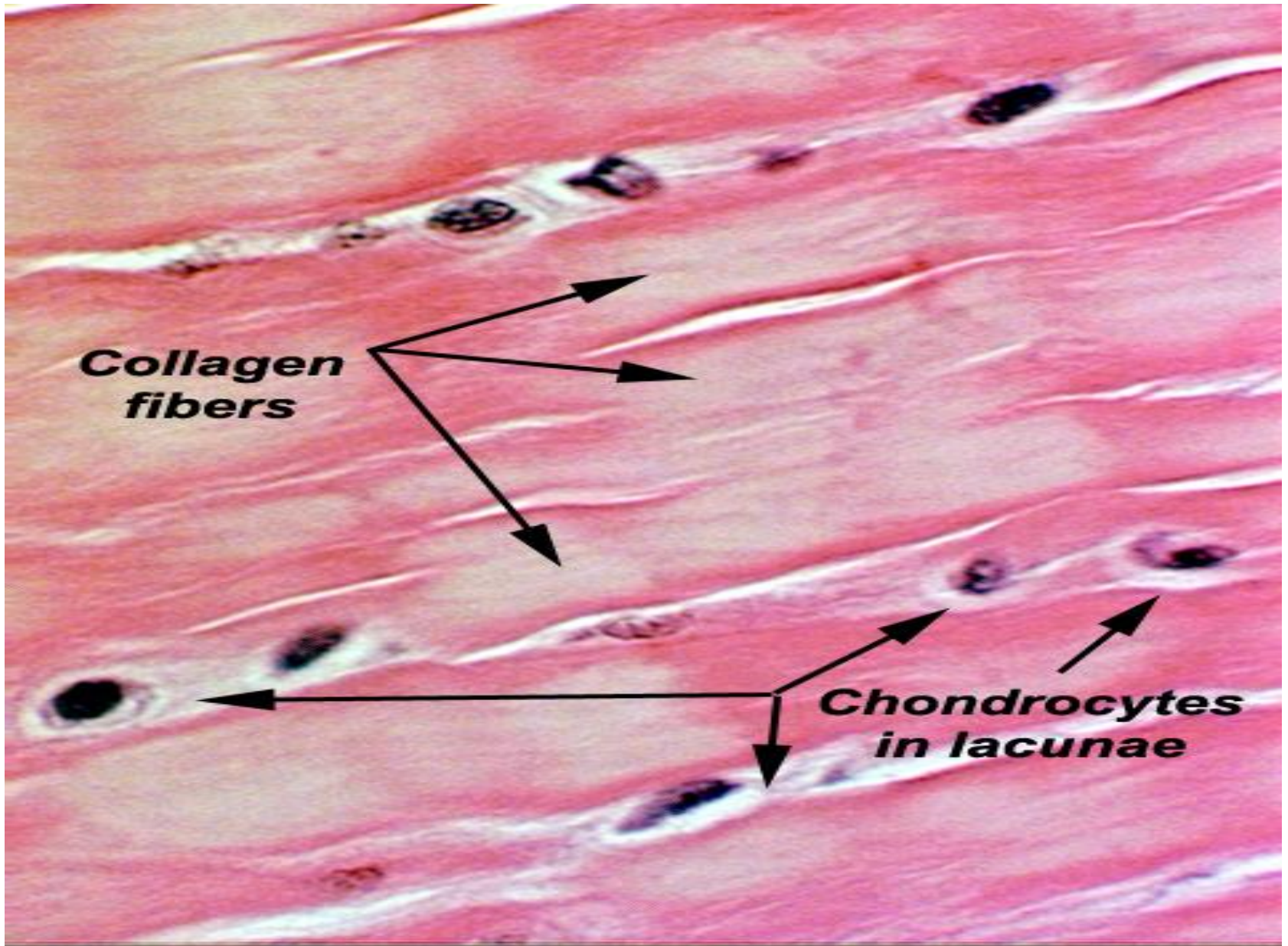
- Auricle or pinna
- Epiglottis
- External auditory meatus

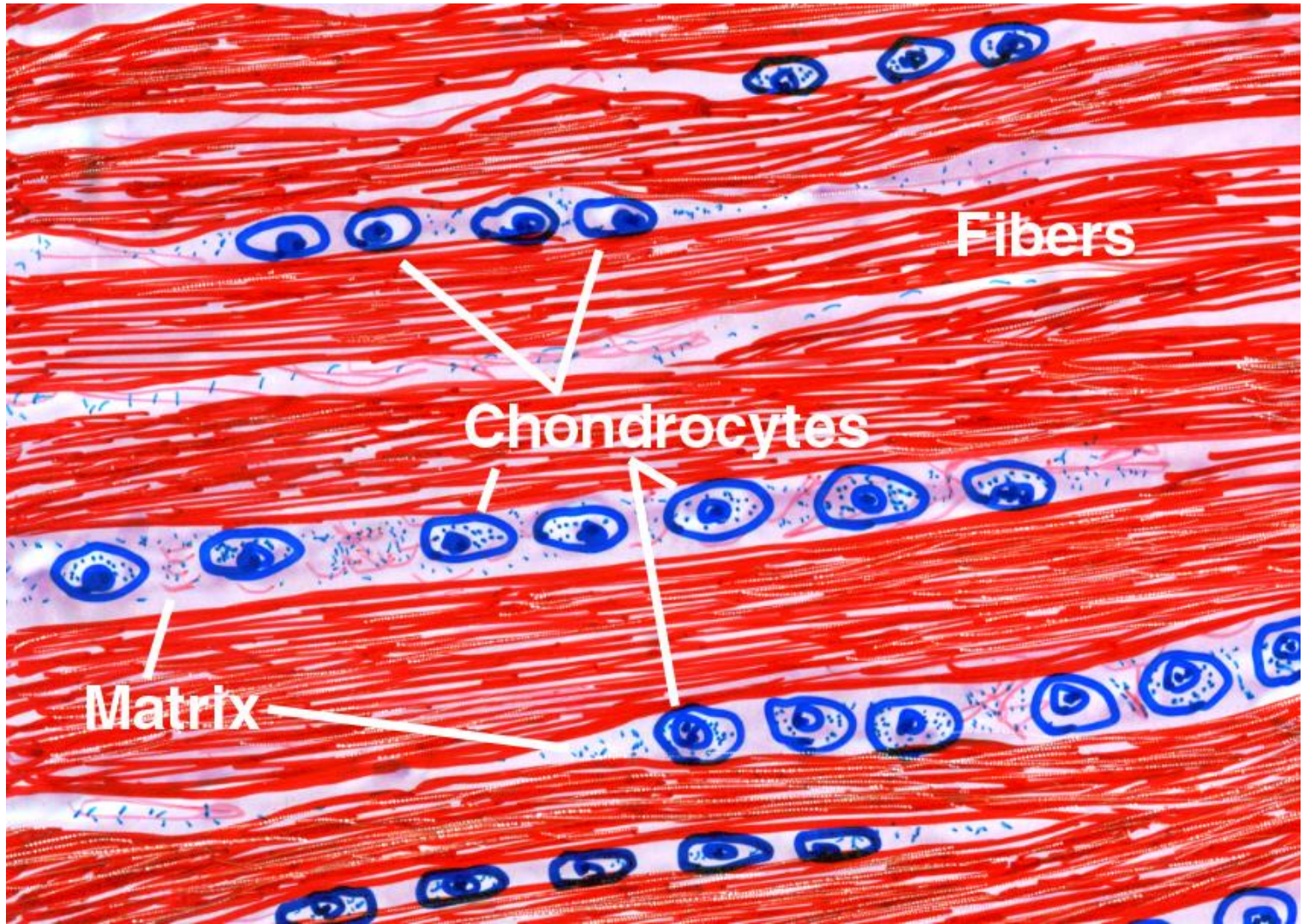


FIBROCARTILAGE

- Perichondrium is characteristically absent
- Has thick bundles of collagen fibers
- Chondrocytes are seen between these fibers in single or in narrow rows







EXAMPLES

- Pubic Symphysis
- Manubriosternal joint
- Intervertebral discs

MCQ

A section of Hyaline cartilage can be identified by the presence of

1. Homogenous matrix
2. Elastic fibres
3. Collagen fibres
4. Chondrocytes arranged in row

MCQ

Hyaline cartilage is present in

1. Tracheal ring
2. Epiglottis
3. Intervertebral disc
4. Glenoidal Labrum

MCQ

Perichondrium is absent in

1. Elastic and Hyaline Cartilage
2. Hyaline Cartilage
3. Fibrocartilage and articular cartilage
4. Costal Cartilage and Ear Pinna

MCQ

Which of the following features is NOT TRUE about cartilage?

1. Firm and flexible
2. Highly vascular
3. Insensitive
4. Poor in regeneration