Republic of Iraq Ministry of Higher Education and Scientific Research
Al-Zahraa University for Women
College of Pharmacy

Human Biology

First semester/ Lab.4

Muscular tissue & Bone and cartilage

By:

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Muscle tissue

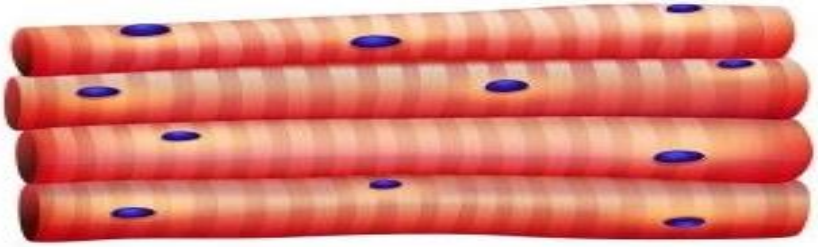
Muscular tissue is a type of tissue that is responsible for the movement in the body. It is classified into three main types, each with distinct structures, functions, and locations

❖ **There are three types of muscle tissue:**

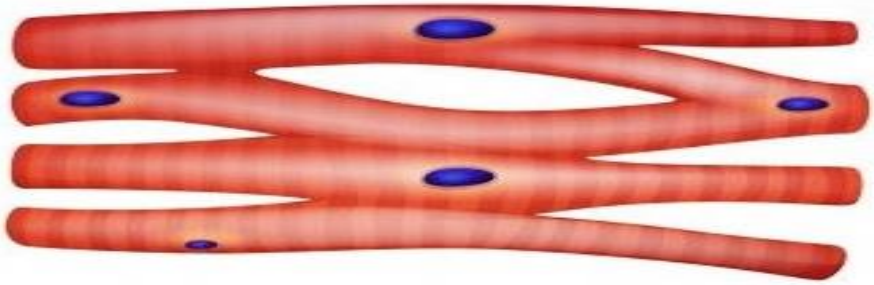
Skeletal Muscle – they are typically attached to bones.

Cardiac Muscle – found in the heart.

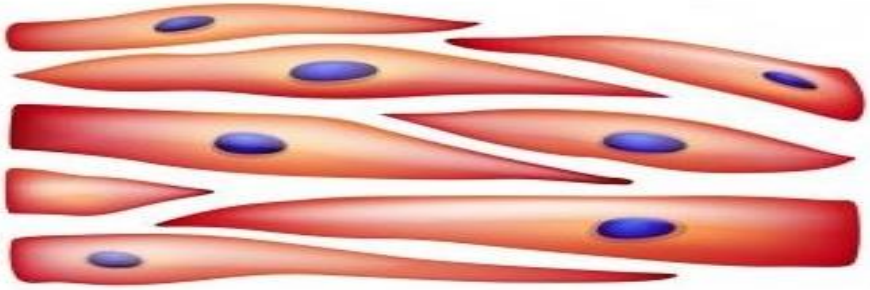
Smooth Muscle – they are found in the inner walls of organs.

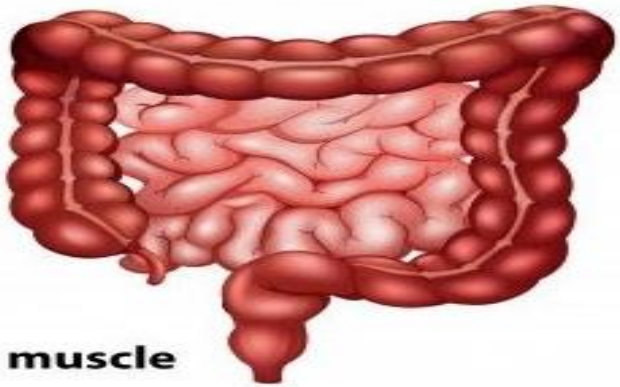


skeletal muscle



cardiac muscle





smooth muscle

Functions of Muscle Tissue

1.Helps in maintaining an erect position, or posture.

2.Helps in the constriction of organs and blood vessels.

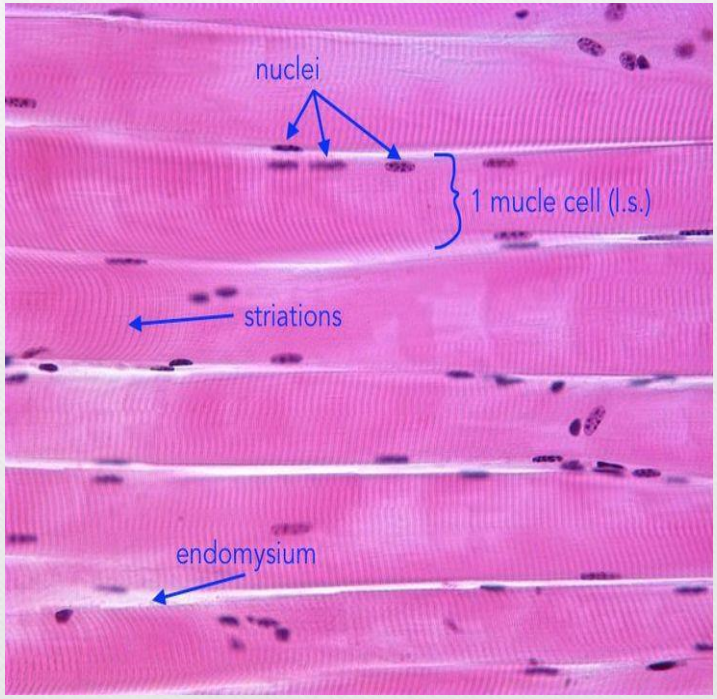
3.Involved in both voluntary and involuntary movements.

4.Involved in pumping blood and regulating the flow of blood in arteries.

Muscle tissue

A. Skeletal muscle

1. Striated and voluntary
2. Skeletal muscle fibers are long
3. Found mostly attached to the skeleton
4. Nuclei are peripherally located

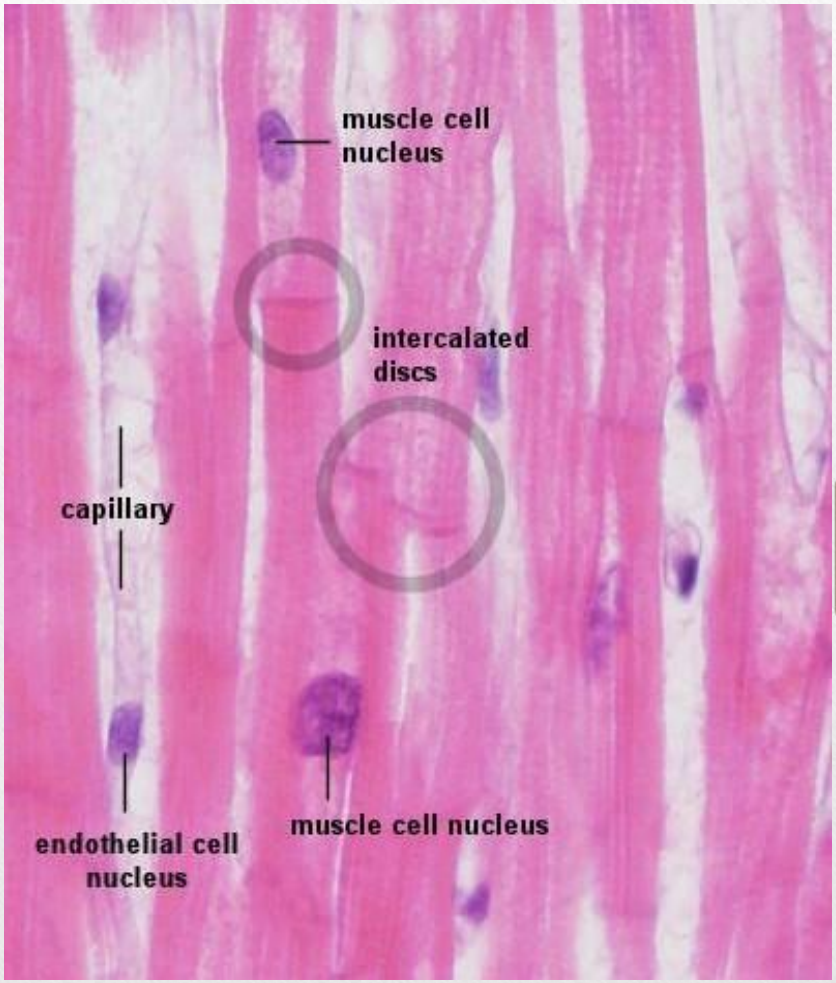


B. Cardiac muscle

1) Striated and involuntary

2) Composes the majority of the heart wall (myocardium)

3) One central nucleus



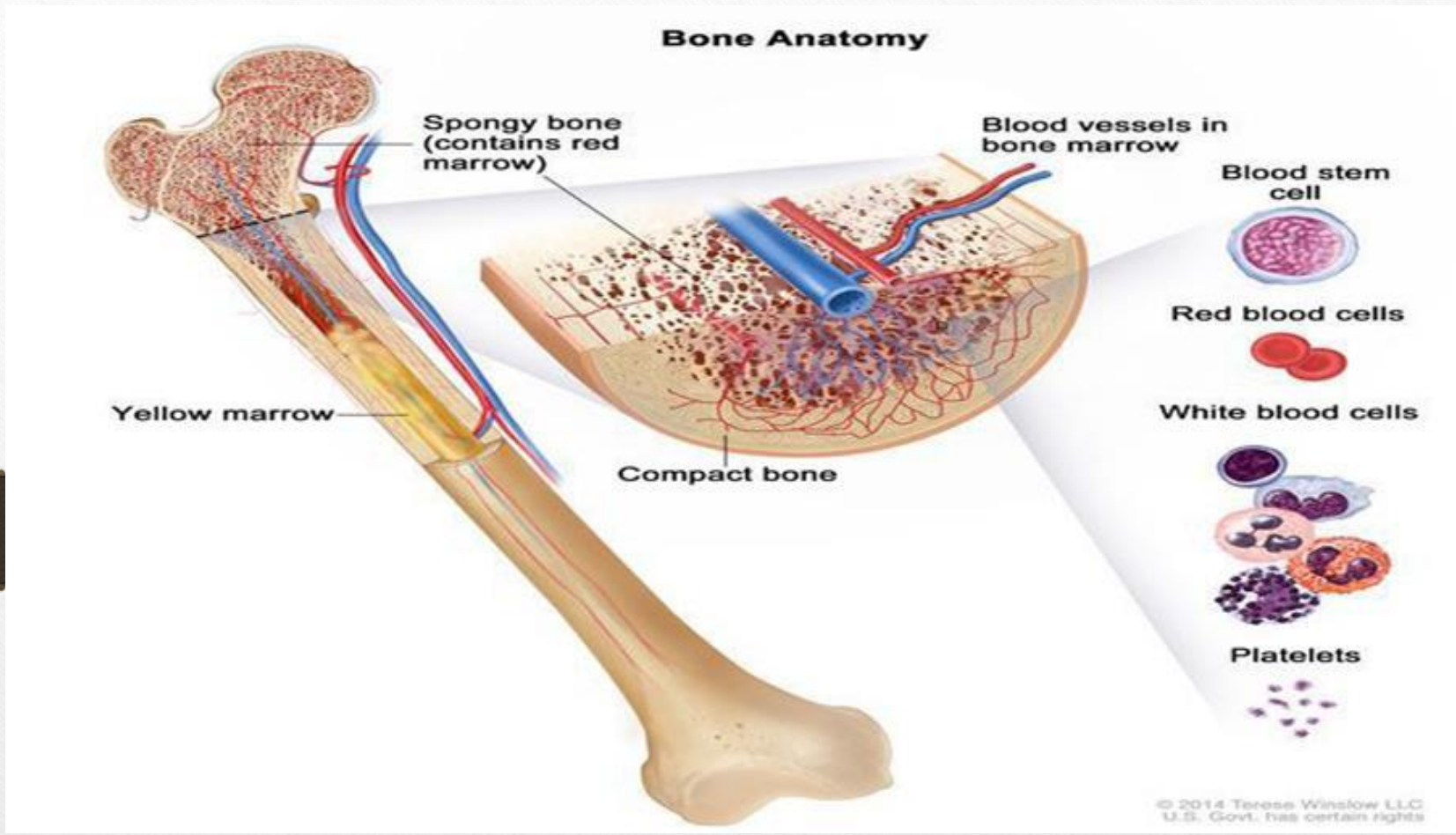
C. Smooth muscle

1) Non striated , involuntary and contain single central nucleus.

2) found in the walls of blood vessels, stomach, and intestines, uterus, ureters, and other hollow organs.

3) fibers are small and spindle in shape.


1 Smooth muscle fibers
2 Connective tissue
3 Smooth muscle fibers
4 Fibroblast
5 Nucleus of smooth muscle fiber
6 Capillary
7 Nucleus of smooth muscle fiber
8 Connective tissue and fibroblast
9 Nucleus and cytoplasm of smooth muscle fibers
10 Connective tissue
11 Capillary



Bone and cartilage

Bone: is a specialized connective tissue composed of calcified extracellular material (mainly collagen fibers and minerals such as calcium phosphate), the bone matrix.

MAJOR FUNCTIONS OF BONES ARE TO:

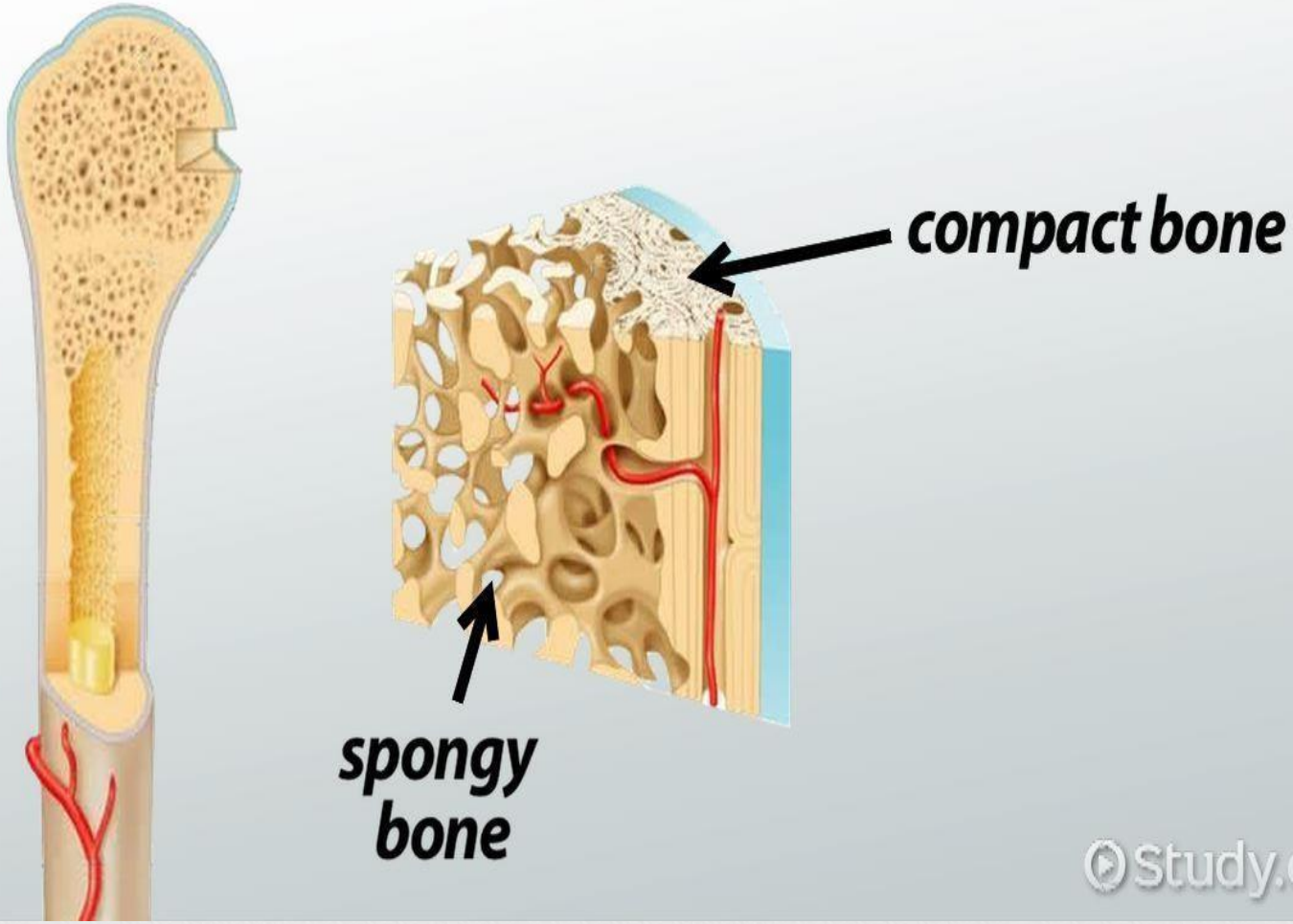
1.Provide structural support for the body
2.Provide protection of vital organs (e.g., skull protects the brain).
3.Produces blood cells (hematopoiesis) in the bone marrow.
4. Stores minerals (calcium, phosphorus) and fat (in the marrow).

BONES ARE MADE OF TWO TYPES:

Compact bone: also known as cortical bone, this hard-outer layer is strong and dense

Spongy bone: this spongy inner layer is lighter and less dense than cortical bone (more porous, found in the interior).

WHAT IS COMPACT BONE?



Bone following three major cell types

- **Osteocytes:** Mature bone cells
- **Osteoblasts:** Bone-forming cells (growing cells) Osteoblasts have three main functions:

1-Growing new bones (bone formation).

2-Reshaping bones to help them change as you age (remodeling).

3-Healing broken bones

- **Osteoclasts:**

1. Bone Resorption : Osteoclasts break down bone tissue by secreting acids and enzymes that dissolve the mineral components and collagen matrix of bone.
2. 2. Calcium Homeostasis : By breaking down bone, osteoclasts release calcium and phosphate into the bloodstream, helping to regulate mineral levels in the body

- **Bone remodeling is a process by both osteoblasts and osteoclasts**

Cartilage

Cartilage remains in isolated areas

- Bridge of the nose
- Parts of ribs
- Joints

Characteristics:

- Cartilage is a strong, flexible connective tissue that protects your joints and bone.
- Composed of cartilage cells and a matrix rich in collagen and elastic fibers.

Functions:

- Provides support and flexibility in certain areas (e.g., nose, ears).
- Reduces friction in joints, acting as a cushion.
- Aids in shock absorption.

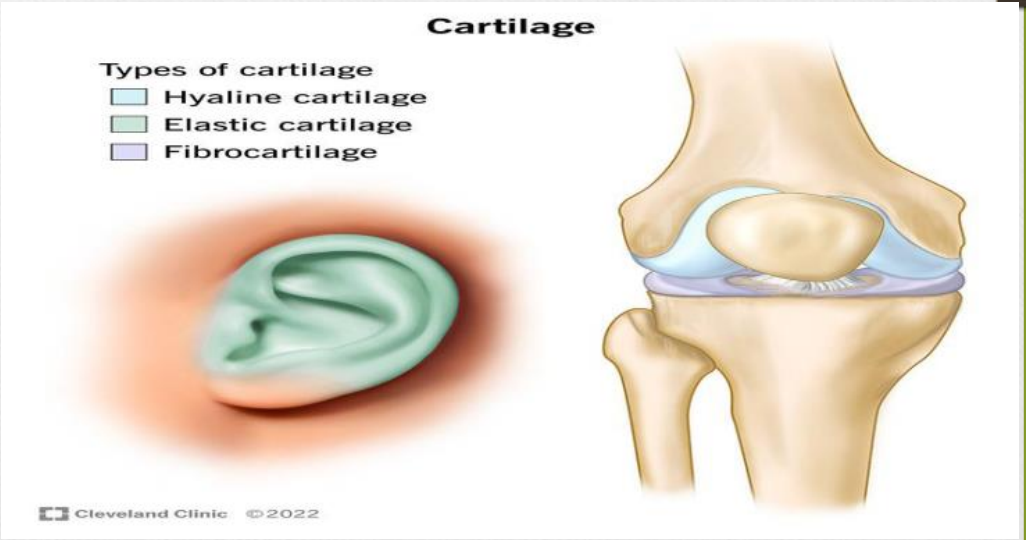
Types of cartilage

There are three types of cartilage in your body:

1-Hyaline cartilage.

2-Elastic cartilage.

3-Fibrocartilage.

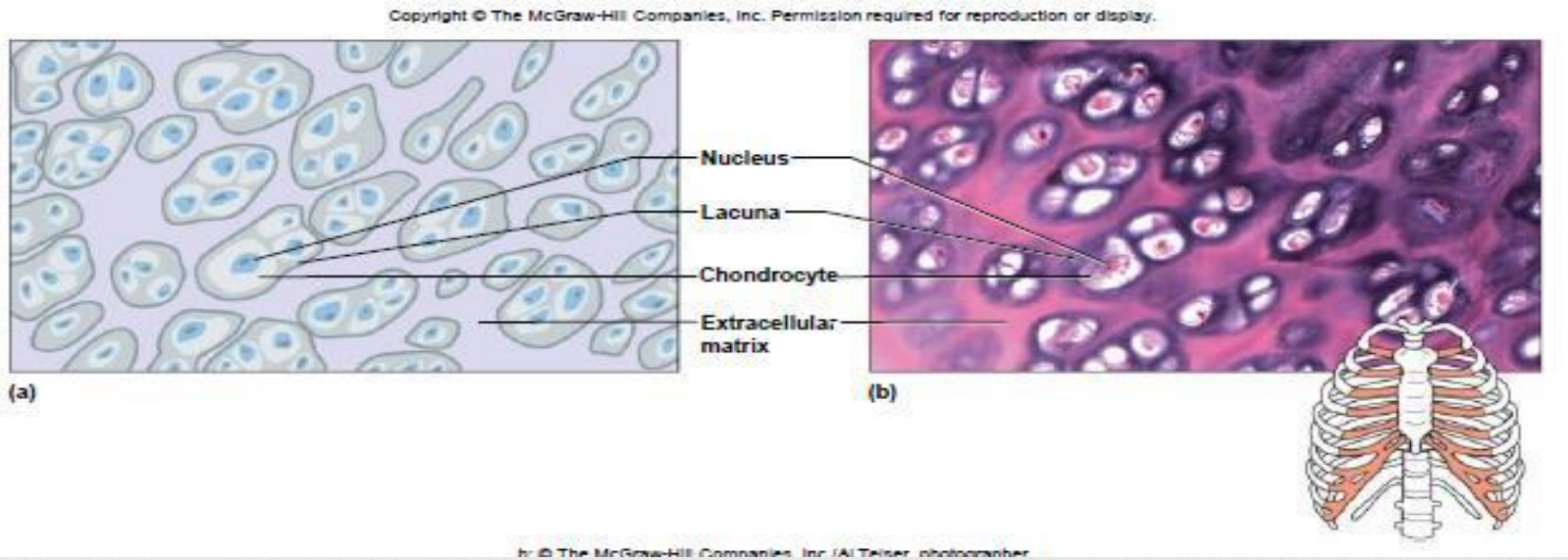


Hyaline cartilage: is the most common type of cartilage in your body.

Hyaline cartilage locations in your body include:

1-At the ends of bones that form joints.

2-Between your ribs.



Elastic cartilage

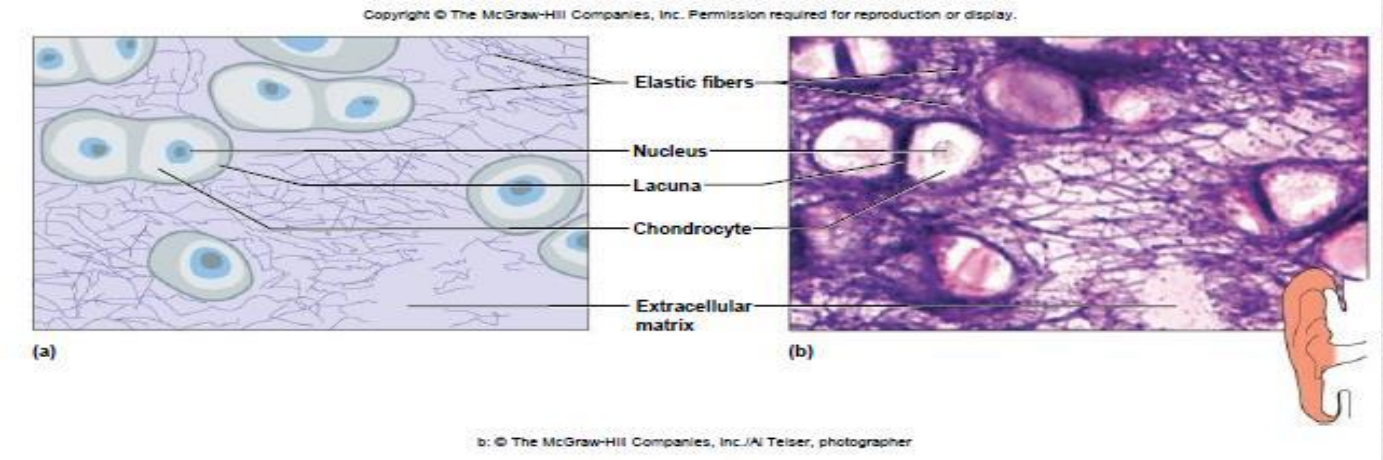
Elastic cartilage is your most flexible cartilage .Your ear is made of elastic cartilage.

Elastic cartilage locations in your body include:

1-Your external ears .

2- the tube that carries sounds from your external ear into your head.

3-Your larynx (your voice box).



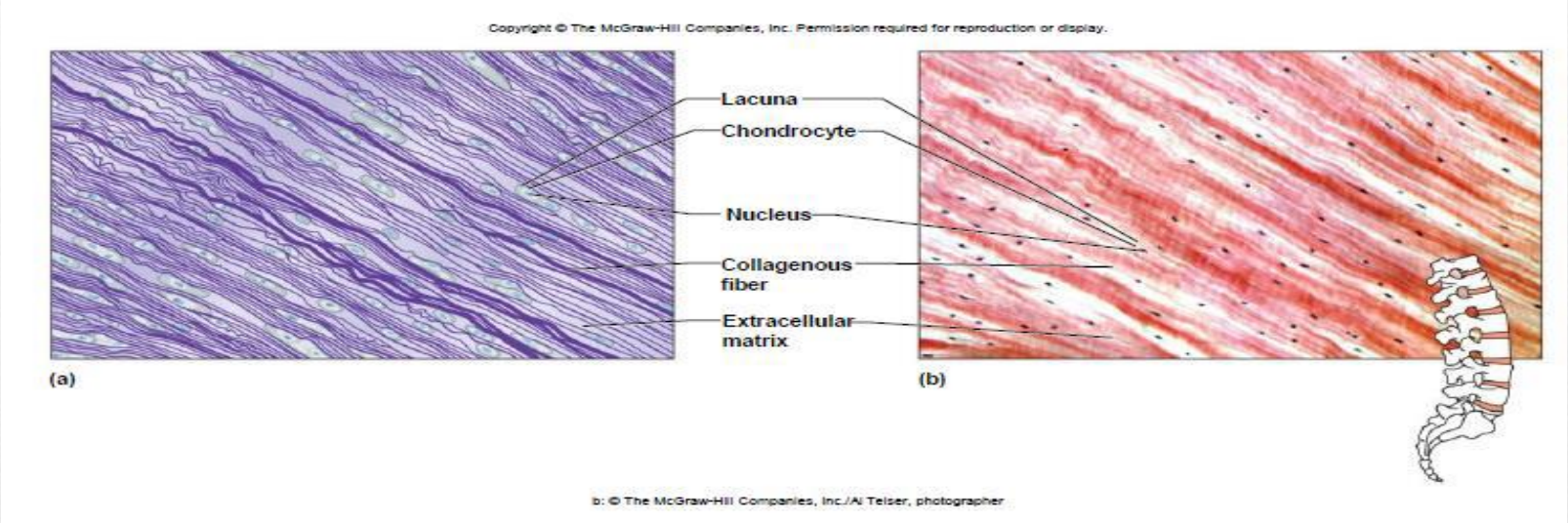
Fibrocartilage:

Fibrocartilage locations in your body include:

1- in your knee.

2-In disks between the vertebrae in your spine.

3-Supporting muscles, tendons and ligaments throughout your body



THANK YOU

Nabaa Faiz Abbas