

Connective tissue

Connective tissue is the most abundant and widely distributed tissue type found in the human body. The role of connective tissue is to protect, support, and bind together parts of the body. While other functions are attributed to connective tissues, these are the main ones.

Structural Elements of Connective Tissue

1- Cells

- Indigenous (undifferentiated mesenchymal cells).
- Blood cells (granulocyte, monocytes and macrophages, , lymphocytes) all derive from a stem cell in bone marrow.

2- Extracellular matrix

- Ground substance- unstructured material that fills the space between cells.
- Fibers- collagen, elastic, or reticular

There are three types of connective tissues found in the human body:

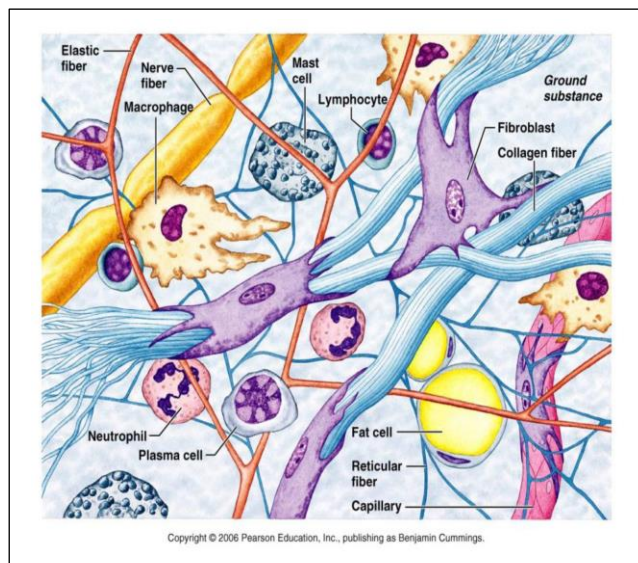
1. Connective tissue proper

a. Loose Connective Tissue

- i. Areolar
- ii. Adipose
- iii. Reticular

b. Dense Connective Tissue

- i. Dense regular
- ii. Dense irregular
- iii. Elastic



2. supportive connective tissue

a- cartilage

- a. Hyaline
- b. Elastic
- c. Fibrocartilage

b. Bone (osseous tissue)

3. fluid connective tissue : Blood

all types have three components: specialized cells, ground substance, and protein fibers. The ground substance is a noncellular material that separates the cells. It varies in consistency from solid (bone) to semifluid (cartilage) to fluid (blood). The fibers are of three possible types; white collagen fibers contain collagen (a protein that gives them flexibility and strength), reticular fibers are very thin collagen fibers and highly branched that form delicate supporting networks, and finally yellow elastic fibers which contain elastin (a protein that is not as strong as collagen but is more elastic).

Functions of Connective Tissue

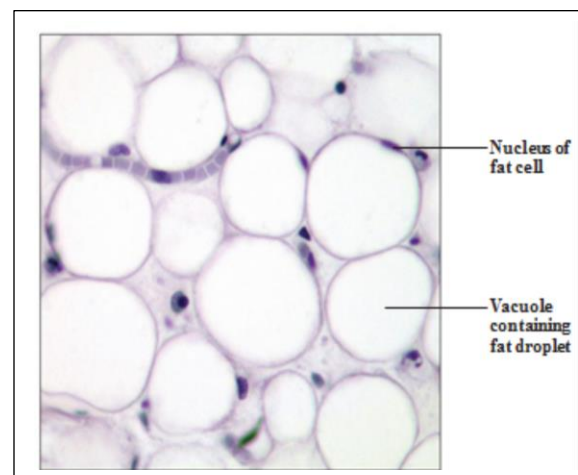
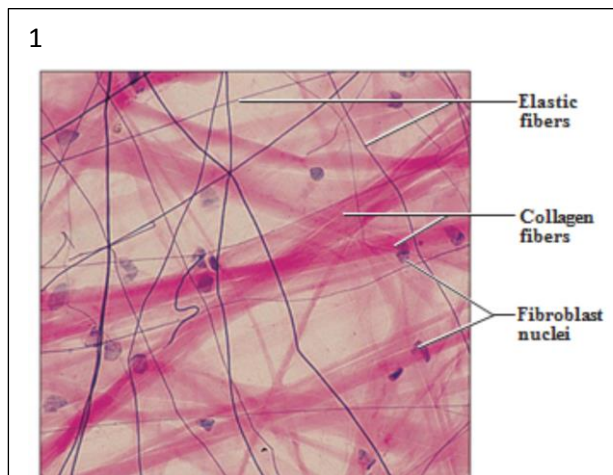
- 1- Binding and support
- 2- Protection
- 3- Insulation
- 4- Transportation (Blood)

Connective tissue proper

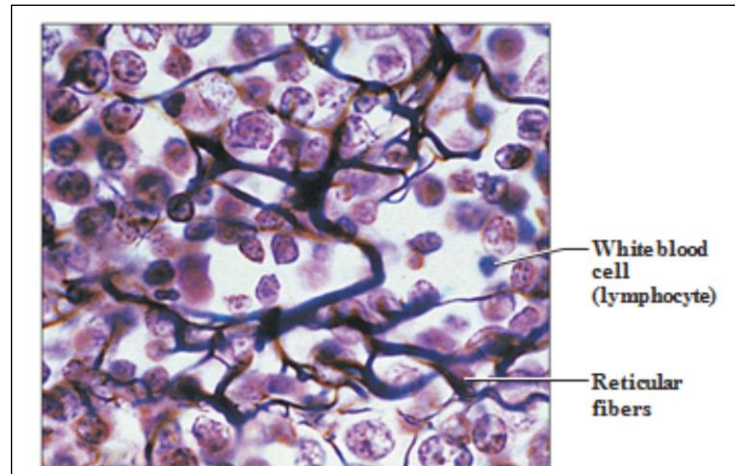
Loose connective tissue

Areolar connective tissue
(lamina propria, packages organs,
surrounds capillaries.)

adipose connective tissue
(hypodermis, around kidneys,
eye balls, abdomen, breasts)



Reticular CT (lymph nodes, bone marrow, and spleen)



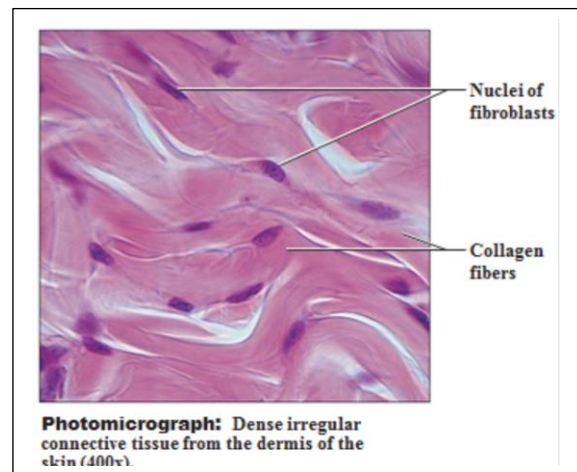
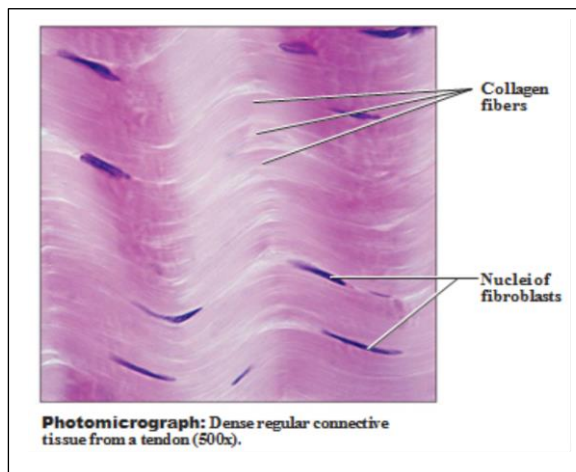
Dense connective

Dense Regular

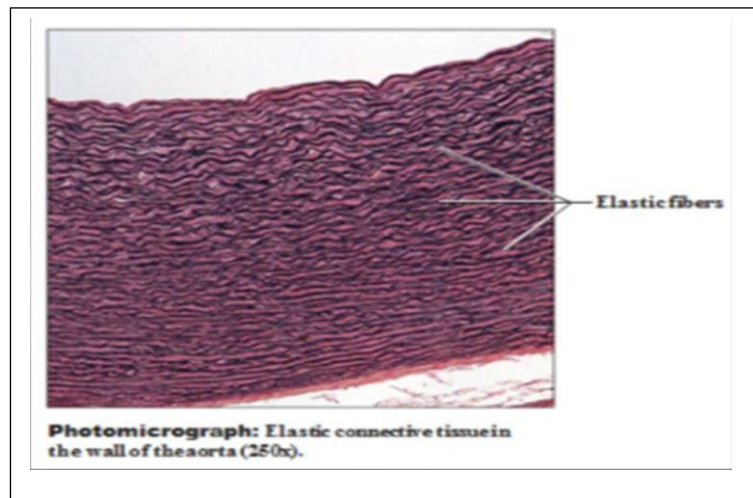
(Tendons, most ligaments)

Dense irregular

(fibrous capsule of organs and of
Joints, dermis of the skin)



Dense elastic (Walls of large arteries; within certain ligaments associated with the vertebral column; within the walls of the bronchial tubes.)

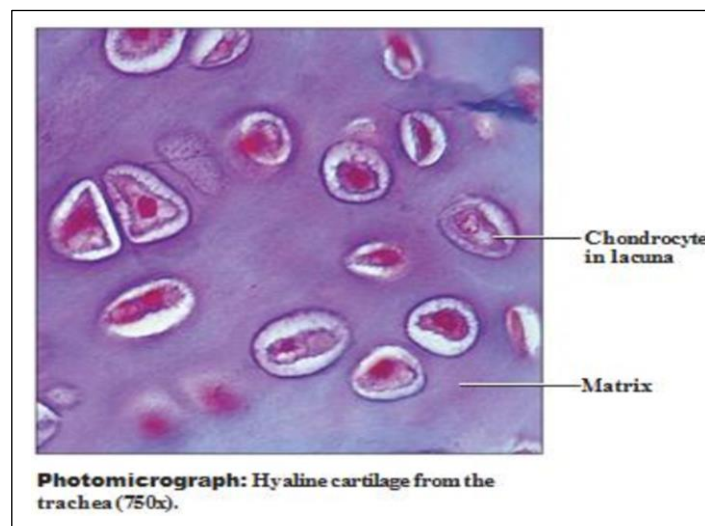


2-supportive connective tissue

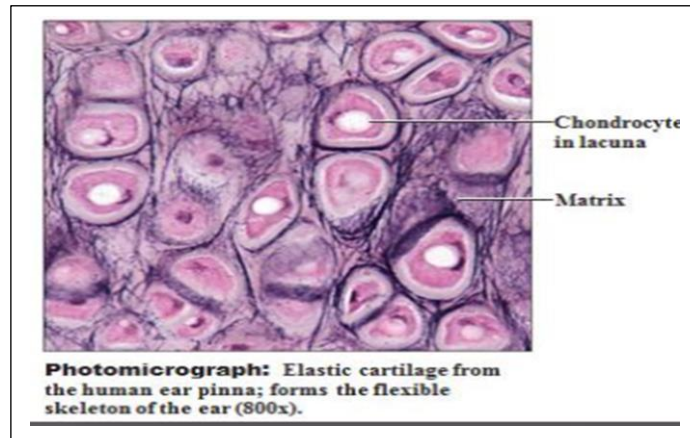
There are two types of supportive connective tissue, cartilage and bone.

Cartilage: In cartilage, the cells (chondrocytes) lie in small chambers called lacunae separated by a semi solid matrix. This matrix is formed by cells called chondroblasts and chondrocytes. The three types of cartilage are distinguished by the type of fiber found in the matrix.

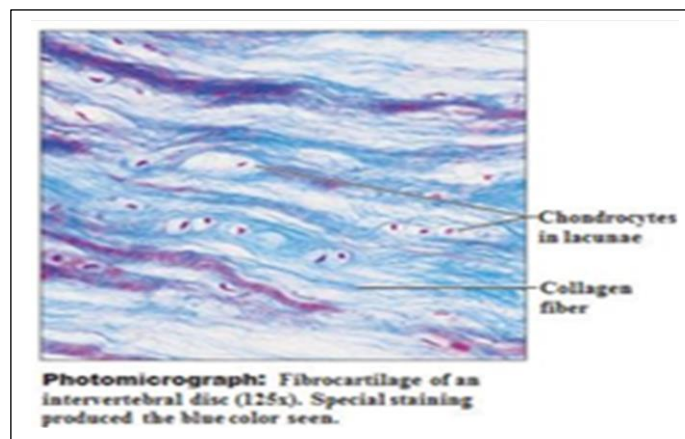
Hyaline cartilage the most common type of cartilage, contains only fine collagen fibers. The matrix has a glassy, translucent appearance. Hyaline cartilage is found in the nose, at the ends of the long bones and the ribs, and it forms rings in the walls of respiratory passages.



Elastic cartilage has more elastic fibers than hyaline cartilage. For this reason, it is more flexible and is found, for example, in the framework of the outer ear.



Fibrocartilage has a matrix containing strong collagen fibers. Fibrocartilage is found in structures that withstand tension and pressure, such as the disks between the vertebrae in the backbone and the cushions in the knee joint.

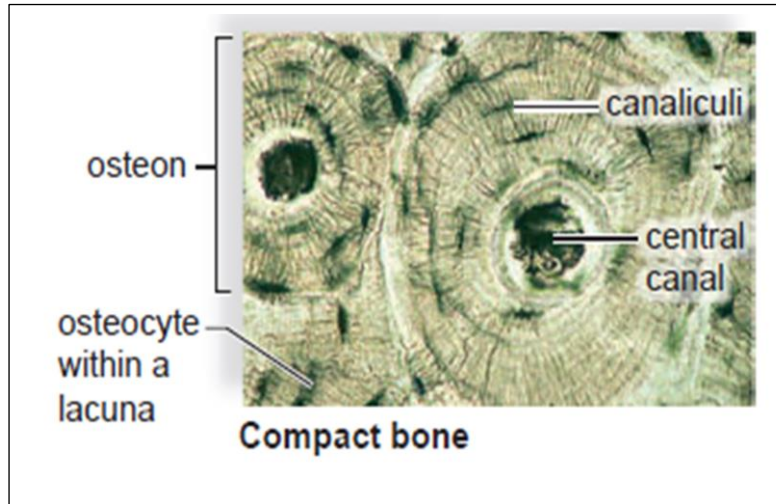


Bone(Osseous tissue)

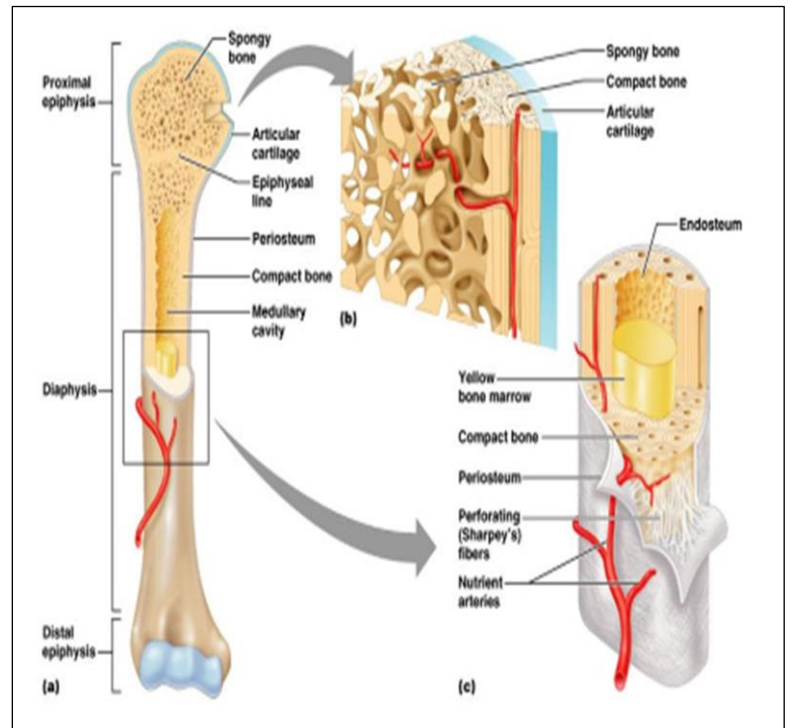
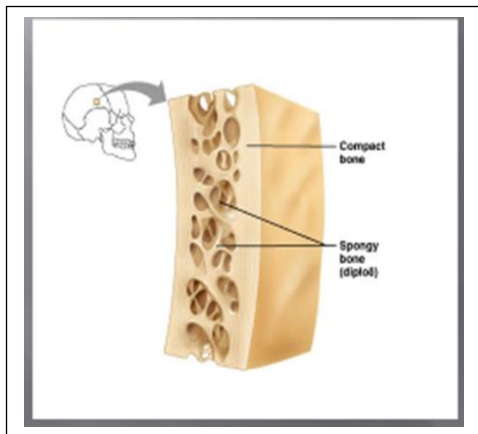
Bone is the most rigid connective tissue. It consists of an extremely hard matrix of inorganic salts, notably calcium salts. These salts are deposited around protein fibers, especially collagen fibers. Cells called *osteoblasts* and *osteoclasts* are responsible for forming the matrix in bone tissue.

There are two type of bone; compact bone and spongy bone. Compact bone is a dense connective tissue. The Haversian systems can be seen. Osteocytes are arranged in concentric rings around the central Haversian canal. Fine, thread-like

canaliculi can be seen. Compact bone is found around the shafts or diaphyses of long bones.



Spongy bone: is called diploe when its in flat bones. Have bone marrow but no marrow cavity.



3- Fluid connective tissue

Blood represents a fluid connective tissue. Blood, which consists of formed elements and plasma, is located in blood vessels. Blood transports nutrients and oxygen to tissue fluid. Tissue fluid bathes the body's cells and removes carbon dioxide and other wastes. Blood helps distribute heat and also plays a role in fluid, ion, and pH balance. The systems of the body help keep blood composition and chemistry within normal limits.

