

## Connective Tissues:

### A. Functions of connective tissues

- 1) bind, support, protect,
- 2) serve as frameworks,
- 3) store fat,
- 4) produce blood cells,
- 5) protect against infection, and
- 6) repair tissue damage.

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### B. Characteristics of connective tissues:

- 1) abundant matrix (extracellular material = organic ground substance + fibers),
- 2) good blood supply (except in cartilage)

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### C. Major Cell Types

- 1) The **fibroblast** is the most common cell type, and is a large, fixed, star-shaped cell that secretes fibers.



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- 2) **Macrophages** are wandering white blood cells that function as scavenger cells and defend against infection.



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- 3) **Mast cells** are large white blood cells located near blood vessels where they release heparin (anticoagulant) and histamine (promotes inflammation).



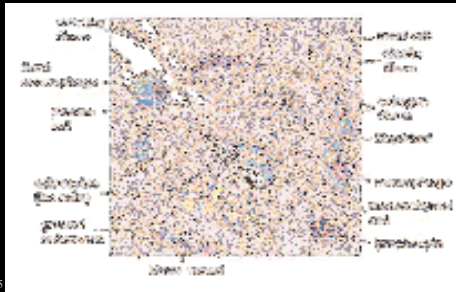
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### D. Connective Tissue Fibers

- 1) **Collagenous fibers** (white thick fibers that provide great strength)
- 2) **Elastic fibers** (yellow thin elastin fibers that stretch easily)
- 3) **Reticular fibers** (very thin collagenous fibers that lend delicate support)

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## Fibers in Loose Connective Tissue



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## Fibrous tissue can be:

- ◆ **Loose connective tissue** (fibroblasts separated by jellylike ground substance)
- ◆ **Dense connective tissue** (contains bundles of collagenous fibers with fibroblasts embedded in between)

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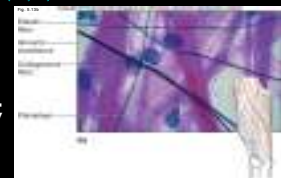
## Categories of loose connective tissue:

- 1) **Areolar tissue**
- 2) **Adipose tissue**
- 3) **Reticular tissue**

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### 1. Areolar Tissue

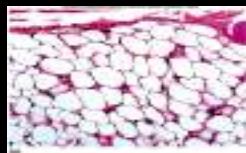
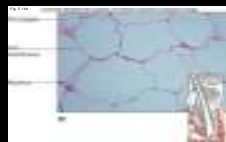
- ◆ **STRUCTURE:** fibroblasts apart from one another; collagenous and elastic fibers.
- ◆ **LOCATION:** between muscles beneath the skin
- ◆ **FUNCTION:** Binds organs together



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### 2. Adipose Tissue

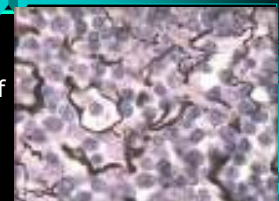
- ◆ **STRUCTURE:** enlarged fibroblasts
- ◆ **FUNCTION:** store fat insulation
- ◆ **LOCATION:** beneath the skin, around joints, breast, padding of internal organs



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### 3. Reticular Tissue

- ◆ **STRUCTURE:** branching network of reticular fibers with many fibroblasts.
- ◆ **FUNCTION:** support anchor cells
- ◆ **LOCATION:** lymph nodes, glands, organs, and bone marrow

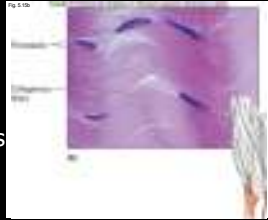


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#### 4. Dense Regular Connective Tissue

##### STRUCTURE:

densely packed collagenous fibers,  
organized in rows  
very strong



##### LOCATION:

tendons and ligaments

##### FUNCTION:

binds organs together

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#### 5. Dense Irregular Connective Tissue

##### STRUCTURE:

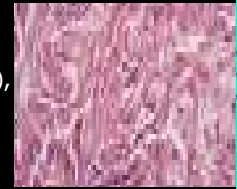
densely packed collagenous fibers  
in random arrays

##### LOCATION:

inner layer of skin (dermis),  
walls of heart chambers &  
digestive organs,  
synovial joints

##### FUNCTION:

interconnects organs, resists forces



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#### Cartilage Tissues:

Cartilage cells (chondrocytes) lie in small chambers (lacunae) in the solid yet flexible matrix.



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#### 6. Hyaline cartilage

##### STRUCTURE:

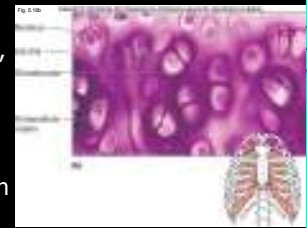
glassy opaque appearance,  
abundant fine collagen fibers

##### LOCATION:

ends of bones & ribs,  
nose,  
rings of trachea

##### FUNCTION:

supports & protection



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#### 7. Elastic cartilage

##### STRUCTURE:

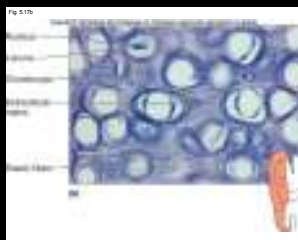
many elastic fibers and some collagen fibers

##### LOCATION:

ear  
larynx

##### FUNCTION:

provides framework



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#### 8. Fibrocartilage

##### STRUCTURE:

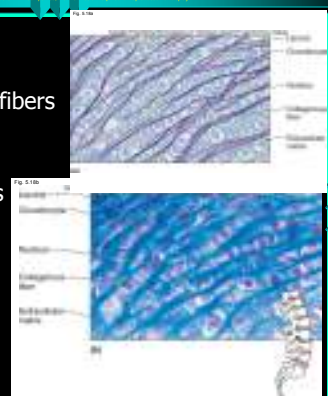
many collagenous fibers

##### LOCATION:

intervertebral disks  
knees  
pelvic girdle

##### FUNCTION:

absorbs shock



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## ◆ Bone Tissue

Bone has an extremely hard matrix of mineral salts, deposited around collagenous fibers

1. **Compact bone:** consists of many cylindrical-shaped units (osteons or Haversian systems)
2. **Spongy bone:** contains numerous bony bars and plates (trabeculae) separated by irregular spaces.

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## 9. Compact Bone

### STRUCTURE:

Osteocytes lie within lacunae; in circles around central canal

### FUNCTION:

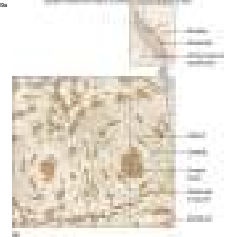
body support  
protection  
provides framework

### LOCATION:

Bones of skeleton



Fig. 5.30a



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## 9. Spongy (cancellous) Bone

### STRUCTURE:

Osteocytes lie within lacunae;  
Lattice like structure of trabeculae

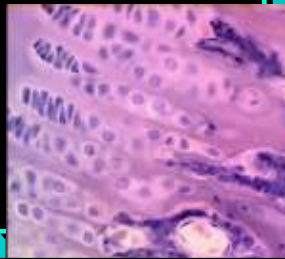
Chondrocytes on the left;  
osteocytes on the right

### FUNCTION:

Support of bone marrow that is site for blood cell formation

### LOCATION:

Parts of a bone that have red bone marrow

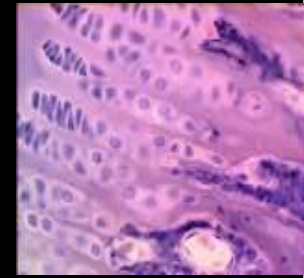


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## Cancellous (Spongy) Bone

- ◆ Large lacunae containing chondrocytes on the left.

- ◆ Smaller lacunae containing osteocytes can be seen to the right.



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## 8. Blood (fluid connective tissue)

### STRUCTURE:

composed of cells (red and white) and platelets suspended in a liquid matrix called plasma

### FUNCTION:

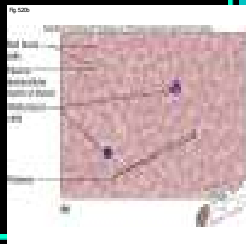
**Red:** transports substances

**White:** defend from diseases

**Platelets:** initiate blood clotting

### LOCATION:

Within blood vessels & heart



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