



# ST. CATHERINE UNIVERSITY

## Tissues

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### Tissues

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- A collection of cells functioning together
  - Made of cells and varying amounts of matrix
    - Matrix: extracellular material (ground substance) and protein fibers
  - 4 types of tissues:
    - Epithelial
    - Connective
    - Nervous
    - Muscle
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## Epithelial Tissue

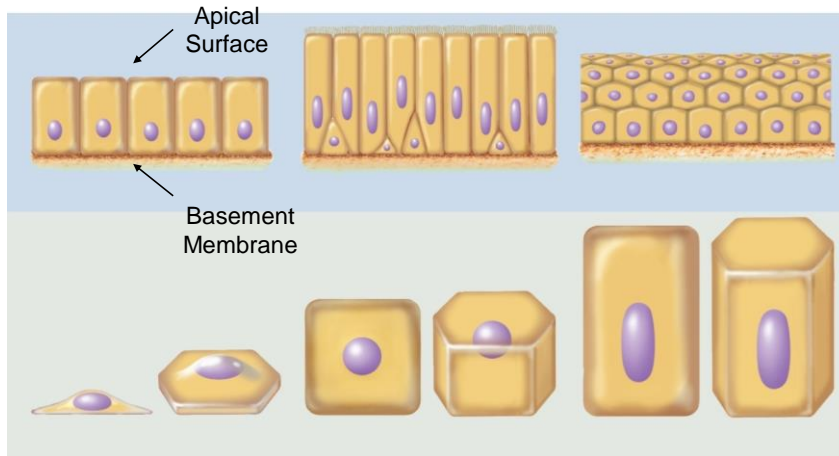
- General Characteristics:
  - Used for covering surfaces
  - Avascular
  - Tightly packed, highly-mitotic cells, little to no matrix
  - Rest upon a basement membrane
  - Extend up to a free or apical surface
  - Protect, secrete, excrete, absorb, filter, and sense

## Epithelial Tissue

### Classification

1. Cell Shape
  - Squamous
  - Cuboidal
  - Columnar
2. Layers
  - Simple
  - Stratified
3. Exceptions
  - Pseudostratified
  - Transitional

## Epithelial Tissue Cont'd



## Connective Tissue

- Consists of mostly matrix (fibers and ground substance) with widely spaced cells.
- Vascular
- Functions
  - Binding of organs
  - Support
  - Physical Protection
  - Immune Protection
  - Movement
  - Storage
  - Heat Production
  - Transportation

# Connective Tissue

5 major classifications

1. Fibrous
2. Adipose
3. Cartilage
4. Bone
5. Blood

## 1. Fibrous Connective Tissue

- Matrix contains significant amounts of protein fibers
1. Cell Types
    - Fibroblasts
    - Mast cells
    - Macrophages
    - Leukocytes
    - Plasma cells
    - Adipocytes

# 1. Fibrous Connective Tissue

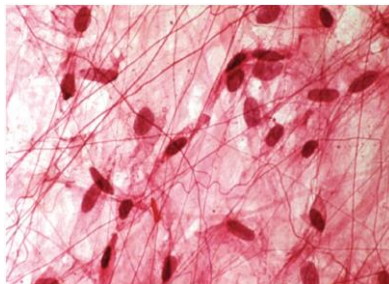
## 2. Matrix

- Fibers
  - Collagenous
  - Reticular
  - Elastic
- Ground Substance

# 1. Fibrous Connective Tissue

## 1. Areolar

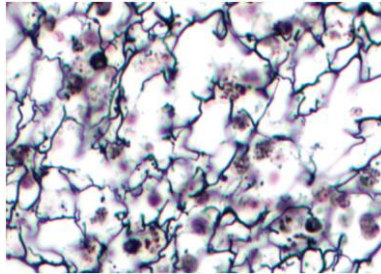
- Significant amount of space between the cells
- Elastic and collagenous fibers
- Lots of ground substance and blood vessels
- Underlying nearly all epithelial



# 1. Fibrous Connective Tissue

## 2. Reticular

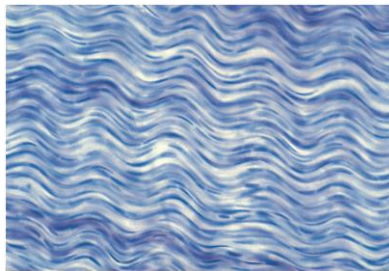
- Reticular fibers form a sponge-like network amongst various blood cells
- Used for filtering material out of the lymph
- Found in lymph nodes, bone marrow, and spleen



# 1. Fibrous Connective Tissue

## 3. Dense Regular

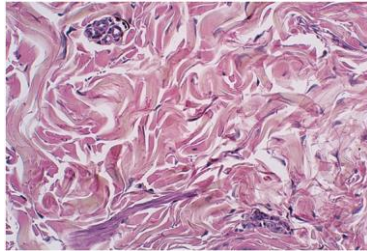
- Lots of collagen and elastin fibers in parallel alignment
- Forms rope-like structure that resists stress
- Holds bones to other bones (ligaments) and muscles to bones (tendons)



# 1. Fibrous Connective Tissue

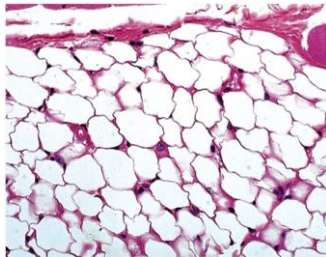
## 4. Dense Irregular

- Collagen fibers arranged in groups aligned in multiple directions
- Withstands stress in multiple directions
- Found in deeper layers of the skin



# 2. Adipose Connective Tissue

- Very little to no matrix
- Closely-packed adipocytes (fat cells)
- Stores triglycerides
  - Energy storage
  - Thermal insulation
  - Protective cushioning
- Found beneath skin, within breasts, and around organs

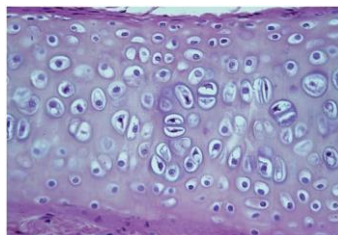


### 3. Cartilage Connective Tissue

- Consists of chondrocytes surrounded by rubbery matrix
- Little to no blood supply
- 3 types
  1. Hyaline
  2. Elastic
  3. Fibrocartilage

### 3. Cartilage Connective Tissue

1. Hyaline Cartilage
  - Fine collagen fibers
  - Found at the ends of bones, trachea and larynx, and makes up most of the fetal skeleton

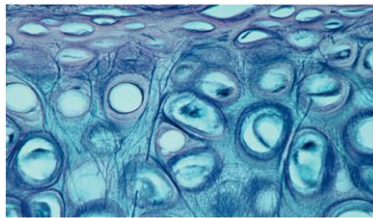




## 3. Cartilage Connective Tissue

### 2. Elastic Cartilage

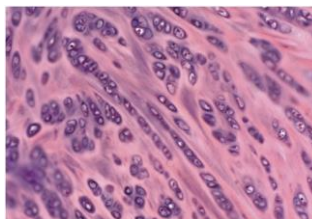
- Collagen and elastin fibers
- Found in the external ear and epiglottis in the throat



## 3. Cartilage Connective Tissue

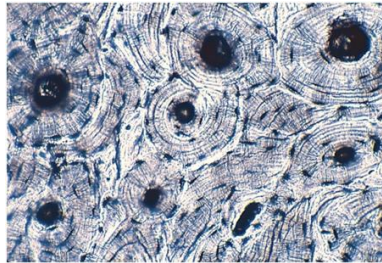
### 3. Fibrocartilage

- Coarse collagen fibers; stronger
- Found in discs between vertebrae, menisci of knees, and pubic symphysis between hip bones



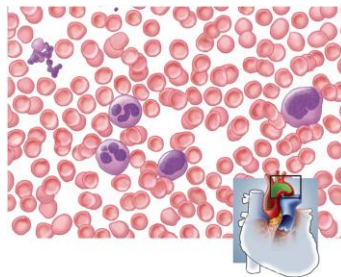
## 4. Bone Connective Tissue

- Hard (minerals) but flexible (collagen) matrix
- Composed of osteocytes
- Provides support, leverage, protection, and mineral storage
- Found in the skeleton



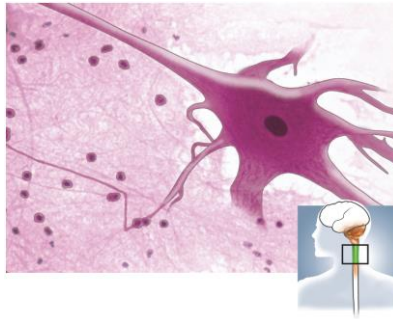
## 5. Blood Connective Tissue

- Liquid matrix (plasma)
- Composed of formed elements
- Transports substances around the body and protects
- Found within heart chambers and blood vessels



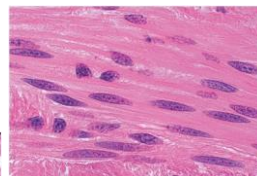
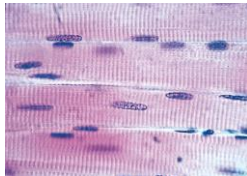
## Nervous Tissue

- Contains neurons and neuroglial cells
- Transmits electrical signals for communication
- Found in brain, spinal cord, and nerves



## Muscle Tissue

- Contains myocytes capable of contracting to cause movement
- Three types: skeletal, cardiac, and smooth
- Found in the skeletal muscles, heart, and walls of various internal organs



## Glands

- Cells or organs that secrete or excrete a substance
- Exocrine vs. Endocrine

## Membranes

- A flat sheet or layer made up of several types of tissue
1. Mucous Membranes
    - Line passages
    - 3 layers
      - Epithelium
      - Areolar connective tissue
      - Smooth muscle
    - Goblet cells
    - Absorb, secrete, and protect

## Membranes

### 2. Serous Membranes

- Simple squamous epithelium over areolar connective
- Produces serous fluid
- Lines/surrounds organs
- Found in the 3 primary body cavities
- 2 primary types
  - Parietal
  - Visceral

## Membranes

### 3. Synovial

- Made only of Connective Tissue
- Protects joints
- Synovial Fluid

### 4. Endothelium

- Lines Circulatory System
- Simple squamous resting on areolar
- Allows for exchange

### 5. Cutaneous

- Skin