

### Terms

<b>Histology</b>	<b>(microscopic anatomy)</b> —the study of tissues and how they are arranged into organs
<b>Tissue</b>	a <b>group of similar cells</b> and cell products that arise from the same region of the embryo and <b>work together</b> to perform a specific structural or physiological role in an organ -First tissues appear when these cells start to organize themselves into layers; First two, and then three strata
<b>Organ</b>	structure with discrete boundaries that is composed of two or more tissue types

### Three primary germ layers

<b>Ectoderm (outer)</b>	Gives rise to epidermis and nervous system
<b>Endoderm (inner)</b>	Gives rise to mucous membrane lining digestive and respiratory tracts, digestive glands, among other things
<b>Mesoderm (middle)</b>	becomes gelatinous tissue called <b>mesenchyme</b> - Wispy collagen fibers and fibroblasts in gel matrix, Gives rise to muscle, bone, blood

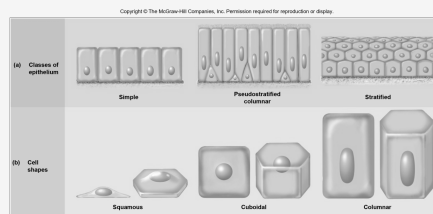
### Connective Tissue: Overview

<b>Connective tissue</b> —	a type of tissue in which cells usually occupy less space than the extracellular material
<b>Binding of organs</b> —	tendons and ligaments
<b>Support</b> —	bones and cartilage
<b>Physical protection</b> —	cranium, ribs, sternum
<b>Immune protection</b> —	white blood cells attack foreign invaders
<b>Movement</b>	bones provide lever system
<b>Storage</b> —	fat, calcium, phosphorus
<b>Heat production</b> —	metabolism of brown fat in infants
<b>Transport</b> —	blood

### Four Broad Categories of Tissues

1. Epithelial Tissue
2. Connective Tissue
3. Nervous Tissue
4. Muscular Tissue

### Epithelial Tissue



### Epithelial Tissue

<b>Covers body surface and lines body cavities</b>
• <b>Basement membrane</b> —layer between an epithelium and the underlying connective tissue
• <b>Collagen</b>
• Anchors the epithelium to the connective tissue below it
• <b>Basal surface</b> —surface of an epithelial cell that faces the basement membrane
• <b>Apical surface</b> —surface of an epithelial cell that faces away from the basement membrane

### Cells Found in Connective Tissue

<b>Macrophages</b> -	phagocytize foreign material and activate immune system when they sense foreign matter (antigen) -Arise from white blood cells called monocytes
<b>Leukocytes</b> ,	or white blood cells
- <b>Neutrophils</b>	wander about attacking bacteria
- <b>Lymphocytes</b>	react against bacteria, toxins, and other foreign material
<b>Plasma cells</b>	synthesize disease-fighting antibodies -Arise from lymphocytes
<b>Mast cells</b>	are found alongside blood vessels -Secrete heparin to inhibit clotting -Secrete histamine to dilate blood vessels

### 2 Types of Fibrous Connective Tissue

<b>Loose connective tissue</b>	– Much gel-like ground substance between cells • 2 Types: Areolar & Reticular
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### 2 Types of Fibrous Connective Tissue (cont)

**Dense connective tissue**

- Fibers fill spaces between cells
- Types vary in fiber orientation
  - **Dense regular** connective tissue
  - **Dense irregular** connective tissue

### 2 Main Types Epithelial Tissue

**Simple epithelium**

- Contains one layer of cells
- Named by shape of cells
- All cells touch the basement membrane

**Stratified epithelium**

- Contains more than one layer
- Named by shape of apical cells
- Some cells** rest on top of others
- does not** touch basement membrane
- Deepest layers undergo continuous **mitosis**
- Their daughter cells push toward the surface and become flatter as they migrate farther upward
- Finally die and flake off—**exfoliation** or **desquamation**

### Four types of simple epithelia

- Three named for their cell shapes
  - **Simple squamous** (thin, scaly cells)
  - **Simple cuboidal** (square or round cells)
  - **Simple columnar** (tall, narrow cells)
- (4)– Pseudostratified columnar

- Not all cells reach the free surface
- Shorter cells are covered over by taller ones

- Looks stratified
- Every cell reaches the basement membrane

**Goblet Cells**

wineglass-shaped mucus-secreting cells in simple columnar and pseudostratified epithelia=

### Two Kinds of Stratified Squamous Epithelia

**Keratinized**

found on skin surface, abrasion resistant Multiple cell layers with cells becoming flat and scaly toward surface keratin is a tough protein

- Epidermis; palms and soles heavily keratinized
- Resists abrasion; retards water loss through skin; resists penetration by pathogenic organisms

### Two Kinds of Stratified Squamous Epithelia (cont)

**Nonkeratinized**

lacks surface layer of dead cells

