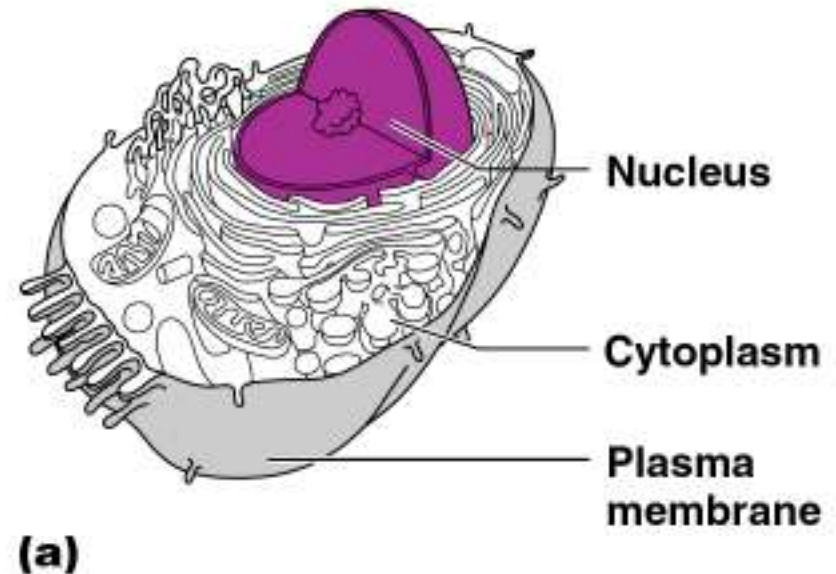

Cells and Tissues

Overview of Cells & Tissues

- Carry out all chemical activities needed to sustain life
- Cells - the building blocks of all living things
- Tissues are groups of cells that are similar in structure and function
- Structure reflects function

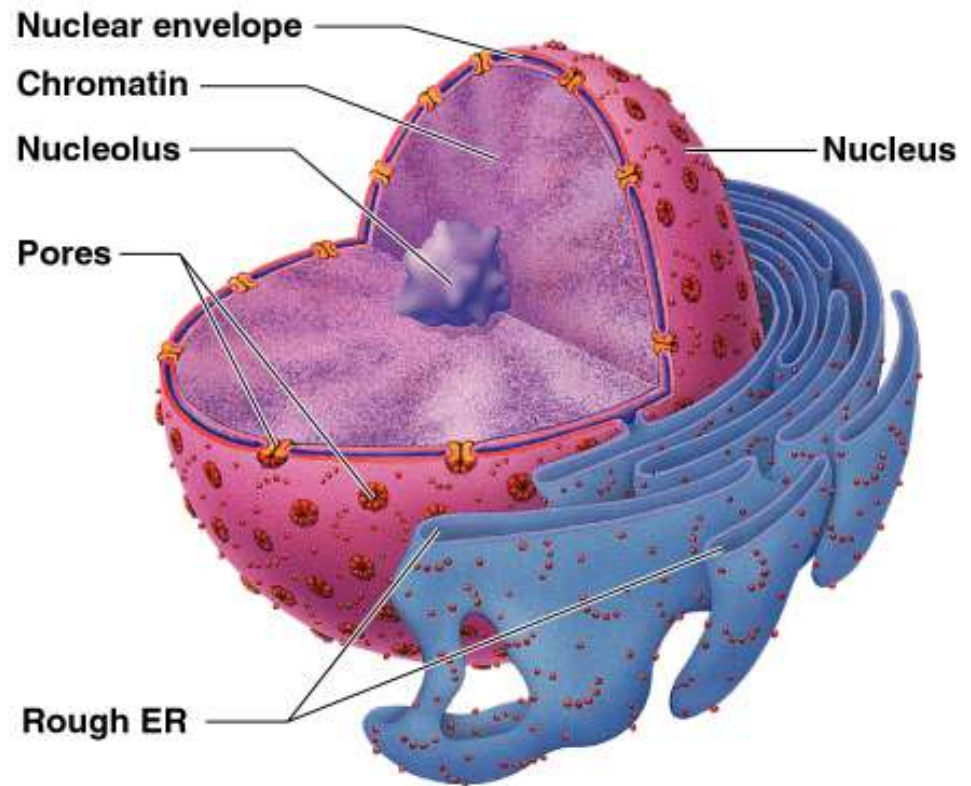
Anatomy of the Generalized Cell

- Cells are not all the same
- All cells share general structures
- Cells are organized into three main regions
 - Nucleus
 - Cytoplasm
 - Plasma membrane



The Nucleus

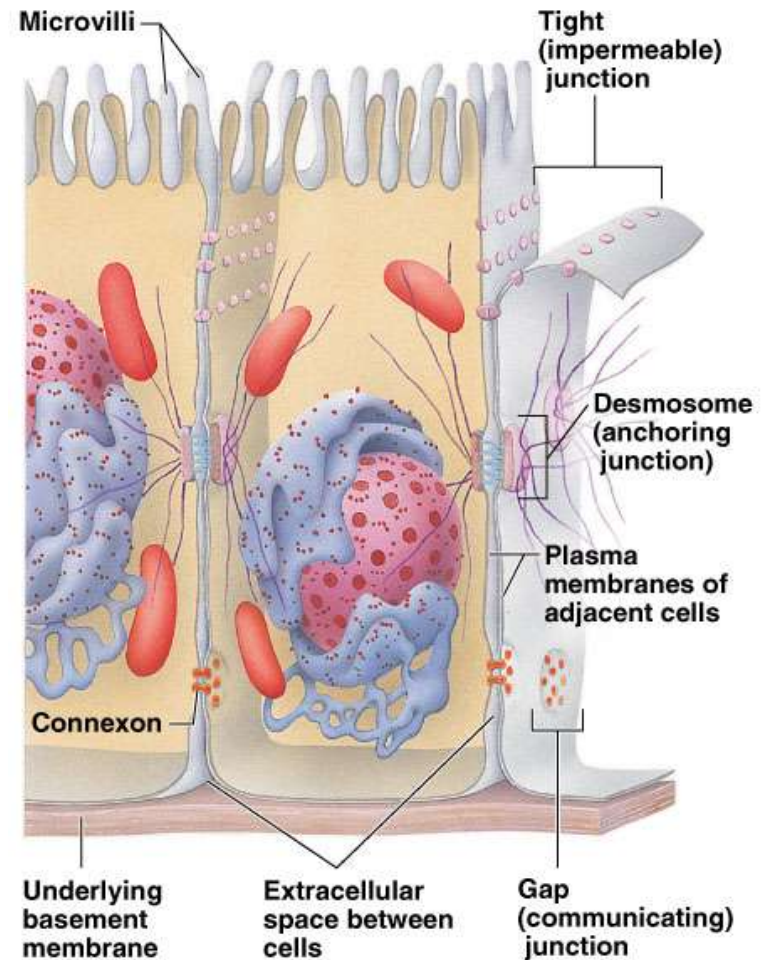
- Control center of the cell
- Contains genetic material (DNA)



(b)

Plasma Membrane Specializations

- Microvilli
 - Finger-like projections that increase surface area for absorption
 - Small intestine and nephrons of kidney

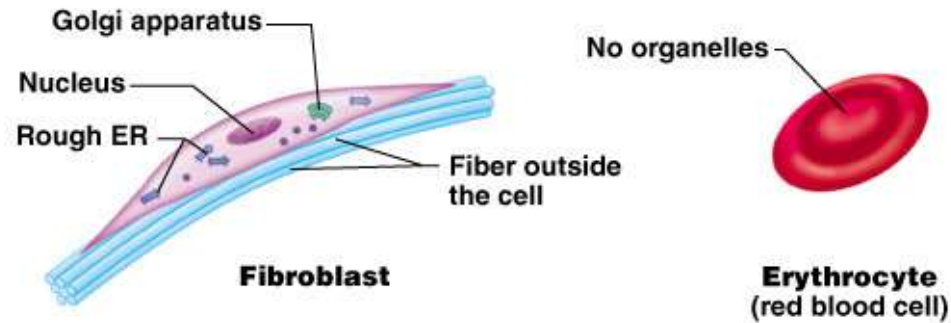


Cellular Projections

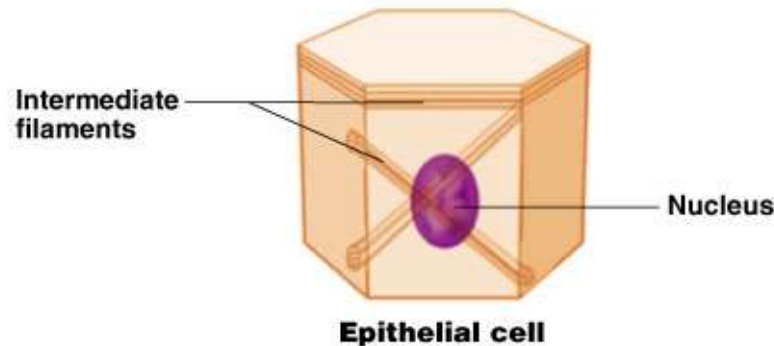
- Not found in all cells
- Used for movement
 - Cilia moves materials across the cell surface
 - Flagellum propels the cell

Cell Diversity-different types of cells

① Cells that connect body parts

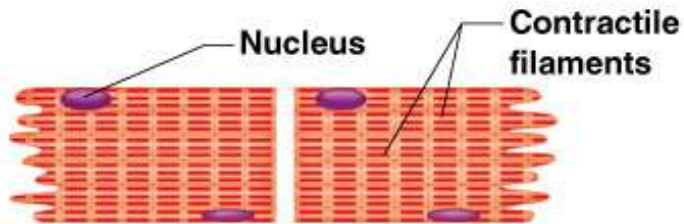


② Cells that cover and line body organs



Cell Diversity

③ Cells that move organs and body parts



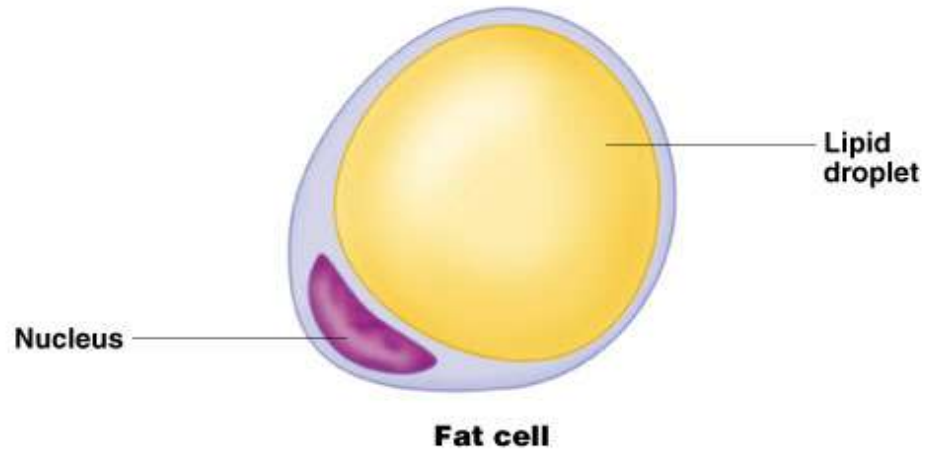
Skeletal muscle cell



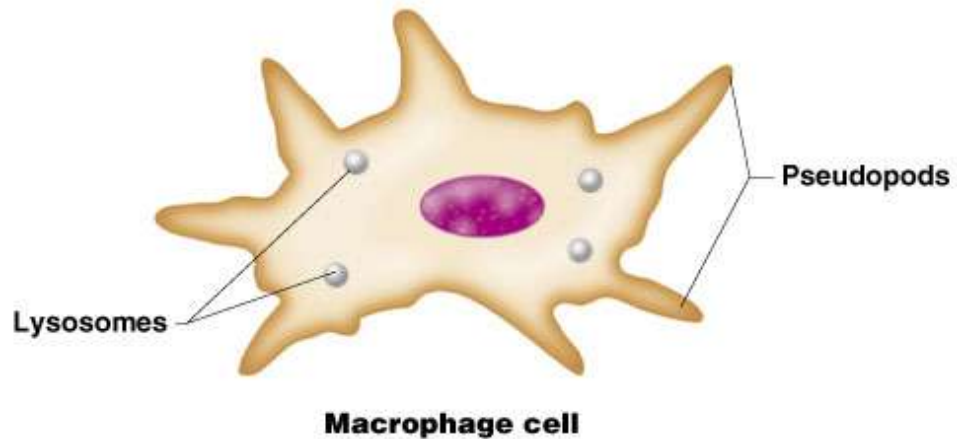
Smooth muscle cell

Cell Diversity

④ Cell that stores nutrients

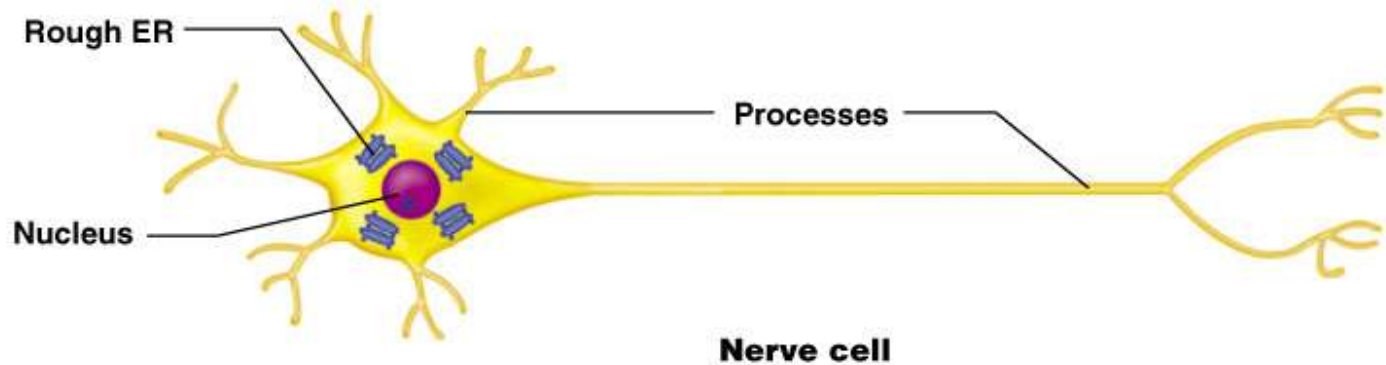


⑤ Cell that fights disease

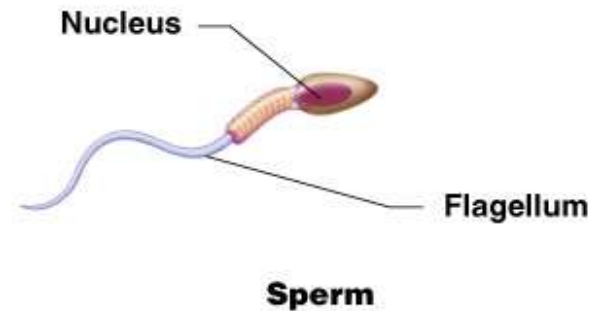
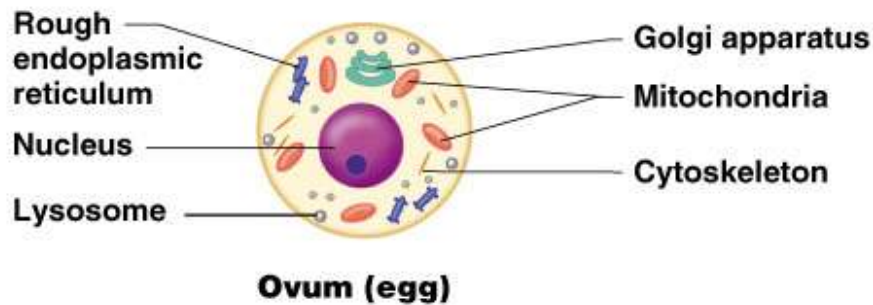


Cell Diversity

⑥ Cell that gathers information and controls body functions



⑦ Cells of reproduction



Stop Day One NOTES ! 😊

Cellular Physiology:

Membrane Transport

- Membrane Transport – movement of substance into and out of the cell
- Transport is by two basic methods
 - Passive transport
 - No energy is required
 - Active transport
 - The cell must provide metabolic energy

Selective Permeability

- The plasma membrane allows some materials to pass while excluding others
- This permeability includes movement into and out of the cell

Cell Life Cycle

- Cells have two major periods

1. Interphase

- Cell grows
- Cell carries on metabolic processes

2. Cell division

- Cell replicates itself
- Function is to produce more cells for growth and repair processes

Body Tissues

- Cells are specialized for particular functions
- Tissues
 - Groups of cells with similar structure and function
 - Four primary types
 1. Epithelium
 2. Connective tissue
 3. Nervous tissue
 4. Muscle

Epithelial Tissues

- Found in different areas
 - Body coverings
 - Body linings
 - Glandular tissue
- Functions
 - Protection
 - Absorption
 - Filtration
 - Secretion

Epithelium Characteristics

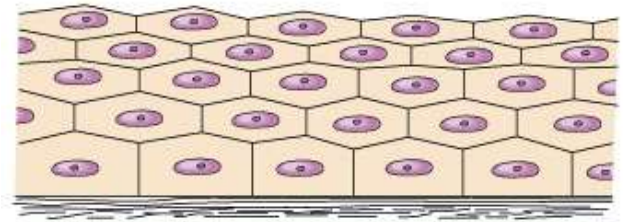
- Cells fit closely together
- Tissue layer always has one free surface
- The lower surface is bound by a basement membrane
- Avascular (have no blood supply)
- Regenerates easily if well nourished

Classification of Epithelium

- Number of cell layers
 - Simple – one layer
 - Stratified – more than one layer



Simple



Stratified

(a)

Classification of Epithelium

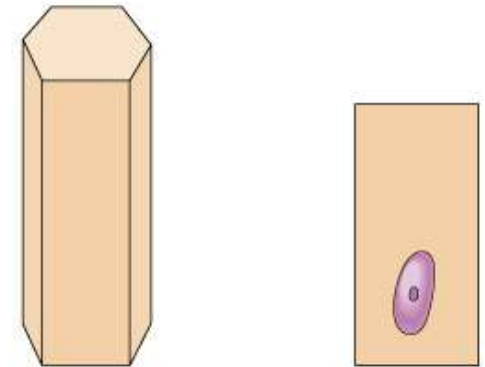
- Shape of cells
 - Squamous – flattened
 - Cuboidal – cube-shaped
 - Columnar – column-like



Squamous



Cuboidal



Columnar

(b)

Connective Tissue

- Found everywhere in the body
- Includes the most abundant and widely distributed tissues
- Functions
 - Binds body tissues together
 - Supports the body
 - Provides protection

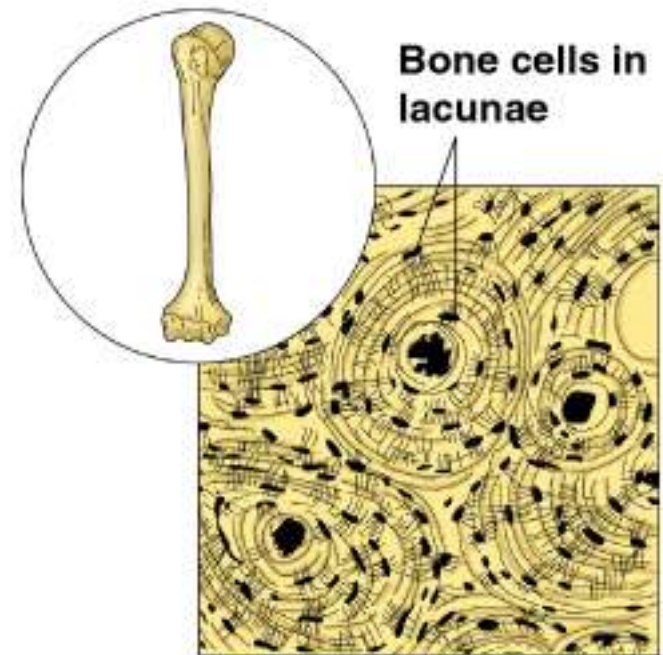
Connective Tissue Characteristics

- Variations in blood supply
 - Some tissue types are well vascularized
 - Some have poor blood supply or are avascular
- Extracellular matrix
 - Non-living material that surrounds living cells

Connective Tissue Types

1. Bone (osseous tissue)

- Composed of:
 - Bone cells in lacunae (cavities)
 - Hard matrix of calcium salts
 - Large numbers of collagen fibers
- Used to protect and support the body

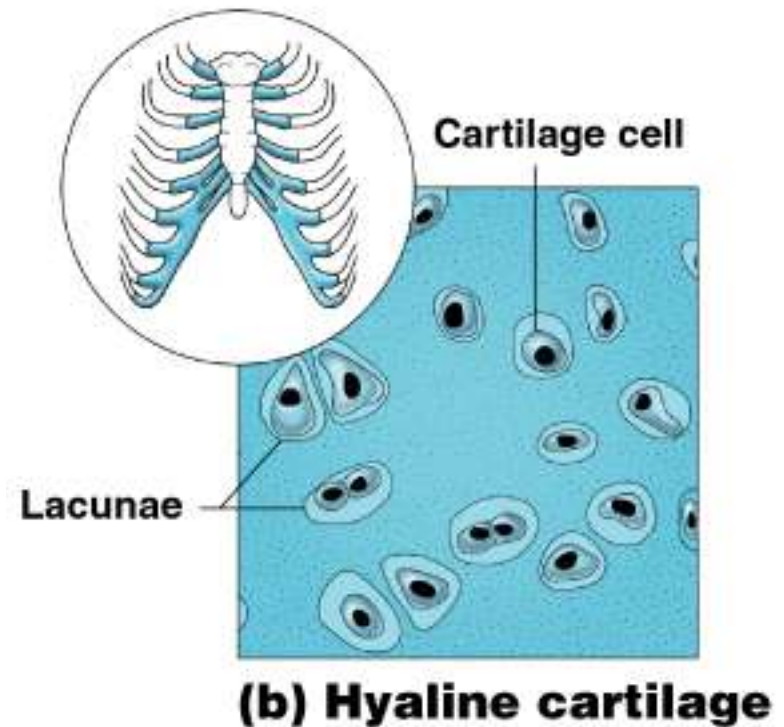


(a) Bone

Connective Tissue Types

2. Hyaline cartilage

- Most common cartilage
- Composed of:
 - Abundant collagen fibers
 - Rubbery matrix
- Entire fetal skeleton is hyaline cartilage



Connective Tissue Types

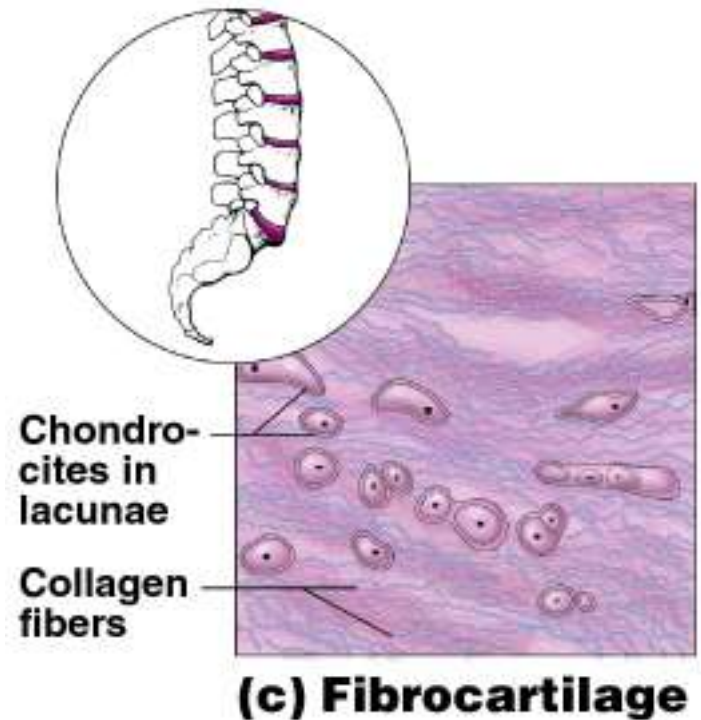
3. Elastic cartilage

- Provides elasticity
- Example: supports the external ear

Connective Tissue Types

4. Fibrocartilage

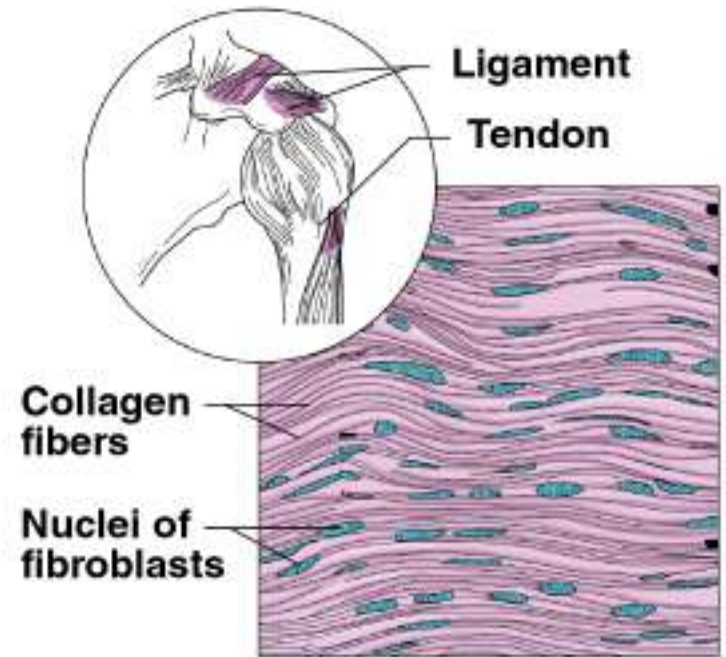
- Highly compressible
- Example: forms cushion-like discs between vertebrae



Connective Tissue Types

5. Dense connective tissue

- Main matrix element is collagen fibers
- Cells are fibroblasts
- Examples
 - Tendon – attach muscle to bone
 - Ligaments – attach bone to bone

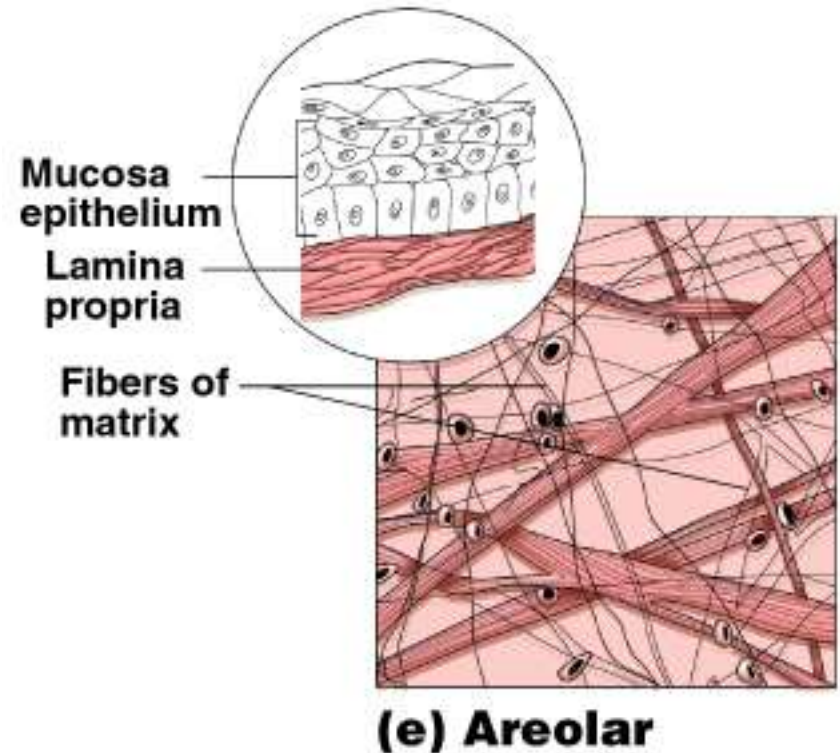


(d) Dense fibrous

Connective Tissue Types

6. Areolar connective tissue

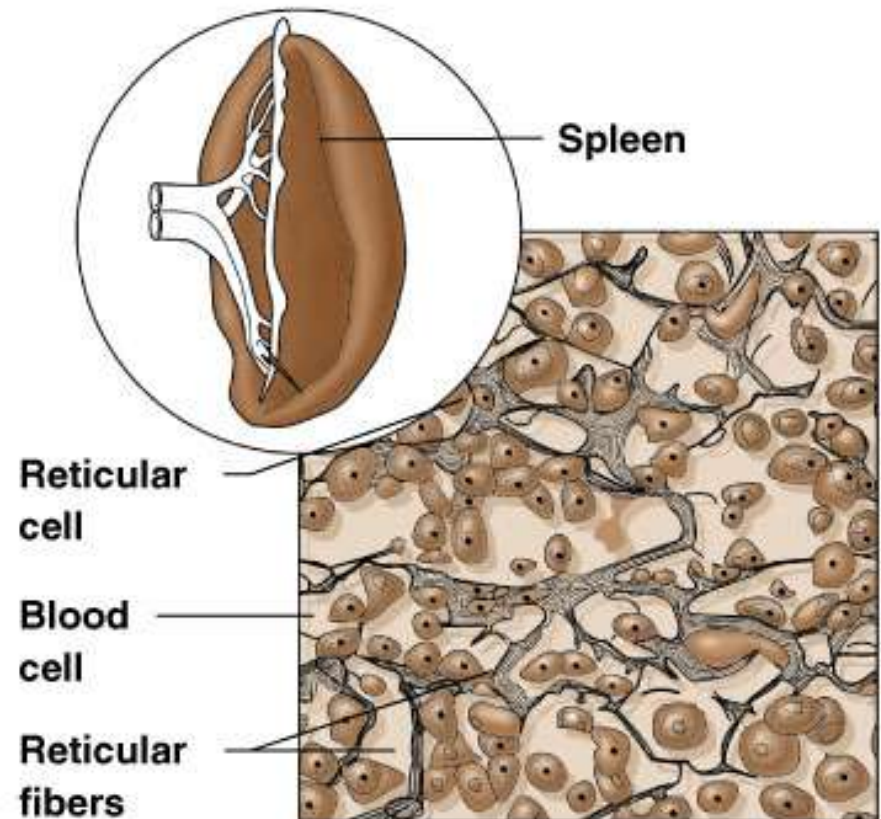
- Most widely distributed connective tissue
- Soft, pliable tissue
- Contains all fiber types
- Can soak up excess fluid



Connective Tissue Types

7. Reticular connective tissue

- Delicate network of interwoven fibers
- Forms stroma (internal supporting network) of lymphoid organs
 - Spleen
 - Bone marrow

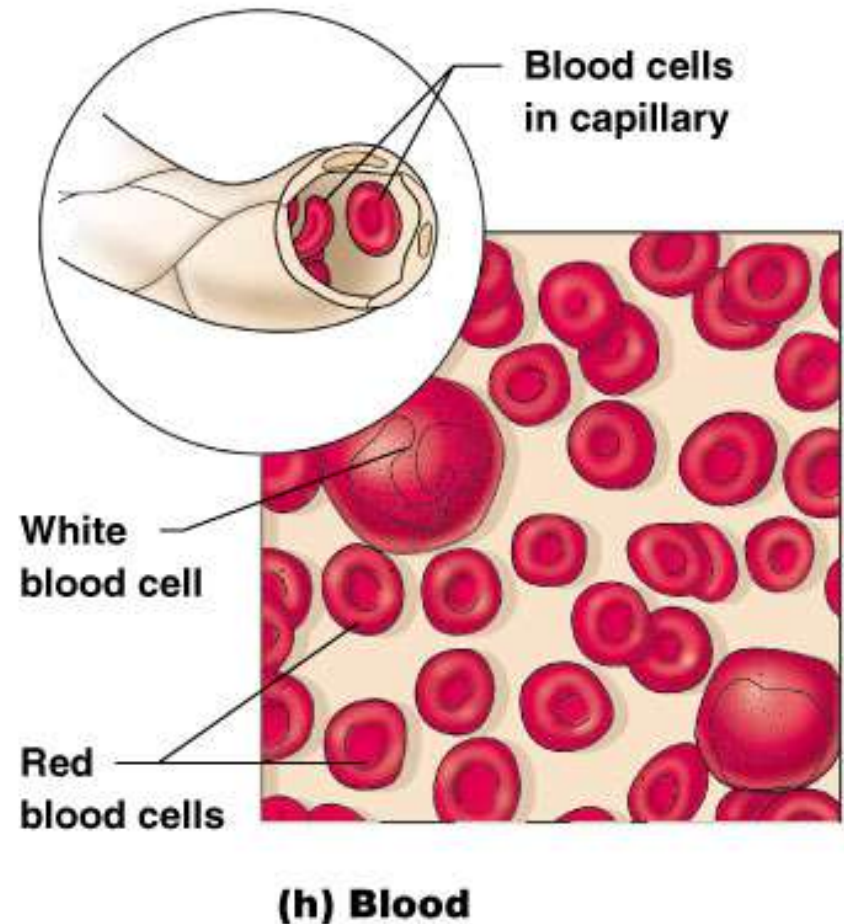


(g) Reticular

Connective Tissue Types

8. Blood

- Blood cells surrounded by fluid matrix
- Fibers are visible during clotting
- Functions as the transport vehicle for materials



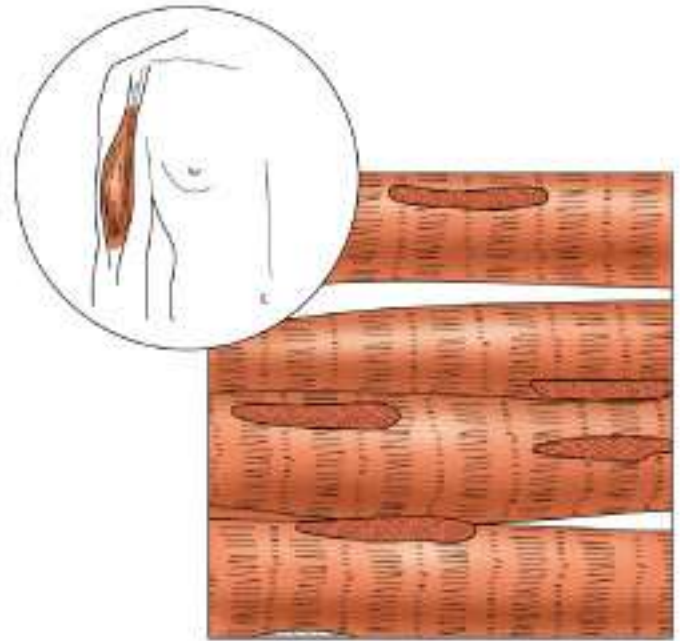
Muscle Tissue

- Function is to produce movement
- Three types
 1. Skeletal muscle
 2. Cardiac muscle
 3. Smooth muscle

Muscle Tissue Types

1. Skeletal muscle

- Can be controlled voluntarily
- Cells attach to connective tissue
- Cells are striated
- Cells have more than one nucleus

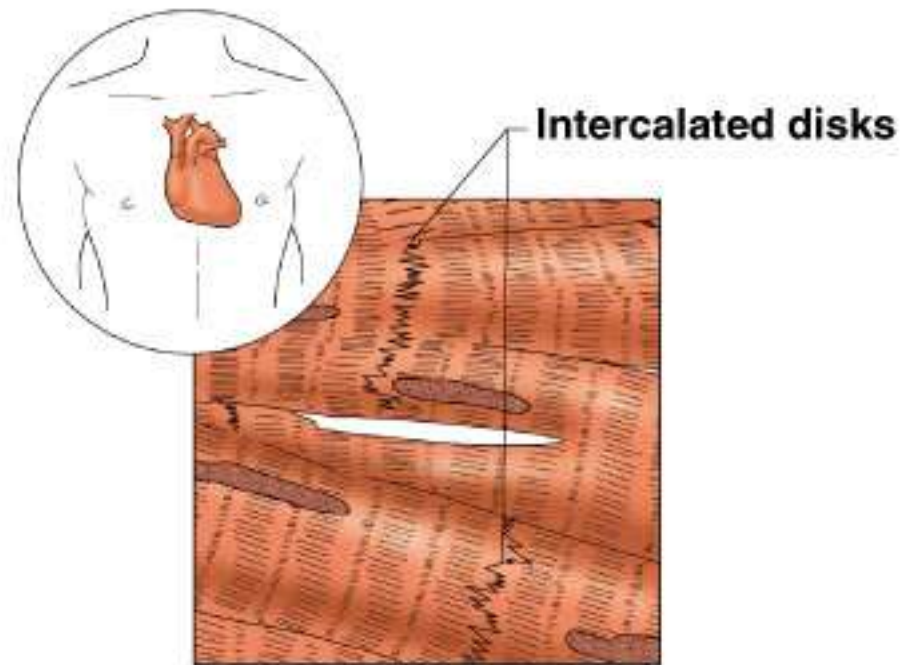


(b) Skeletal muscle

Muscle Tissue Types

2. Cardiac muscle

- Found only in the heart
- Function is to pump blood (involuntary)
- Cells attached to other cardiac muscle cells at intercalated disks
- Cells are striated
- One nucleus per cell

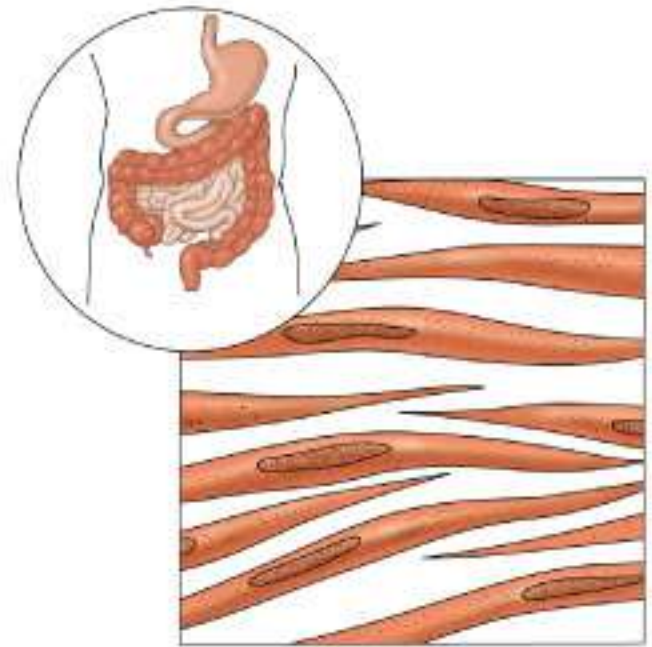


(c) Cardiac muscle

Muscle Tissue Types

3. Smooth muscle

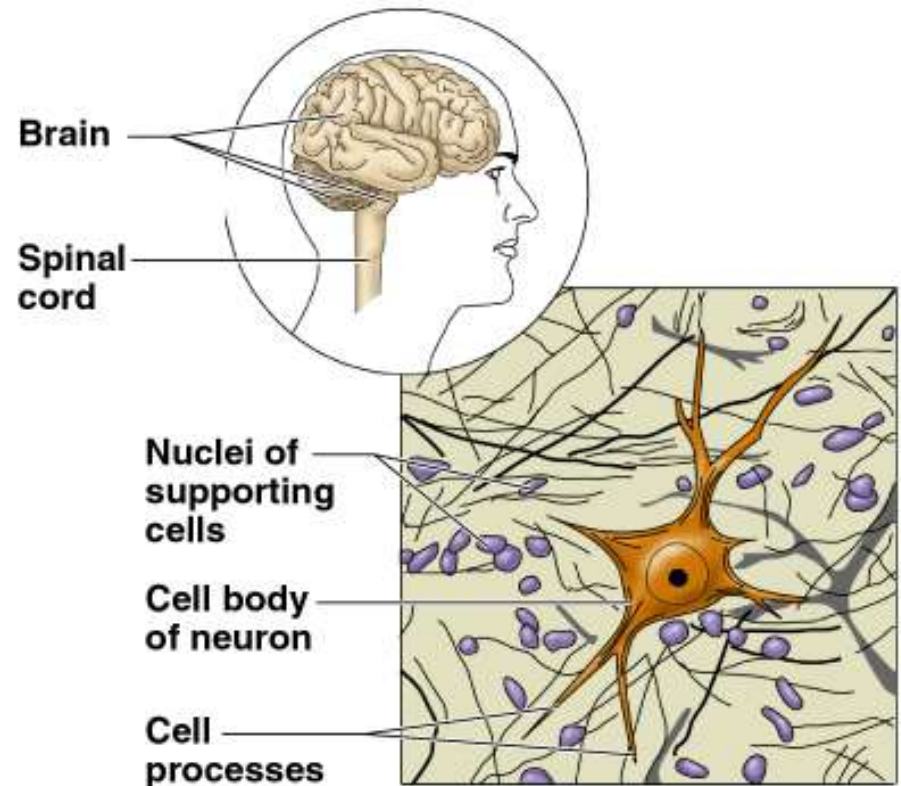
- Involuntary muscle
- Surrounds hollow organs
- Attached to other smooth muscle cells
- No visible striations
- One nucleus per cell



(a) Smooth muscle

Nervous Tissue

- Neurons and nerve support cells
- Function is to send impulses to other areas of the body



Tissue Repair

- Regeneration
 - Replacement of destroyed tissue by the same kind of cells
- Fibrosis
 - Repair by dense fibrous connective tissue (scar tissue)
- Determination of method
 - Type of tissue damaged
 - Severity of the injury