

Tissues (Histology)



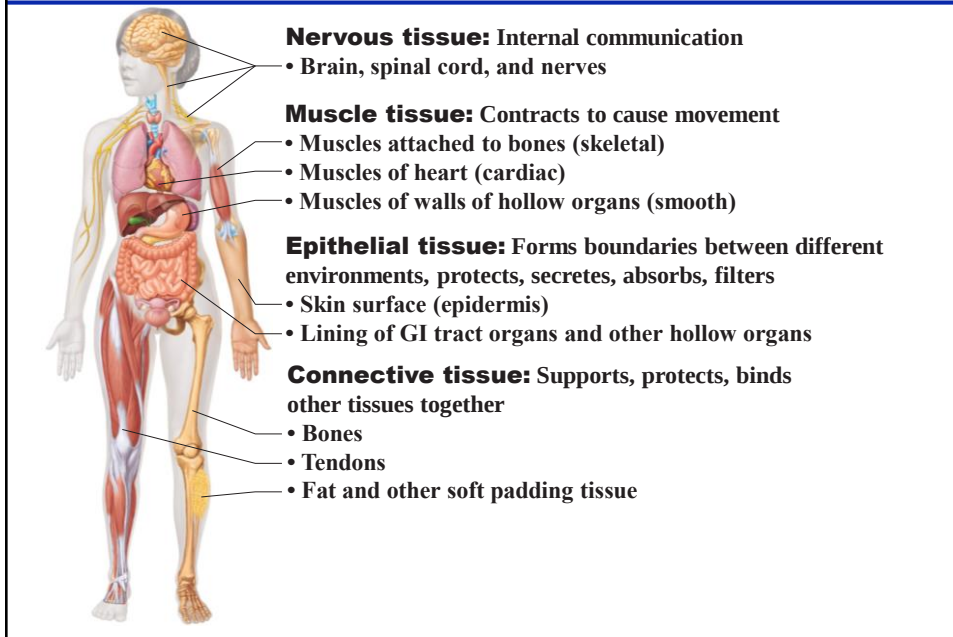
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Tissues

- Groups of cells with a common function
- Four primary tissues
 - Epithelia
 - Connective tissues
 - Muscle
 - Nervous

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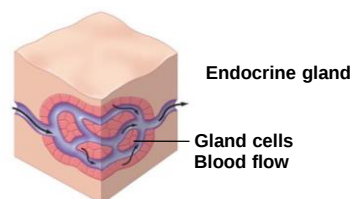
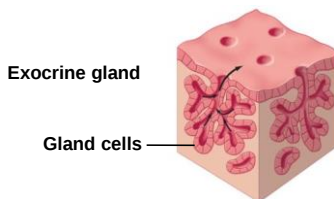
Various Tissue Locations - Informational



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Epithelial Tissues

- Line body cavities and cover surfaces
- Glandular epithelia
 - Epithelial cells adapted to make up glands
 - Exocrine glands
 - Secrete into ducts to exterior of body
 - Endocrine glands
 - Secrete into the blood

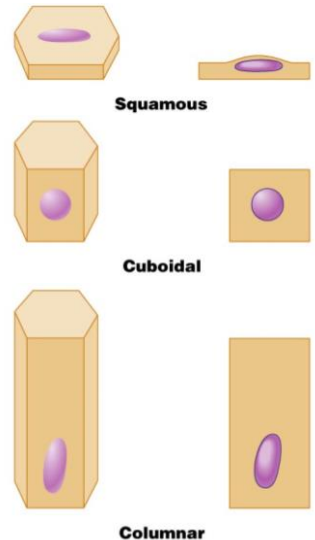


b) Glandular epithelia secrete a product.

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Epithelial Tissues: Classification

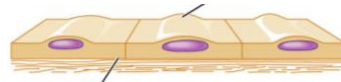
- Shape
 - **Squamous**
 - Flattened cells (scale like)
 - **Cuboidal**
 - Cube shaped (box-like)
 - **Columnar**
 - Column shaped



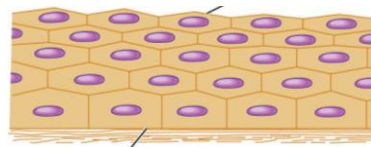
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Epithelial Tissues: Classification

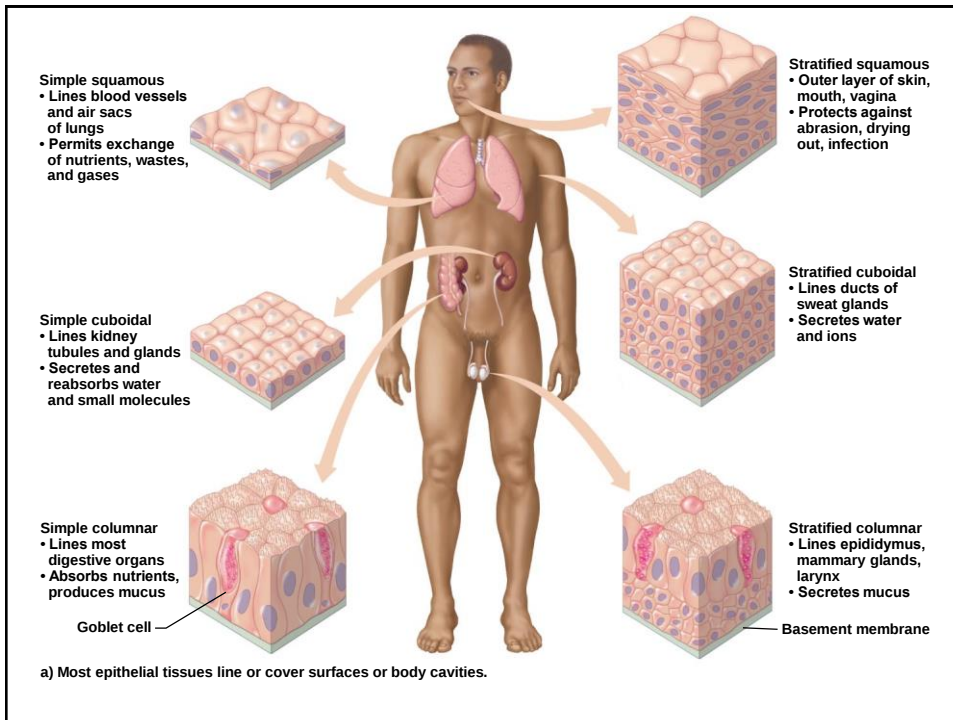
- Number of layers
 - **Simple/single-layered**
 - Adapted for diffusion across cell barriers



- **Stratified/multiple-layered**
 - Provide protection, as in the skin surface

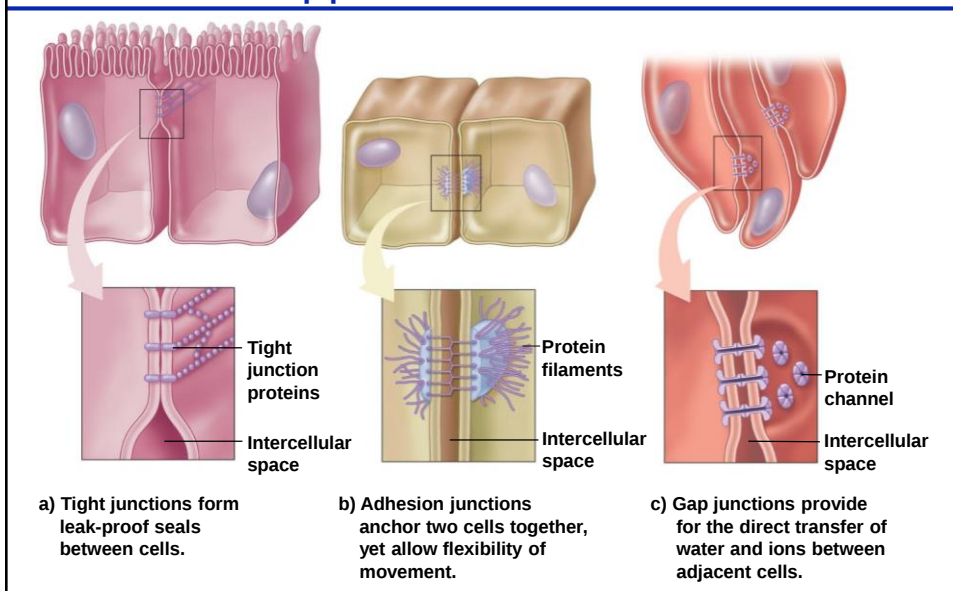


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The Basement Membrane Provides Structural Support and Junctions



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Connective Tissue

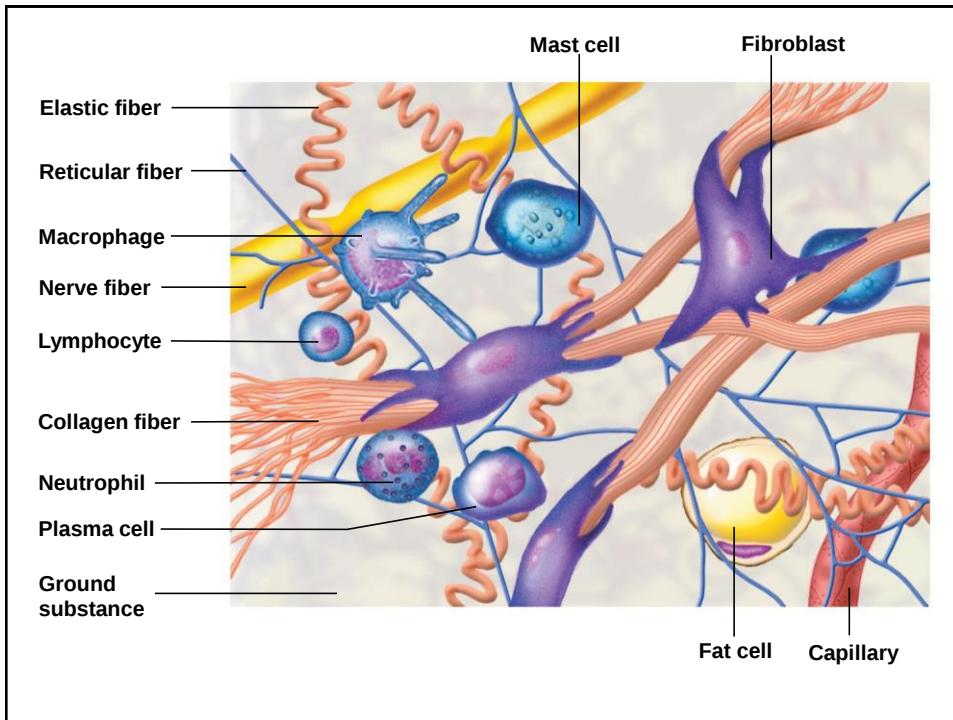
- General functions
 - Supports softer organs of body
 - Connects parts of body
 - Stores fat
 - Produces blood cells
- Contains fibers and cells embedded in nonliving extracellular matrix
- Matrix provides the strength
- Two general types
 - Fibrous and special

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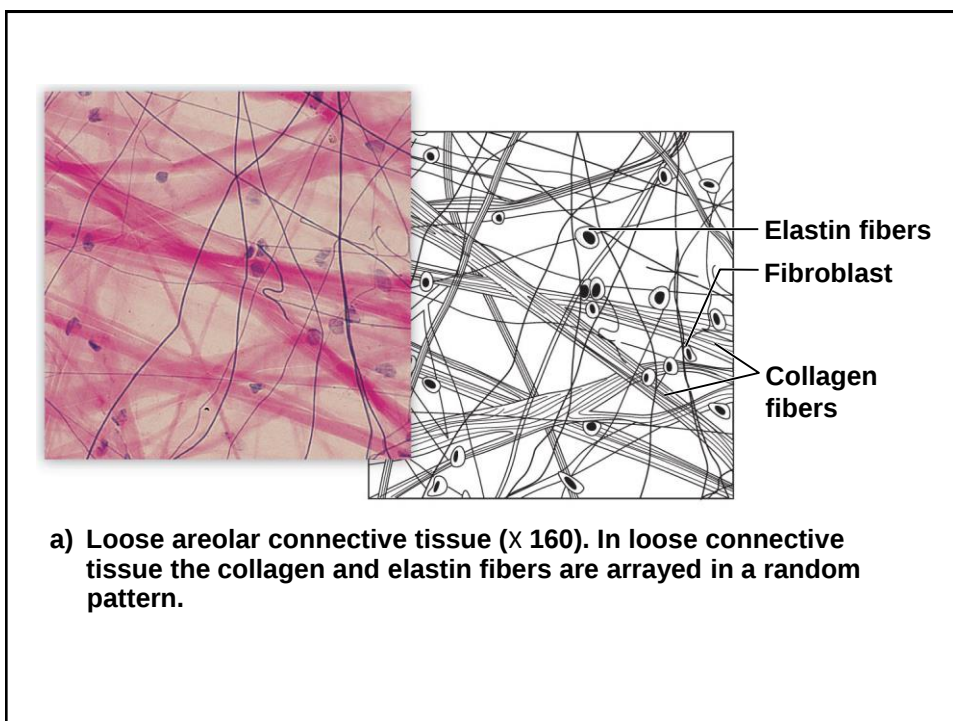
Fibrous Connective Tissue

- Function
 - provides strength and elasticity
- Cells
 - Fibroblasts
 - Macrophages
 - Lymphocytes
 - Neutrophils
- Fibers
 - Collagen
 - Elastic
 - Reticular

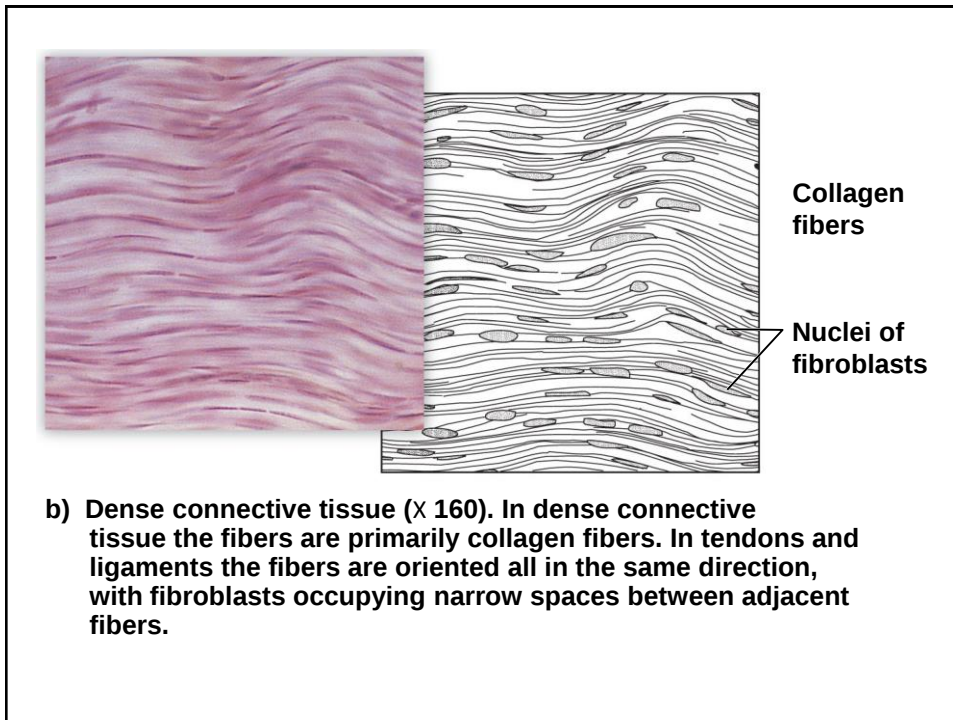
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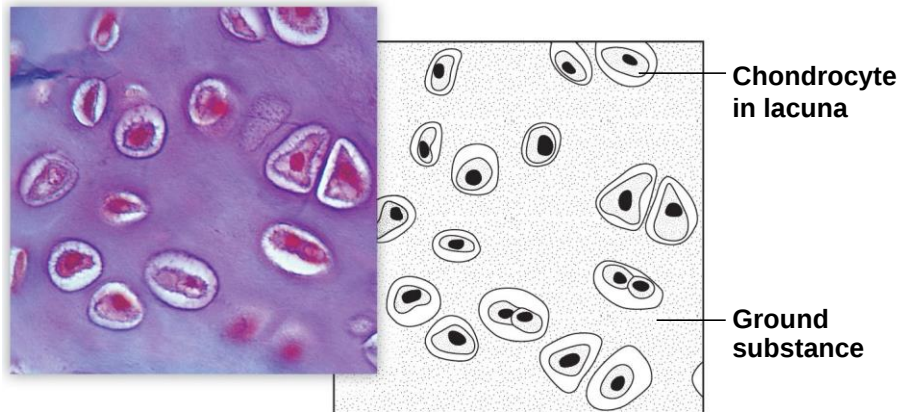


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Specialized Connective Tissues

- **Cartilage**
 - produced by chondroblasts found in lacunae
 - no blood vessels
 - high collagen content

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a) Cartilage from the trachea ($\times 300$). Mature cartilage cells, called chondrocytes, become trapped in chambers called lacunae within the hard, rubbery ground substance. Ground substance is composed of collagen fibers, polysaccharides, proteins, and water.

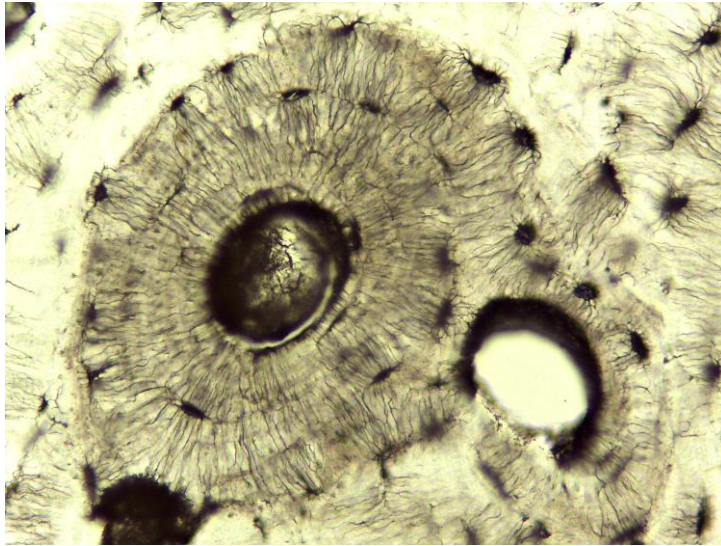
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Specialized Connective Tissues

- **Bone**
 - inorganic matrix with calcium salts for hardness

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Bone Connective Tissue



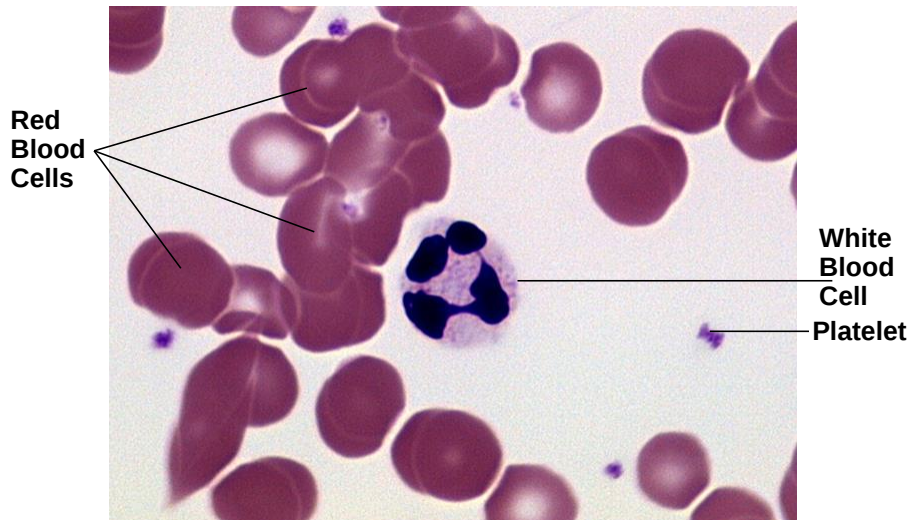
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Specialized Connective Tissues

- **Blood**
 - fluid matrix of plasma
 - red blood cells
 - white blood cells
 - platelets

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Blood Connective Tissue

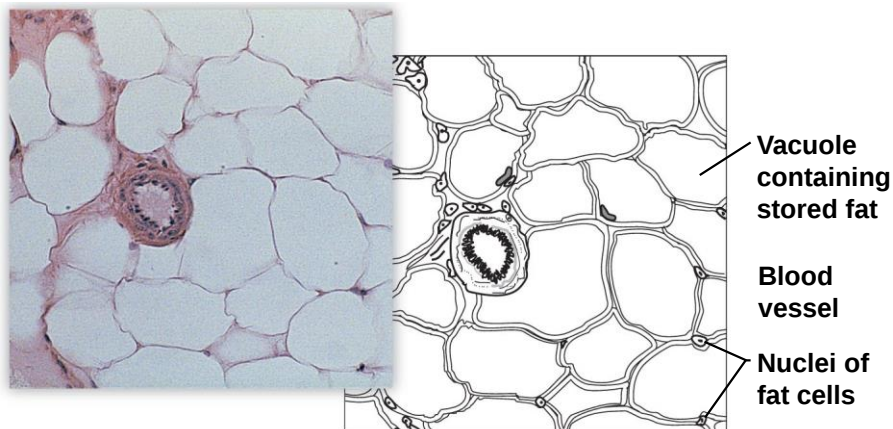


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Specialized Connective Tissues

- **Adipose tissue**
 - fat cells
 - function in insulation, protection, and energy storage

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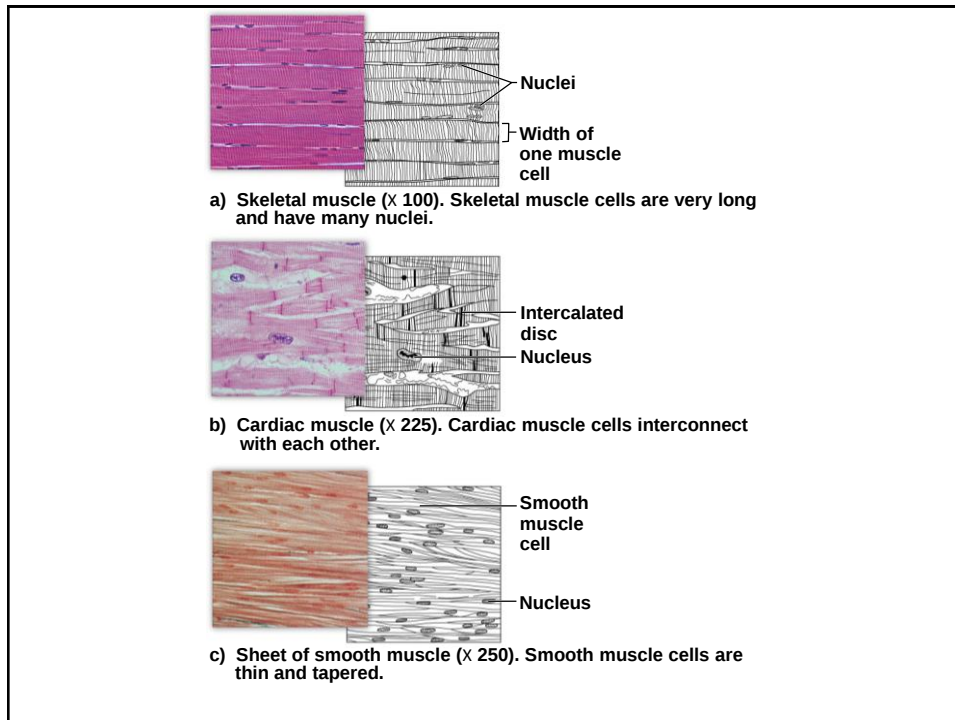
- b) Adipose tissue from the subcutaneous layer under the skin ($\times 140$). Adipose tissue consists almost entirely of fat cells. The fat deposit within a fat cell can become so large that the nucleus is pushed to the side.

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Muscle Tissue Contracts to Produce Movement

- **Skeletal** muscle
 - Moves body parts
 - Voluntary, multinucleated
- **Cardiac** muscle
 - Functions in the heart
 - Involuntary, single nucleus
- **Smooth** muscle
 - Surrounds hollow structures
 - Involuntary, single nucleus

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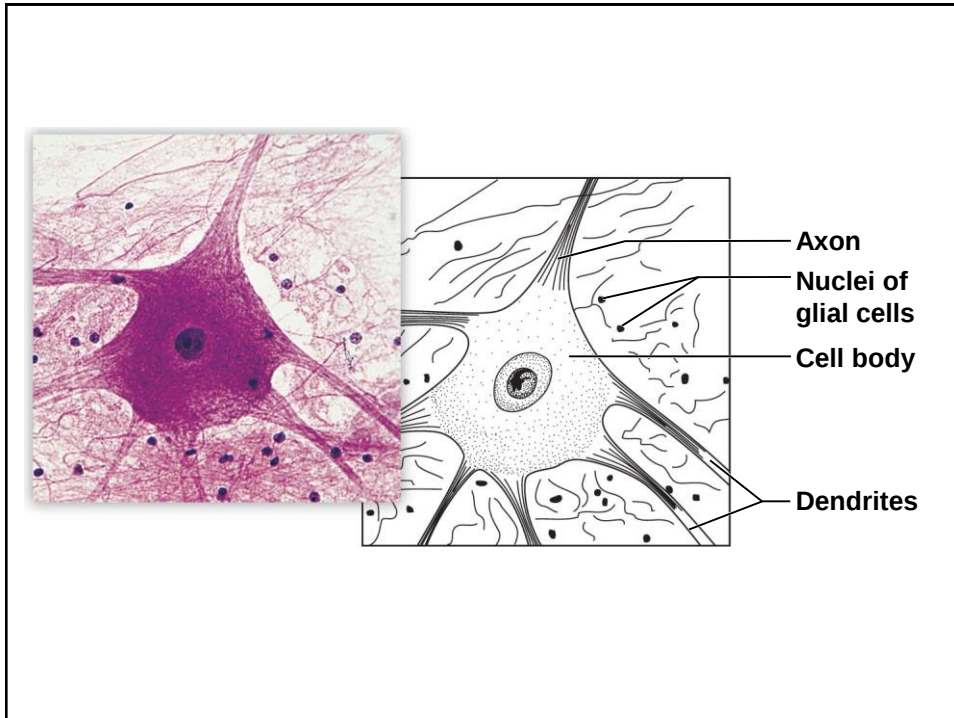


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Nervous Tissues Transmit Impulses

- **Neuron**
 - specialized nervous system cell
 - Function: generate and transmit electrical impulses
 - Structural components: cell body, dendrites, axon
- **Glial cells** support neurons

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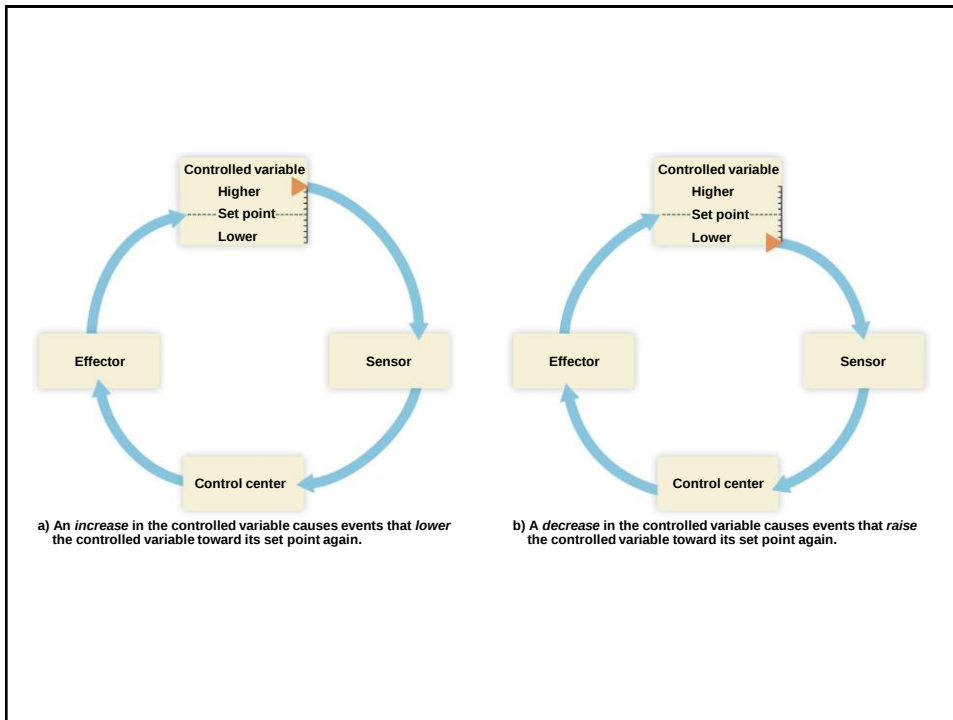


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Multicellular Organisms Must Maintain Homeostasis

- Maintenance of relative constancy of the conditions of the internal environment
- **Negative feedback control system**
 - deviations from normal are detected and counteracted
- Components of a negative feedback control system
 - Controlled variable
 - Sensor
 - Control center
 - Effector

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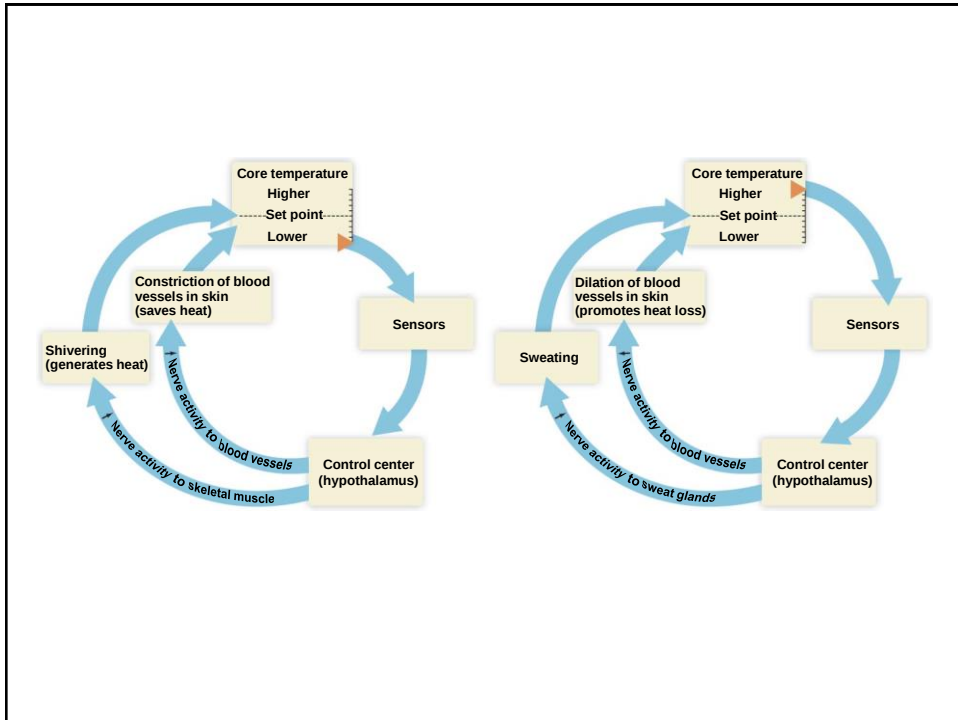


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Negative Feedback Helps Maintain Core Body Temperature

- **Controlled variable:** body temperature
- **Sensors:** temperature sensors in skin and internal organs
- **Control center:** hypothalamus
- **Effectors**
 - Blood vessels
 - Sweat glands
 - Skeletal muscles

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