

# TISSUES

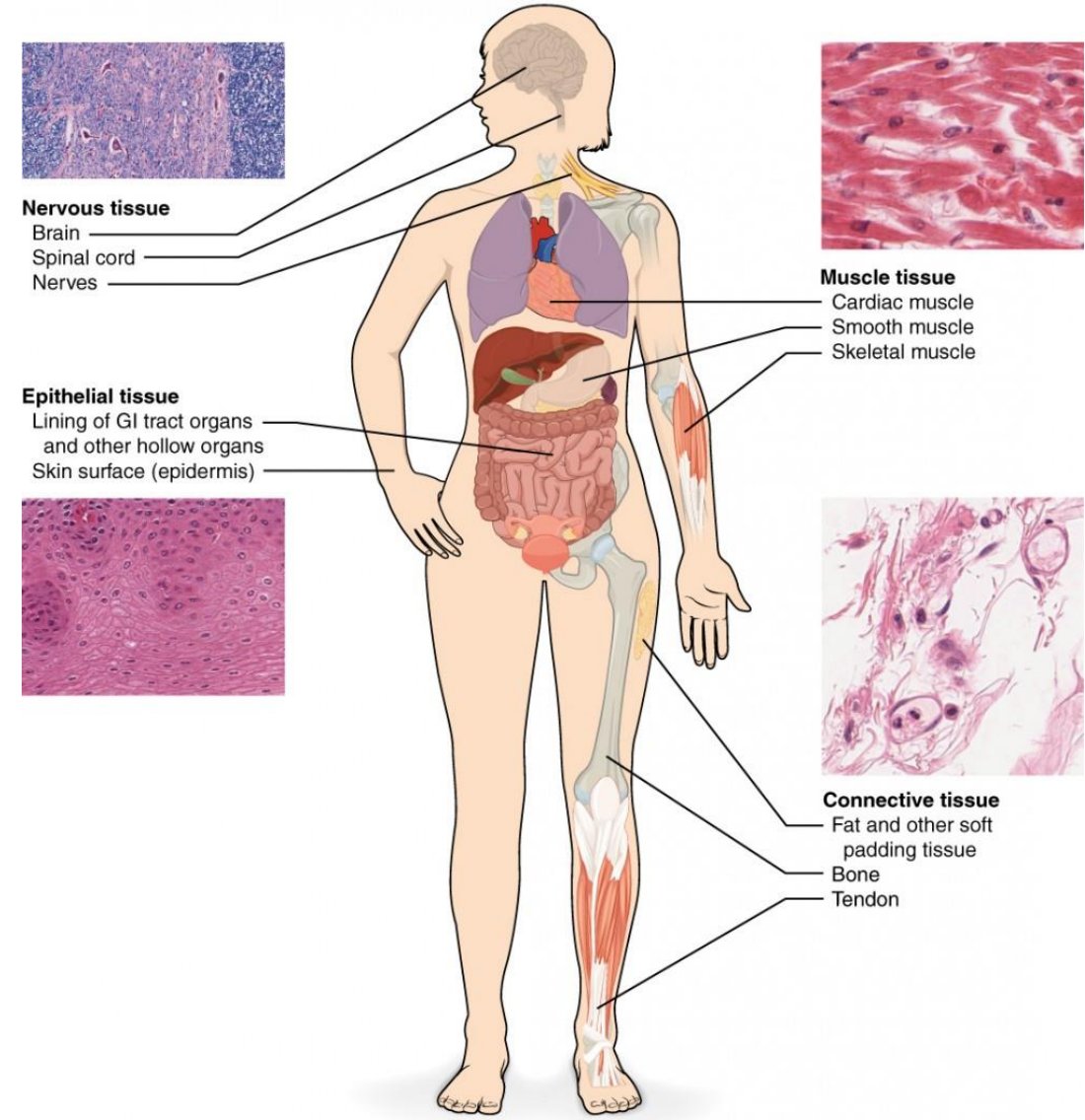
Primary Care Paramedicine

Module: 04  
Section: 05



- Define the term tissue
  - A tissue is a group of similar cells collected together by an intercellular matrix. Histology is the study of tissues.
- List the four types of tissue found in the body
  - The four main types of tissues in the body are epithelial, connective, muscle, and nerve tissue.

- A group of similar cells that perform a common function
- Vary in size and shape
- Principle types
  - Epithelial
  - Connective
  - Muscle
  - Nervous



Tissues

# EPITHELIAL TISSUE

- Types:
  - Membranous
    - Covers the body and some parts
    - Lines serous cavities
  - Glandular
    - Grouped in solid cords or specialized follicles that form the secretory units of the endocrine and exocrine glands

- Function
  - Protection
    - Skin
  - Sensory
    - Skin, nose, eyes and ears
  - Secretion
    - Hormones, mucous, digestive juices and sweat
  - Absorption
    - Lungs, GI tract
  - Excretion
    - Kidneys

- Characteristics
  - Consist of tightly packed cells with little intercellular matrix
  - They have one free surface and reproduce readily.
  - Contains no blood vessels (avascular)
    - Oxygen and nutrients must diffuse from underlying tissue
  - They cover the body, line body cavities, and cover organs within body cavities.

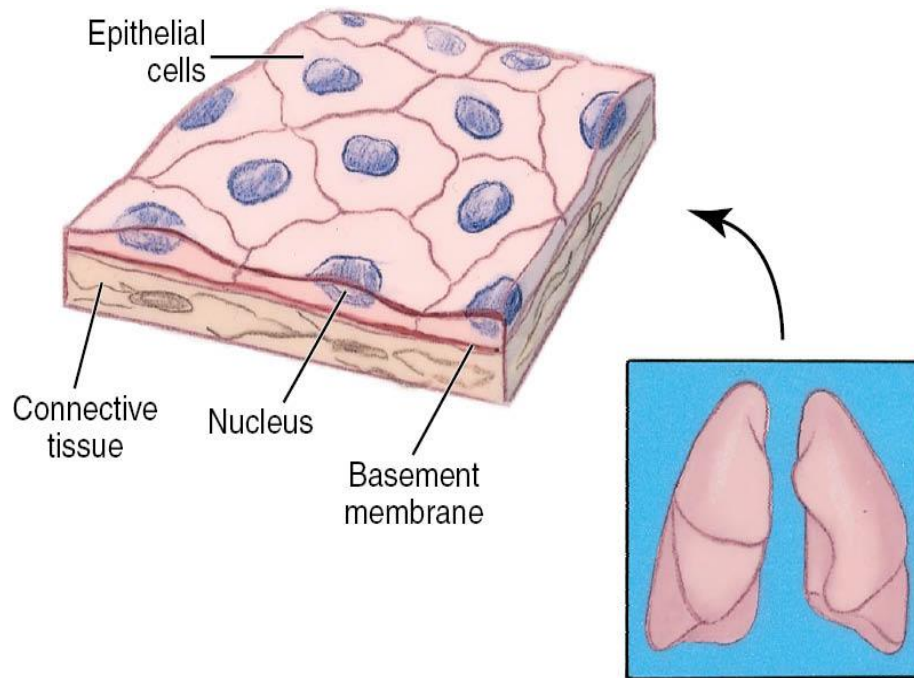
## Based on Shape

- Squamous
- Cuboidal
- Columnar
- Pseudostratified columnar

## Based on Layers

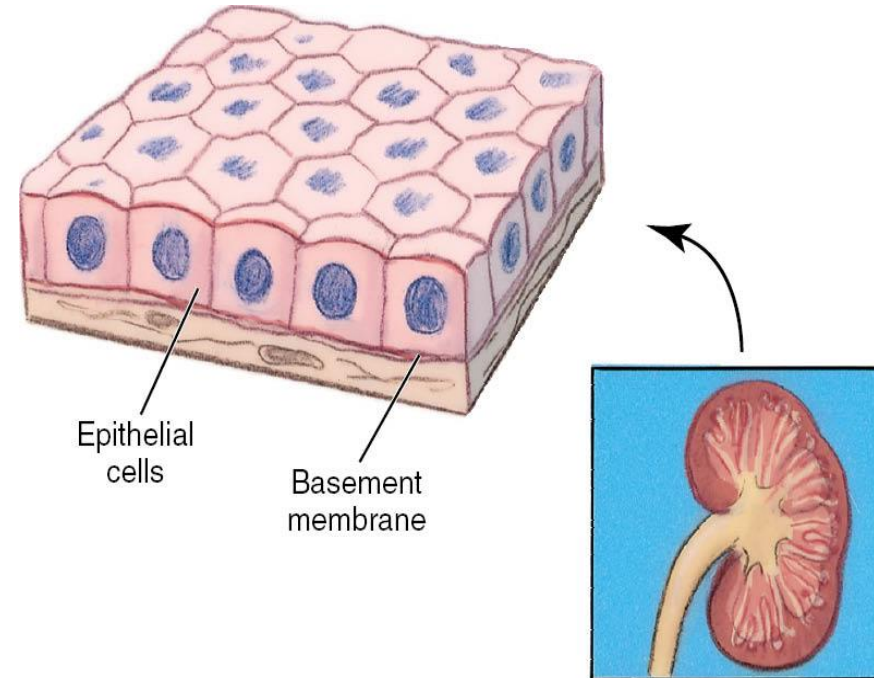
- Simple
  - Single layer
- Stratified
  - Multiple layers
- Transitional
  - Layers of various shapes in areas of stretching and tension
  - Varies in shape and layers with force





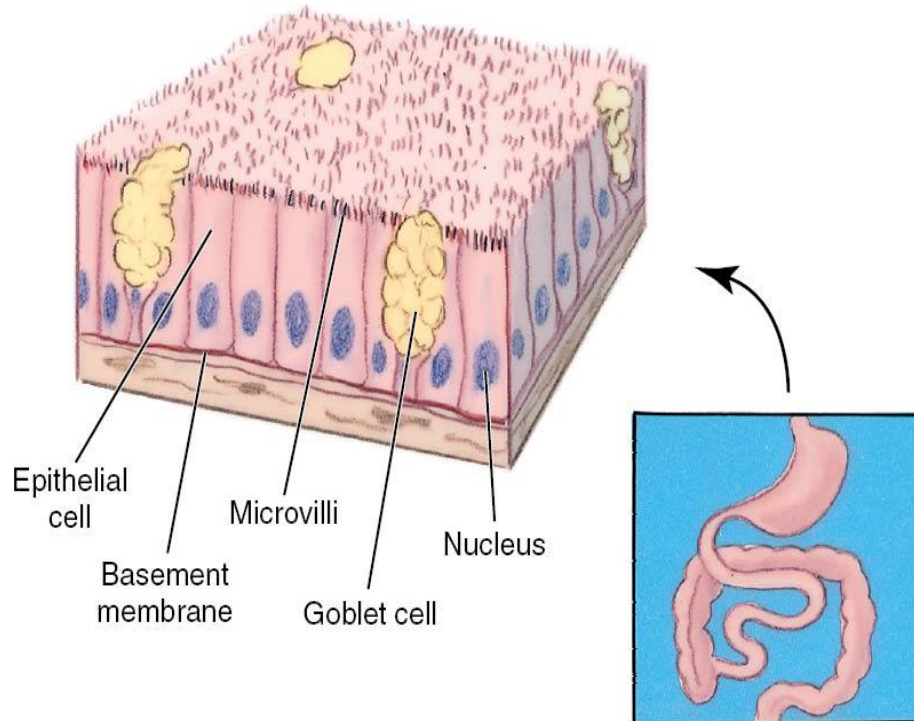
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Simple squamous epithelium in the alveoli of the lungs. It is also found in capillary walls and in the renal corpuscles of the kidney.

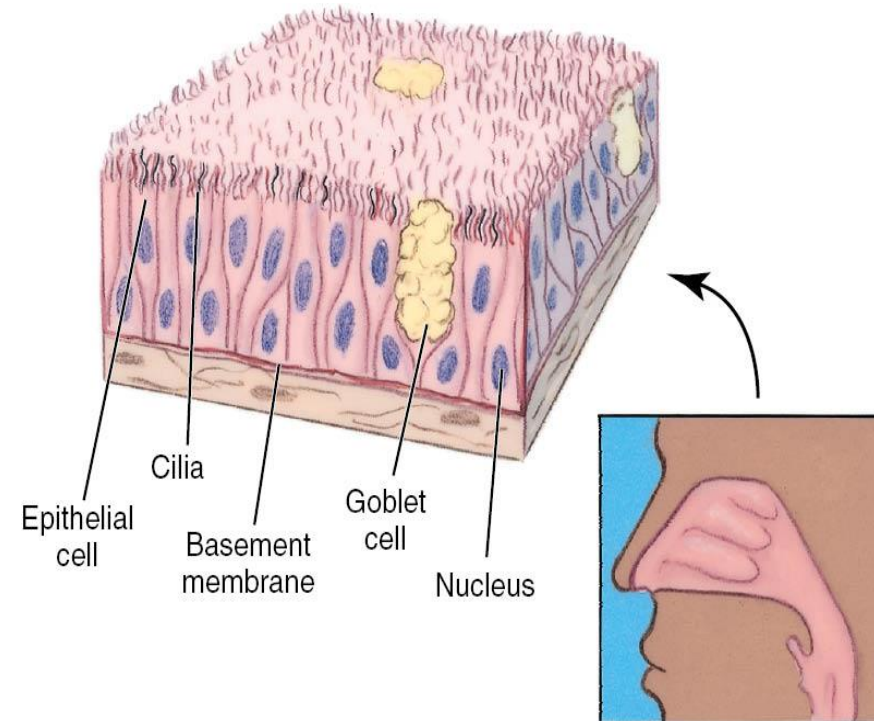


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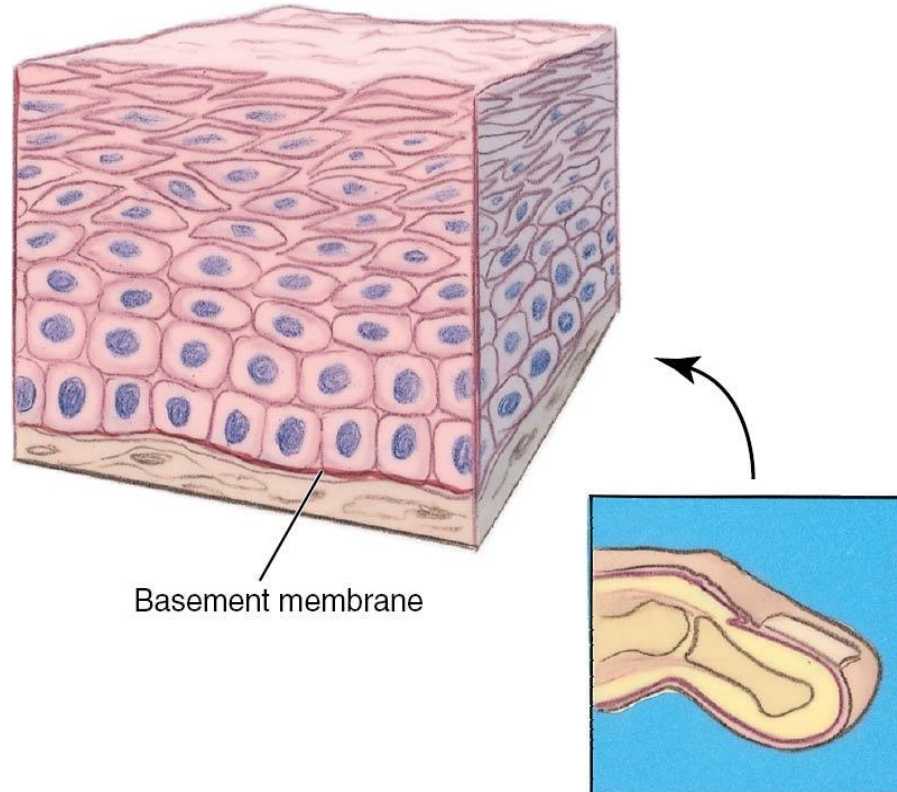
Simple cuboidal epithelium in the kidney tubules. It is also found in many glands and as a covering of the ovary.



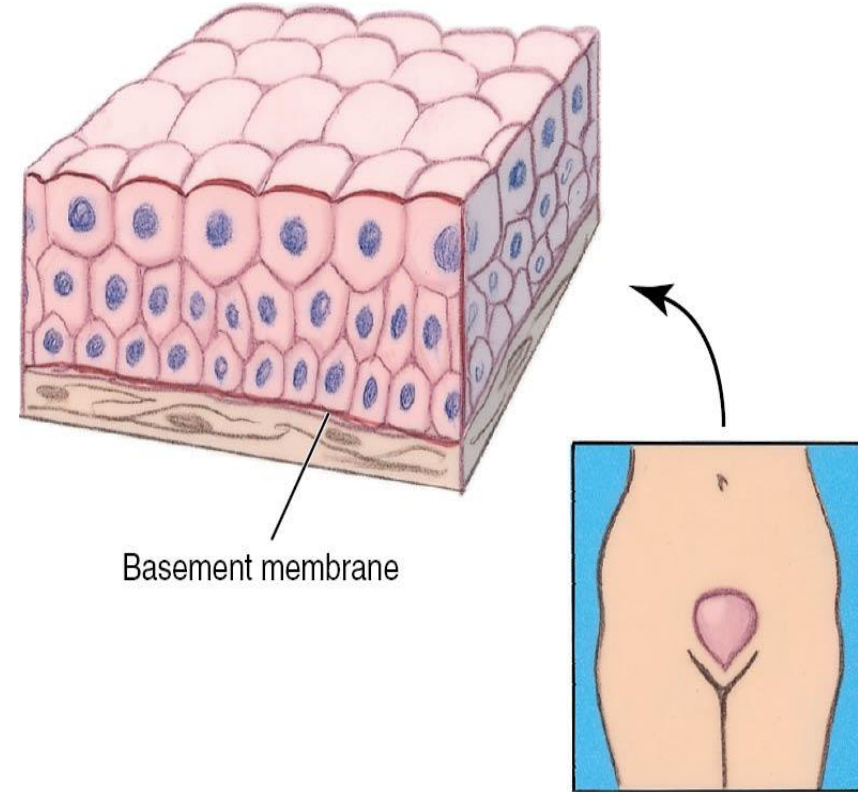
Simple columnar epithelium in the lining of the stomach and intestines.



Pseudostratified columnar epithelium in the respiratory tract. It also lines some of the male reproductive system.



Stratified squamous epithelium from the outer layer of the skin. Note the numerous cell layers and the flattened cells at the surface.

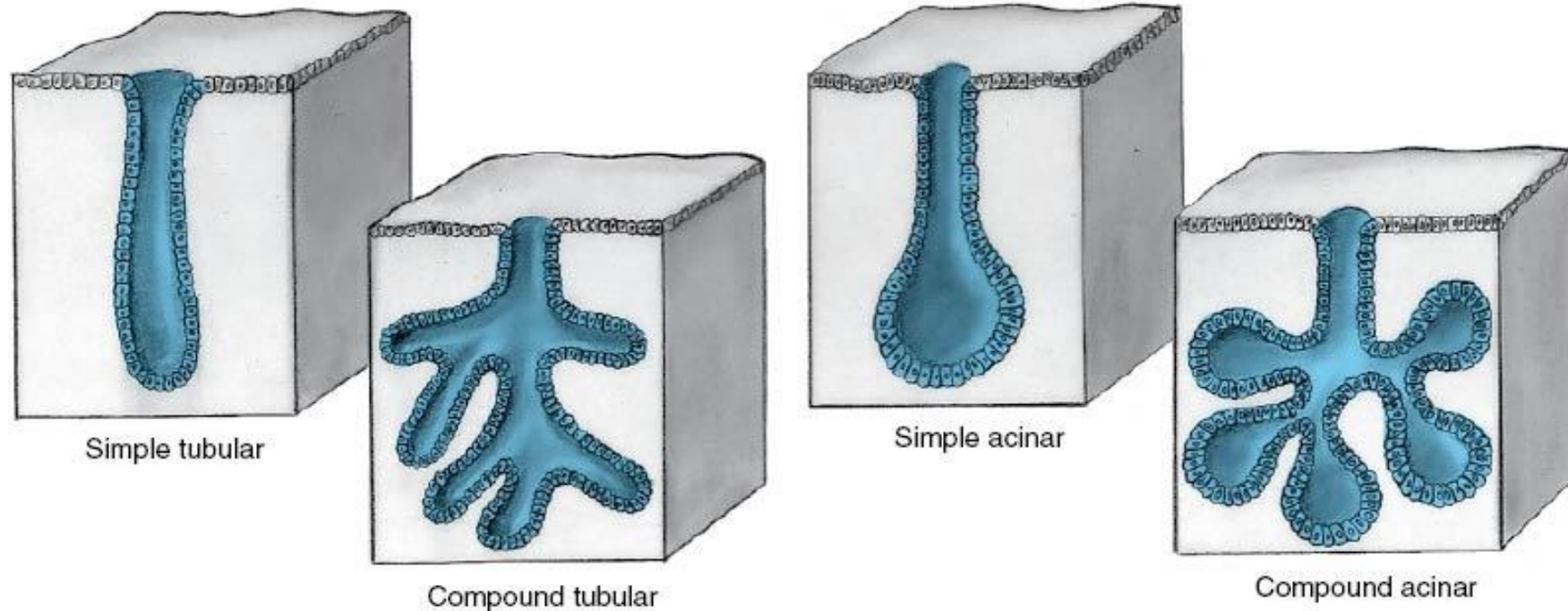


Transitional epithelium from the urinary bladder.

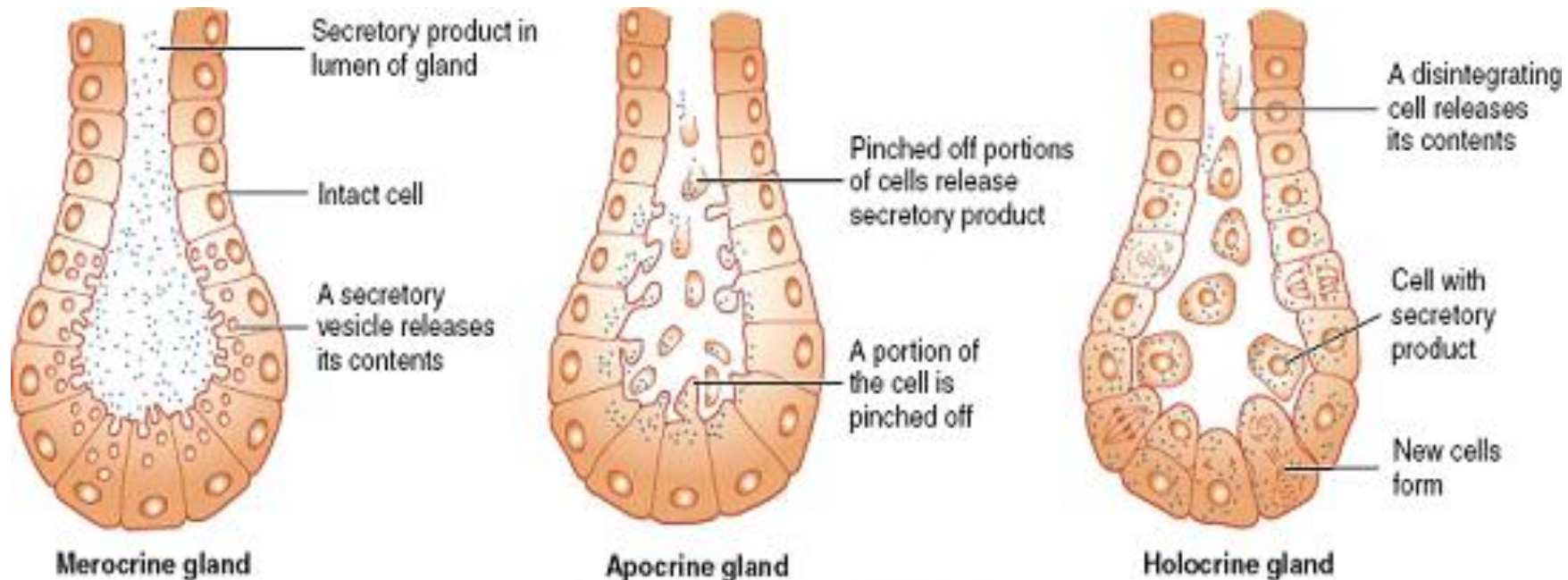
Cell Type	Example	Purpose
Simple squamous	Alveoli	Filter
Simple cuboidal	Glands	Excretion
Simple columnar	Lining of stomach	Absorption/cilia
Pseudostratified columnar	Air passages	Mucous/cilia
Stratified squamous	Skin, esophagus	Protection
Stratified cuboidal	Epiglottis	Protection
Stratified columnar	Anus	Protection
Stratified transitional	Bladder	Stretch

- Gland Structure
  - Exocrine glands secrete their product onto a free surface through a duct
    - Goblet cells are unicellular exocrine glands
    - Other exocrine glands are multicellular.
  - Endocrine glands are ductless glands and secrete their products into the blood

- Classification of glands according to structure.



- Classification of glands according to mode of secretion.



Tissues

# CONNECTIVE TISSUE



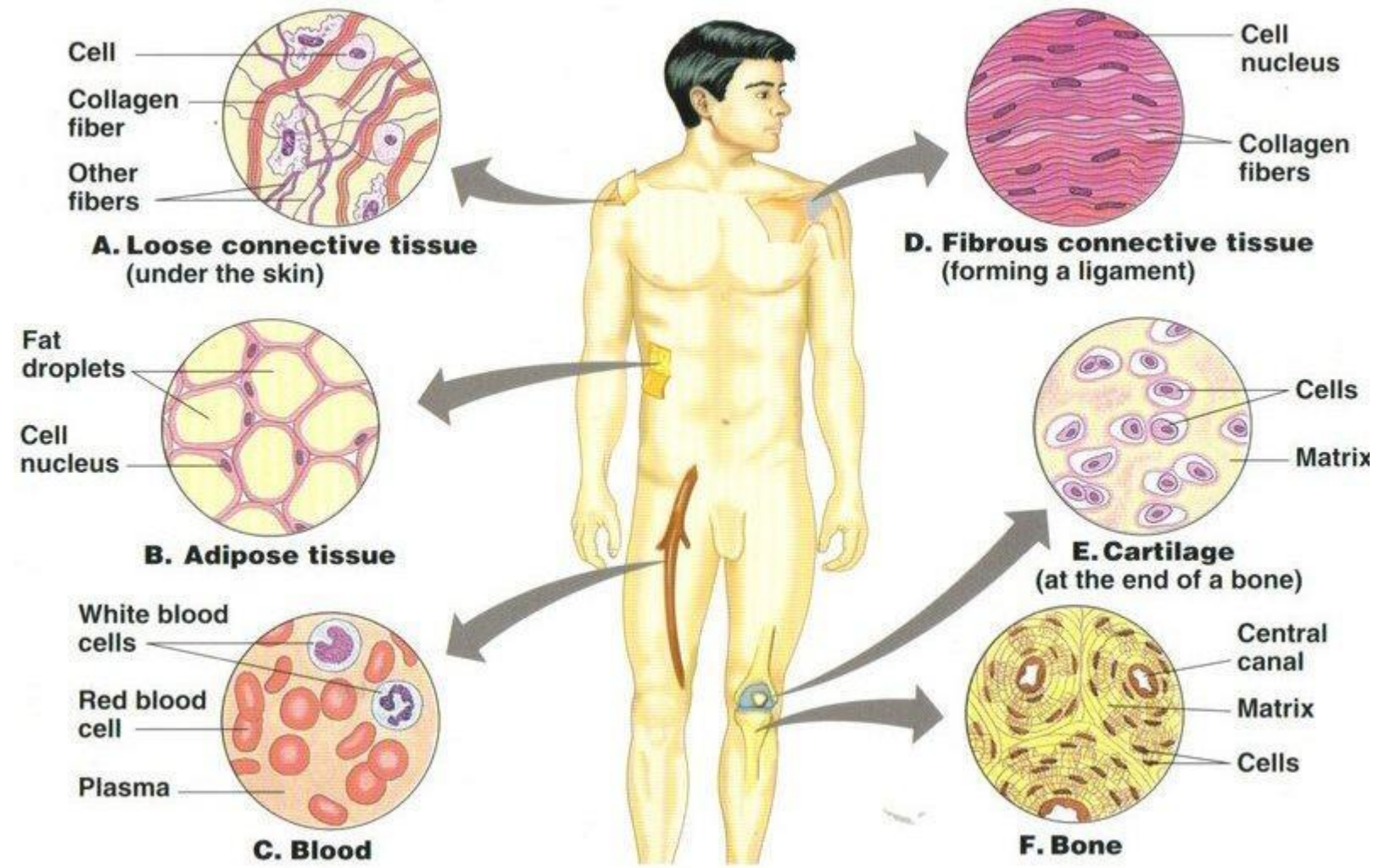
- General Characteristics
  - Most widespread tissue
  - Has an abundance of intercellular matrix with relatively few cells.
- Functions
  - Support
  - Connects
  - Transports
  - Defends

- Types of connective tissue cell
  - Fibroblasts
    - Produce the fibers found in connective tissue.
  - Macrophages
    - Are phagocytic connective tissue cells that clean up cellular debris and foreign particles.
  - Mast cells
    - Contain heparin, anticoagulant, and histamine, a substance that promotes inflammation.

- Loose connective tissue
  - Loose network of collagenous and elastic fibers and a variety of connective tissue cells
  - Predominant cell is the fibroblast
  - Fills spaces in the body and binds together structures.
- Adipose tissue (fat)
  - Forms a protective cushion around certain organs, provides insulation, and is an efficient energy storage material.
- Dense fibrous connective tissue
  - Densely packed collagenous fibers in a matrix
  - Has a poor vascular supply and forms tendons and ligaments.

- Cartilage
  - Blood vessels do not penetrate cartilage so cellular reproduction and healing occur slowly
  - Hyaline cartilage (most common)
    - Found at the ends of long bones, trachea, costal cartilages, and fetal skeleton
  - Fibrocartilage
    - Found in the intervertebral disks
  - Elastic cartilage
    - Found in the framework of the external ear

- Bone (osseous tissue)
  - Rigid connective tissue with mineral salts in the matrix to give it strength and hardness
  - Its structural unit is the osteon (Haversian system)
- Blood
  - A connective tissue that has a liquid matrix called plasma
    - Erythrocytes - transport oxygen
    - Leukocytes - which fight disease
    - Thrombocytes - function in blood clotting



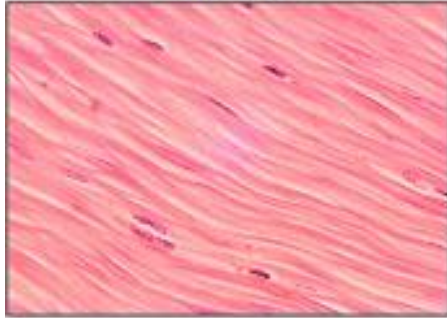
Tissues

# MUSCULAR TISSUE

- Characteristics:
  - Has an abundance of cells and is highly vascular.
  - Muscle cells are long and slender and are arranged in bundles.
  - Actin and myosin are contractile protein microfilaments in the sarcoplasm (cytoplasm).
- Types
  - Skeletal
  - Smooth
  - Cardiac

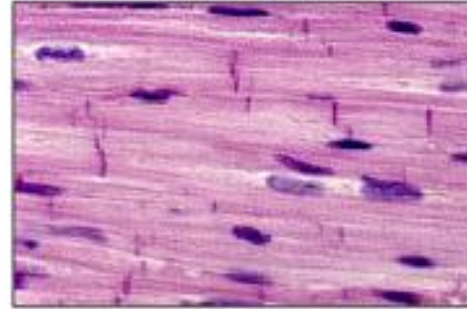


Smooth Muscle  
Tissue



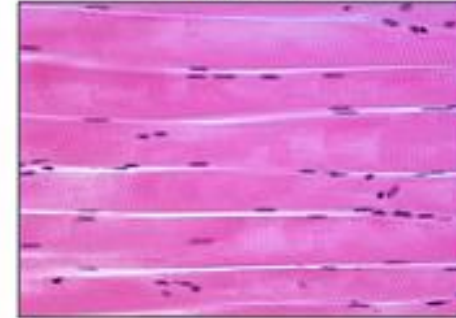
Involuntary  
Control

Cardiac Muscle  
Tissue



Involuntary  
Control

Skeletal Muscle  
Tissue

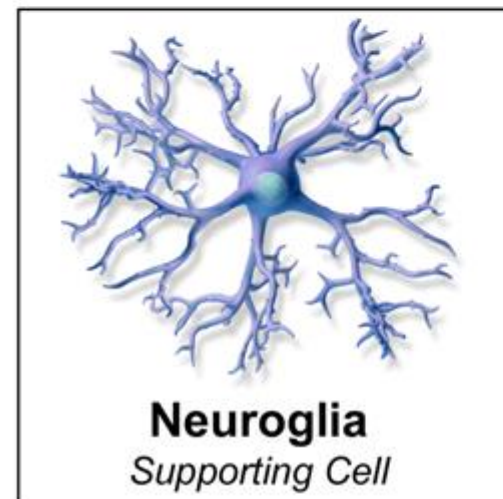
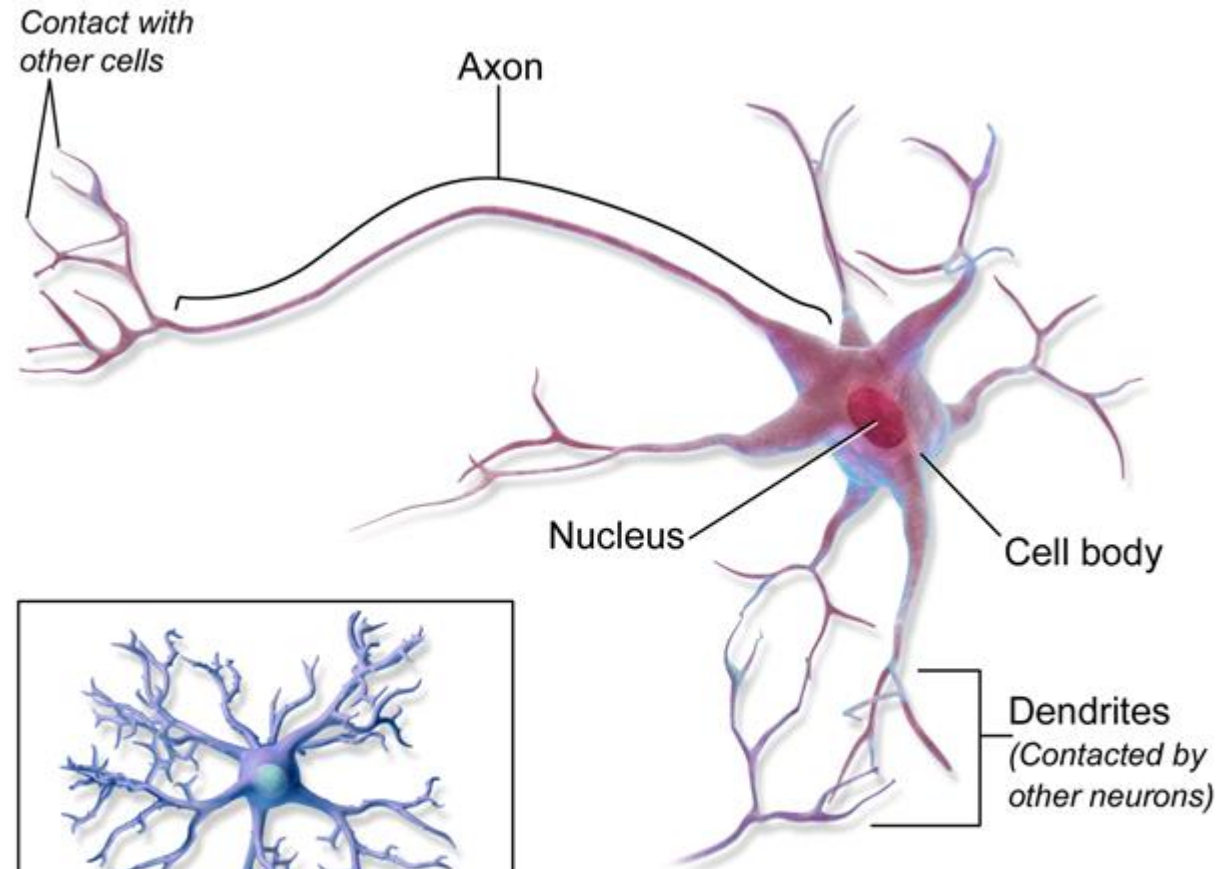


Voluntary  
Control

Tissues

# **NERVOUS TISSUE**

- Two types of cells
  - Neurons
    - Conducting cells of nerve tissue
    - Have a cell body with efferent processes called axons and afferent processes called dendrites.
  - Neuroglia
    - Supporting cells of nerve tissue
    - Do not conduct impulses.



**Neuron**  
(Sizes and Shapes Vary)

Tissues

# **INFLAMMATION AND TISSUE REPAIR**

- Inflammation manifests in four ways
  - Redness
  - Swelling
  - Heat
  - Pain
- Blood vessel dilation increases blood flow to the area that causes the redness and heat
- Increased vascular permeability results in an accumulation of fluid in the tissue spaces, which accounts for the swelling.
- The swelling puts pressure on the nerves to cause pain.

- Regeneration
  - The replacement of destroyed tissue by cells that are identical to the original tissue cells.
- Fibrosis
  - The replacement of destroyed tissue by formation of fibrous connective tissue (scar tissue).
- Most tissue repair is a combination of regeneration and fibrosis.

- Steps in tissue regeneration and repair:
  - A. Normal skin
  - B. Wound with bleeding
  - C. Clot forms
  - D. Fibroblasts migrate to the area
  - E. Fibroblasts proliferate and begin forming fibers of collagen
  - F. Surface epithelium regenerates and grows between scab and granulation tissue
  - G. Formation of granulation tissue (scar) is complete and scab detaches.

