

The background of the slide is a microscopic histological image of tissue, likely stained with hematoxylin and eosin (H&E). It shows a complex arrangement of cells and fibers, with various shades of pink, purple, and blue. The tissue appears to be a dense, fibrous structure, possibly connective tissue or a specific type of epithelium. The overall texture is intricate and detailed, typical of a high-magnification histological section.

Histology

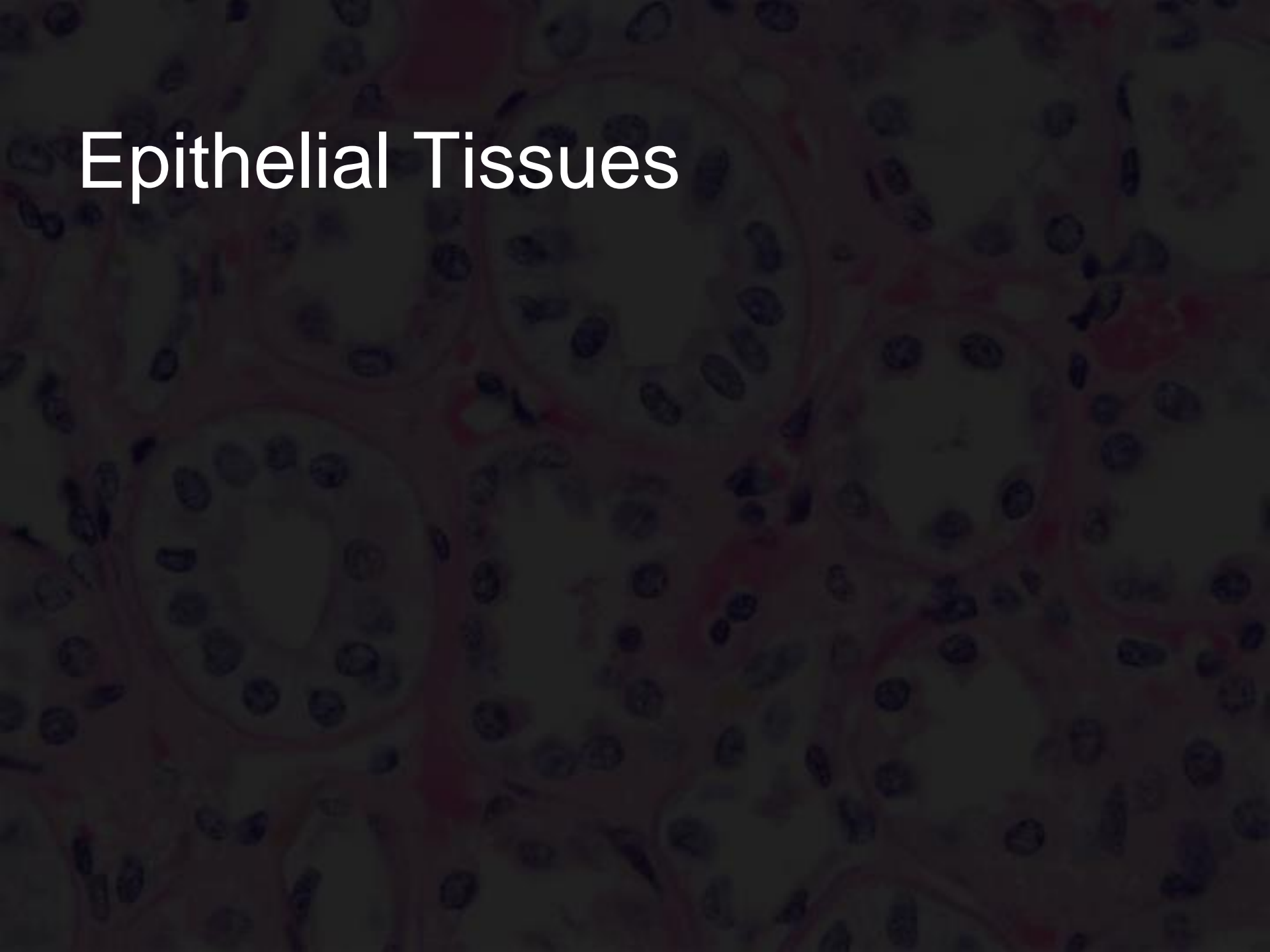
Tissues

- Cells work together in functionally related groups called tissues
- Types of tissues:
 1. Epithelial – lining and covering
 2. Connective – support
 3. Muscle – movement
 4. Nervous – control

Epithelial Tissue – General Characteristics & Functions

- Covers a body surface or lines a body cavity
- Forms most glands
- Functions of epithelium
 - Protection
 - Absorption, secretion, and ion transport
 - Filtration
 - Forms slippery surfaces

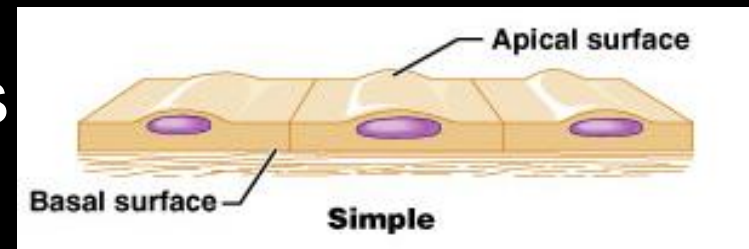
Epithelial Tissues

A microscopic image of epithelial tissue, showing a dense layer of cells with prominent nuclei and a clear boundary between the cells and the underlying connective tissue. The cells are arranged in a regular, organized pattern, characteristic of epithelial tissue. The nuclei are stained dark purple, and the cytoplasm and extracellular matrix are stained pink.

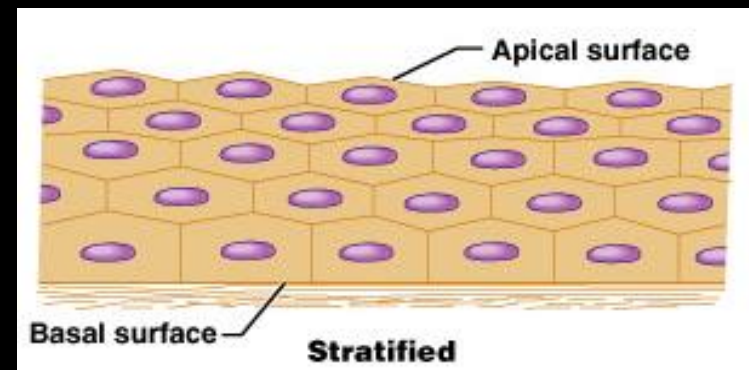
Classifications & Naming of Epithelia

- First name of tissue indicates number of layers

- Simple – one layer of cells



- Stratified – more than one layer of cells



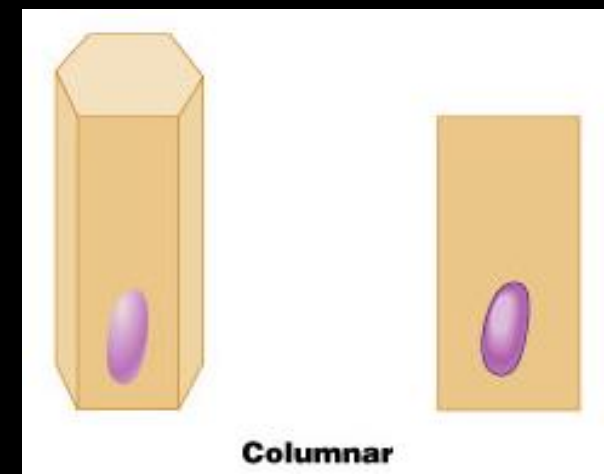
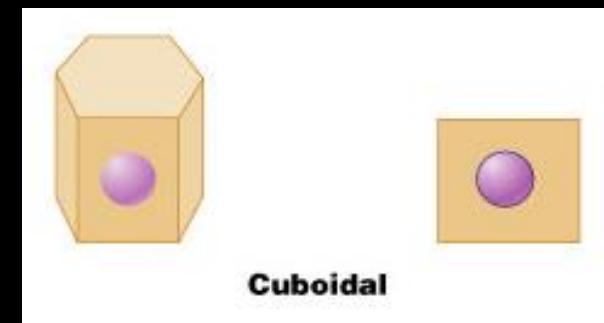
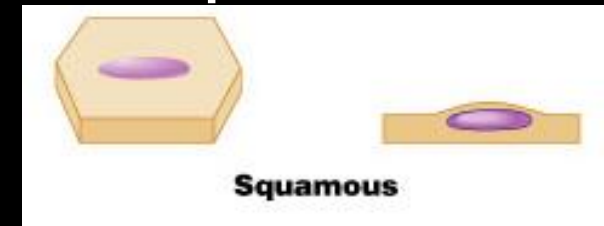
Classification & Naming of Epithelia

- Last name of tissue describes shape of cells

- Squamous – cells wider than tall (plate or “scale” like)

- Cuboidal – cells are as wide as tall, as in cubes

Columnar – cells are taller than they are wide, like columns



Naming Epithelia

- Naming the epithelia includes both the layers (first) and the shape of the cells (second)
 - i.e. stratified cuboidal epithelium
- The name may also include any accessory structures
 - Goblet cells
 - Cilia
 - Keratin
- Special epithelial tissues (don't follow naming convention)
 - Psuedostratified
 - Transitional

Simple Squamous Epithelium

■ Description

- single layer of flat cells with disc-shaped nuclei

■ Special types

□ Endothelium (inner covering)

- slick lining of hollow organs

□ Mesothelium (middle covering)

- Lines peritoneal, pleural, and pericardial cavities
- Covers visceral organs of those cavities

Simple Squamous Epithelium

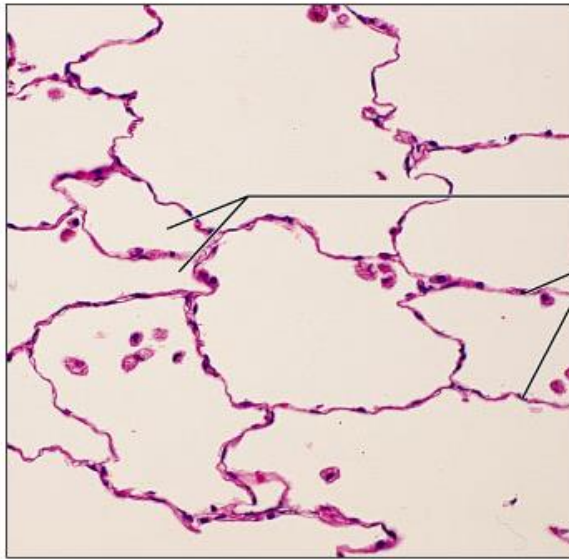
■ Function

- Passage of materials by passive diffusion and filtration
- Secretes lubricating substances in serosae

■ Location

- Renal corpuscles
- Alveoli of lungs
- Lining of heart, blood and lymphatic vessels
- Lining of ventral body cavity (serosae)

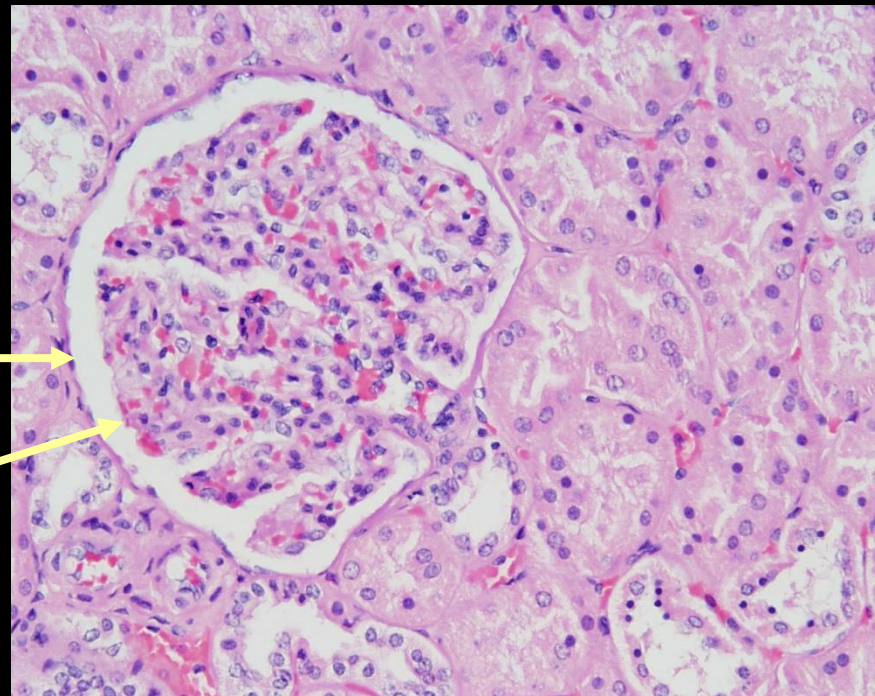
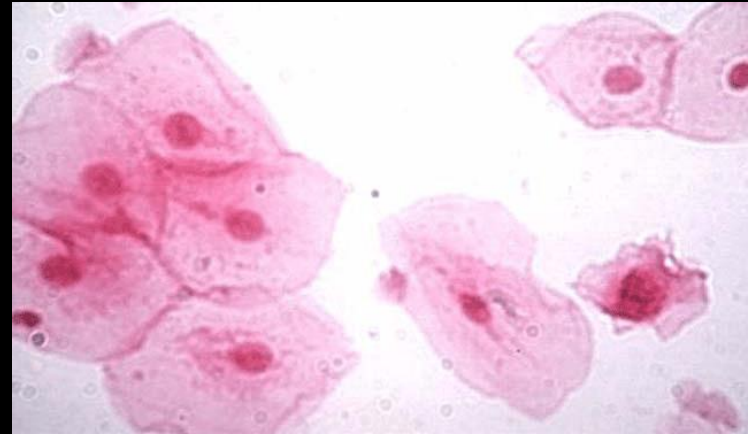
Simple Squamous Epithelium



Air sacs of lung tissue

Nuclei of squamous epithelial cells

Photomicrograph: Simple squamous epithelium forming part of the alveolar (air sac) walls (400 \times).



Simple squamous lining the walls of the capillary

Simple Cuboidal Epithelium

- Description

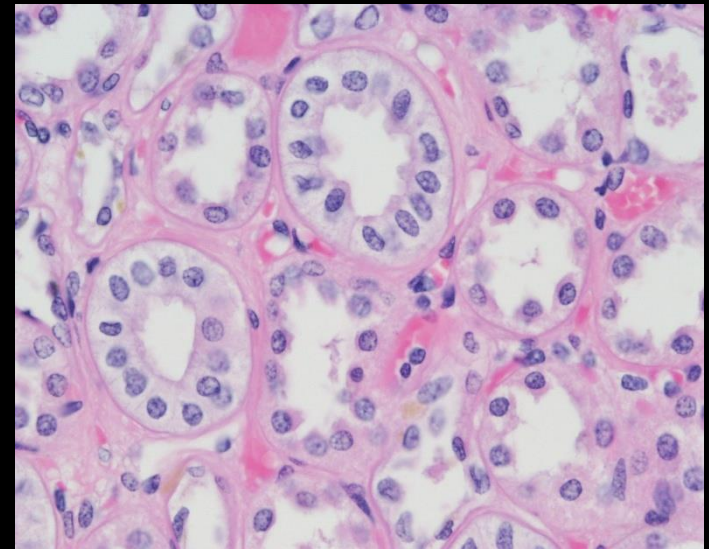
- single layer of cube-like cells with large, spherical central nuclei

- Function

- secretion and absorption

- Location

- kidney tubules, secretory portions of small glands, ovary & thyroid follicles



Simple Columnar Epithelium

■ Description

- single layer of column-shaped (rectangular) cells with oval nuclei
 - Some bear cilia at their apical surface
 - May contain goblet cells

■ Function

- Absorption; secretion of mucus, enzymes, and other substances
- Ciliated type propels mucus or reproductive cells by ciliary action

Simple Columnar Epithelium

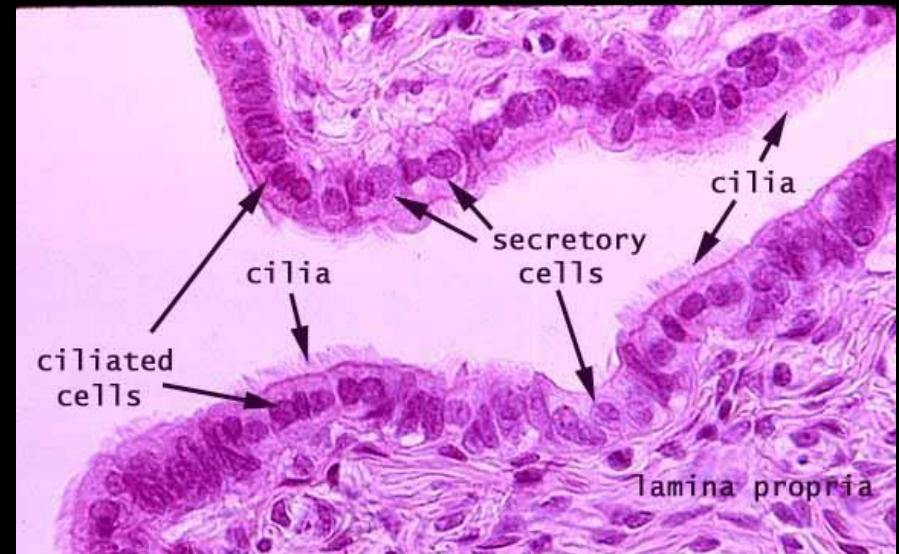
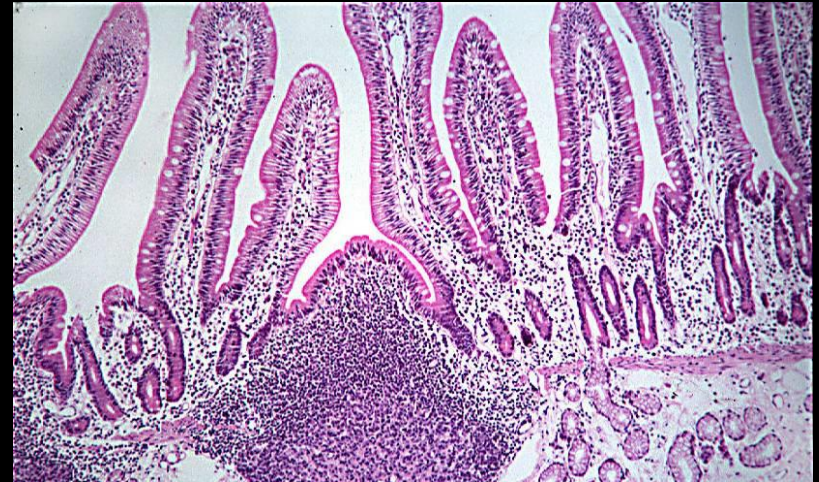
■ Location

□ Non-ciliated form

- Lines digestive tract, gallbladder, ducts of some glands

□ Ciliated form

- Lines small bronchi, uterine tubes, uterus



Pseudostratified Columnar Epithelium

■ Description

- All cells originate at basement membrane
- Only tall cells reach the apical surface
- May contain goblet cells and bear cilia
- Nuclei lie at varying heights within cells
 - Gives false impression of stratification

■ Function

- secretion of mucus; propulsion of mucus by cilia

Pseudostratified Columnar Epithelium

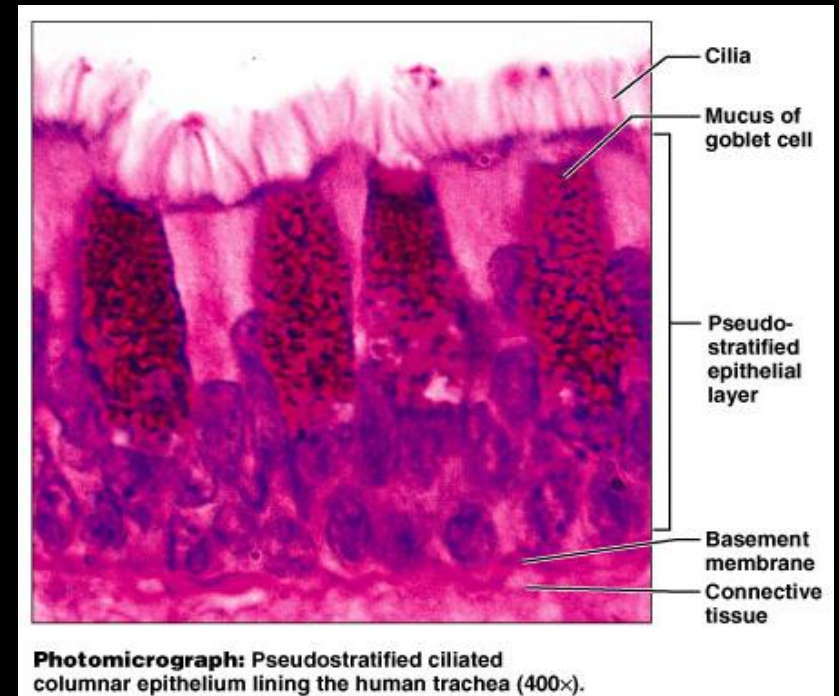
■ Locations

□ Non-ciliated type

- Ducts of male reproductive tubes
- Ducts of large glands

□ Ciliated variety

- Lines trachea and most of upper respiratory tract



Stratified Epithelia

- Contain two or more layers of cells
- Regenerate from below
- Major role is protection
- Are named according to the shape of cells at apical layer

Stratified Squamous Epithelium

■ Description

- Many layers of cells – squamous in shape
- Deeper layers of cells appear cuboidal or columnar
- Thickest epithelial tissue – adapted for protection

Stratified Squamous Epithelium

■ Specific types

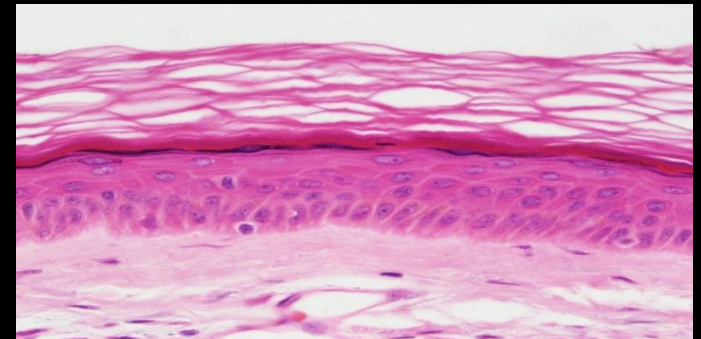
- Keratinized – contain the protective protein keratin
 - Surface cells are dead and full of keratin
- Non-keratinized – forms moist lining of body openings

■ Function

- Protects underlying tissues in areas subject to abrasion

■ Location

- Keratinized – forms epidermis
- Non-keratinized – forms lining of esophagus, mouth, and vagina



Photomicrograph: Stratified squamous epithelium lining of the esophagus (300x).

Transitional Epithelium

■ Description

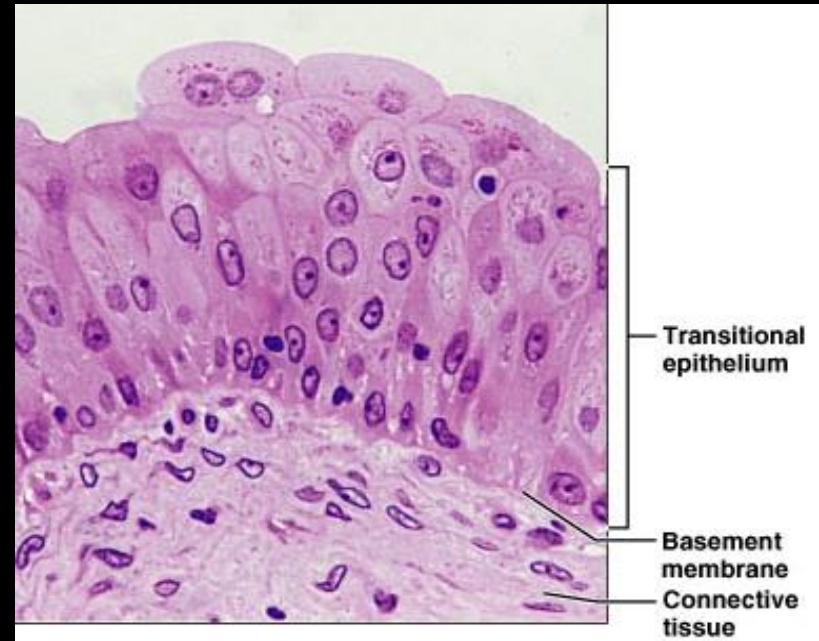
- Basal cells usually cuboidal or columnar
- Superficial cells dome-shaped or squamous

■ Function

- stretches and permits distension of urinary bladder

■ Location

- Lines ureters, urinary bladder and part of urethra

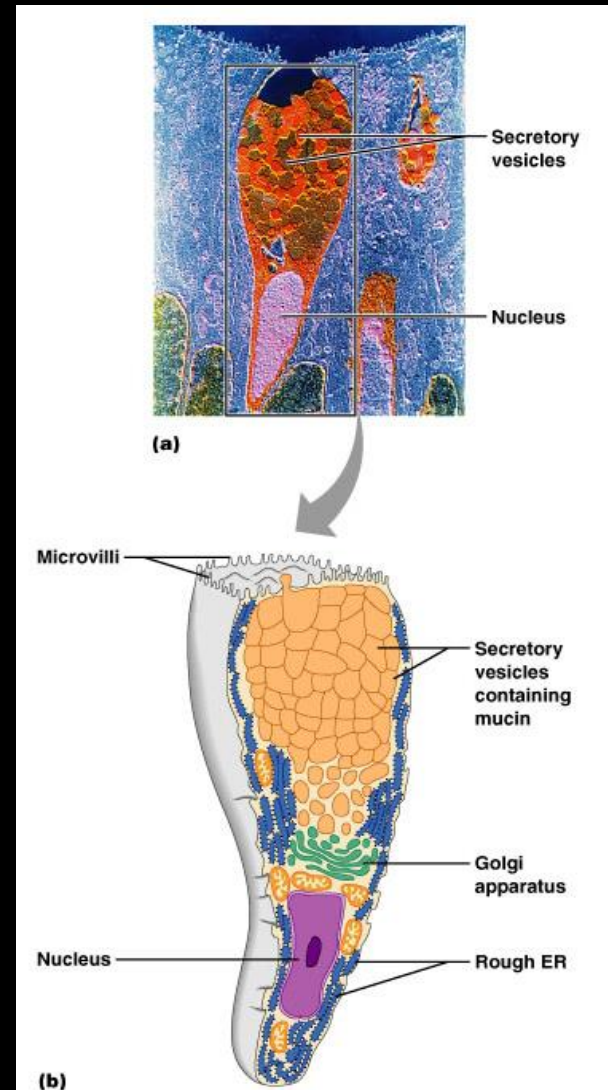


Glandular Epithelium

- Ducts carry products of exocrine glands to epithelial surface
- Include the following diverse glands
 - Mucus-secreting glands
 - Sweat and oil glands
 - Salivary glands
 - Liver and pancreas
 - Mammary glands
- May be: unicellular or multicellular

Unicellular Exocrine Glands (The Goblet Cell)

- Goblet cells produce mucin
- Mucin + water → mucus
- Protects and lubricates many internal body surfaces



May also be classified by types of secretions from exocrine glands

■ Serous

- mostly water but also contains some enzymes
- Ex. parotid glands, pancreas

■ Mucous

- mucus secretions
- Ex. sublingual glands, goblet cells

■ Mixes

- serous & mucus combined
- Ex. submandibular gland

Connective Tissues

A dark, low-contrast microscopic image of connective tissue, showing a dense network of fibers and cells. The fibers appear as thin, wavy lines, and the cells are small, dark spots scattered throughout the matrix. The overall texture is complex and fibrous.

Connective Tissue Proper - Structures

- Variety of cells, fibers & grounds substances
 - Types of depend on use
- Cells found in connective tissue proper
 - Fibroblasts
 - Macrophages, lymphocytes (antibody producing cells)
 - Adipocytes (fat cells)
 - Mast cells
 - Stem cells
- Fibers:
 - Collagen – very strong & abundant, long & straight
 - Elastic – branching fibers with a wavy appearance (when relaxed)
 - Reticular – form a network of fibers that form a supportive framework in soft organs (i.e. Spleen & liver)
- Ground substance:
 - Along with fibers, fills the extracellular space
 - Ground substance helps determine functionality of tissue

Connective Tissue Proper - Classifications

- Loose Connective Tissue
 - Areolar
 - Reticular
 - Adipose
- Dense Connective Tissue
 - Regular
 - Irregular
 - Elastic

Areolar Connective Tissue

■ Description

□ Gel-like matrix with:

- all three fiber types (collagen, reticular, elastic) for support

□ Cells – fibroblasts, macrophages, mast cells, white blood cells, adipocytes

□ Highly vascular tissue

■ Function

□ Wraps and cushions organs

□ Holds and conveys tissue fluid

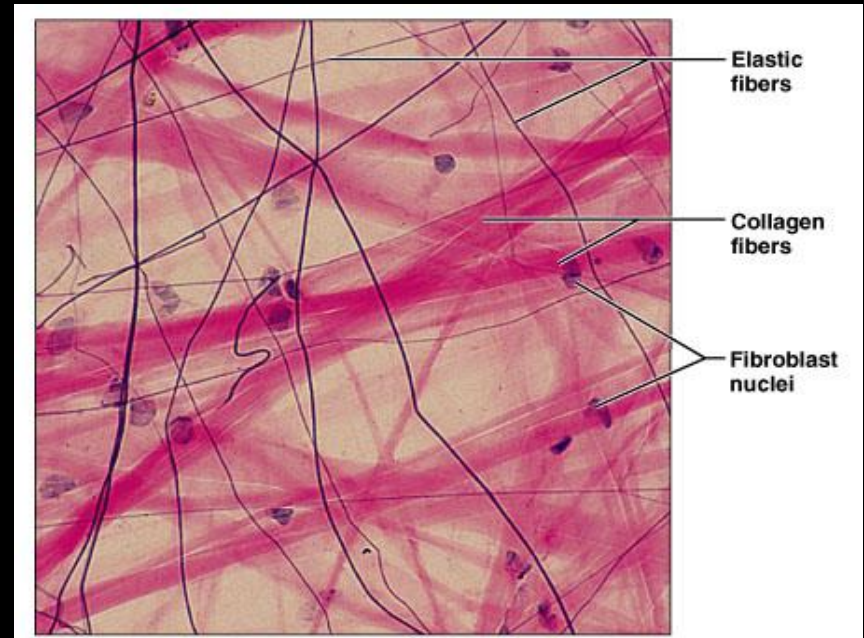
□ Important role in inflammation

□ Main battlefield in fight against infection

Areolar Connective Tissue

■ Location

- Widely distributed under epithelia
- Packages organs
- Surrounds capillaries



Adipose Tissue

■ Description

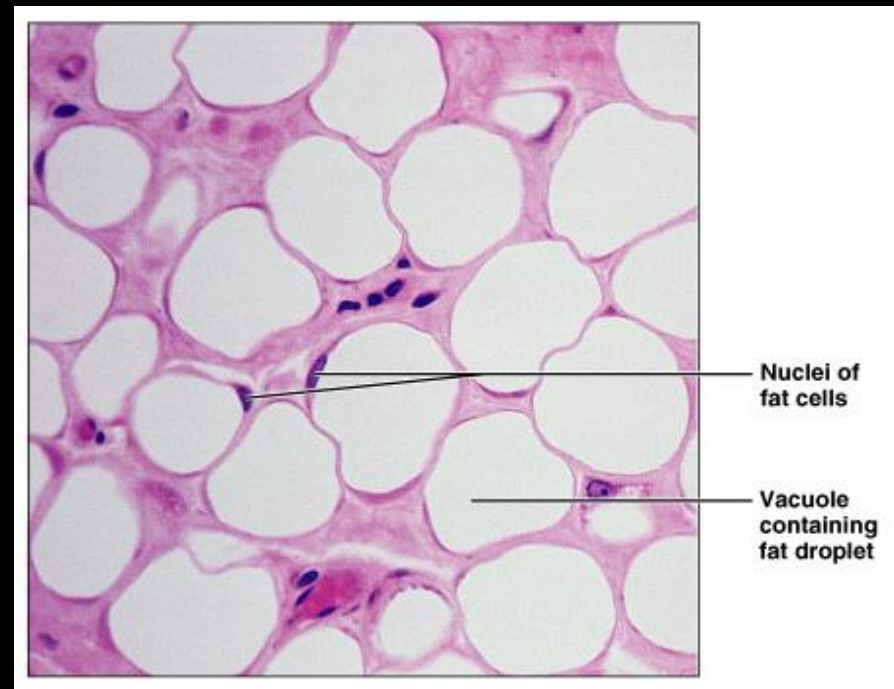
- Closely packed adipocytes
- Have nucleus pushed to one side by fat droplet

■ Function

- Provides reserve food fuel
- Insulates against heat loss
- Supports and protects organs

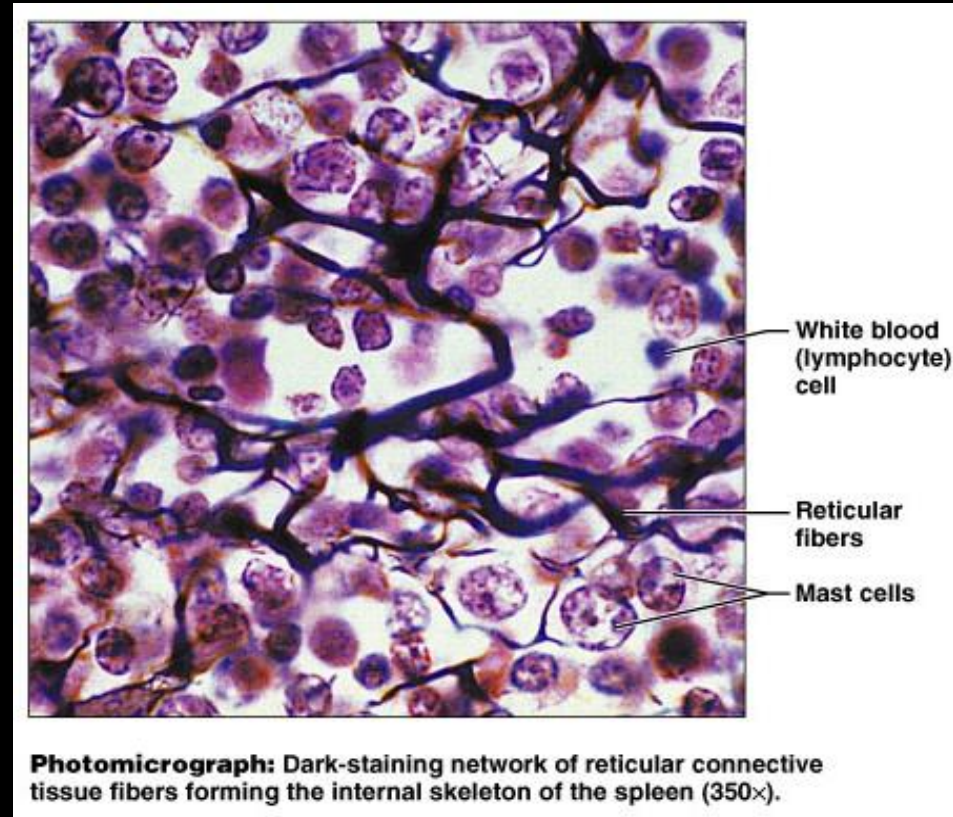
■ Location

- Under skin
- Around kidneys
- Behind eyeballs, within abdomen and in breasts



Reticular Connective Tissue

- Description – network of reticular fibers in loose ground substance
- Function – form a soft, internal skeleton (stroma) – supports other cell types
- Location – lymphoid organs
 - Lymph nodes, bone marrow, and spleen



Dense Irregular Connective Tissue

■ Description

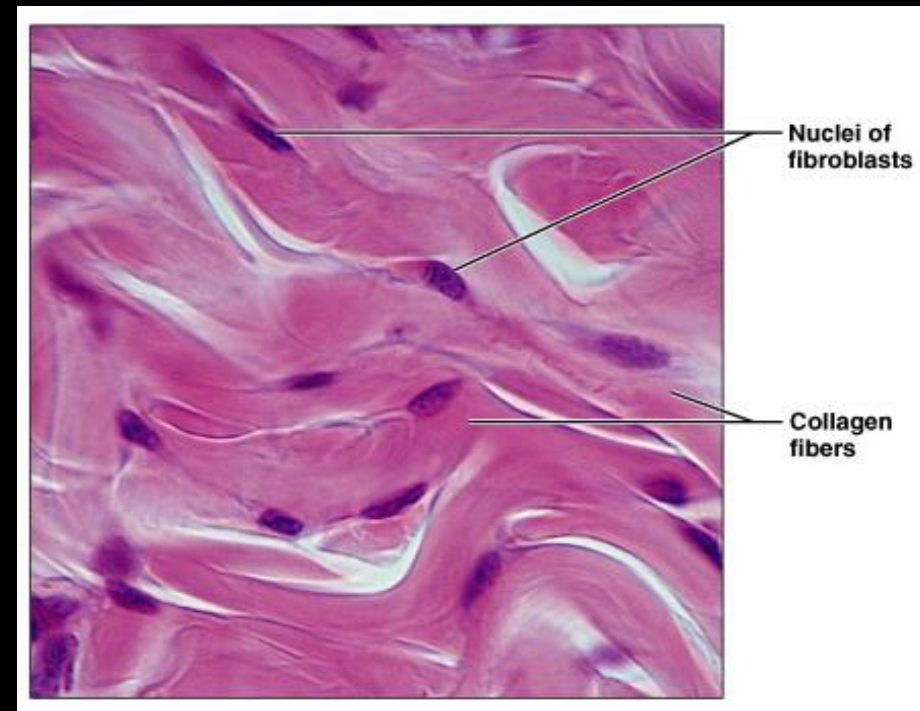
- Primarily *irregularly* arranged collagen fibers
- Some elastic fibers and fibroblasts

■ Function

- Withstands tension
- Provides structural strength

■ Location

- Dermis of skin



Dense Regular Connective Tissue

■ Description

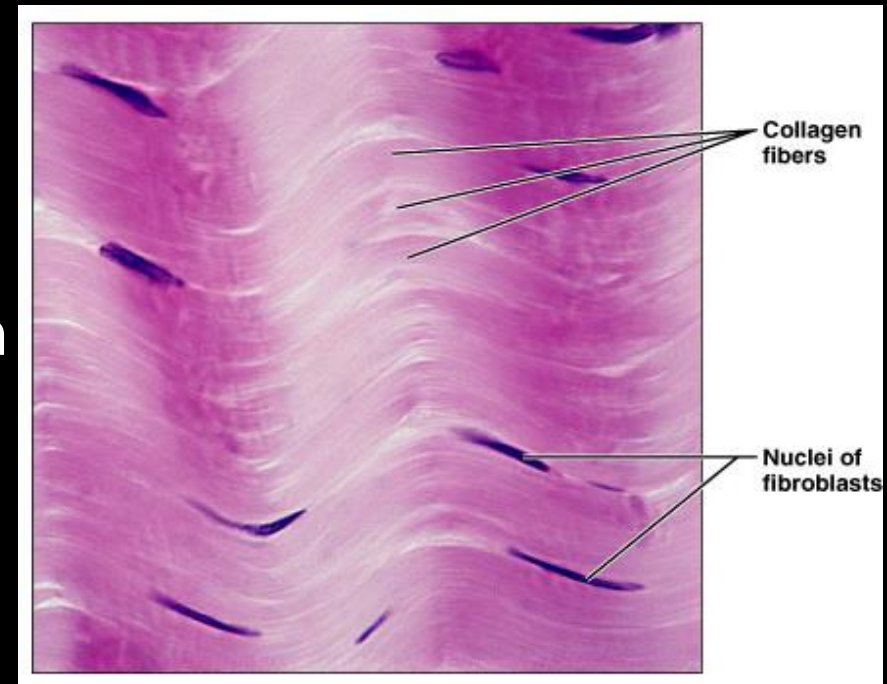
- Primarily *parallel* collagen fibers
- Fibroblasts and some elastic fibers
- Poorly vascularized

■ Function

- Attaches muscle to bone
- Attaches bone to bone
- Withstands great stress in one direction

■ Location

- Tendons and ligaments



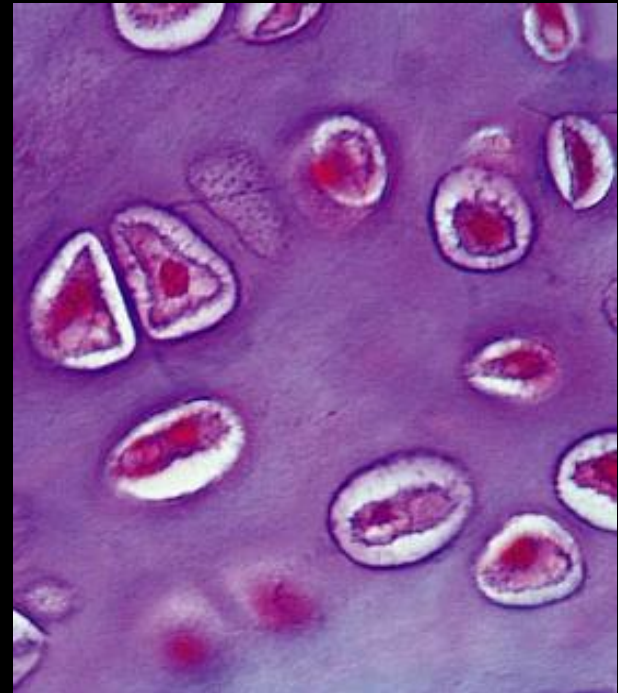
Cartilage

■ Characteristics:

- Firm, flexible tissue
- Contains no blood vessels or nerves
- Matrix contains up to 80% water
- Cell type – chondrocyte

■ Types:

- Hyaline
- Elastic
- Fibrocartilage



Hyaline Cartilage

■ Description

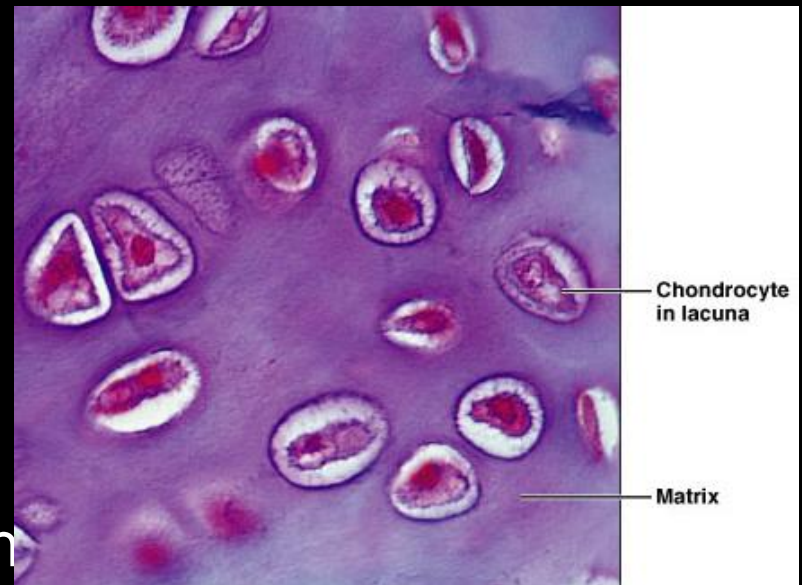
- Imperceptible collagen fibers (hyaline = glassy)
- Chondrocytes lie in lacunae (area that houses cell)

■ Function

- Supports and reinforces
- Resilient cushion
- Resists repetitive stress

■ Location

- Ends of long bones
 - Costal cartilage of ribs
 - Cartilages of nose, trachea, and larynx
- Location



Elastic Cartilage

■ Description

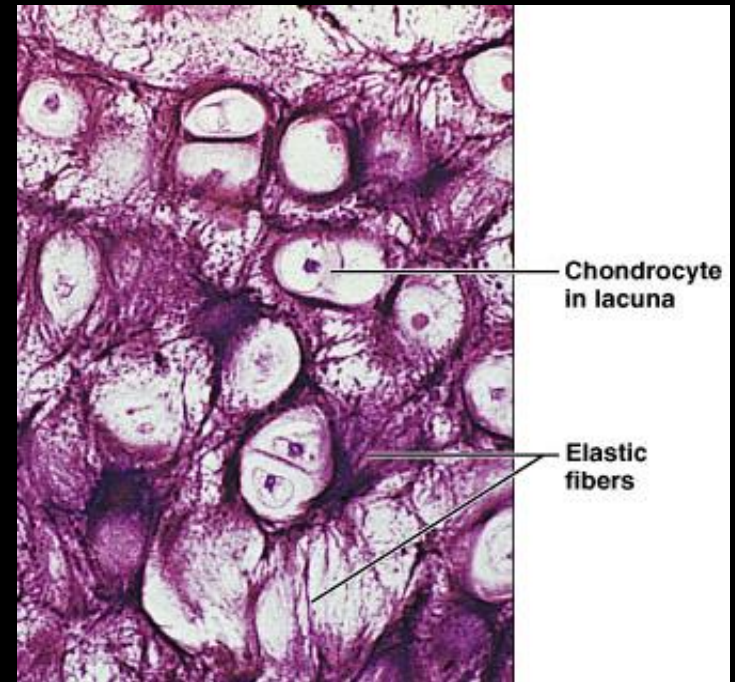
- Similar to hyaline cartilage
- More elastic fibers in matrix

■ Function

- Maintains shape of structure
- Allows great flexibility

■ Location

- Supports external ear
- Epiglottis



Fibrocartilage

■ Description

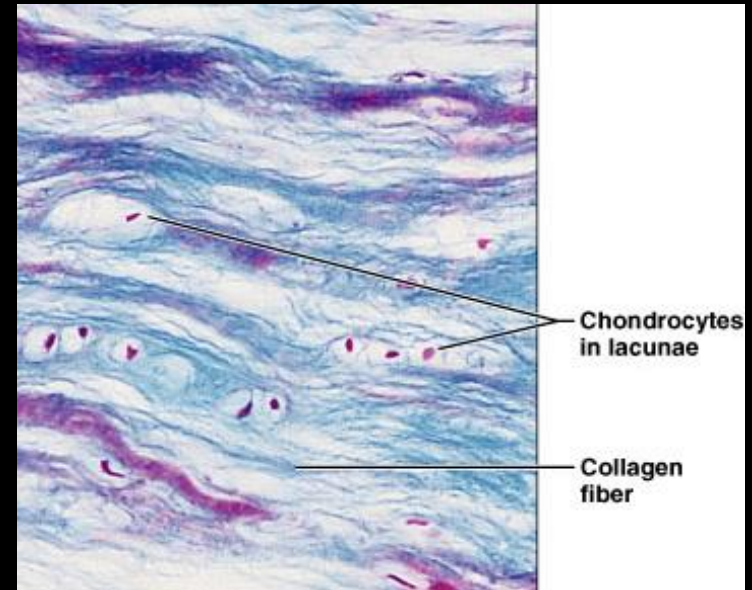
- Matrix similar, but less firm than hyaline cartilage
- Thick collagen fibers predominate

■ Function

- Tensile strength and ability to absorb compressive shock

■ Location

- Intervertebral discs
- Pubic symphysis
- Discs of knee joint



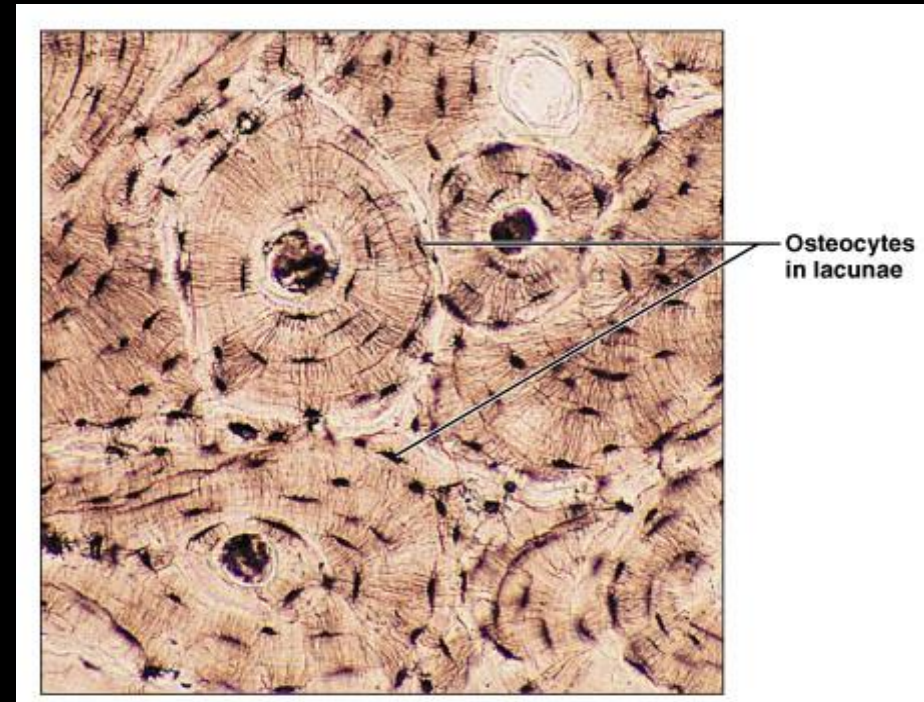
Bone Tissue

■ Function

- Supports and protects organs
- Provides levers and attachment site for muscles
- Stores calcium and other minerals
- Stores fat
- Marrow is site for blood cell formation

■ Location

- Bones



Blood Tissue

■ Description

- red and white blood cells in a fluid matrix

■ Function

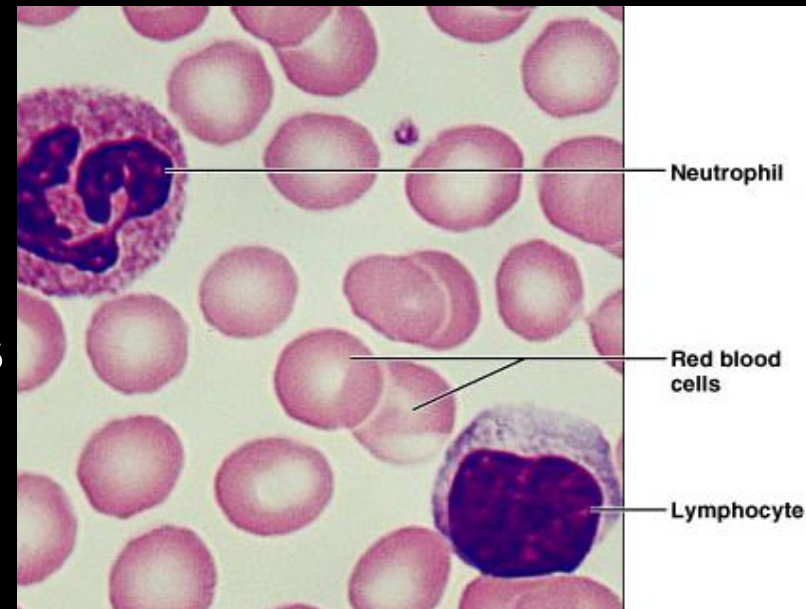
- transport of respiratory gases, nutrients, and wastes

■ Location

- within blood vessels

■ Characteristics

- An atypical connective tissue
- Consists of cells surrounded by fluid matrix



Muscle Tissue

■ Types

- Skeletal muscle tissue
- Cardiac muscle tissue
- Smooth muscle tissue

Skeletal Muscle Tissue

■ Characteristics

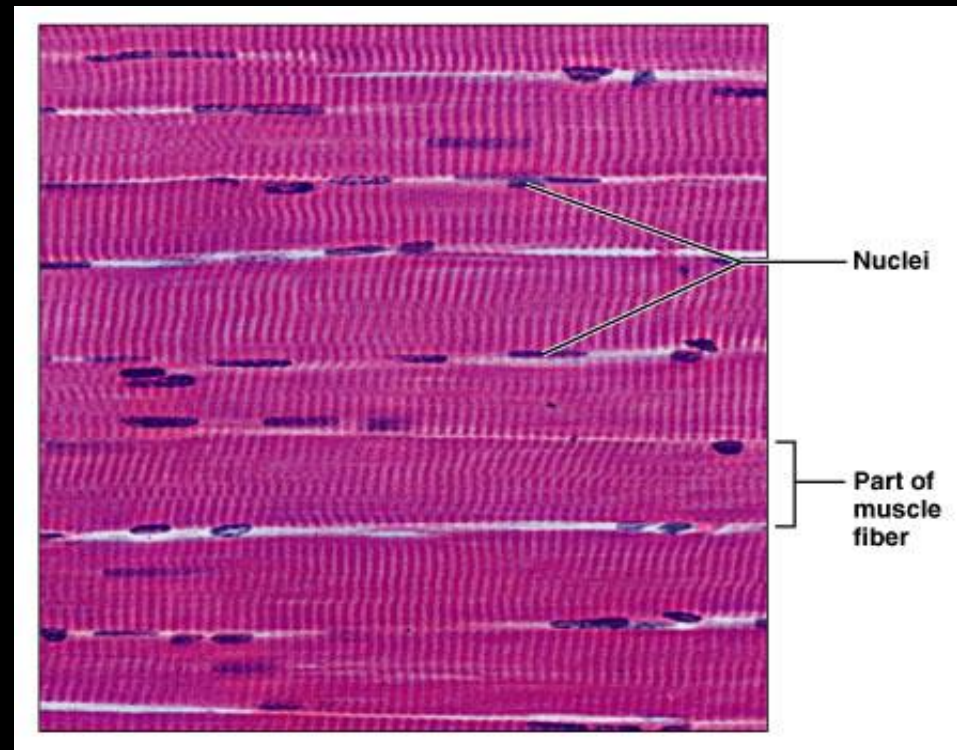
- Long, cylindrical cells
- Multinucleate
- Obvious striations

■ Function

- Voluntary movement
- Manipulation of environment
- Facial expression

■ Location

- Skeletal muscles attached to bones (occasionally to skin)



Cardiac Muscle Tissue

- Function

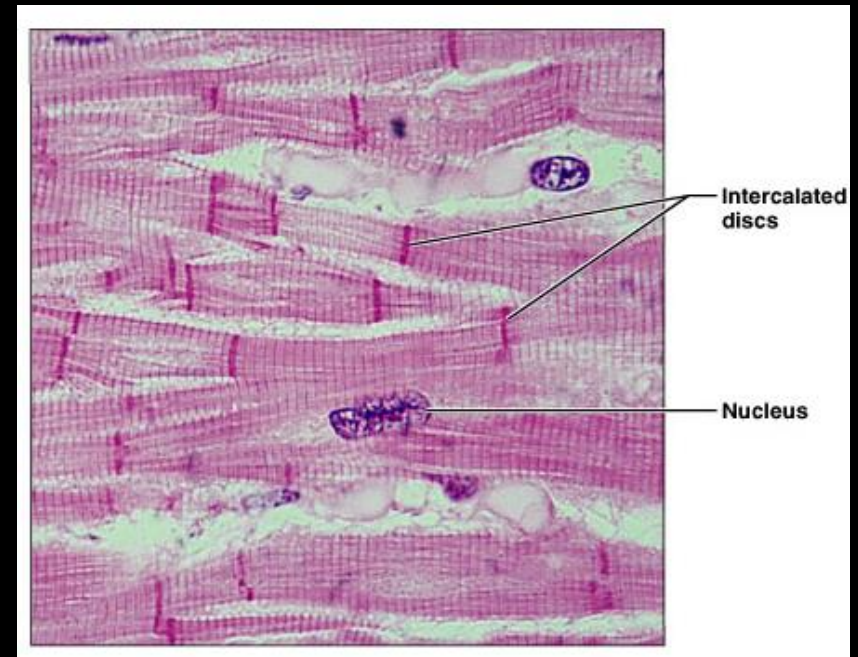
- Contracts to propel blood into circulatory system

- Characteristics

- Branching cells
 - Uni-nucleate
 - Intercalated discs

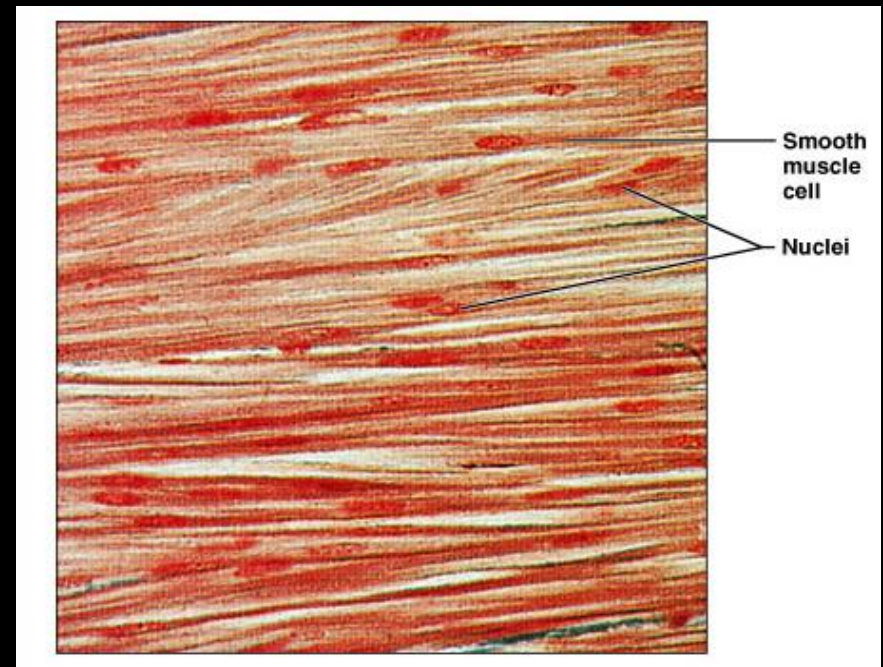
- Location

- Occurs in walls of heart

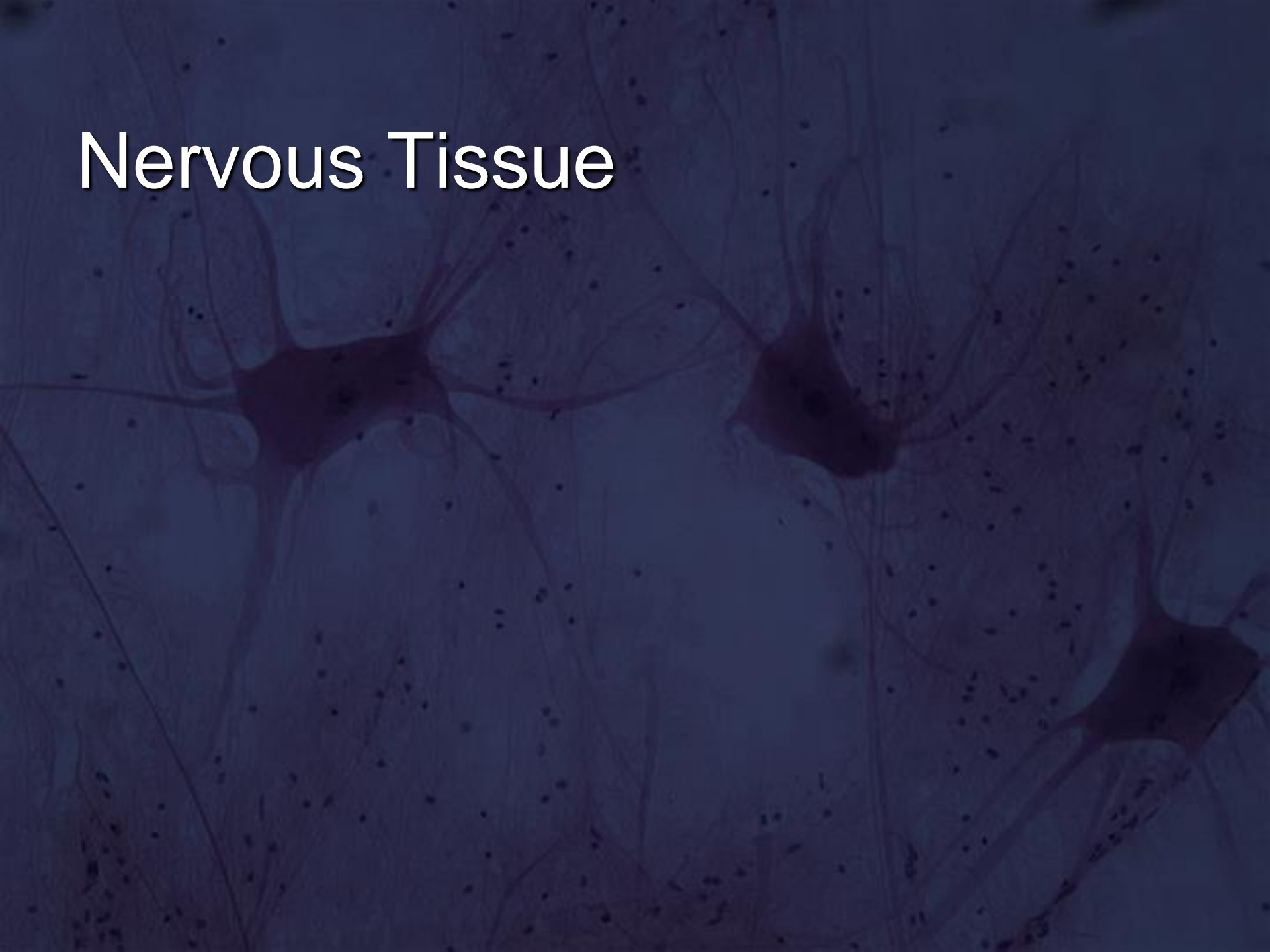


Smooth Muscle Tissue

- Characteristics
 - Spindle-shaped cells with central nuclei
 - Arranged closely to form sheets
 - No striations
- Function
 - Propels substances along internal passageways
 - Involuntary control
- Location
 - Mostly walls of hollow organs



Nervous Tissue



Nervous Tissue

- **Function**
 - Transmit electrical signals from sensory receptors to effectors
- **Location**
 - Brain, spinal cord, and nerves
- **Description**
 - Main components are brain, spinal cord, and nerves
 - Contains two types of cells
 - Neurons – excitatory cells
 - Supporting cells (neuroglial cells)

