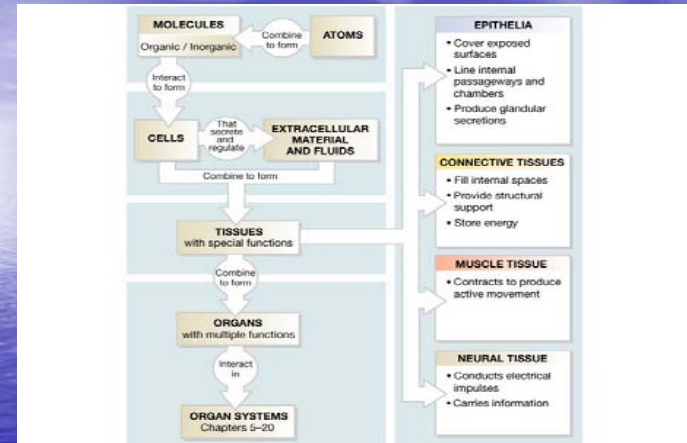


Chapter Tissues

Read section 1 and be able to list the four major tissues types and provide examples of where each occurs in the body.

- **Introduction:**

- A. Cells are arranged in **tissues** that provide specific functions for the body.
- B. Cells of different tissues are structured differently, which leads to their differences in function.
 - Structure or form defines Function
 - “Anatomy” defines “Physiology”
- C. The tissues of the human body include four major types.



Section 2

- Read section 2 and Describe the general characteristics and functions of epithelial tissues.
- Be sure to describe the types of epithelium and identify an organ in which each is found.
- Also be able to explain how glands are classified.

• Epithelial Tissues:

- A. **General Characteristics**
1. Epithelial tissue is widespread throughout the body, covers organs, and lines body surfaces.
 2. Epithelial tissues are anchored to a basement membrane, are made up of tightly packed cells containing little intercellular material, generally lack blood vessels, and are replaced frequently.

3. They function in protection, secretion, absorption, excretion, and sensory reception.

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TABLE 5.1 TISSUES

TYPE	FUNCTION	LOCATION	DISTINGUISHING CHARACTERISTICS
Epithelial	Protection, secretion, absorption, excretion	Cover body surfaces, cover and line internal organs, compose glands	Lack blood vessels, readily divide; cells are tightly packed
Connective	Bind, support, protect, fill spaces, store fat, produce blood cells	Widely distributed throughout body	Mostly have good blood supply; cells are farther apart than cells of epithelia, with matrix in between
Muscle	Movement	Attached to bones, in the walls of hollow internal organs, heart	Contractile
Nervous	Transmit impulses for coordination, regulation, integration, and sensory reception	Brain, spinal cord, nerves	Cells connect to each other and other body parts

Classification of Epithelial Tissue

Epithelial tissue is classified by the number of layers within the tissue and shape of cell.

Simple = one layer

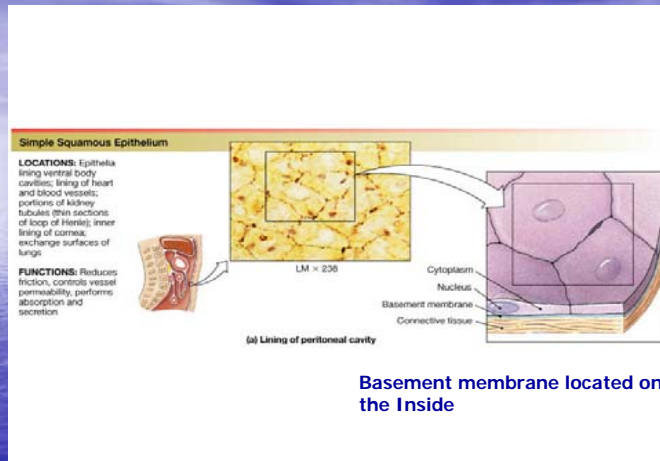
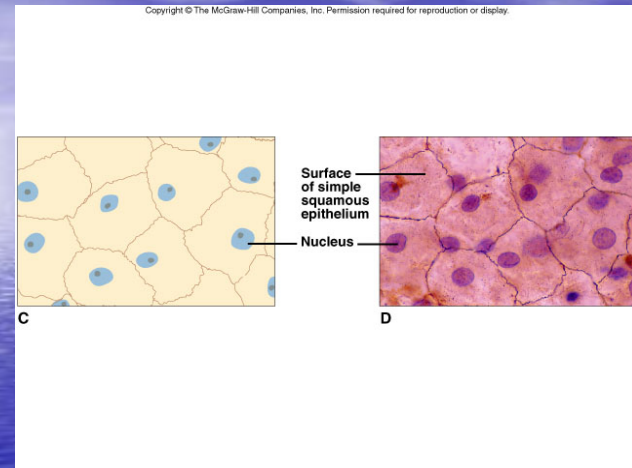
Stratified = 2 or more layers

Shapes vary from cuboidal, squamous, and columnar

As you go through this lecture try to relate "Form" to "Function". The structure of the tissue will define its function i.e. simple layer for movement of material across therefore you'll find it in the body where you have absorption or secretion. Stratified many layers for "no movement across" thus this tissue is found in skin.

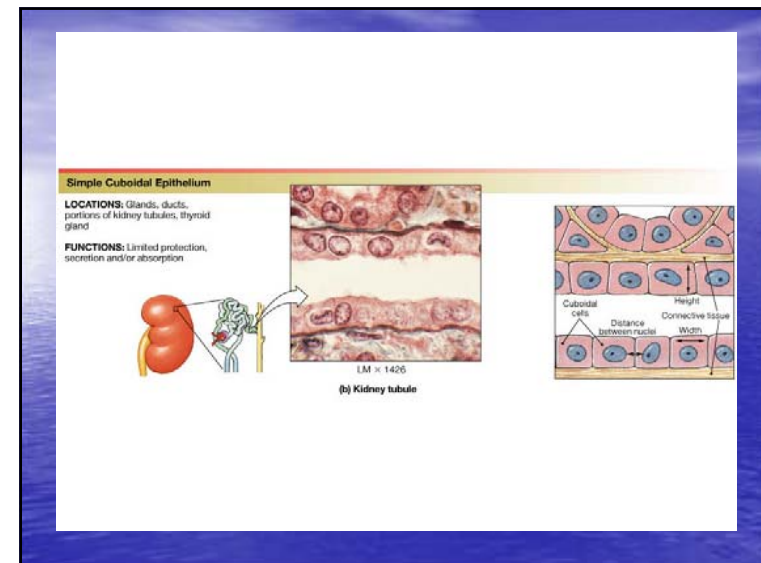
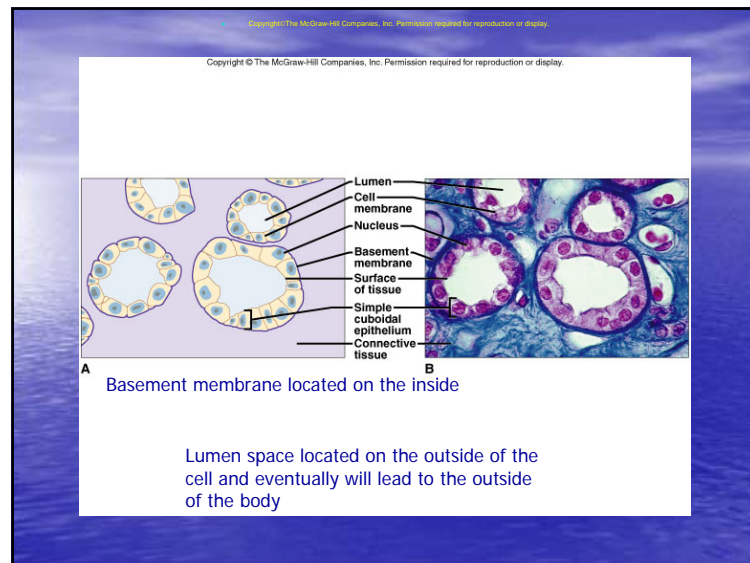
B. **Simple Squamous Epithelium**

1. Simple squamous epithelium is made up of a single layer of thin, flattened cells.
2. Because it is suited for diffusion, it functions in the exchange of gases in the lungs and lines blood and lymph vessels as well as body cavities.



C. **Simple Cuboidal Epithelium**

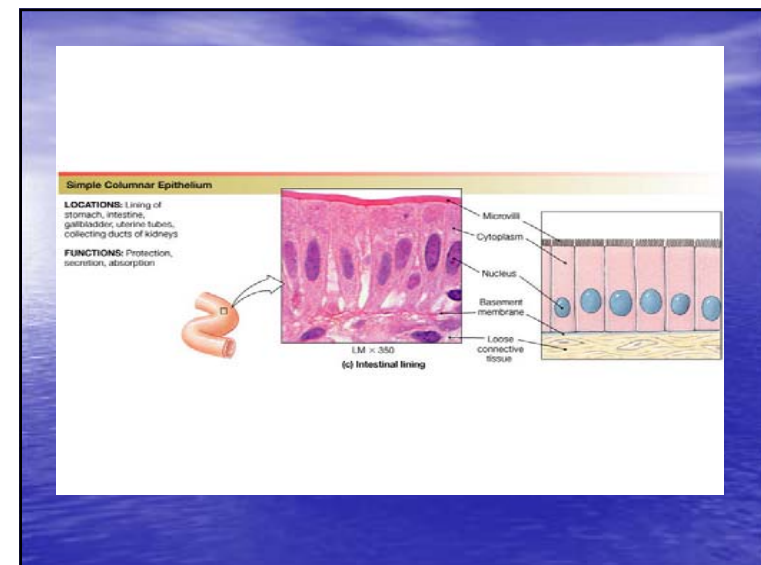
1. Simple cuboidal epithelium consists of a single layer of cube-shaped cells with centrally located nuclei.
2. It functions in secretion and absorption in the kidneys, and in secretion in glands.



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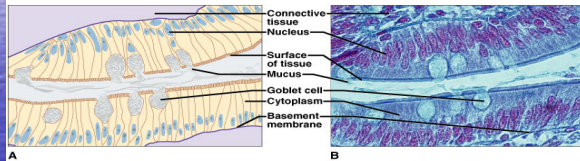
D. **Simple Columnar Epithelium**

- Simple columnar epithelium is made up of a row of elongated cells whose nuclei are all located near the basement membrane. It may be ciliated.
- It lines the uterus, stomach, and intestines where it protects underlying tissues, secretes digestive fluids, and absorbs nutrients.



3. In the intestine, these cells possess microvilli that increase the surface area available for absorption.
4. Mucus-secreting goblet cells can be found among columnar cells.

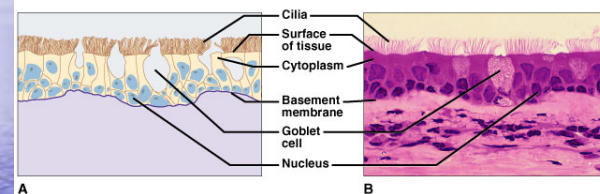
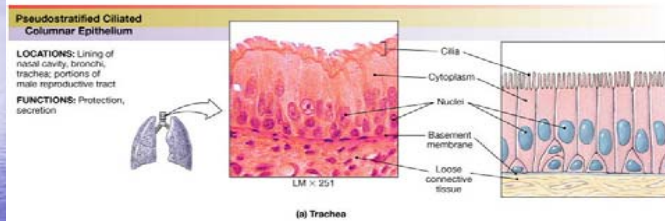
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E. Pseudostratified Columnar Epithelium

1. These cells appear layered due to the varying positions of their nuclei within the row of cells, but are not truly layered. "pseudo" = kinda
2. Cilia may be present, along with mucus-secreting goblet cells, that line and sweep debris from respiratory tubes.

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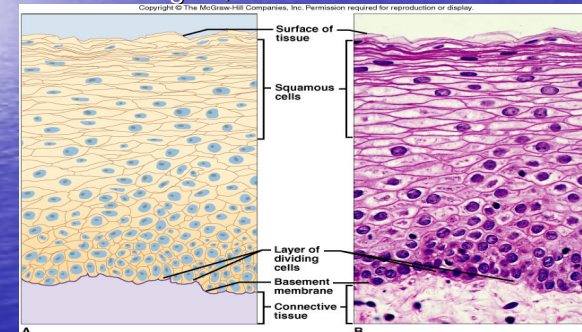


Pseudostratified

F. **Stratified Squamous Epithelium**

1. This type of tissue is made up of layers of flattened cells that are designed to protect underlying layers.
2. It makes up the outer layer of skin, and lines the mouth, throat, vagina, and anal canal.

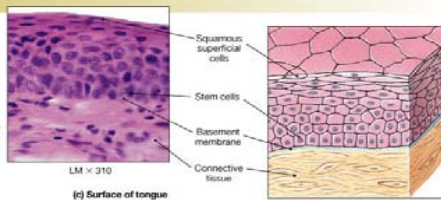
3. In the skin, outer layers of cells undergo keratinization; however, this process does not occur where tissues remain moist in the throat, vagina, or anal canal.



Stratified Squamous Epithelium

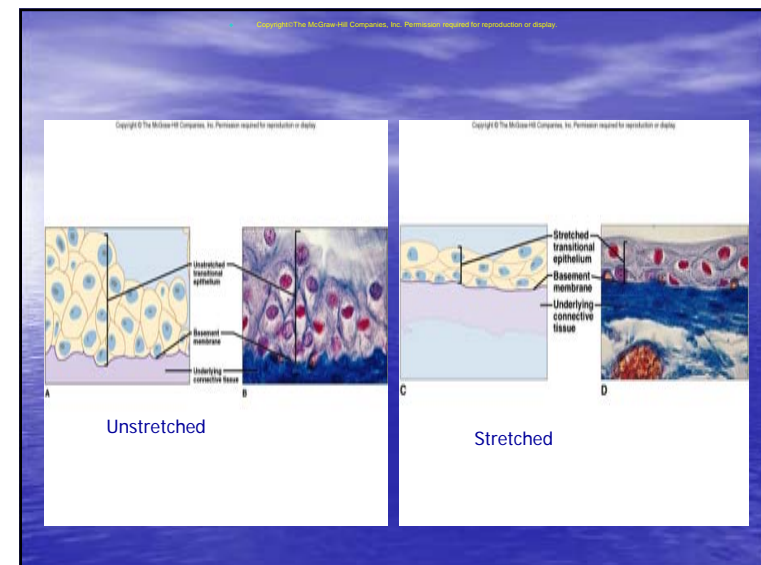
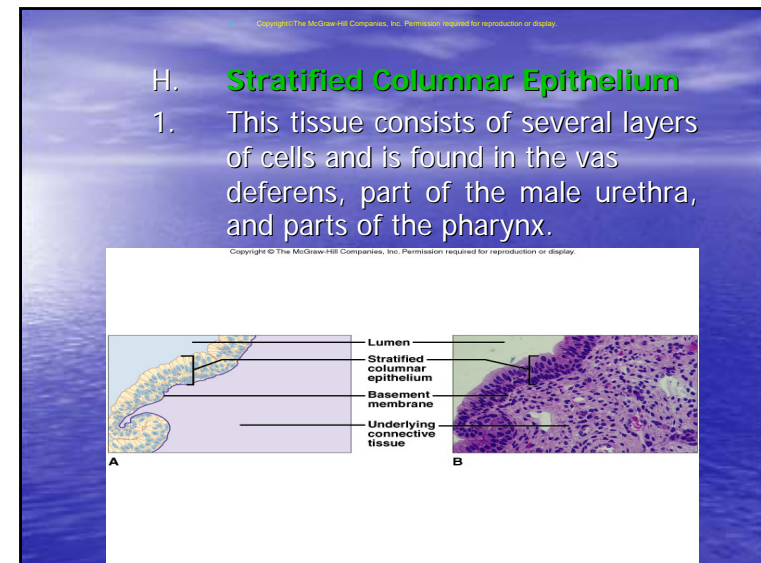
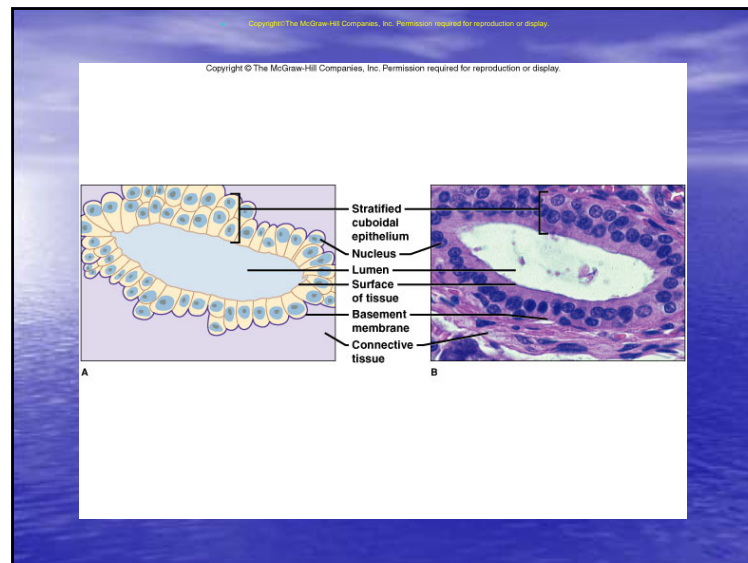
LOCATIONS: Surface of skin; lining of mouth, throat, esophagus, rectum, anus, and vagina

FUNCTIONS: Provides physical protection against abrasion, pathogens, and chemical attack



G. **Stratified Cuboidal Epithelium**

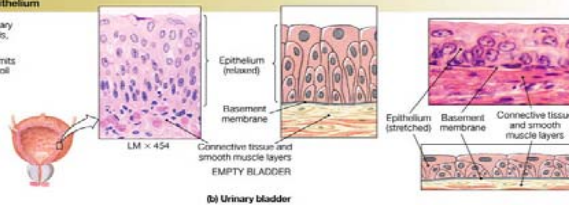
1. This tissue consists of two to three layers of cuboidal cells lining a lumen of the mammary glands, sweat glands, salivary glands, and pancreas.
2. Several layers of cells provide greater protection than one single layer.



Transitional Epithelium

LOCATIONS: Urinary bladder, renal pelvis, ureters.

FUNCTIONS: Permits expansion and recoil after stretching.



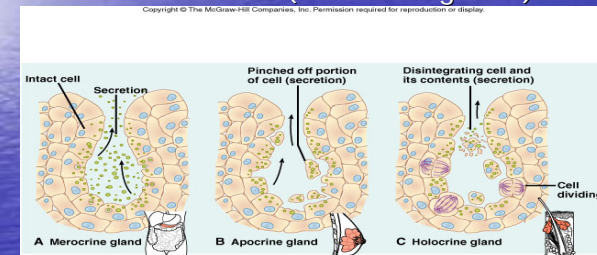
(b) Urinary bladder

J. Glandular Epithelium

1. This tissue is made up of cells designed to produce and secrete substances into ducts or into body fluids.
2. Glands that secrete products into ducts are exocrine; those that secrete into body fluids and blood are called endocrine.

3. Glands are classified by the ways the glands secrete their products.
 - a. Merocrine glands release fluid products by exocytosis (pancreas) and are grouped as serous which produce a watery fluid or mucus which produce a thicker, protective substance.

- b. Apocrine glands lose portions of their cell bodies during secretion (mammary glands).
- c. Holocrine glands release entire cells (sebaceous glands).



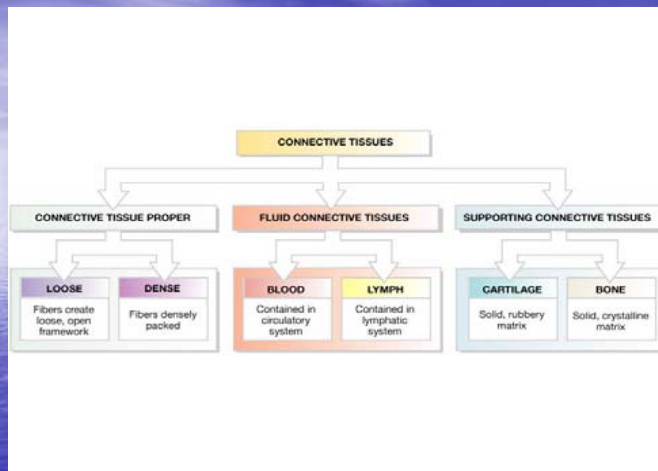
Section 3 Connective tissue

- Read text section 3 and be able to list the types of connective tissue within the body
- Describe the general cellular components, structures, fibers, and matrix (where applicable) of each type of connective tissue.
- Describe the major functions of each type of connective tissue

Connective Tissues:

A. General Characteristics

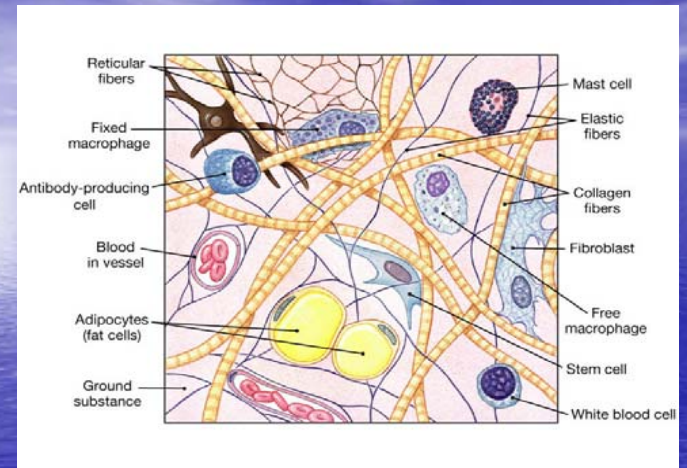
1. Connective tissues bind, support, protect, serve as frameworks, fill spaces, store fat, produce blood cells, protect against infection, and repair tissue damage.
2. Unlike epithelial tissues, connective tissues have abundant matrix, or intercellular material, throughout, and have good blood supplies (except cartilage).
3. **Type of Connective tissue is Categorized by the type of cells and matrix (ground substance-if any) found.**



B. Major Cell Types

1. The **fibroblast** is the most common cell type, and is a fixed, star-shaped cell that secretes fibers and is large in size.
2. Wandering **macrophages** function as scavenger cells and defend against infection.

3. **Mast cells** are large and are located near blood vessels where they release heparin (anticoagulant) and histamine (promotes inflammation).

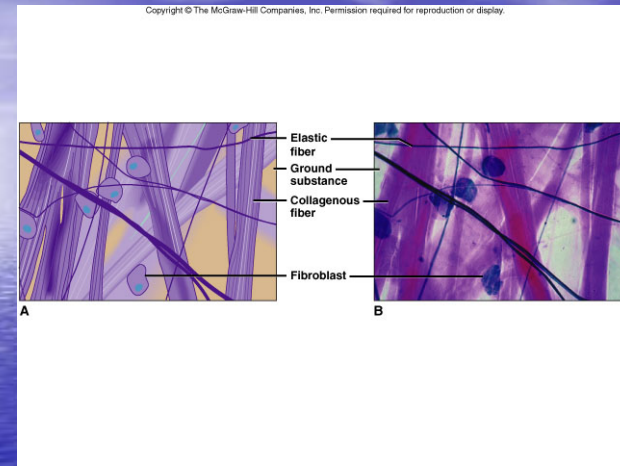


- C. **Connective Tissue Fibers**
1. Strong **collagenous** fibers (white fibers), made of the protein collagen, add strength for holding body parts together.
 2. **Elastic** fibers (yellow fibers), made of the protein elastin, are stretchy and add flexibility to certain types of connective tissues.

3. **Reticular** fibers are thin collagenous fibers that form supportive networks in a variety of tissues.

D. **Loose Connective (areolar) Tissue**

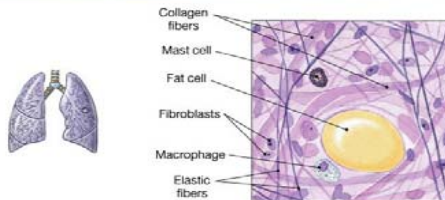
1. This type of tissue forms delicate, thin membranes throughout the body that bind body parts together such as skin and underlying organs.
2. The majority of the cells are fibroblasts that are separated by a gel-like ground substance that contains collagenous and elastic fibers.



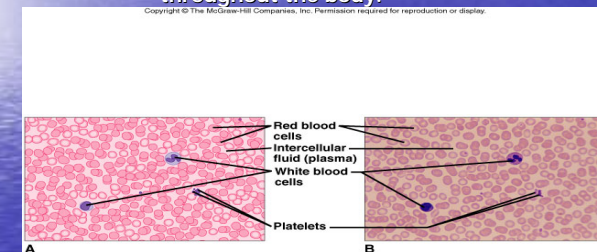
Loose Connective Tissue

LOCATIONS: Beneath dermis of skin, digestive tract, respiratory and urinary tracts; between muscles; around blood vessels, nerves, and around joints

FUNCTIONS: Cushions organs; provides support but permits independent movement; phagocytic cells provide defense against pathogens

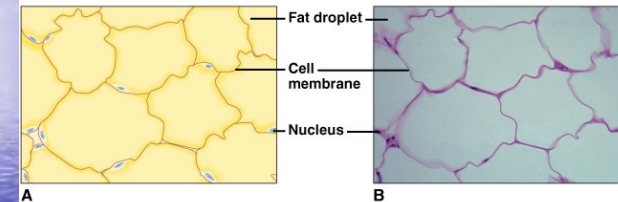


- I. **Blood**
 1. Blood is composed of cells (red and white) suspended in a liquid matrix called plasma.
 2. It functions to transport substances throughout the body.



E. **Adipose Tissue**

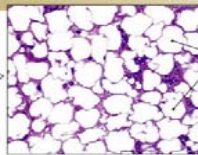
1. Adipose tissue is loose connective tissue designed to store fat.
2. It is found beneath the skin, around joints, padding the kidneys and other internal organs, and in certain abdominal membranes.



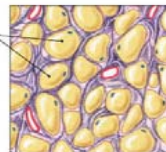
Adipose Tissue

LOCATIONS: Beneath skin, especially at sides, buttocks, breasts; behind eyeballs; around kidneys

FUNCTIONS: Provides padding and cushions shocks; insulates (reduces heat loss); stores energy reserves

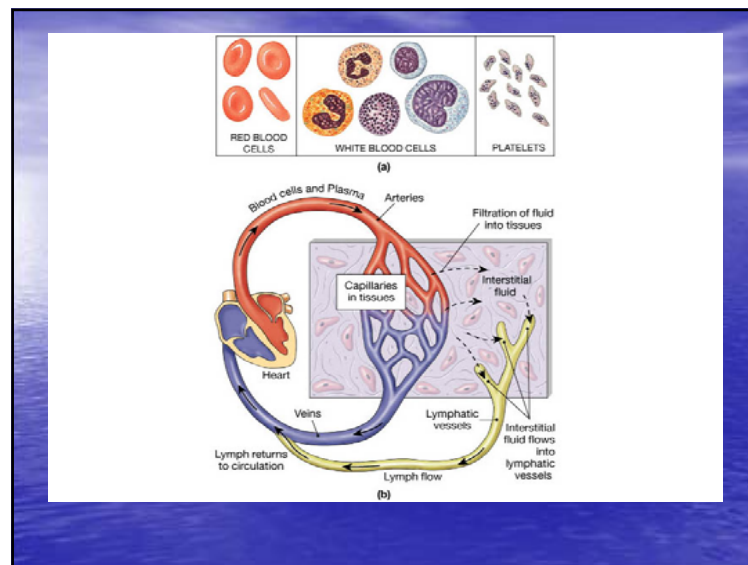
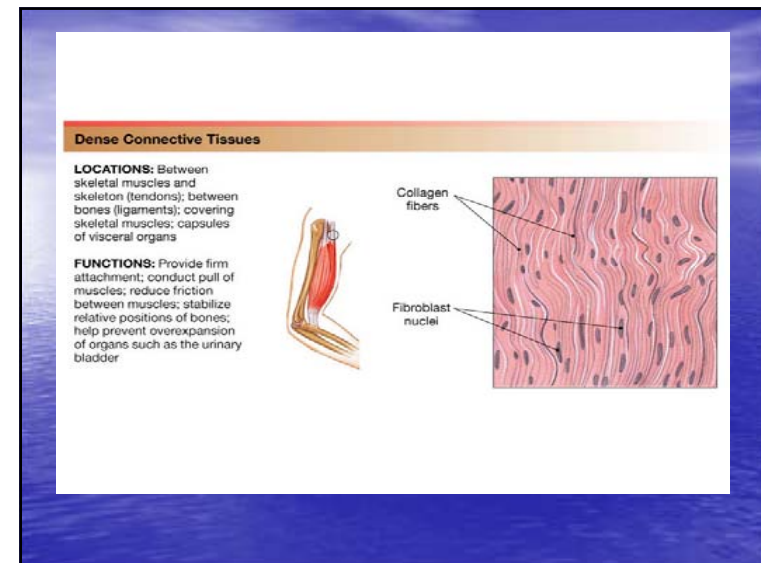
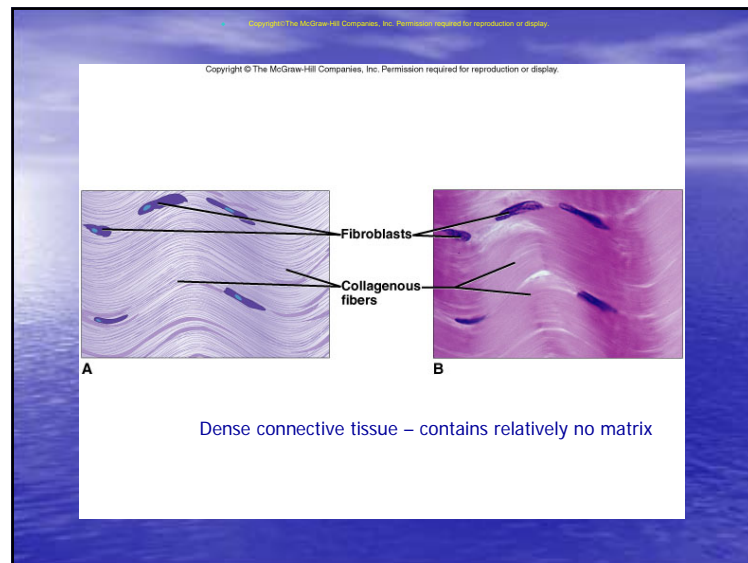


(b) Adipose tissue



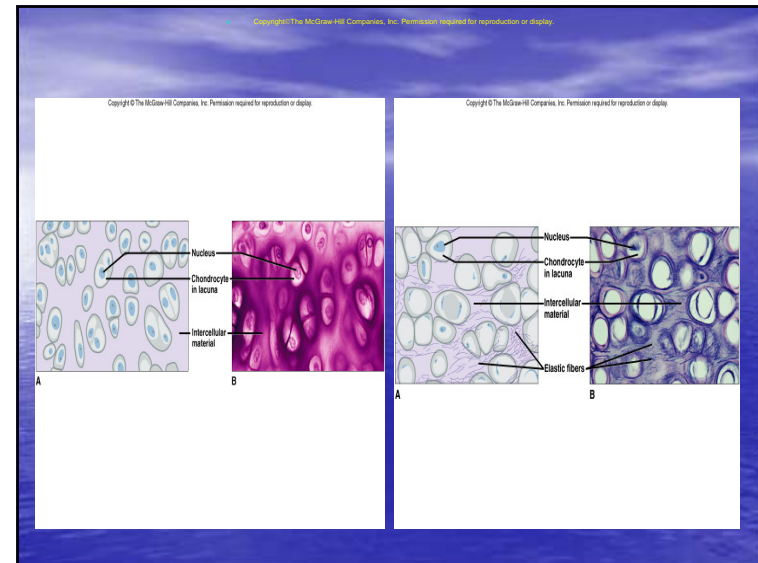
F. **Dense Connective Tissue**

1. This tissue consists of densely packed collagenous fibers and is very strong but lacks a good blood supply.
2. It is found as part of tendons and ligaments.



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- G. **Cartilage**
1. Cartilage is a rigid connective tissue that provides a supportive framework for various structures. It lacks a vascular system and so heals slowly.
 2. Cartilage cells (chondrocytes) lie within lacunae in the gel-like fluid matrix.

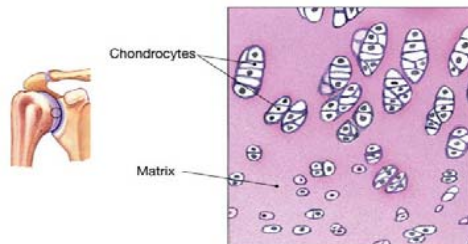
3. Cartilaginous structures are enclosed within a connective tissue perichondrium.
4. The most common, hyaline cartilage, is white with abundant fine collagen fibers, is found at the ends of bones, and supports respiratory passages.



Hyaline Cartilage

LOCATIONS: Between tips of ribs and bones of sternum; covering bone surfaces at synovial joints; supporting larynx (voicebox), trachea, and bronchi; forming part of nasal septum

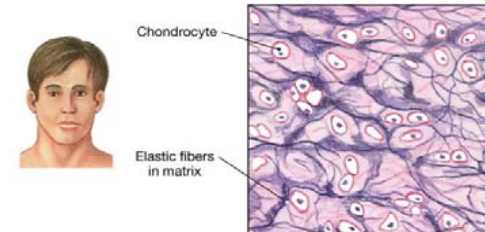
FUNCTIONS: Provides stiff but somewhat flexible support; reduces friction between bony surfaces



Elastic Cartilage

LOCATIONS: Auricle of external ear; auditory canal; epiglottis

FUNCTIONS: Provides support, but tolerates distortion without damage and returns to original shape

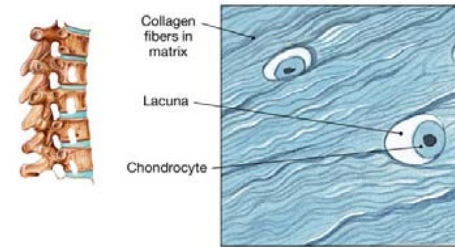


5. Elastic cartilage, with elastic fibers, provides a framework for the external ears and parts of the larynx.
6. Fibrocartilage, with many collagenous fibers, is a tough tissue that provides a shock-absorbing function in intervertebral disks and in the knees and pelvic girdle.

Fibrocartilage

LOCATIONS:
Intervertebral discs separating vertebrae along spinal column; pads within knee joint; between pubic bones of pelvis

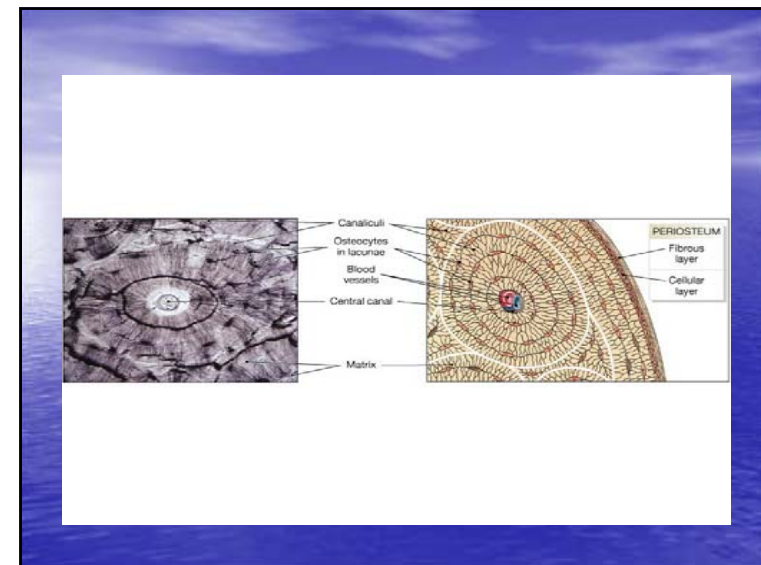
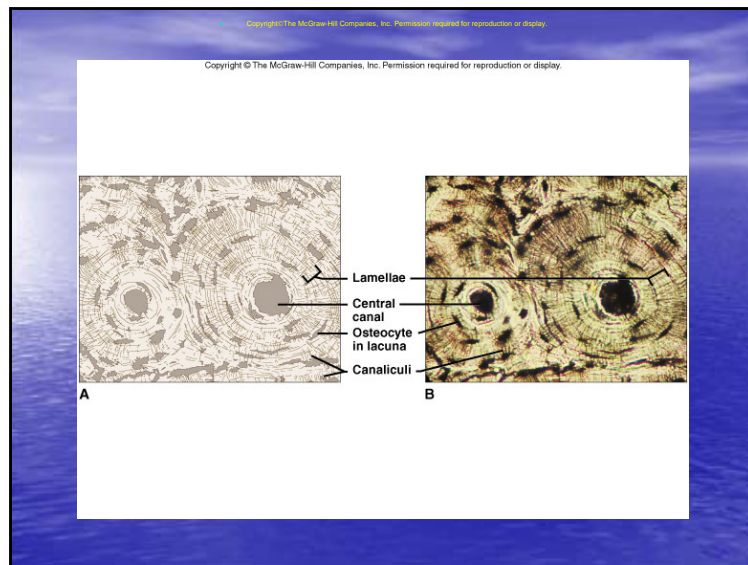
FUNCTIONS: Resists compression; prevents bone-to-bone contact; limits relative movement



H. **Bone**

1. Bone is the most rigid connective tissue, with deposits of mineral salts and collagen within the matrix.
2. Bone internally supports the body, protects, forms muscle attachments and is the site for blood cell formation.

3. Bone cells, called osteocytes, lie within lacunae and are arranged in concentric circles (osteons) around osteonic canals interconnected by canaliculi.
4. Bone has a good blood supply, enabling rapid recovery after an injury.



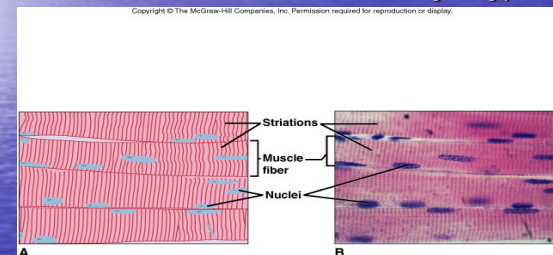
Section 4 Muscle

- Read text and describe the three types of muscle tissue cells their function and where they are located in the body.

Muscle Tissues:

A. General Characteristics

- Muscle cells, or fibers, can contract and consist of three major types.



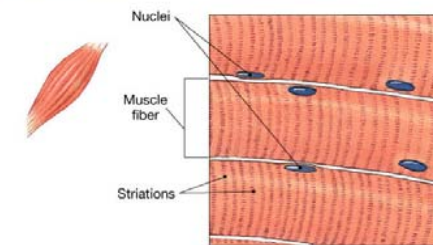
B. **Skeletal Muscle Tissue**

1. Skeletal muscle is attached to bone and can be controlled by conscious effort (voluntary).
2. The cells (muscle fibers) are long and cylindrical, striated, have many nuclei and contract from nervous impulse.

Skeletal Muscle Tissue

LOCATIONS: Combined with connective tissues and nervous tissue in skeletal muscles

FUNCTIONS: Moves or stabilizes the position of the skeleton; guards entrances and exits to the digestive, respiratory, and urinary tracts; generates heat; protects internal organs



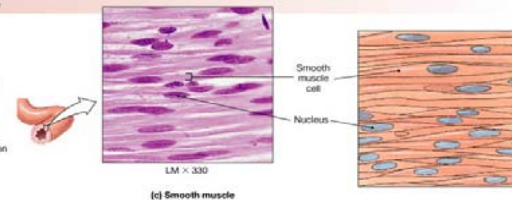
C. **Smooth Muscle Tissue**

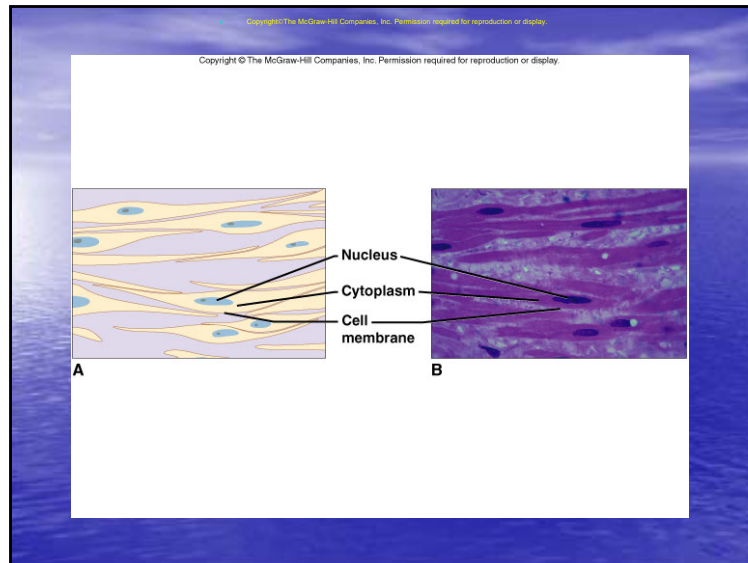
1. Smooth muscle tissue lacks striations, is uninucleate, and consists of spindle-shaped cells.
2. This involuntary muscle is found in the walls of internal organs, and in the digestive tract, blood vessels, and urinary bladder.

Smooth Muscle Tissue

LOCATIONS: Encircles blood vessels; in the walls of digestive, respiratory, urinary, and reproductive organs

FUNCTIONS: Moves food, urine, and reproductive tract secretions; controls diameter of respiratory passageways; regulates diameter of blood vessels and contributes to regulation of tissue blood flow

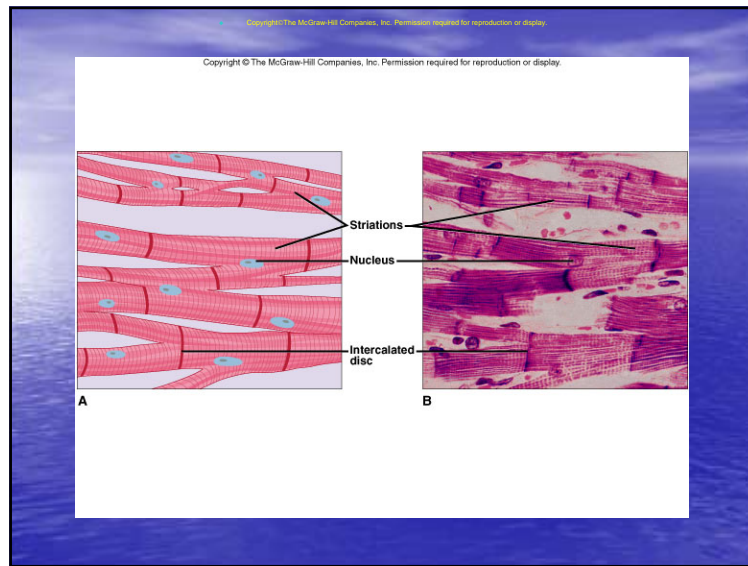




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D. Cardiac Muscle Tissue

- Cardiac muscle tissue is found only in the heart and consists of branching fibers that are connected to each other with intercalated disks.
- This involuntary muscle has a single nucleus in each cell but appears striated.



Cardiac Muscle Tissue

LOCATION: Heart

FUNCTIONS: Circulates blood; maintains blood (hydrostatic) pressure

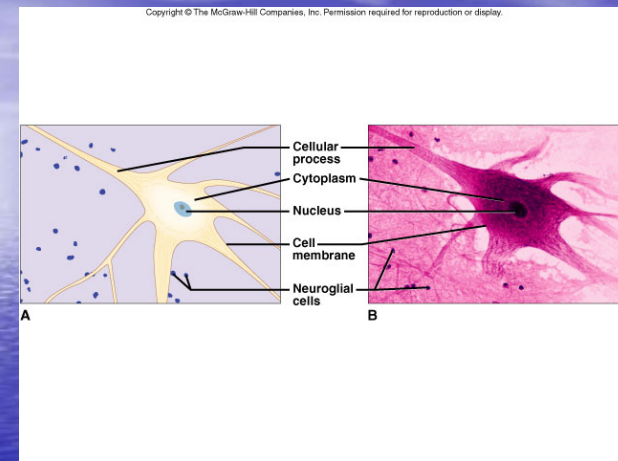
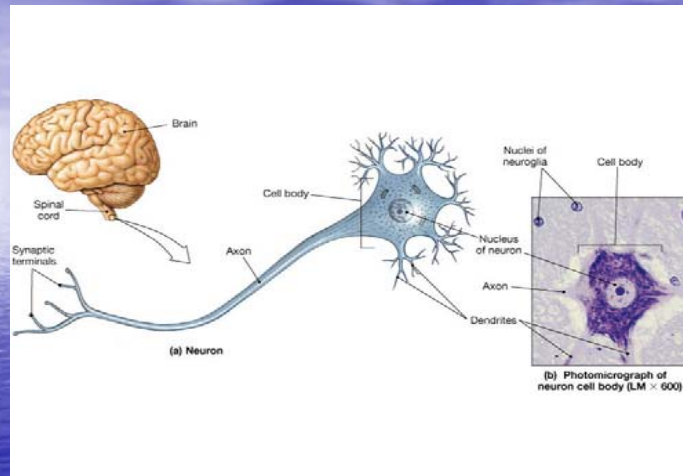
The diagram includes a small illustration of the heart. The detailed micrograph on the right shows branching cardiac muscle cells with a single central nucleus, striations, and intercalated discs connecting the cells.

Section 5 Nervous Tissue

- Read section 5 and describe the general characteristics of the nervous tissue (cells) and functions of the nervous system.

Nervous Tissues:

- Nervous tissues are found in the brain, spinal cord, and nerves.
- Neurons**, or nerve cells, conduct nervous impulses while helper cells, or **neuroglia**, support and nourish the neurons.



Section 6 Membranes

- Read text section 6 and define a membrane and describe the four major types.

- Serous membranes- lines body cavities that lack opening to the outside
- Mucous membranes line cavities and tubes that open to the outside.
- Cutaneous membrane is commonly called the skin- chapter 6
- Synovial membrane lines joints – chapter 7

