

Unit 3-Histology



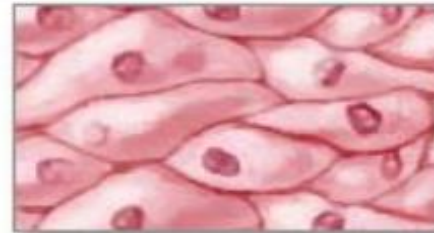
Histology= the study of tissues

- A tissue is a group of cells that have a similar shape and function. Different types of tissues can be found in different organs.
- In humans, there are four basic types of tissue. *(There may be various sub-tissues within each of the primary tissues.)*

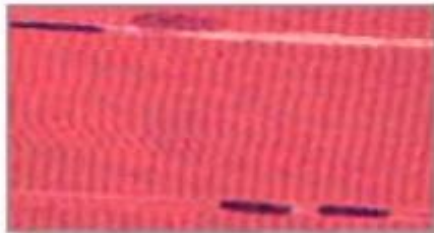
Four types of tissue



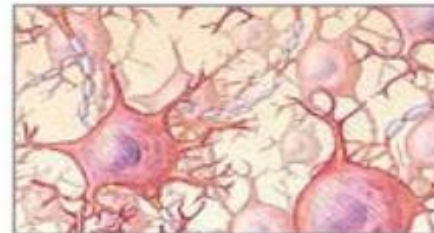
Connective tissue



Epithelial tissue



Muscle tissue



Nervous tissue

And this
type.....



- A. Epithelial Tissue (8 types)
- B. Muscle Tissue (3 types)
- C. Nervous Tissue (2 types)
- D. Connective Tissue (a lot)

A. Epithelial Tissue

- Lines organs and covers all free body surfaces
- The major function of epithelial tissue includes protection, secretion, absorption, filtration and sensory reception.
- Anchored to connective tissue
- It lacks blood vessels
- Undergoes mitosis (rapid healing).
- Cells tightly packed together

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

Helpful stuff: Name is based on its description

squamous = flat



cuboidal = square



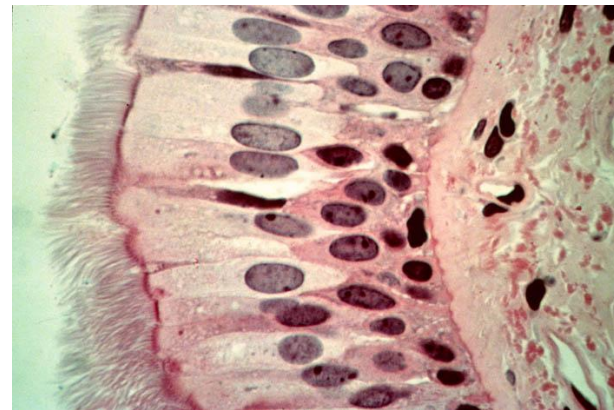
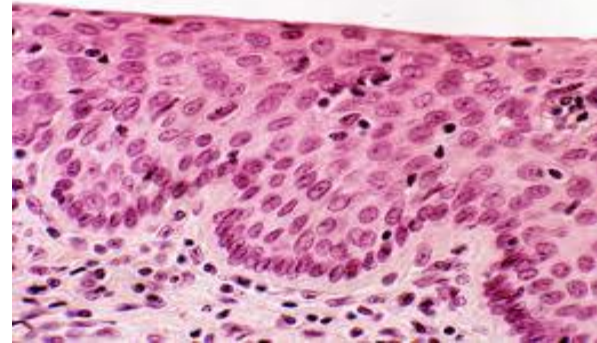
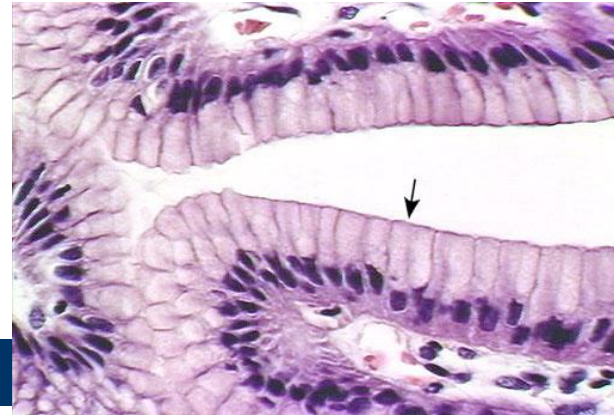
columnar = column (rectangle)



- simple = single layer
- stratified = multiple layers
- Pseudostratified- appears to be two or more cell layers but is not (pseudo = false)

Classification

- Simple-one cell layer
- Stratified-two or more cell layers
- Pseudostratified-appears to be two or more cell layers but is not



Cell Composition

Epithelium



simple squamous
(blood vessel)



simple cuboidal
(small ducts)



simple columnar
(digestive tract)



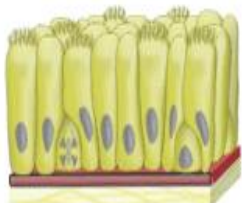
stratified squamous
(non-keratinized)
(oral cavity, vagina)



stratified cuboidal
(large ducts)



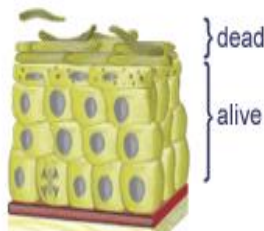
stratified columnar
(reproductive tract)



pseudostratified columnar
(respiratory tract)



transitional epithelium
(urinary bladder)

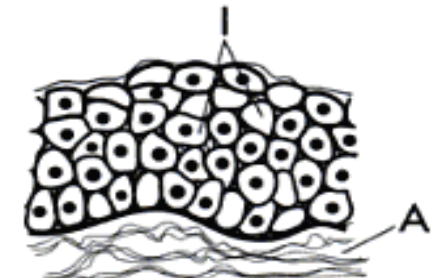
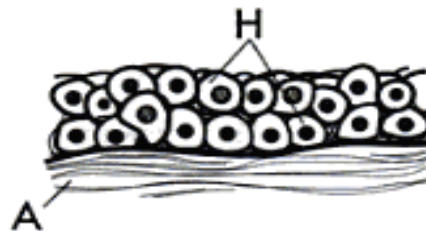
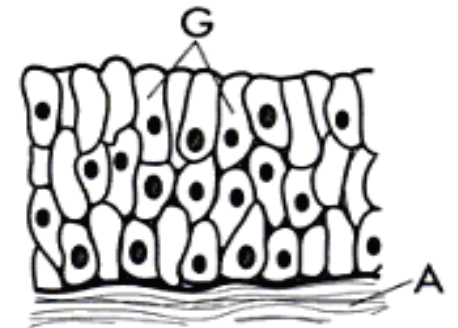
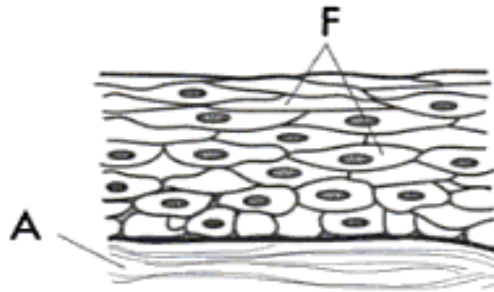
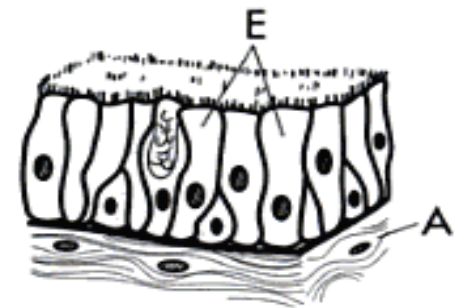
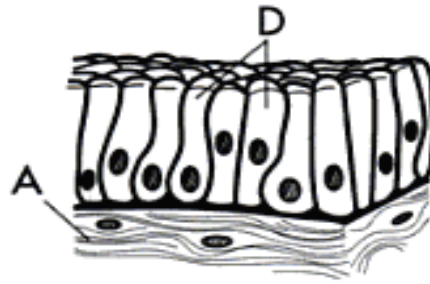
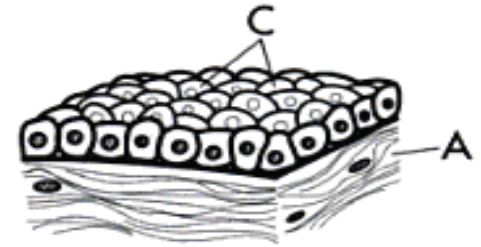
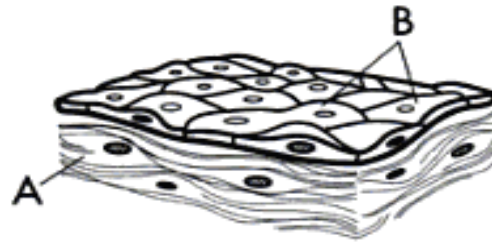


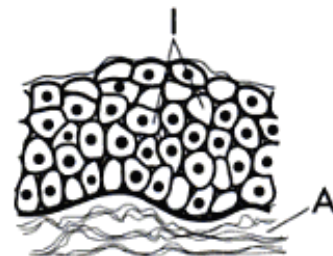
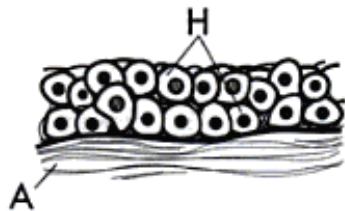
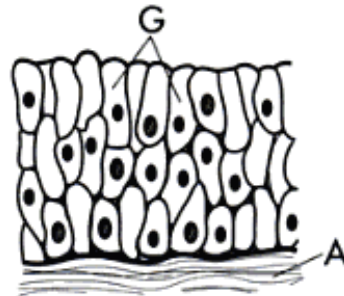
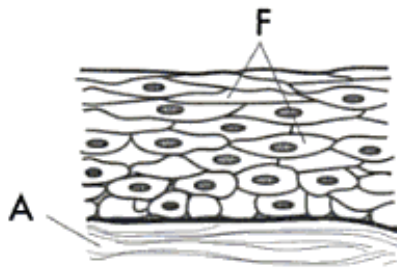
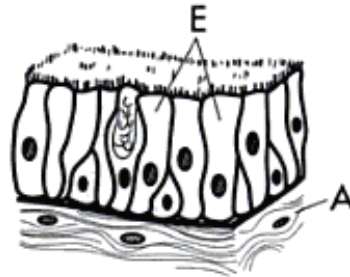
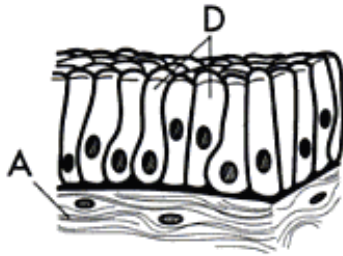
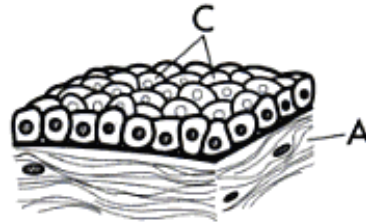
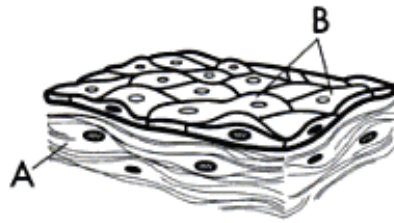
stratified squamous (keratinized)
(skin)

} dead
 } alive

- Squamous- flat/irregularly shaped cells
- Columnar-taller than they are wide
- Cuboidal-cube shaped
- Transitional-changes from squamous to cuboidal

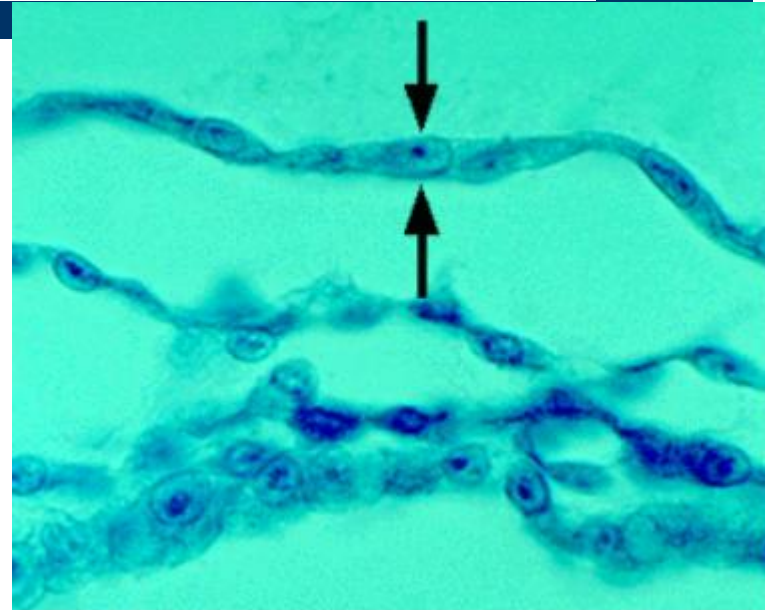
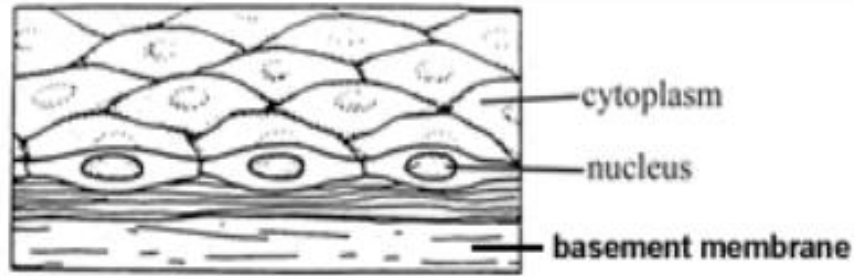
Identify the tissues





- B. Simple Squamous
- C. Simple Cuboidal
- D. Simple Columnar
- E. Pseudostratified Columnar
- F. Stratified Squamous
- G. Stratified Columnar
- H. Stratified Cuboidal
- I. Transitional

Simple Squamous

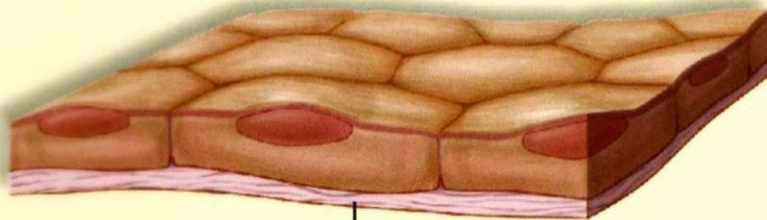
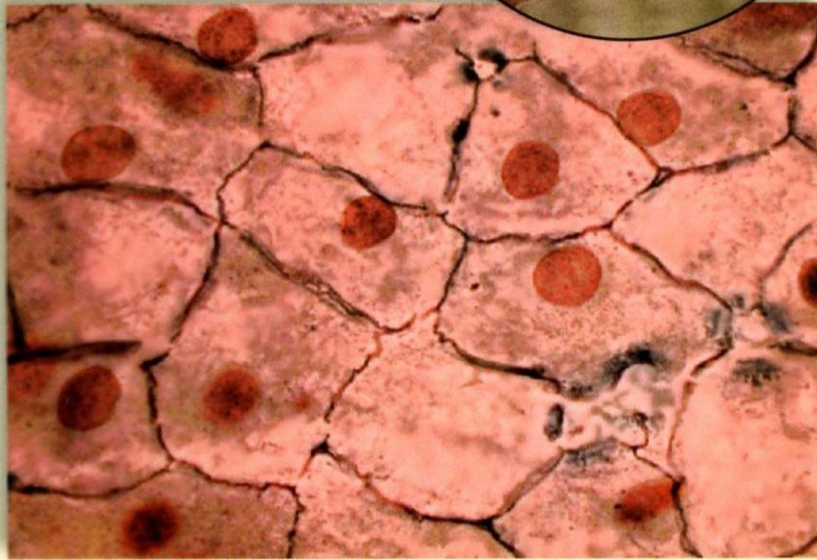
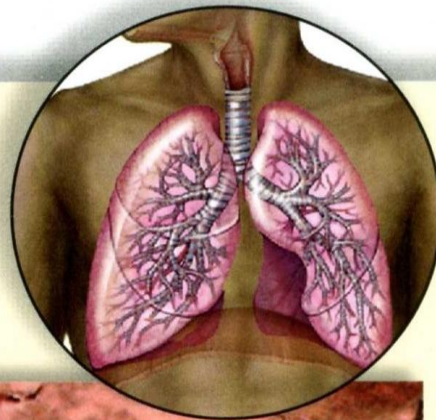


Function: diffusion (air sacs in lungs) and filtration (kidneys or walls of capillaries).

(They are thin to allow rapid passage of substances through them.)

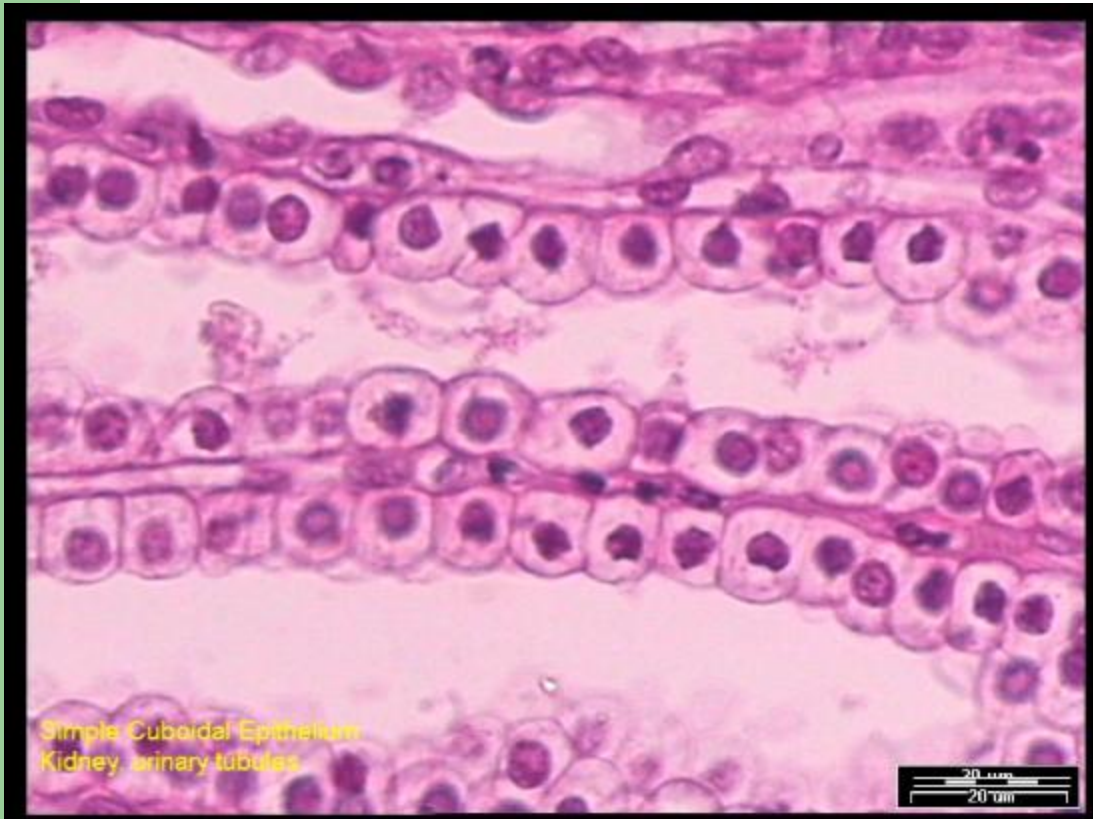
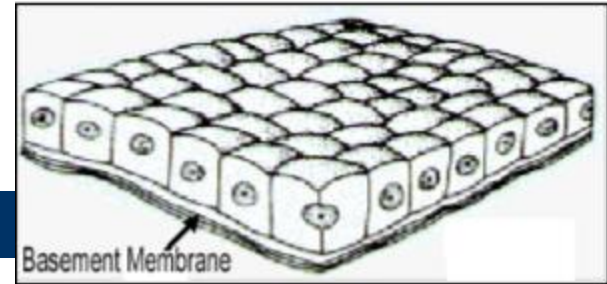
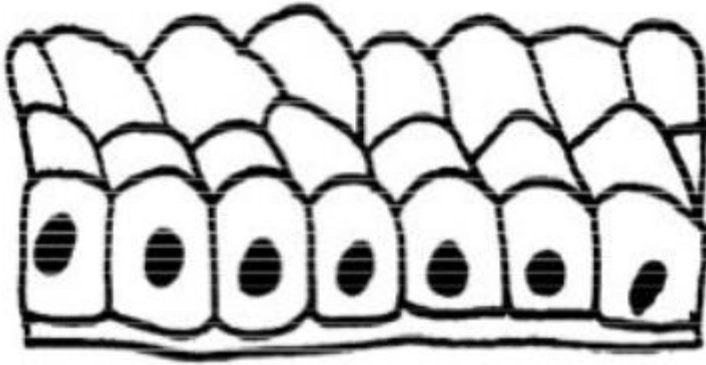
Simple squamous

- lining of lungs, blood vessels
- protects



basement membrane

Simple Cuboidal



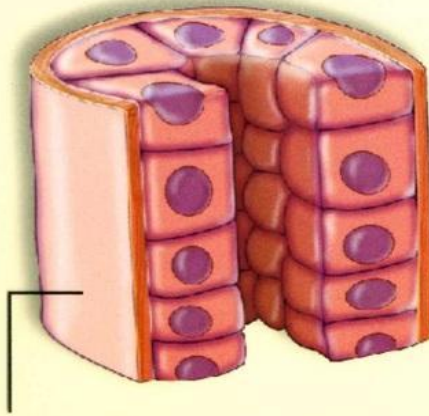
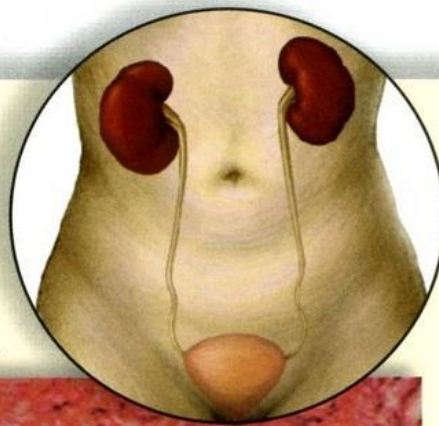
Function:

Protection,
Secretion and
Absorption

Found in kidneys,
thyroid glands, and
covering the ovaries

Simple cuboidal

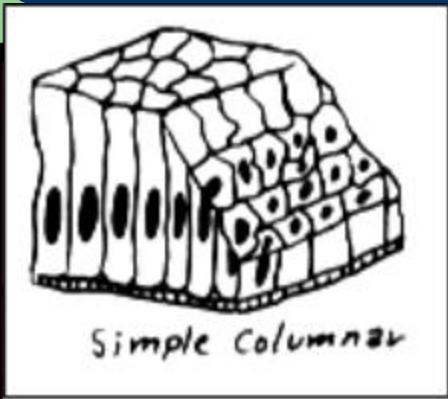
- lining of kidney tubules, various glands
- absorbs molecules



basement membrane

Simple Columnar

1. Nonciliated simple columnar epithelial (*with microvilli that increase surface area which then increase rate of absorption or they are goblet cells that secrete mucus*)
2. Ciliated simple columnar epithelial (*with cilia at top so to wave or sweep any trapped particles or mucus out of body*)



Function: Secretion and Absorption

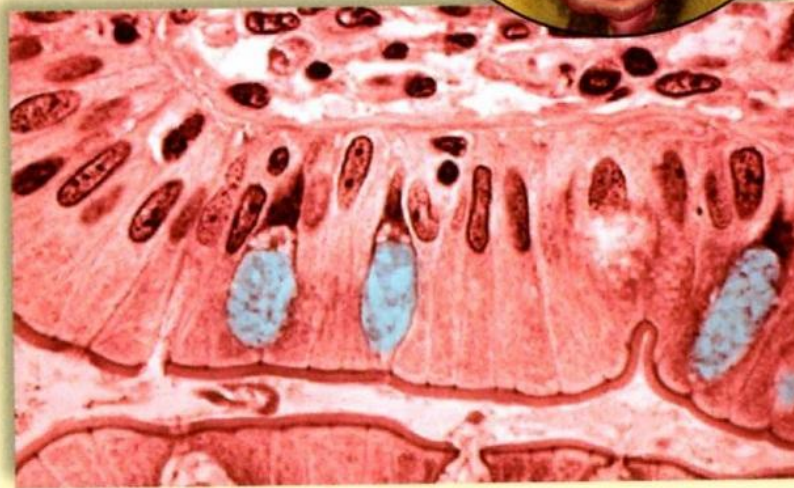
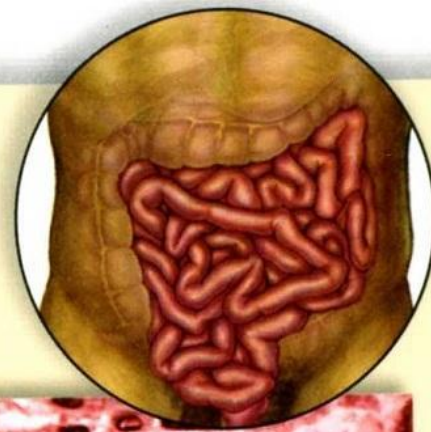
Found in upper respiratory tract, digestive tract, and uterus

*Contains goblet cells to secrete mucus

*Can have microvilli

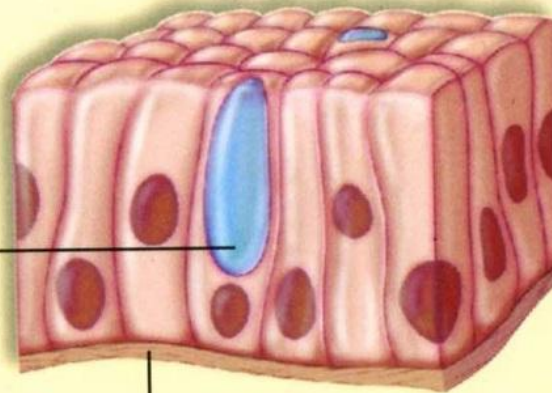
Simple columnar

- lining of small intestine, oviducts
- absorbs nutrients

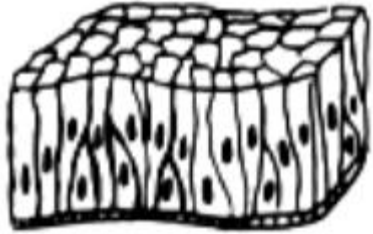


goblet cell
secretes
mucus

basement
membrane



Pseudostratified Columnar



Pseudostratified
Columnar

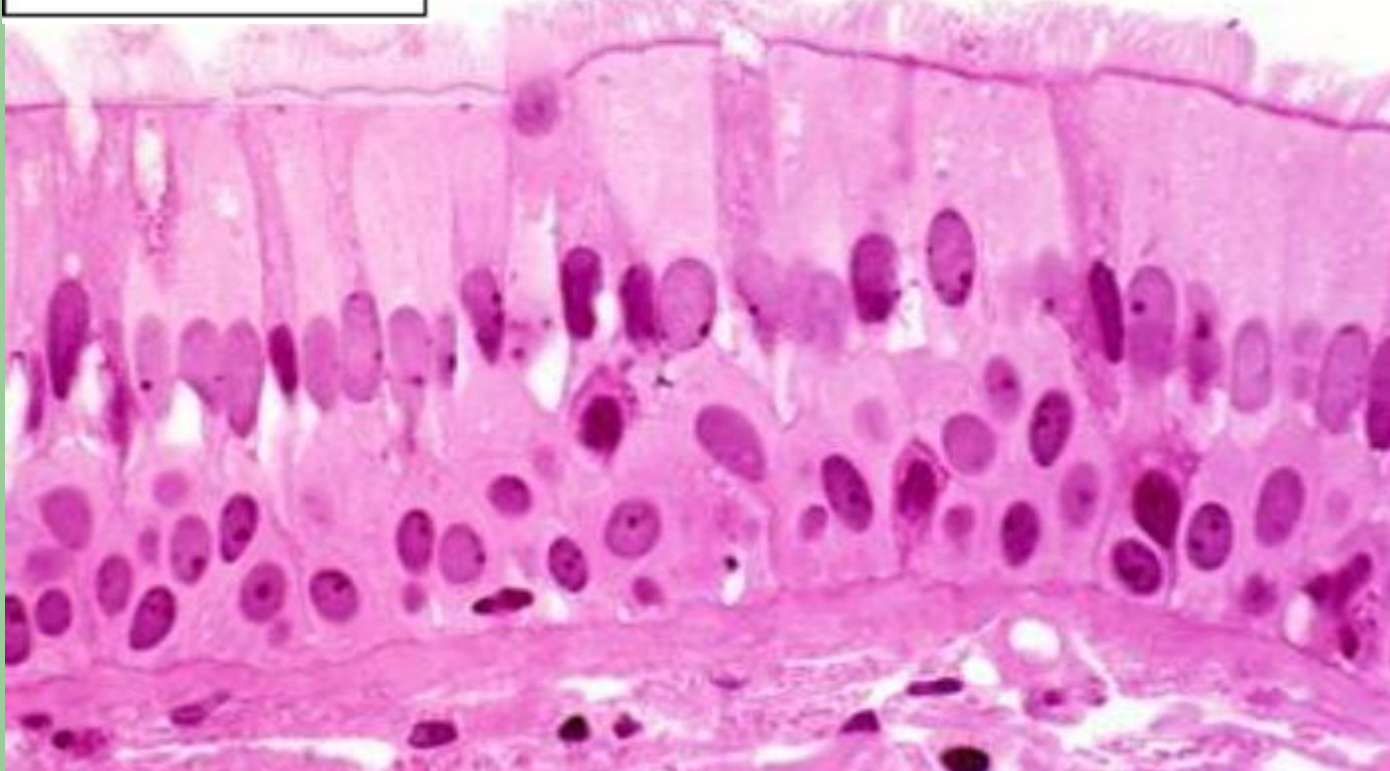
-Nuclei are uneven which gives it a layered appearance but it's a single layer. (pseudo = false)

-Can have goblet (form mucus) cells and cilia

-Pseudostratified ciliated columnar epithelial cells → learn to say that you'll impress a lot of people! ;)

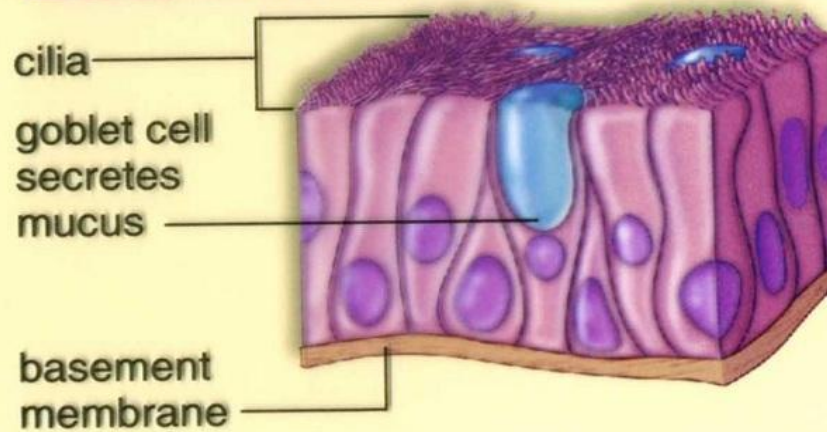
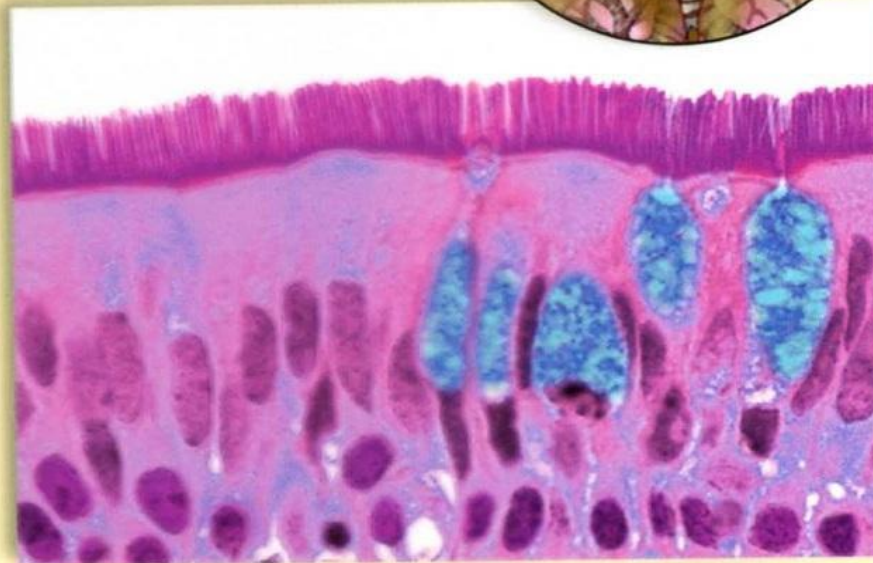
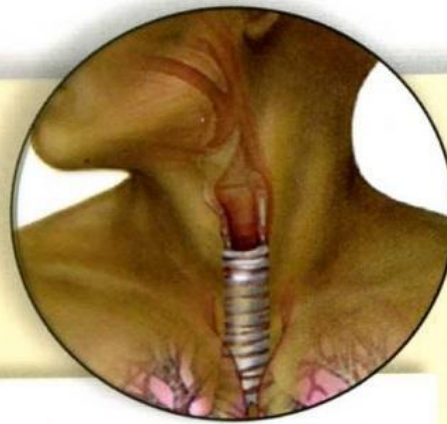
Location: lining air passages and tubes of the reproductive system

Function: Most have cilia, so they sweep away dirt from air passages



Pseudostratified, ciliated columnar

- lining of trachea
- sweeps impurities toward throat



Stratified Squamous

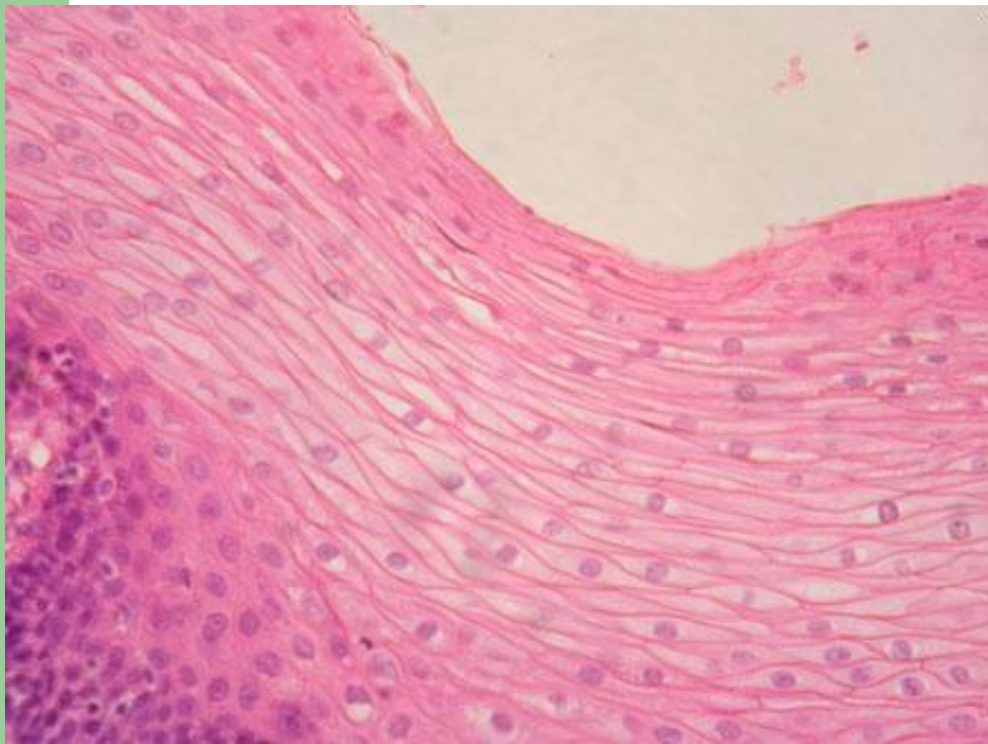
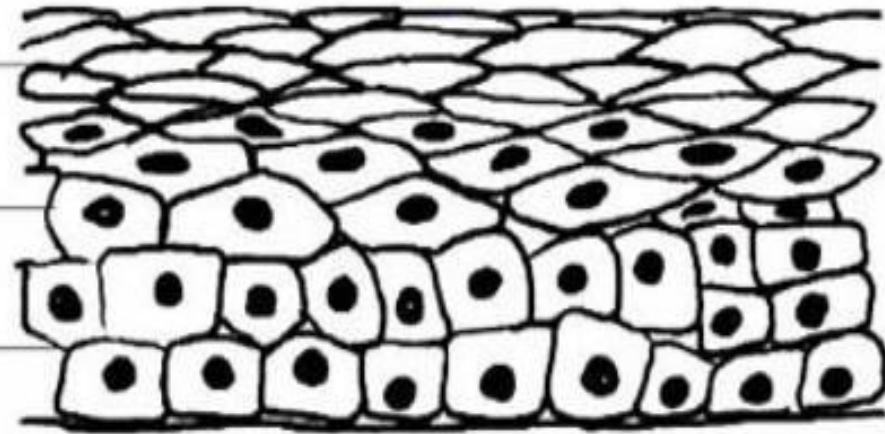


Stratified
Squamous

flattened cells worn
away from top surface

flattened cells worn
away from top surface

cells at base
divide by mitosis



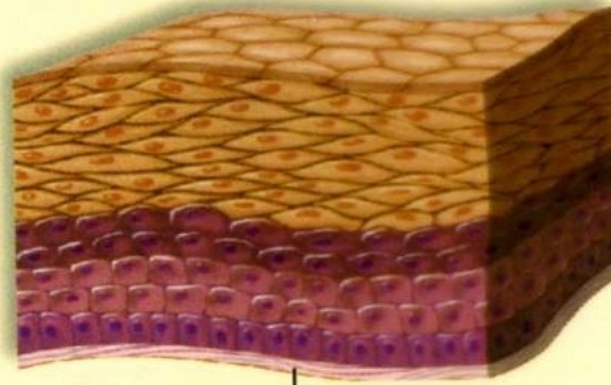
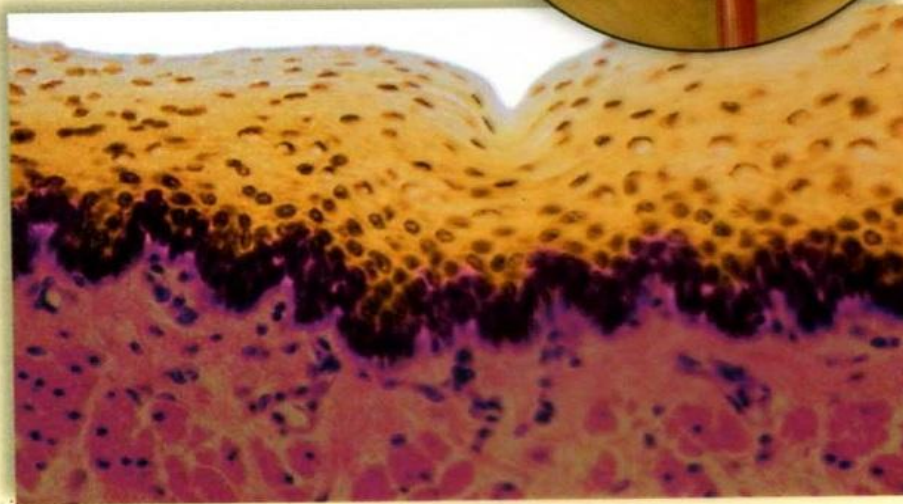
Multi layer squamous,
functions in protection

Found in skin* and mouth,
esophagus, anus, and
vagina

**top of skin is keratinized*

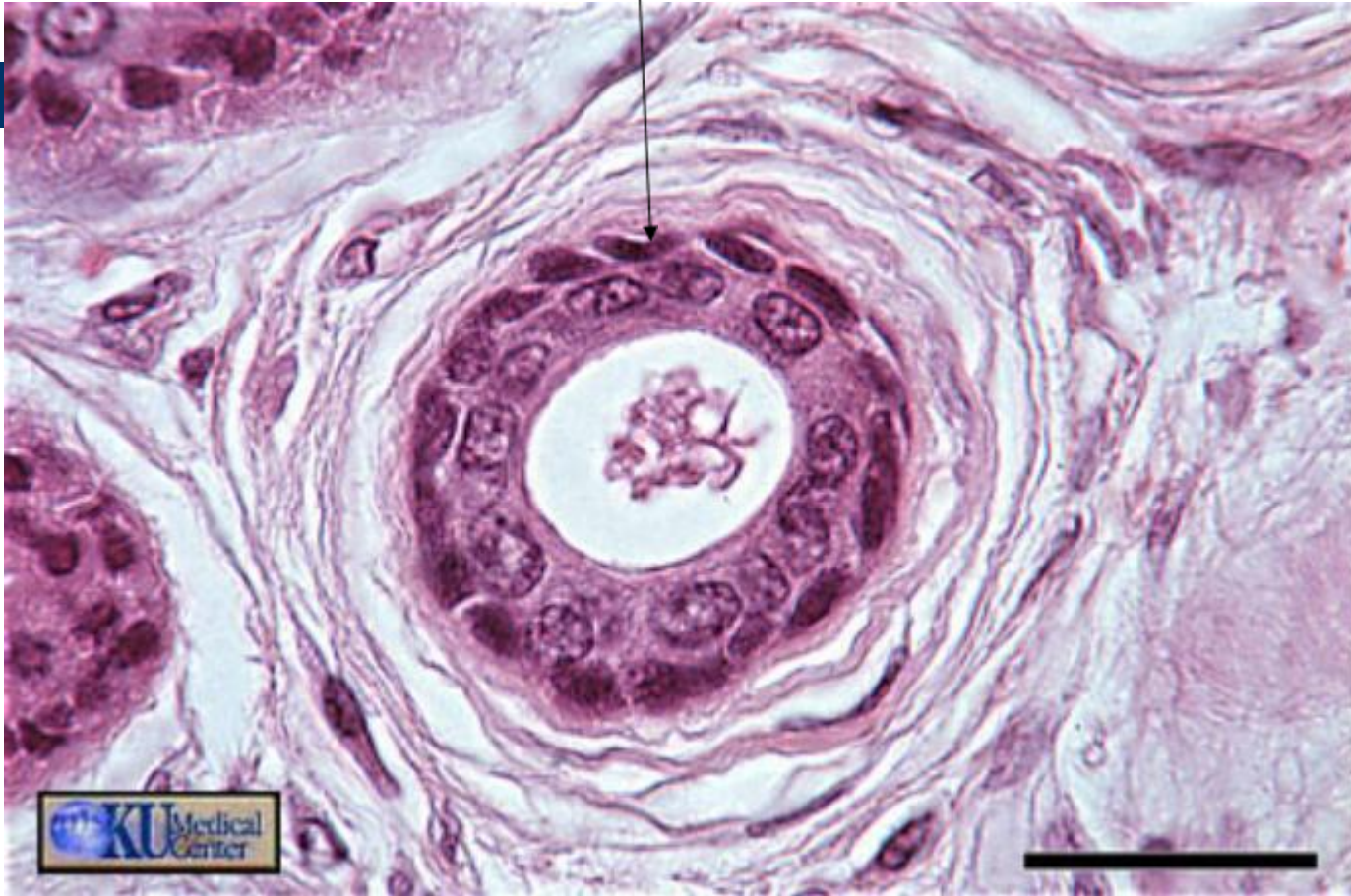
Stratified squamous

- lining of nose, mouth, esophagus, anal canal, vagina
- protects



basement membrane

Stratified cuboidal epithelium

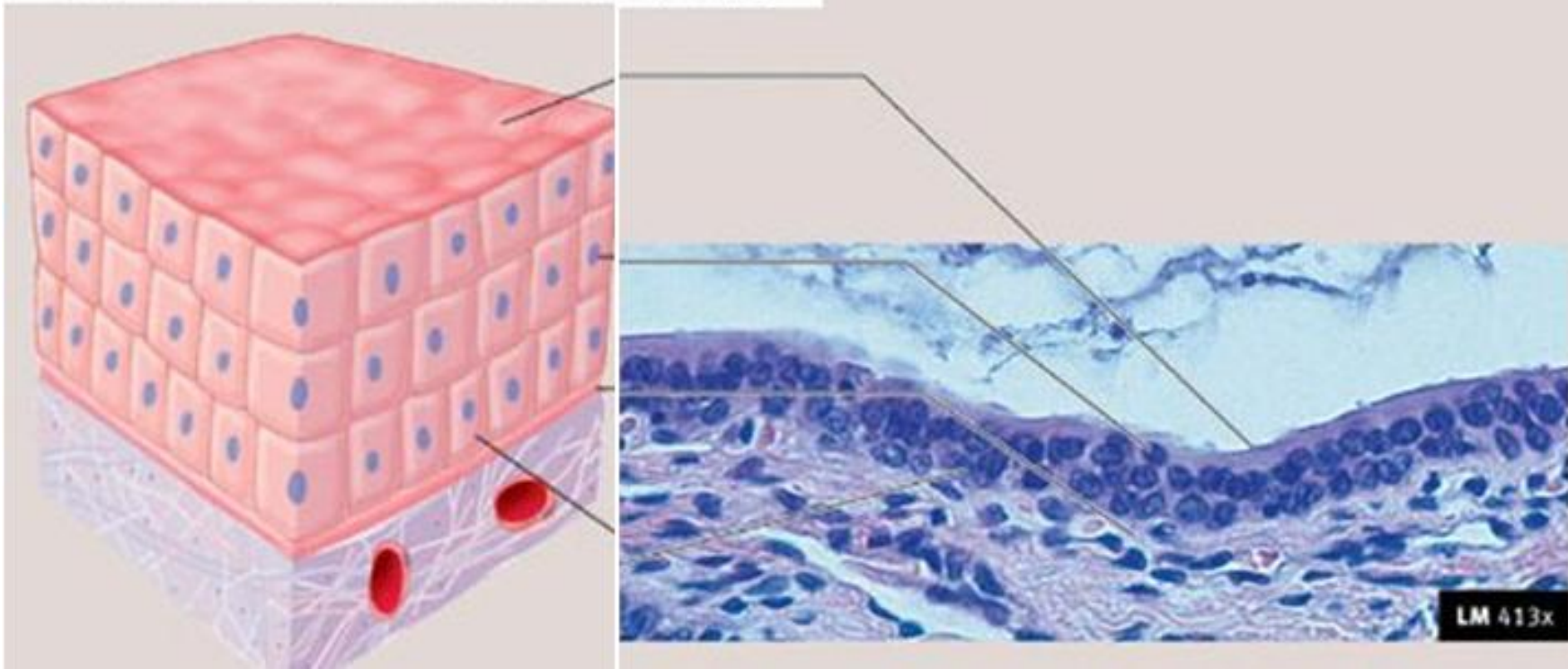


Stratified cuboidal epithelium

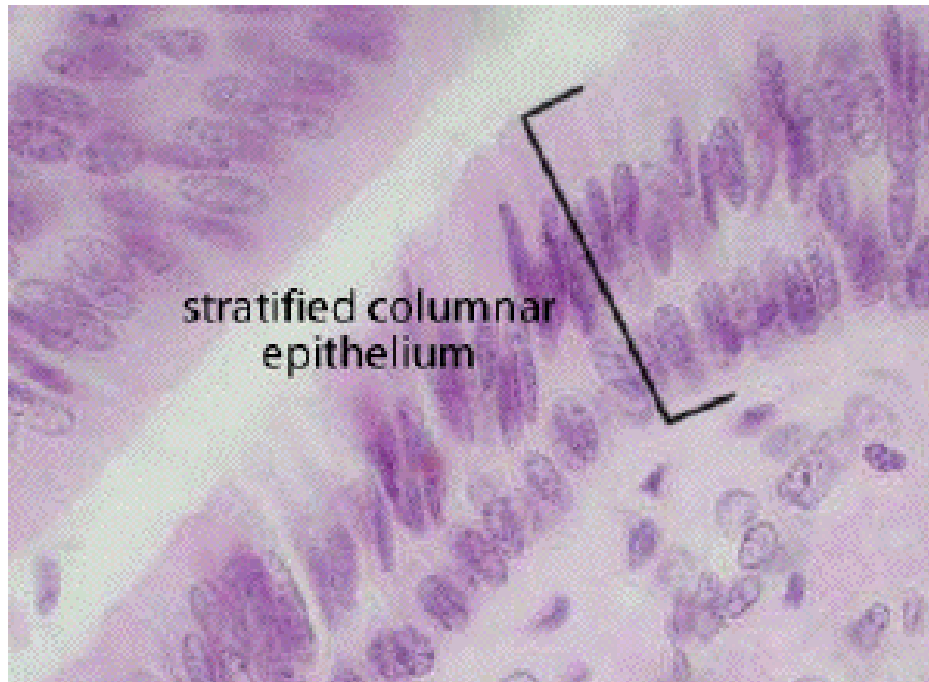
- -Found in ducts of many glands (sweat, salivary, mammary, pancreas)
- Also found in the lining of ovaries and seminiferous tubules (testes)

- -Function- Protection and limited secretion and absorption

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Stratified Columnar Epithelium

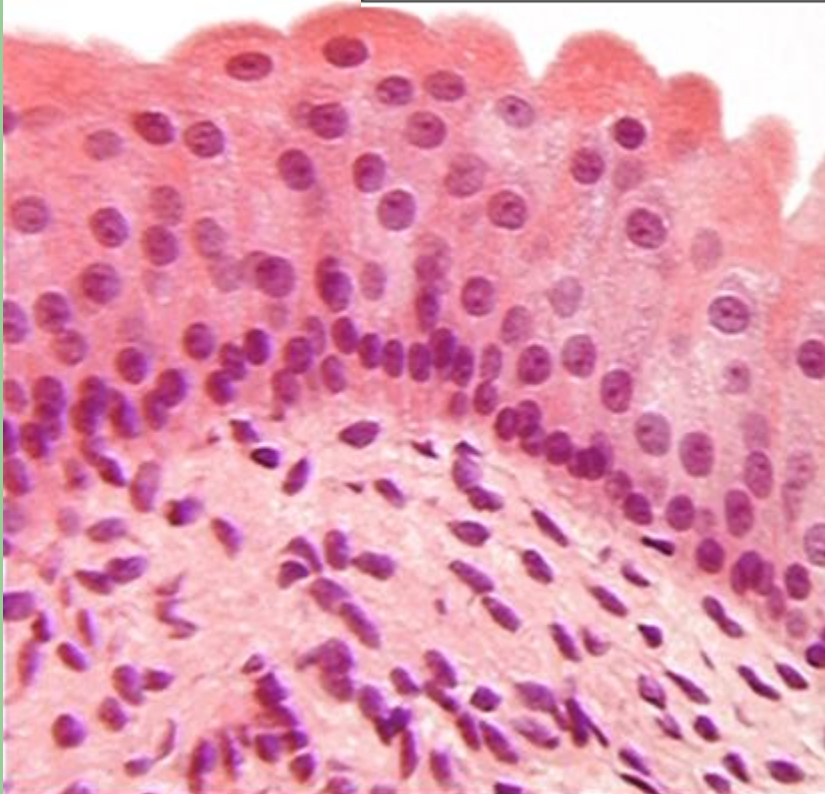
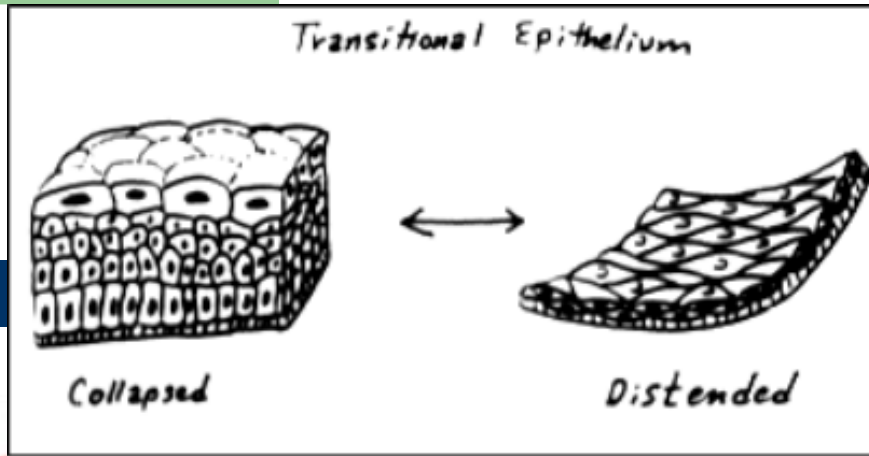


Top layer look elongated
Bottom layer look cube shaped

Protection and Secretion

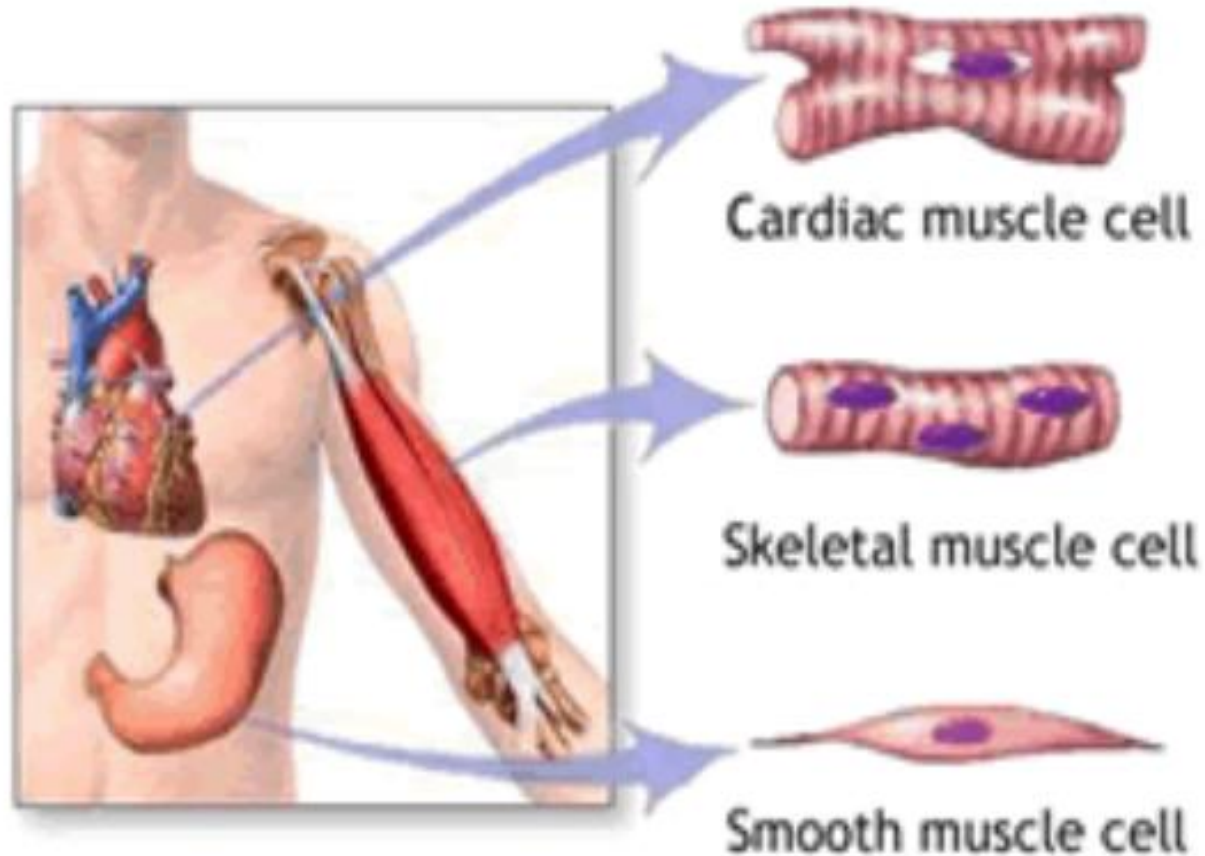
Found in the male urethra and
lining of larger ducts of
excretory glands

Transitional Epithelium



- Changes from squamous to cuboidal
- Stratified
- Stretchable
- Blocks diffusion (no leaking)
- Found in the urinary bladder

B. Muscle Tissue



Overall Characteristics: produce motion, maintains posture, generates heat, and provides protection

Cardiac Muscle -forms the bulk of the wall of the heart.

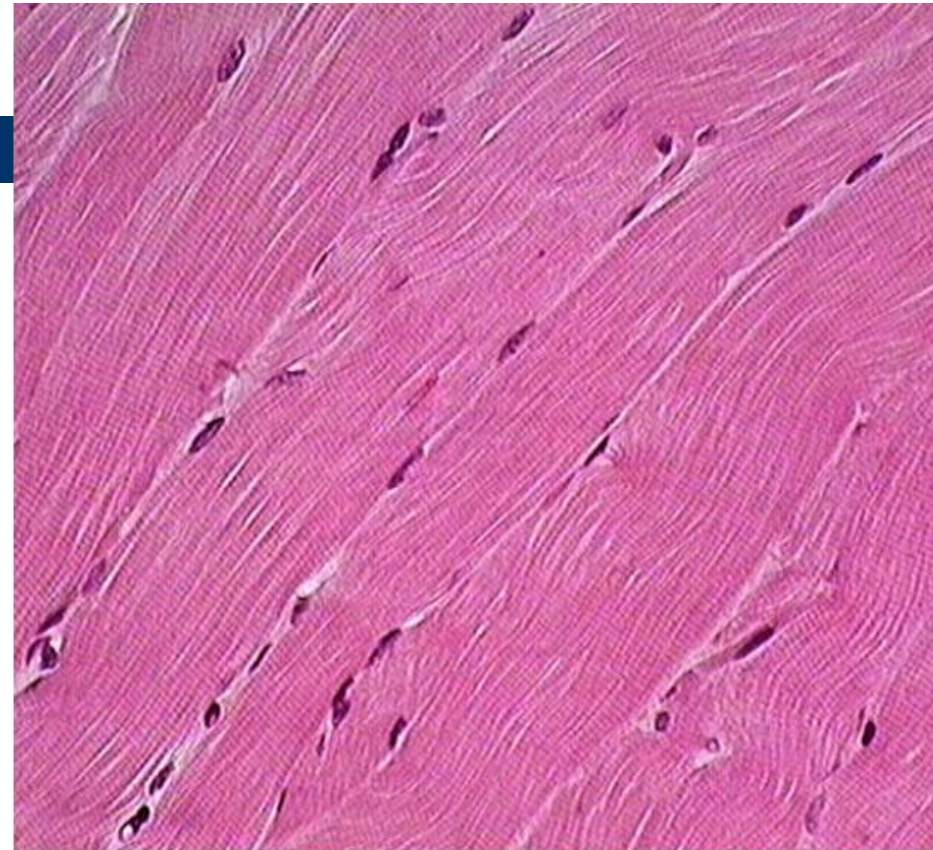
General Characteristics:

- -striated (alternating light and dark protein bands)
 - -involuntary (Naturally happens)
 - -can regenerate under certain conditions
 - Intercalated discs
 - Single nuclei
- 
- *Cool info: in resting conditions, cardiac muscle tissue contracts and relaxes an avg of 75 times a minute.*

Skeletal muscle- attached to the bones of the skeleton

General Characteristics:

- -striated (alternating light and dark protein bands)
- -voluntary (we can consciously control and move parts of the skeleton)
- -multinucleic



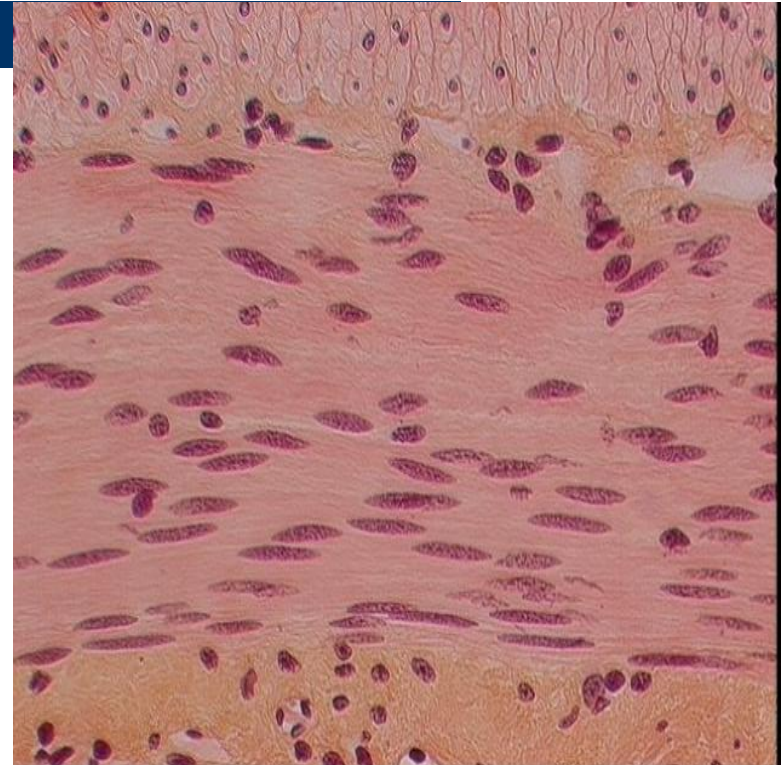
Smooth muscle- located in the walls of hollow internal structures

Internal structures such as:

- Blood vessels
- Airways to the lungs
- Stomach
- Intestines
- Gallbladder
- Urinary bladder

General Characteristics:

- -Nonstriated
- -involuntary
- -mononucleic



C. Nerve Tissue

Consists of two types of cells:

Neurons and Neuroglia

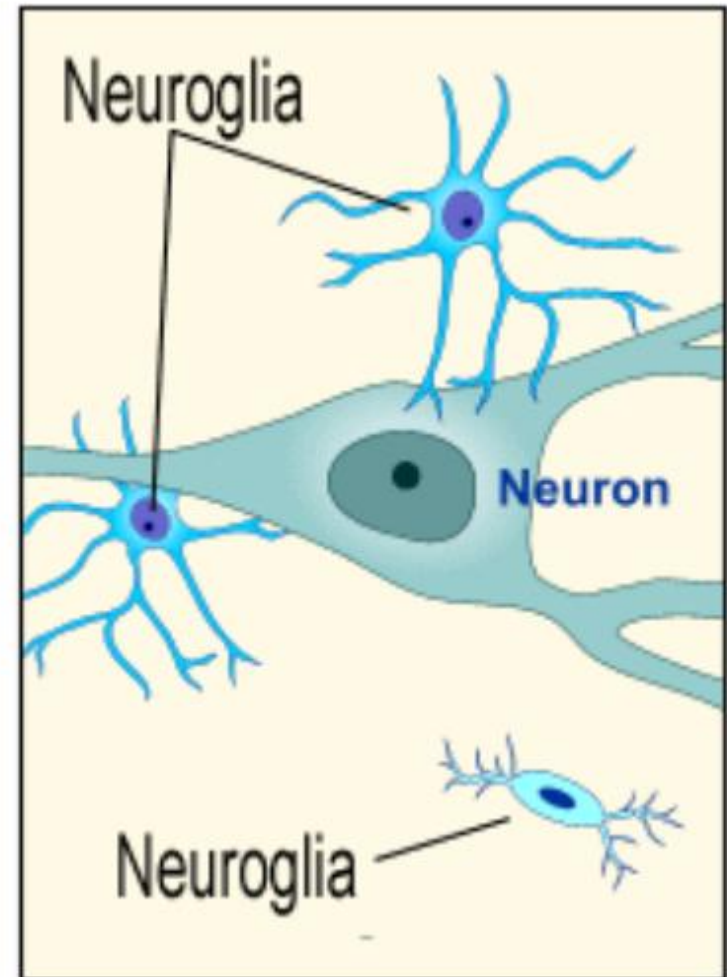
Neurons= nerve cells

-sensitive to various stimuli, convert stimuli into impulses, then send impulses to other neurons, muscle fibers, or glands.

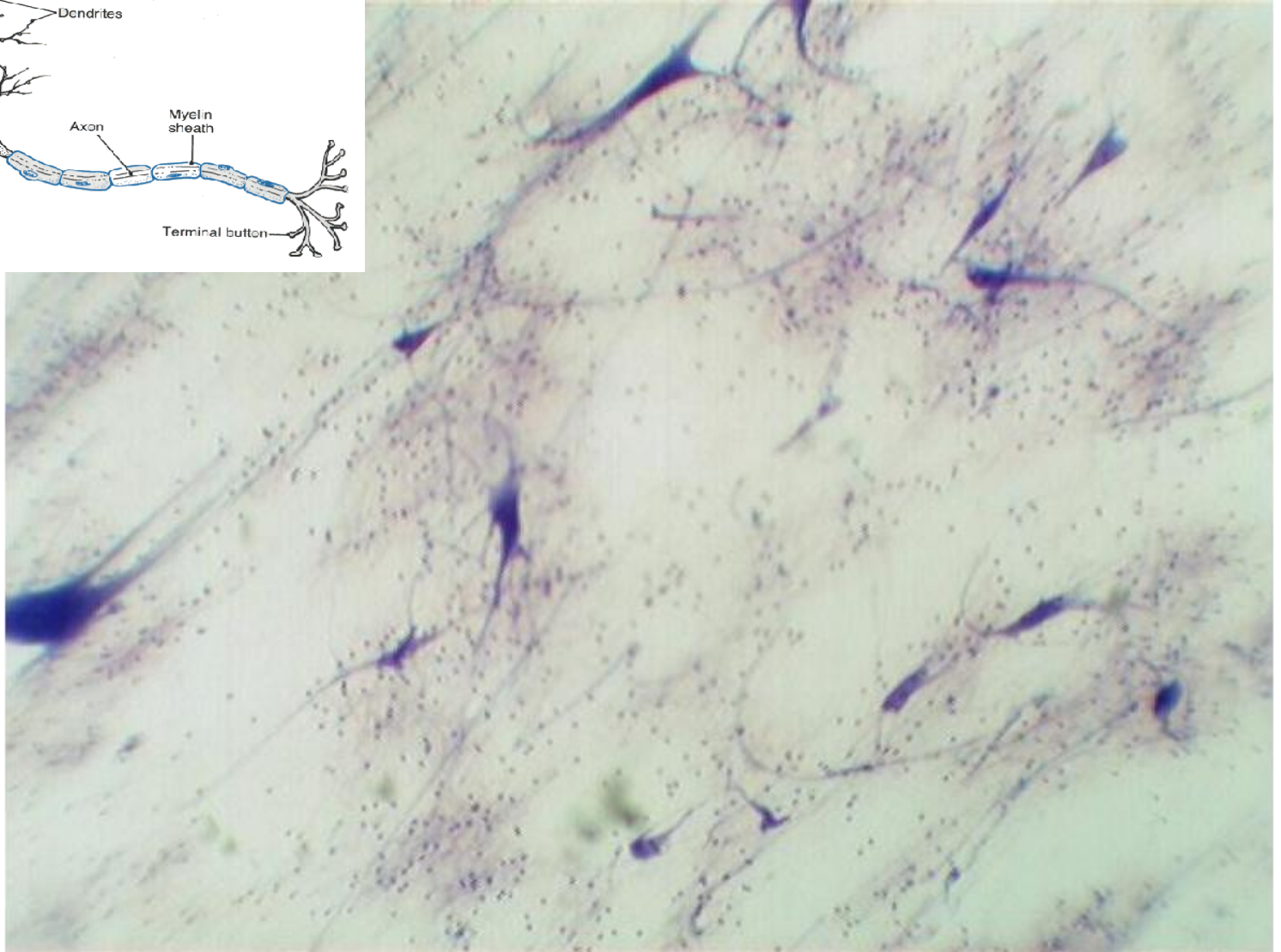
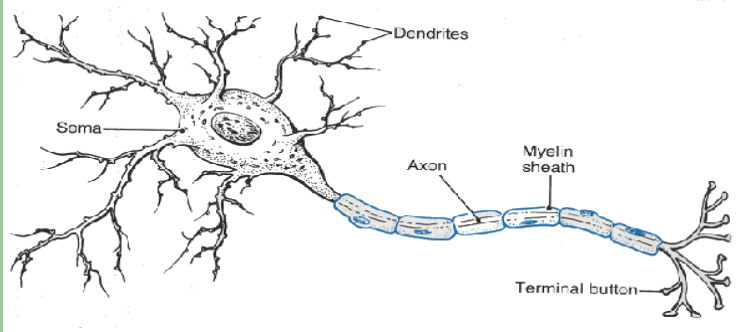
Neuroglia= glia; neuron's "little maids"

-smaller than neurons, 5 to 50 times more numerous, hold nervous tissue together, can't conduct impulses, multiply to fill in spaces formerly occupied by neurons.

Where do you find it?- brain, spinal cord, the nerves and associated ganglia.



Nervous tissue (spinal cord)



D. **Connective Tissue** (all of the left over tissue)

General Characteristics:

- Most abundant tissue in your body, found throughout
- Binds structures together
- Provides support, protection, framework, fills space, stores fat, produces blood cells, fights infection, and helps repair tissue.
- Most has a good blood supply (except cartilage and tendons)
- Cells can reproduce

Connective Tissue is composed of:

- -2 main components: cells and extracellular matrix (which is composed of protein fibers and ground substance- *fluid, semi-solid*)
 - Cells (Fibroblasts, Macrophages, Mast Cells)
 - Extracellular Matrix (Collagen Fibers, Elastic Fibers, Reticular Fibers, Ground Substance)

Three Connective Fiber Types

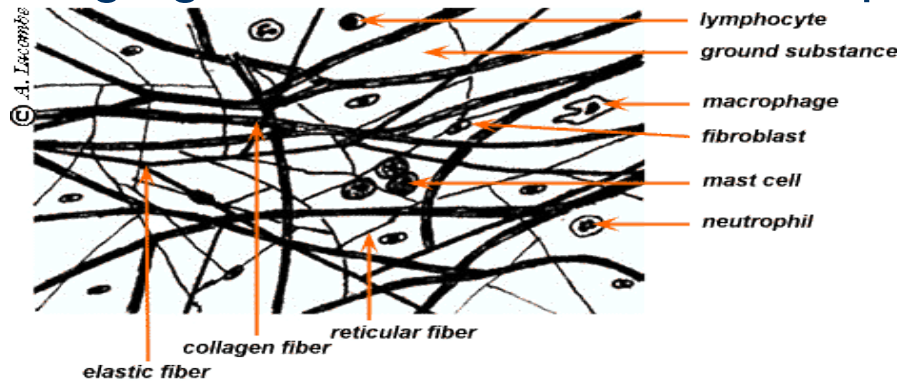
- Collagenous fibers-most abundant type; thick; holds structures together (AKA white fibers)
- Elastic fibers-composed of elastin; pliable and elastic; (AKA- yellow fibers)
- Reticular fibers-highly branched; short, thin and delicate; supportive networks within tissues

Connective Tissue Categories

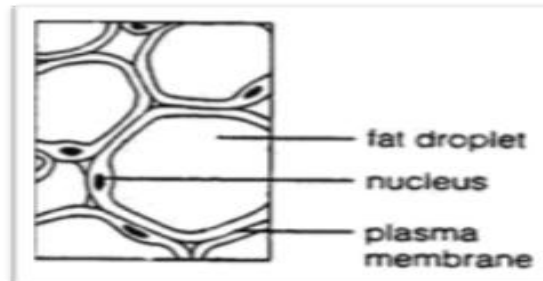
- 1. Connective Tissue Proper:
 - A. Loose (Areolar, adipose, reticular)
 - B. Dense (Regular, irregular, elastic)
- 2. Specialized Connective Tissue:
 - C. Cartilage (Hyaline, elastic, fibro)
 - D. Bone (compact and spongy)
 - E. Blood

1. Connective Tissue Proper- A. Loose (3 types)

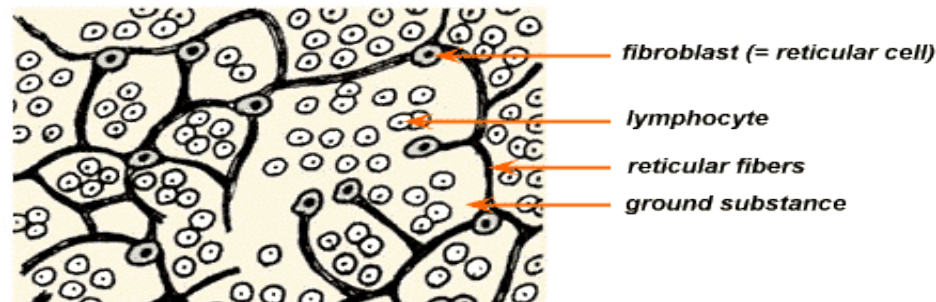
- Aerolar- fibers loosely woven; underlies layers of epithelial tissue; serves as packaging material and nourishes epithelial cells



- Adipose- aerolar tissue that is invaded by fat cells

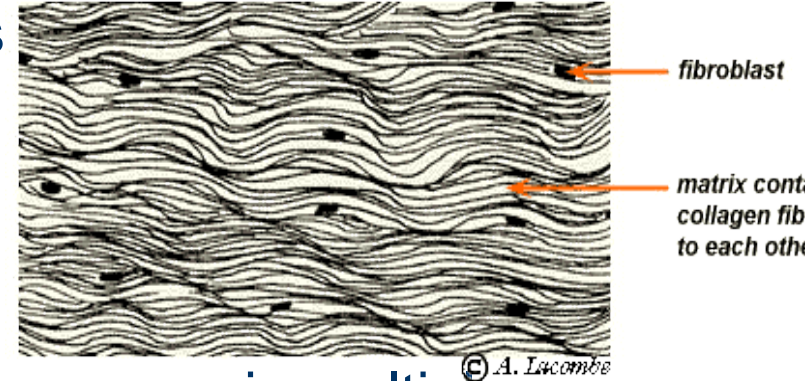


- Reticular- loosely woven fibers; forms framework that supports internal organs such as liver and spleen.

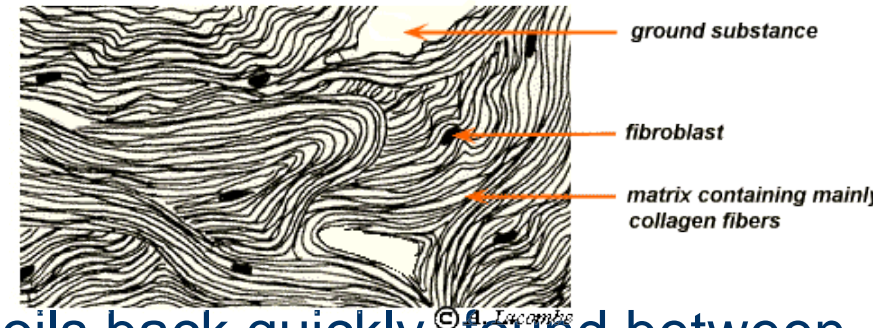


1: Connective Tissue Proper- B.Dense(3 types)

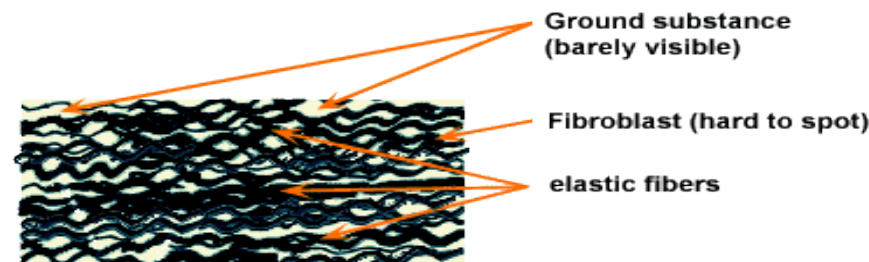
- Regular- mostly made of collagen fibers; slightly wavy; found in places where tension is exerted in a single direction--tendons, where muscles attach to bones, and ligaments (poor blood supply)



- Irregular- made of things same as regular, move in multiple directions- skin, digestive tract, heart valves



- Elastic- stretched easily and then recoils back quickly- found between bones and spinal column, penis, walls of arteries, and lung tissue

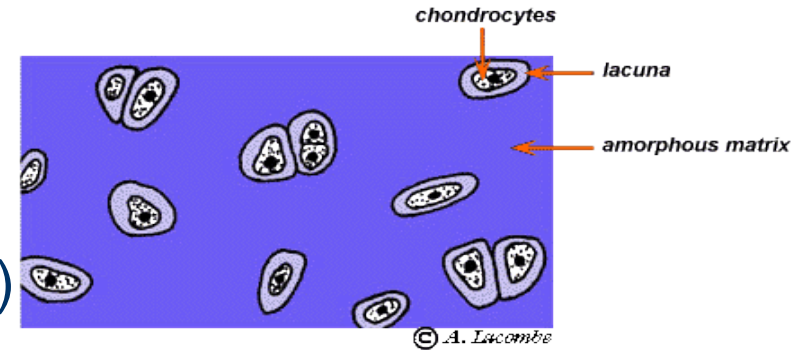


2. Specialized Connective Tissue: C. Cartilage (3 types)

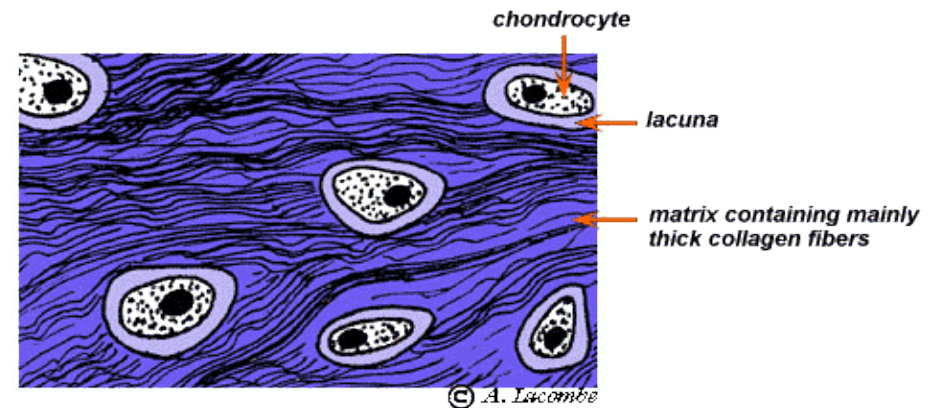
- Cartilage- tough but flexible, no blood vessels or nerves, protects underlying tissue, forms structure for developing bones.

3 types:

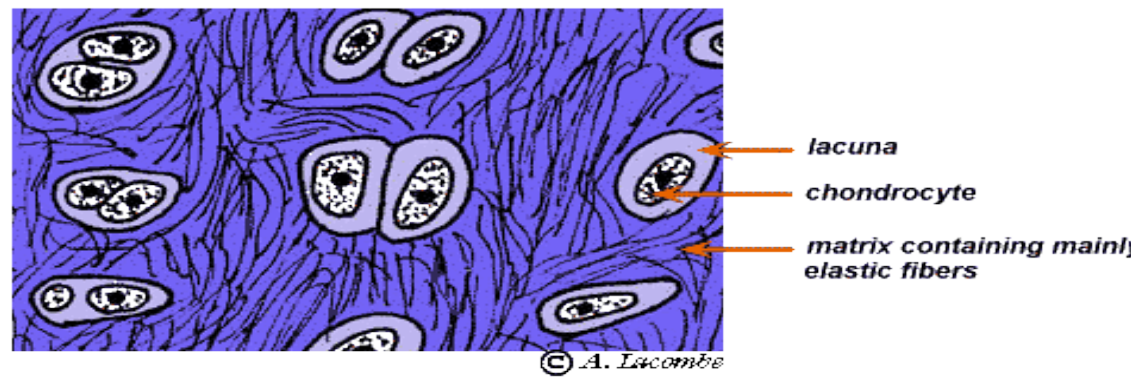
- Hyaline cartilage-
(ends of bones, joints, soft part of nose)



- Fibrocartilage-
(between vertebrae, knees,
and pelvic girdle)



- Elastic cartilage-
(external ears and parts
of larynx)

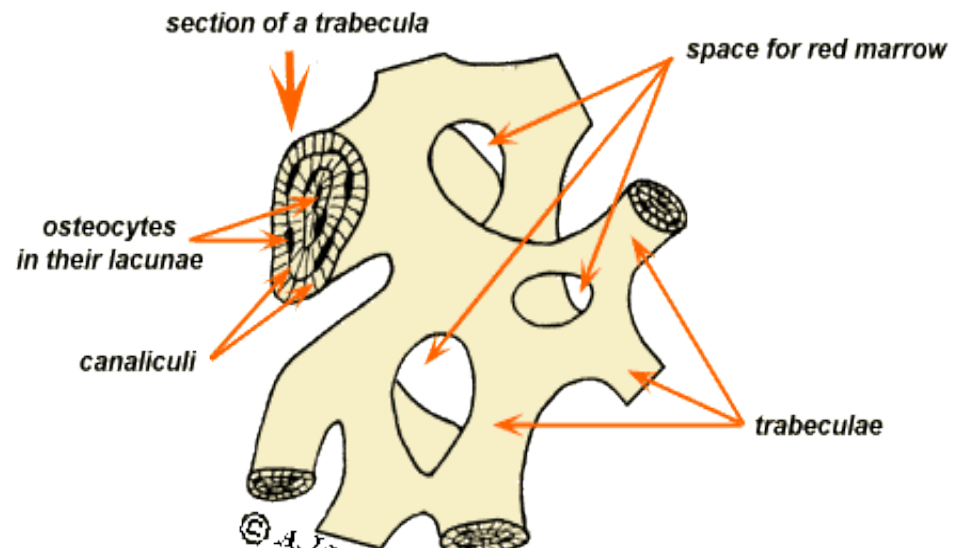
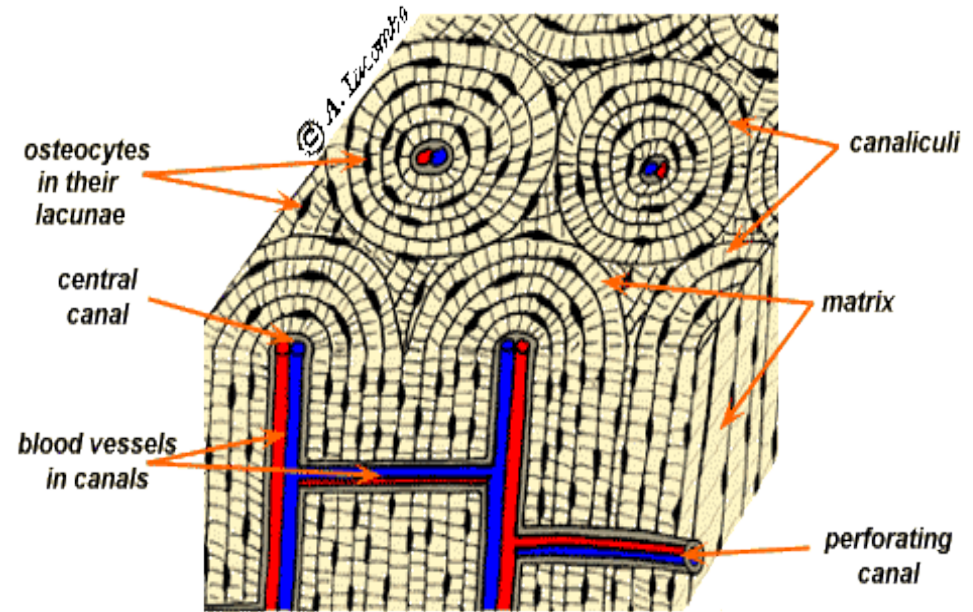


2. Specialized Connective Tissue: D. Bone (2 types)

- Bone (osseous tissue)- one of the hardest tissues in body; resists compression; forms blood cells; contains red and yellow bone marrow

2 types:

- Compact Bone- form external layer of all bones and bulk of long bones (helps resist stress of weight)
- Spongy Bone- form short, flat, and irregularly shaped bones and most of heads of long bones



2. Specialized Connective Tissue: E. Blood

- Contains, Red Blood Cells, White Blood Cells, and Platelets suspended in plasma

Has 3 functions:

- Transportation- to delivers oxygen, nutrients, carbon dioxide, nitrogen waste, hormones
- Regulation- body temp and pH in body tissues
- Protection- prevent blood loss by forming blood clots; antibodies, and WBCs fight infection

