



Tissues



Mrs. Wilson

Anatomy & Physiology

I. Histology

A. Study of normal tissues

1. Before pathology

B. Tissues

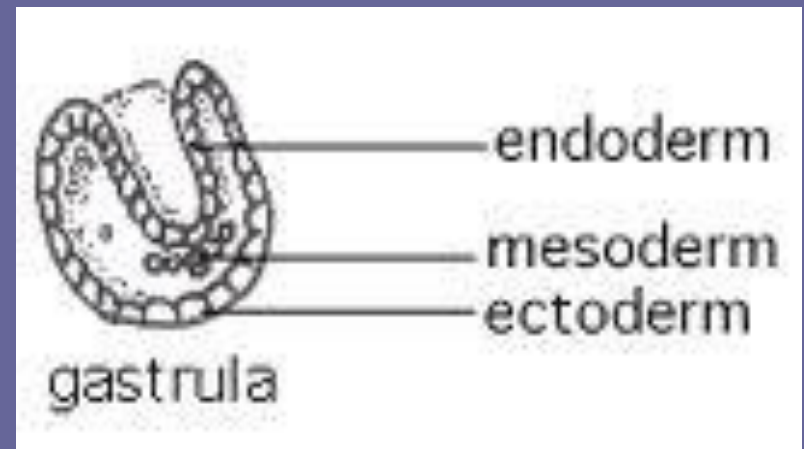
1. group of cells working together to do a job



C. Embryonic development

1. 3 primary germ layers

- epithelial- from all 3 (endoderm, ectoderm, mesoderm)
- connective and muscle- from mesoderm
- nerve- from ectoderm



II. Matrix

A. Nonliving intercellular framework secreted by the cell to separate and bind them together

1. liquid-

2. solid-

3. semisolid-



EPITHELIAL TISSUES

I. Features

A. tightly packed / little matrix

B. location

1. cover surfaces

2. lining of cavities/ lumens

3. glandular



C. one surface exposed

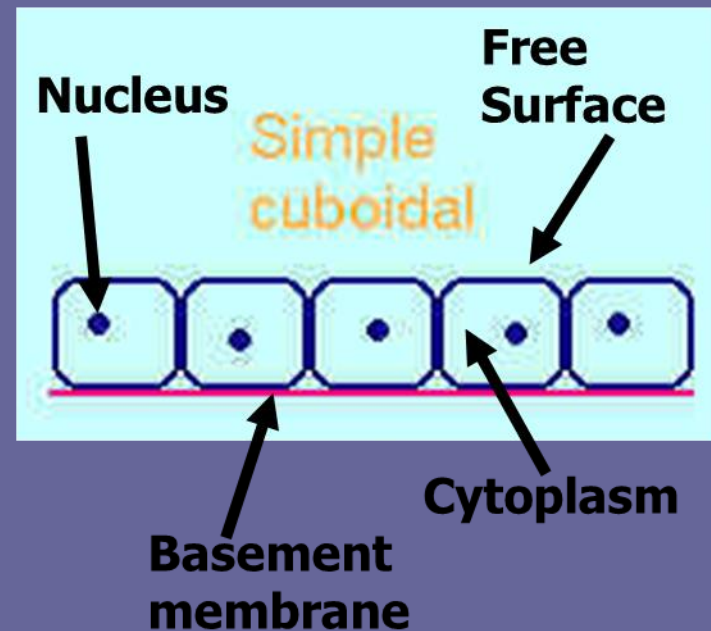
D. attached by basement membrane

1. glycoproteins and fibers

E. avascular (no blood)

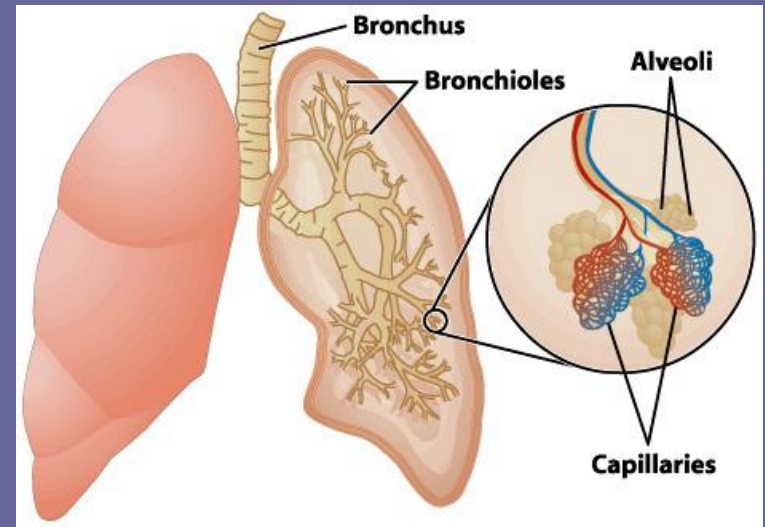
F. Rapid mitosis

1. skin/ stomach



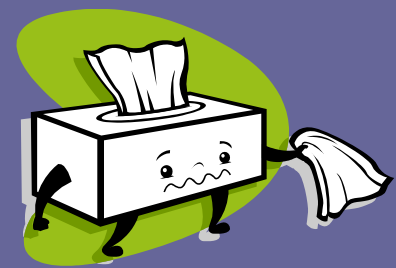
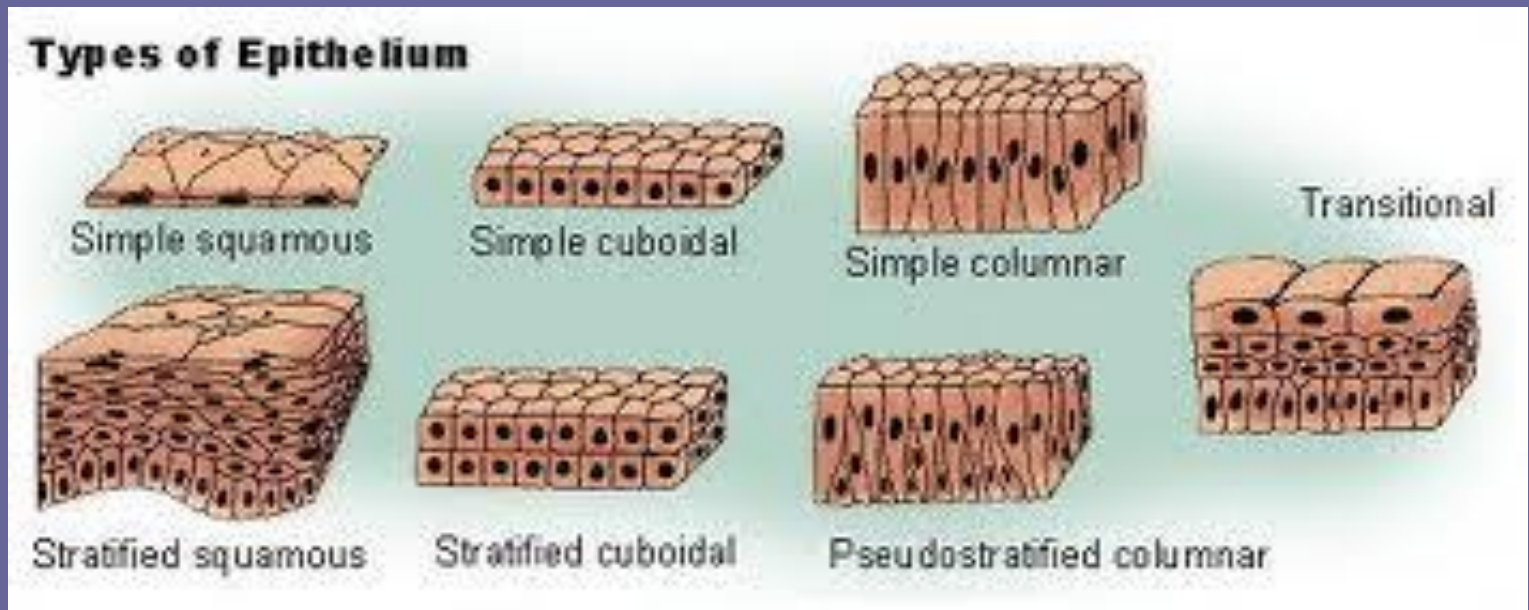
II. Functions

- A. protection (skin)
 - 1. pathogens
 - 2. injury
 - 3. toxins
 - 4. desiccation
- B. absorption and secretion
 - 1. digestive cavity /glands
- C. filtration
 - 1. kidneys
- D. diffusion/osmosis
 - 1. lung air sacs
- E. chemoreceptors (neuroepithelium)
 - 1. taste buds/nasal



III. Simple epithelial tissue

A. 1 layer:



1. Simple squamous

a. features

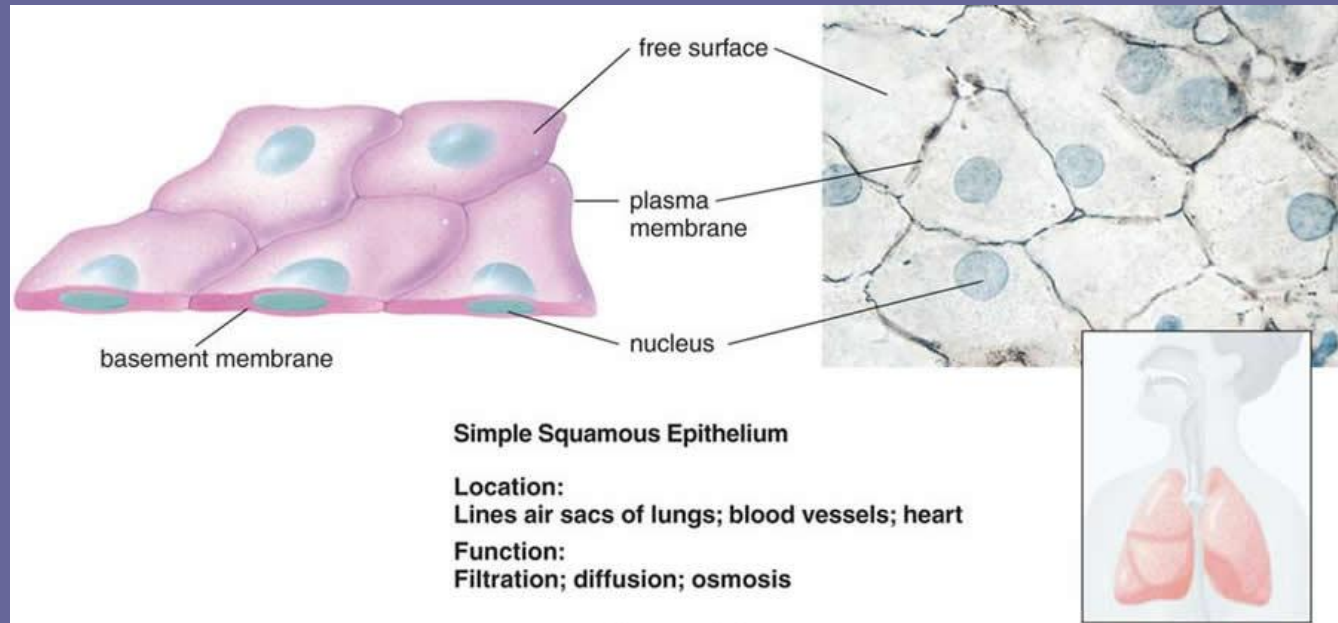
- thin flat
- damaged easily

b. Jobs

- filtration, diffusion, osmosis

c. locations

- air sacs (alveoli)
- walls of capillaries
- kidneys
- lumens of vessels



2. Simple cuboidal

a. features:

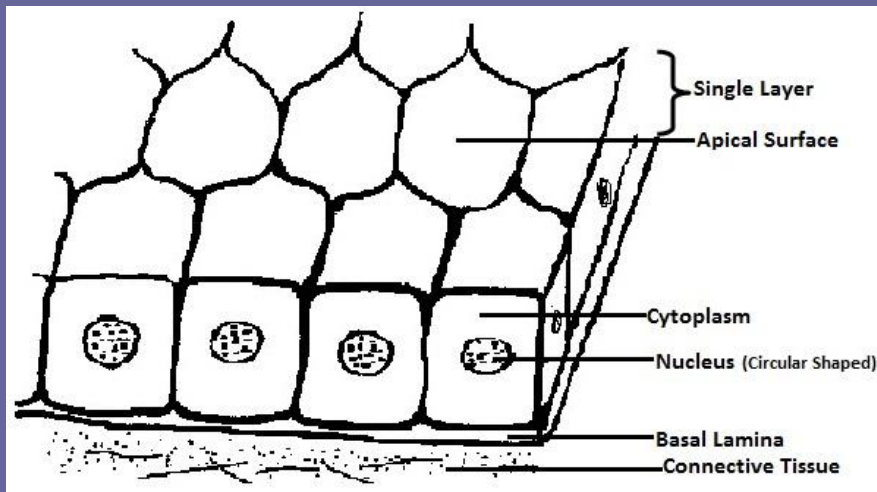
- cube shaped

b. Jobs

- secretion
- absorption

c. location

- Kidney tubules
- Ducts of glands
- Ovary surface



3. Simple columnar

a. features

- tall
- Nuclei level

b. goblet cells

- Secrete mucus

c. maybe microvilli

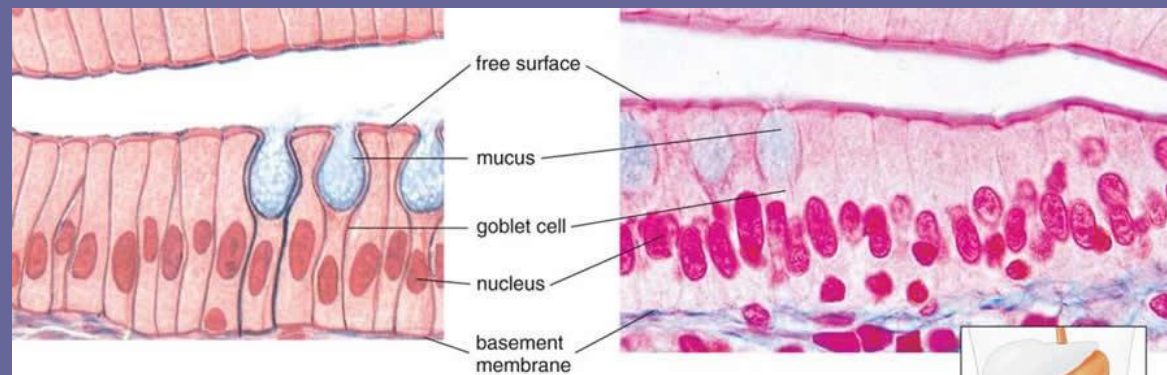
increase surface absorption

d. Jobs

- secretion
- absorption
- protection

e. Location

- stomach/ intestine/uterus
- *stomach = replaced 1-3 days



Simple Columnar Epithelium

Location:
Lines gastrointestinal tract; the ducts
of many glands

Function:
Protection; secretion; absorption



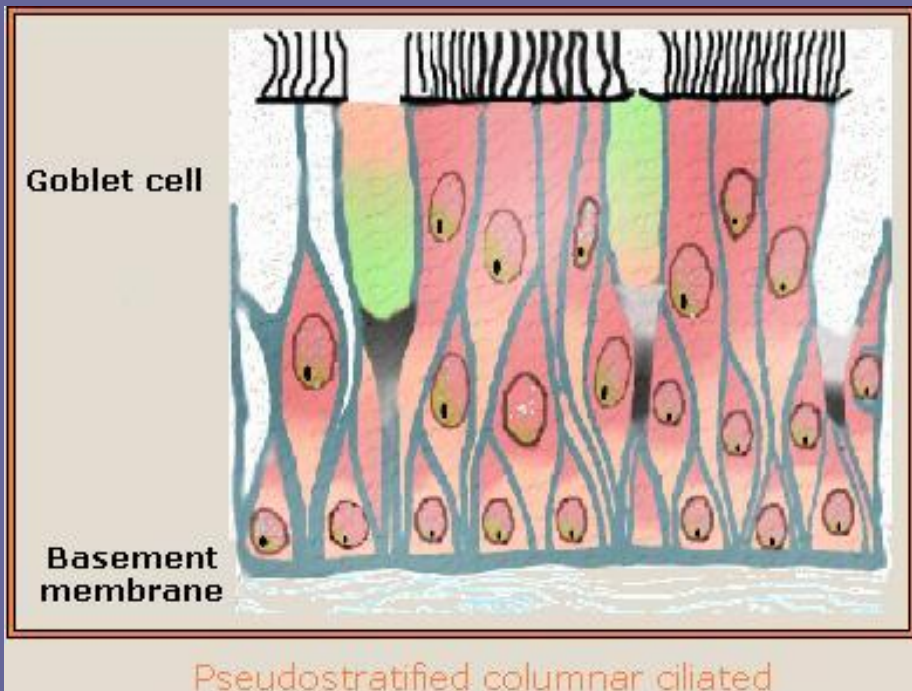
4. Pseudostratified ciliated columnar

a. features

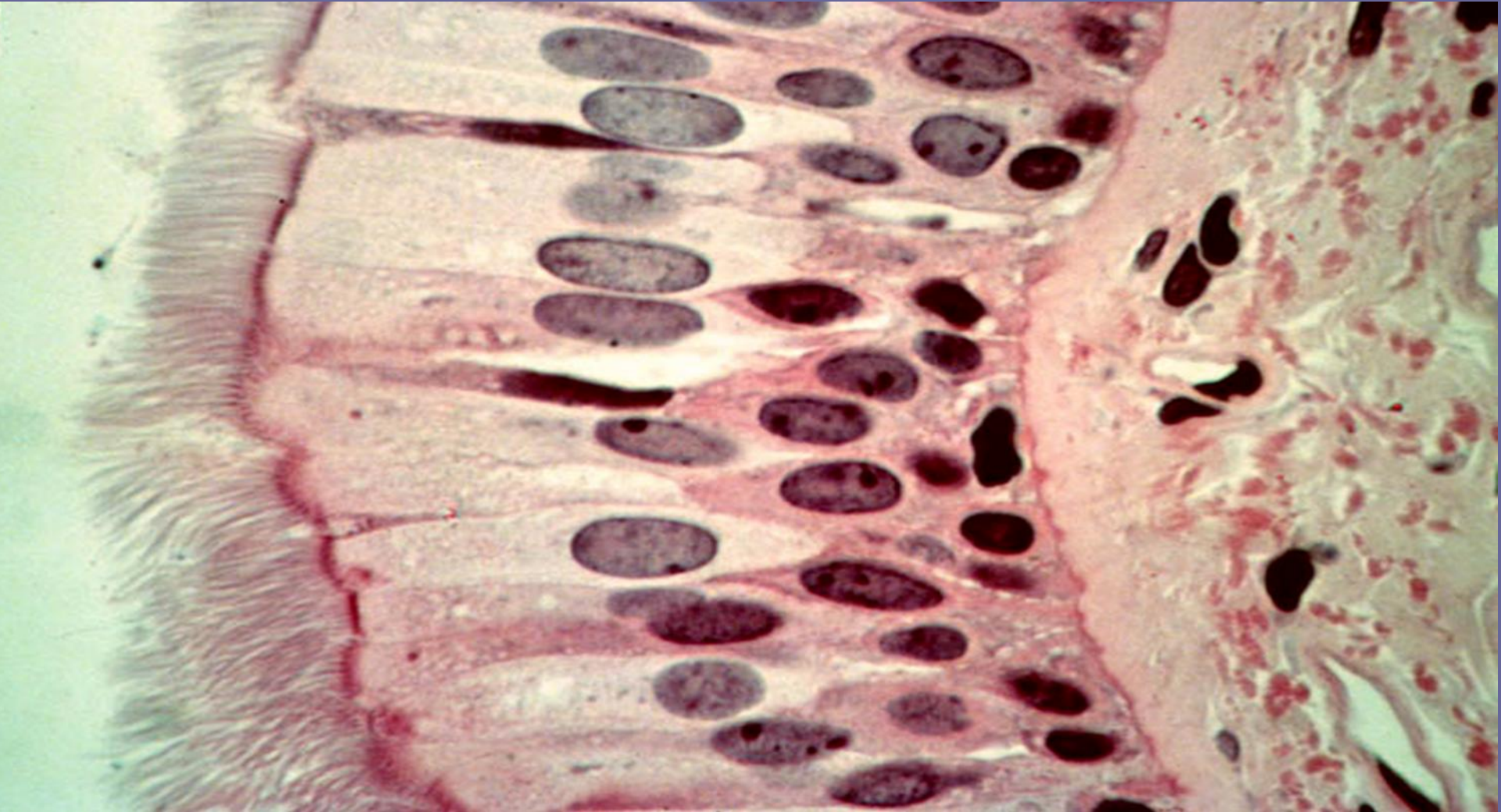
- Nuclei= different levels
- Cilia
- goblet cells

b. Jobs/locations

- trachea / bronchi (respiratory epithelials)
- trap particles in mucus
- uterine tubes; movement of sex cells



Pseudostratified

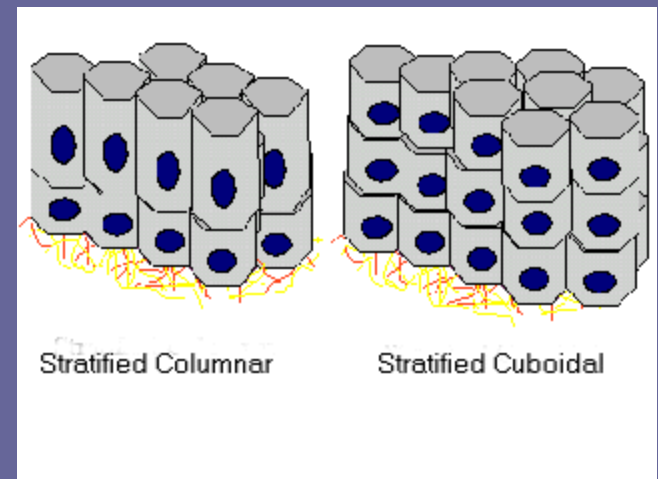
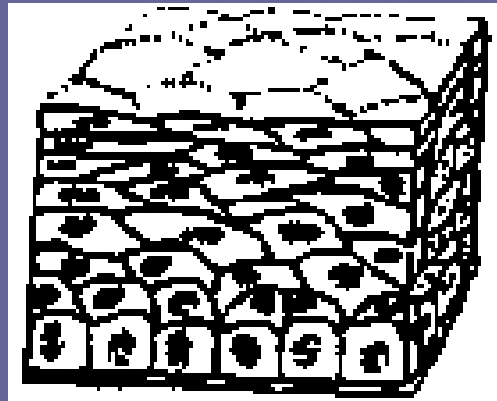


IV. Stratified epithelium

A. facts:

- layers
- Protective
- named by outer layer

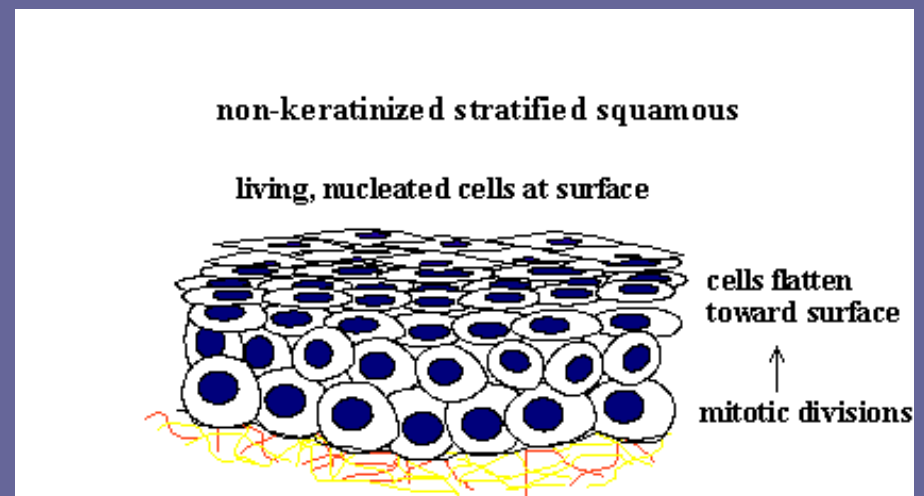
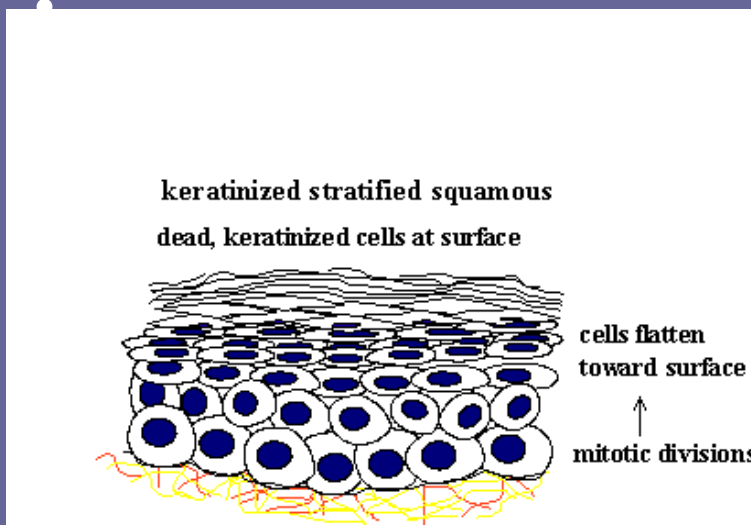
B. types



1. Stratified squamous

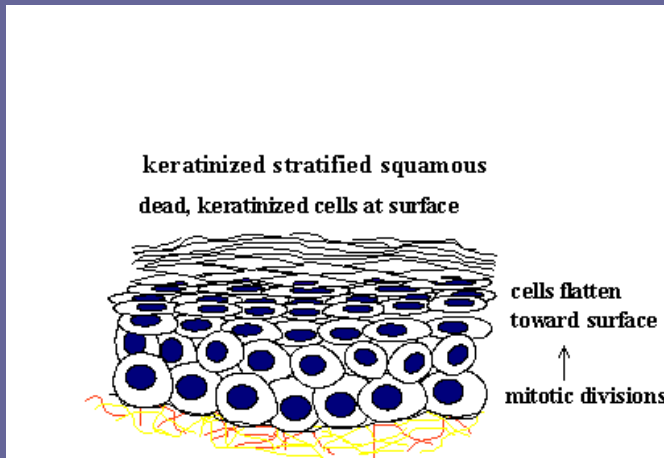
- a. flat at surface
- b. mitosis = deepest layer
stratum germinativum or
basal layer
- c. mitotic rate = rate upper
layer is removed

- d. **Keratinized (protein) or
nonkeratinized**



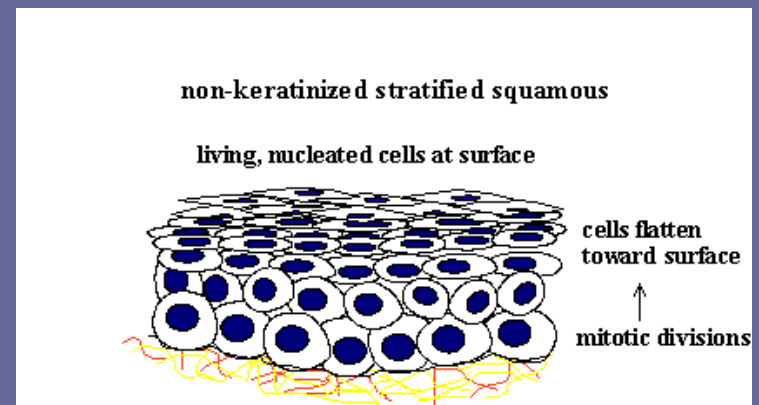
1a. Keratinized Stratified Squamous Epithelium

- a. upper layer of skin
- b. durable
- c. Top= Dead



1b. Nonkeratinized Stratified Squamous Epithelium

- a. oral cavity , pharynx, nasal cavity, vagina, and anal opening
- b. moderate abrasion
- c. Cells alive



It takes about 27 days for the outer layer of skin to shed and be replaced; that works out to 1.5 pounds of skin cells per year.

FYI

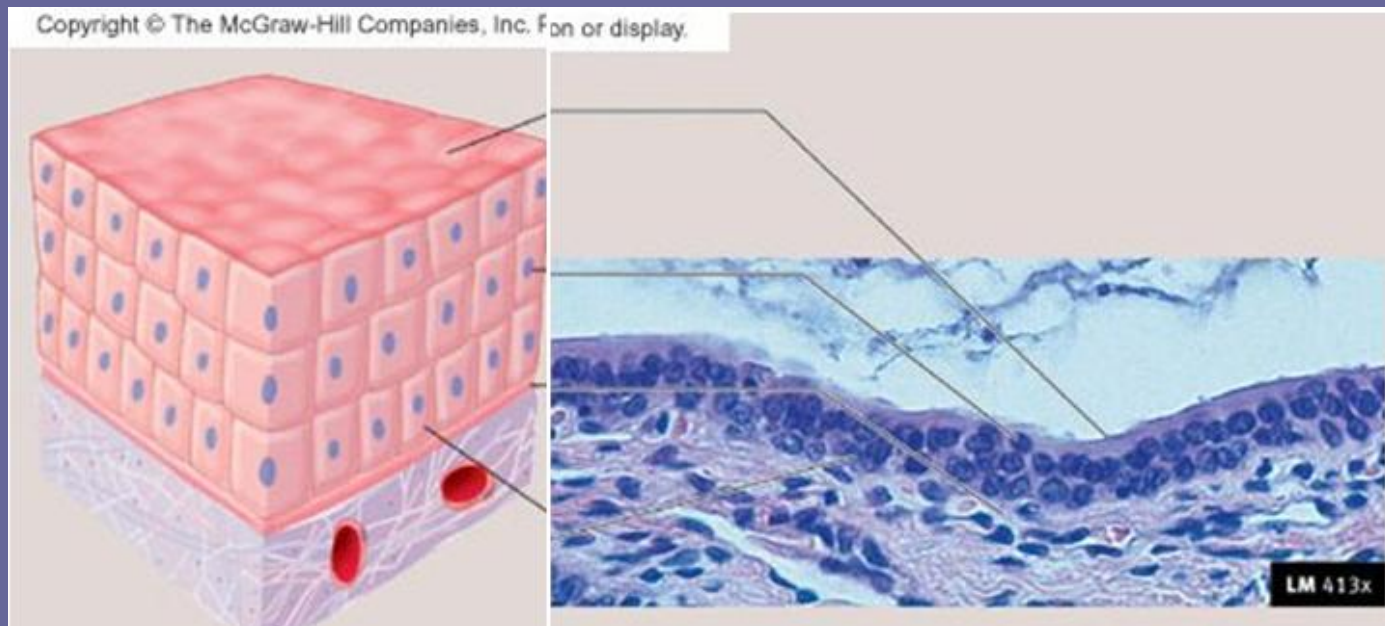


- ***skin's defense against pathogens
 1. keratinization-
 2. stratification and rapid mitosis
 3. pH (4-6.8) slows growth
 4. oral cavity (5.8-7.1) anal region(6) vagina(4 or lower)

2. Stratified cuboidal

a. 2-3 layers

b. large ducts: sweat glands, salivary glands and pancreas



3. Transitional epithelium *uroepithelium

a. changes shape-

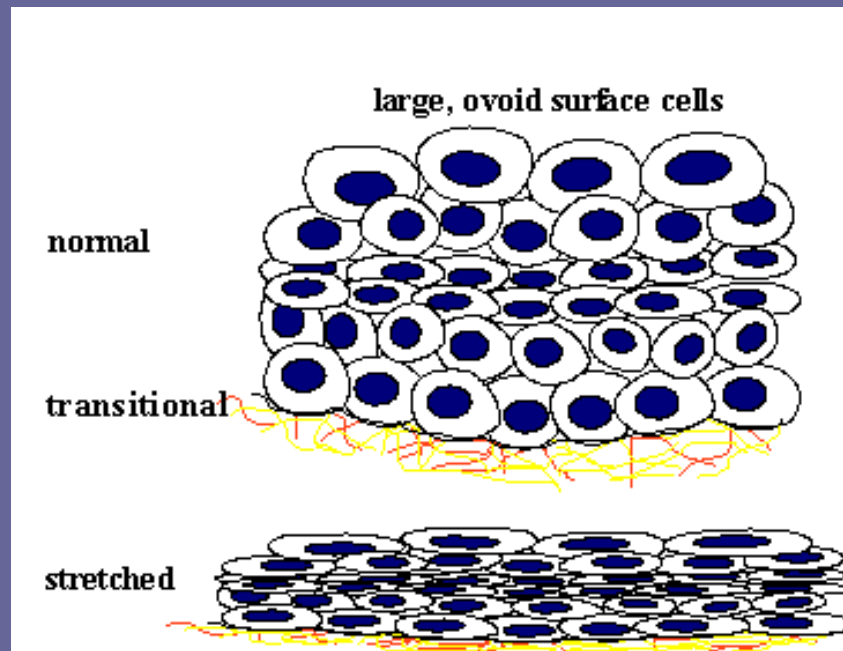
b. upper layer

rounded

c. urinary system

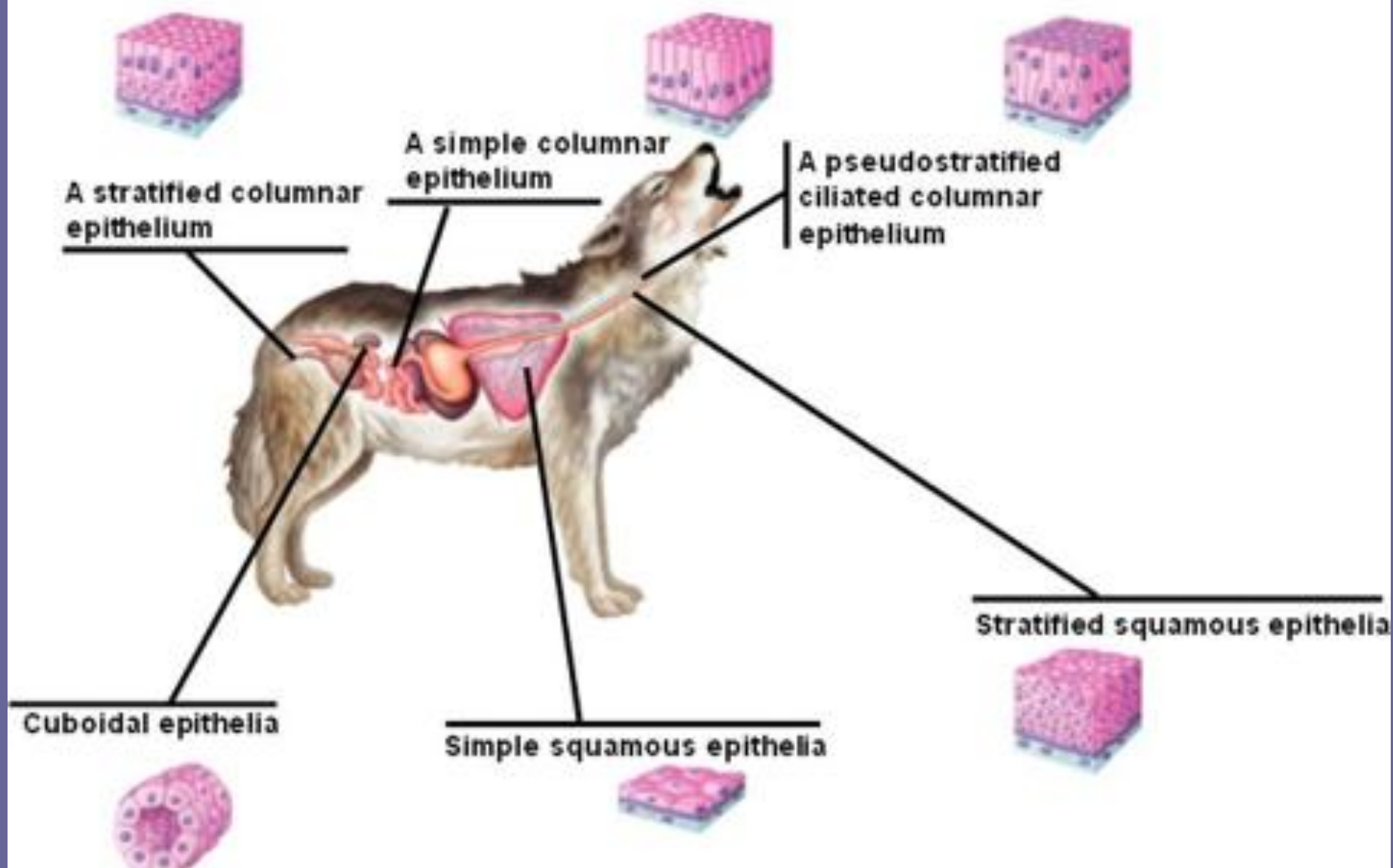
d. Distension

(stretching) of bladder



EPITHELIAL TISSUE

Columnar epithelia, which have cells with relatively large cytoplasmic volumes, are often located where secretion or active absorption of substances is an important function.



V. Glandular epithelium



A. Facts:

- Exocrine (ducts)- sebaceous , sweat , mammary , salivary and pancreatic glands
- Endocrine -directly secrete

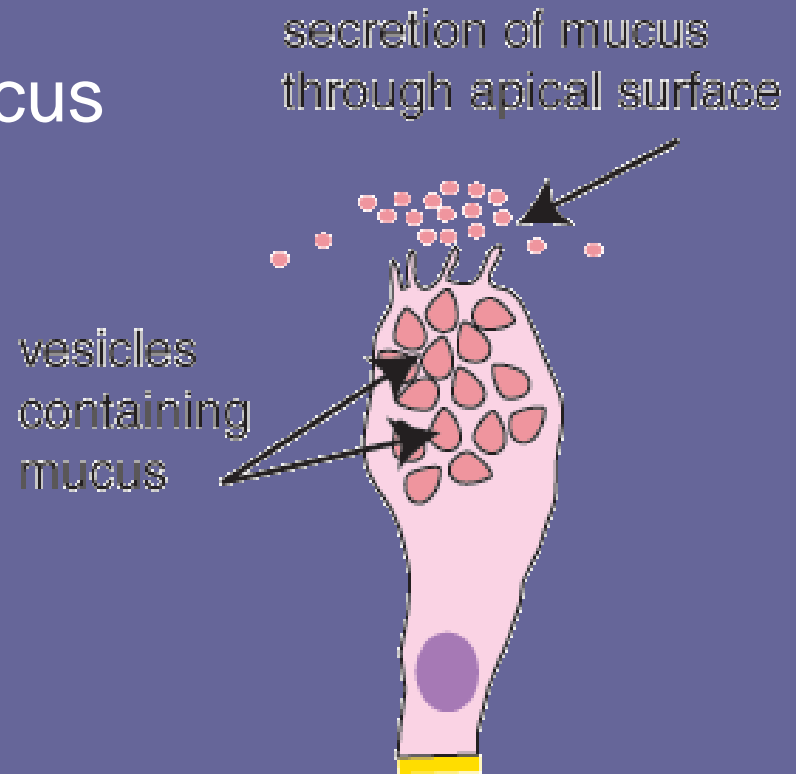
B. Classification

1. structure:

a. unicellular-

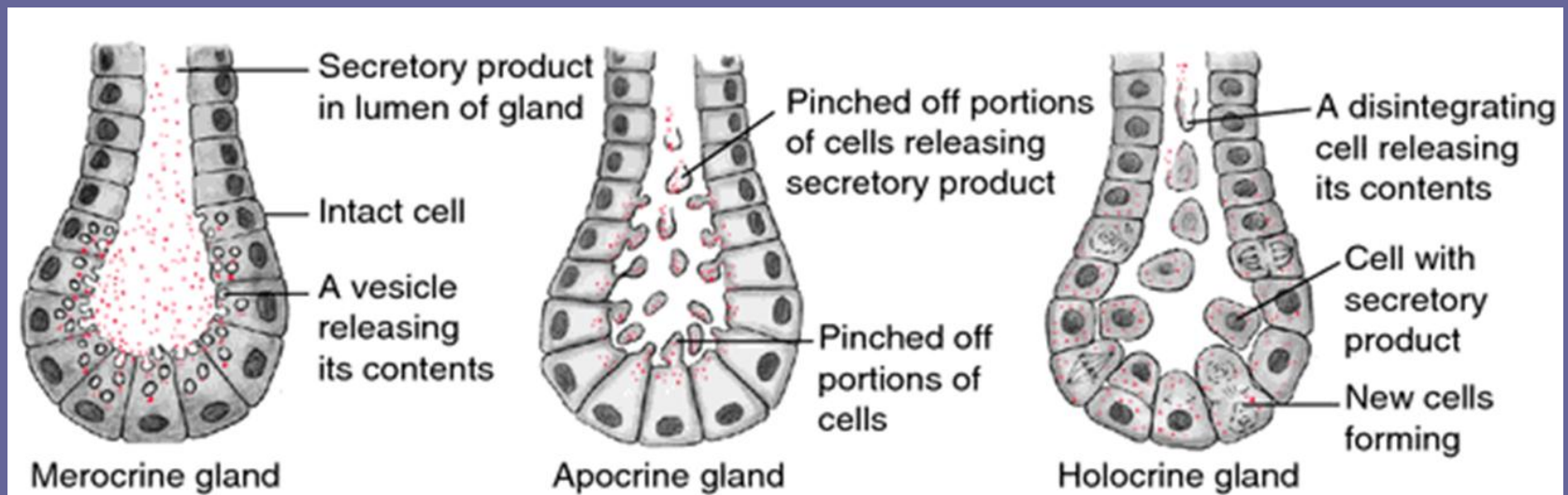
- goblet cells for mucus

b. multicellular = glands



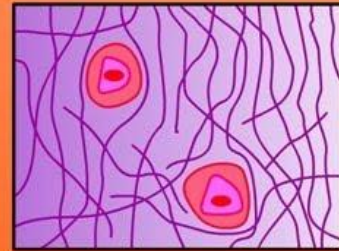
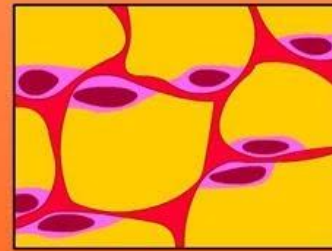
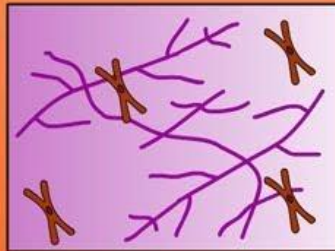
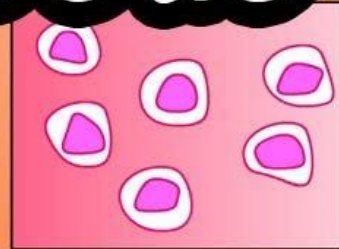
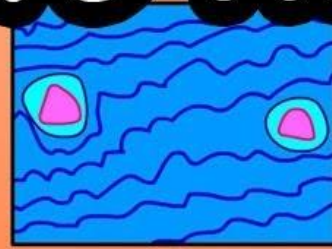
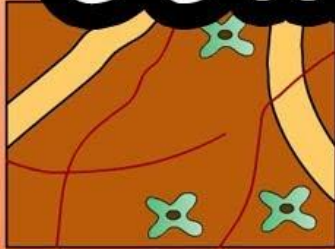
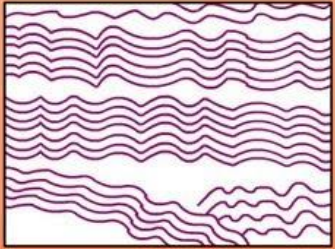
2. secretion

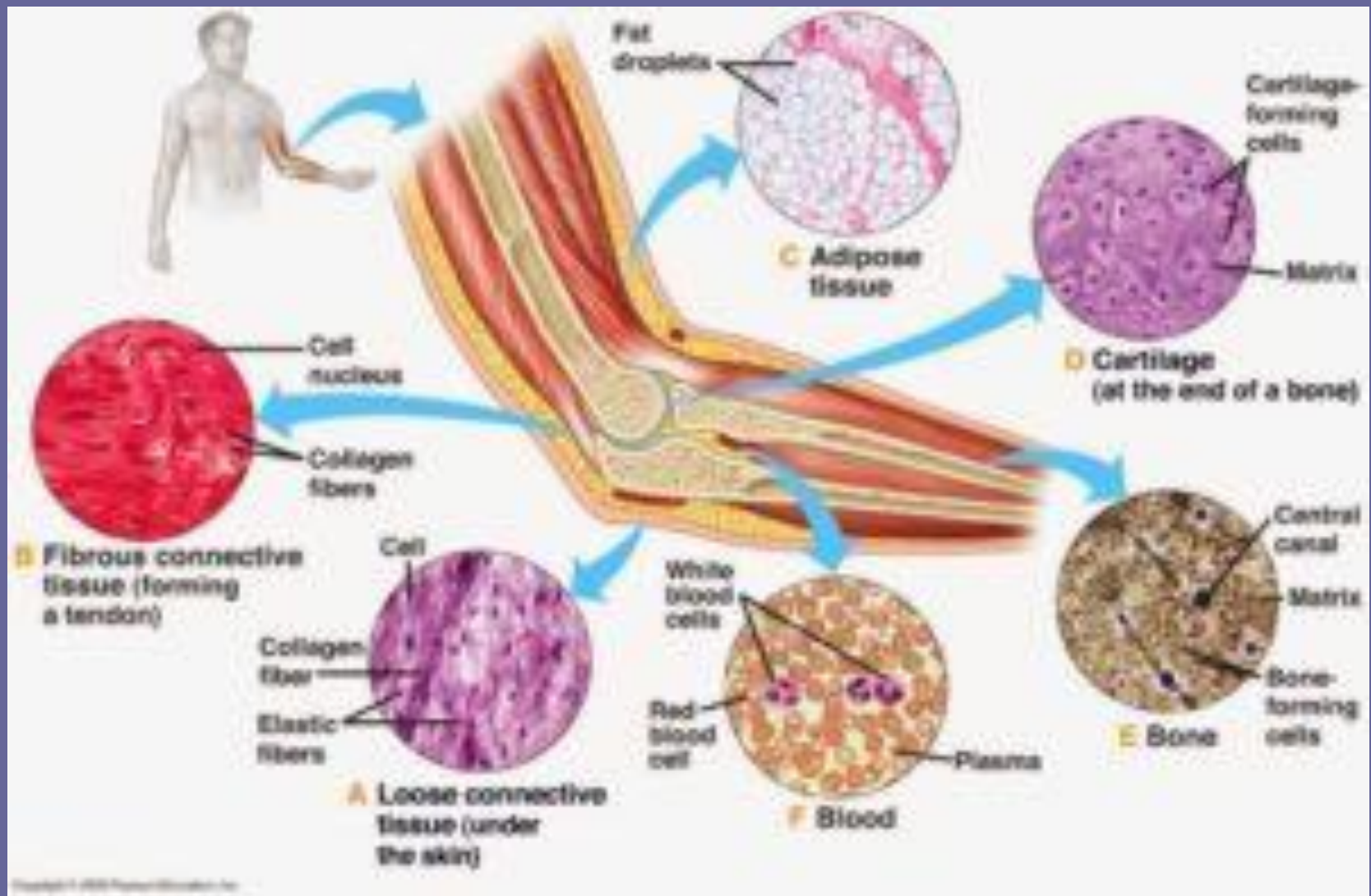
- a. Merocrine gland- watery -- salivary, pancreatic, certain sweat glands
- b. Apocrine gland- piece of cell (exocytosis) ---- mammary, some sweat
- c. Holocrine gland- entire cell = sebaceous (oil) gland



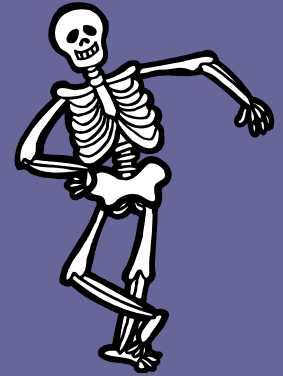
Types Of

Connective Tissue



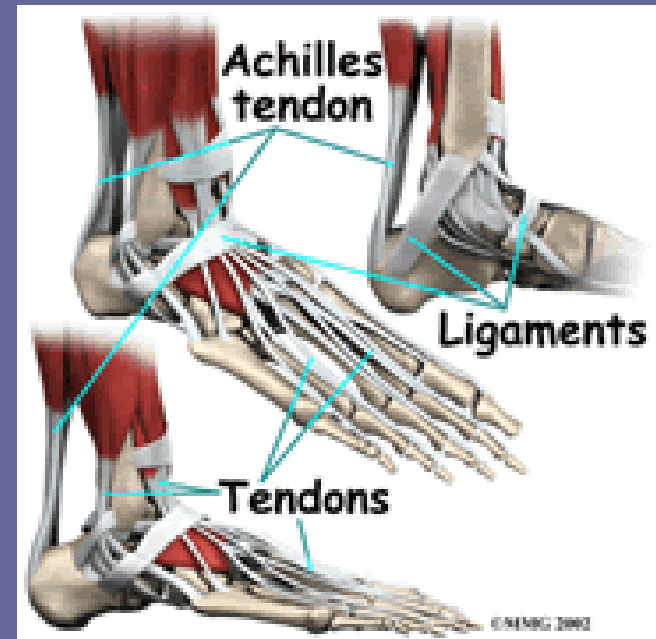


I. Connective tissues



A. features

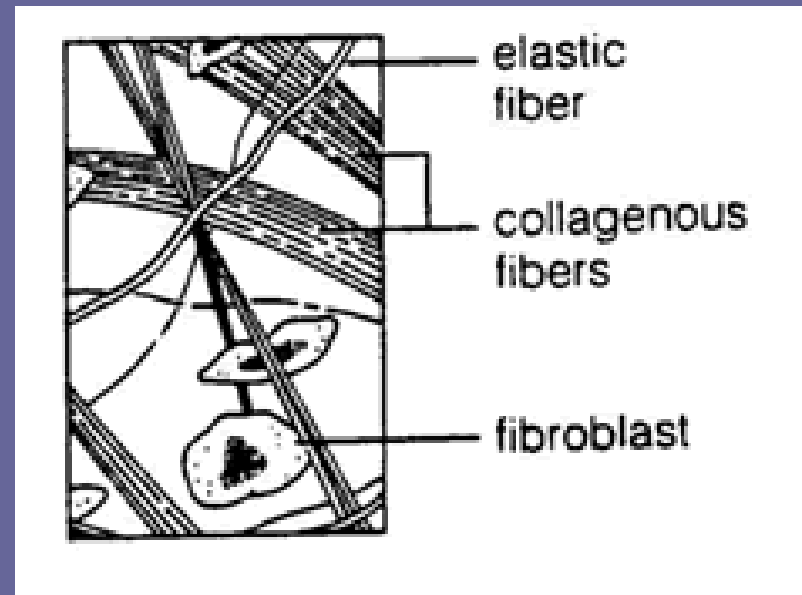
1. more matrix
2. everywhere
3. most vasculated
4. can repair
5. not on free surfaces



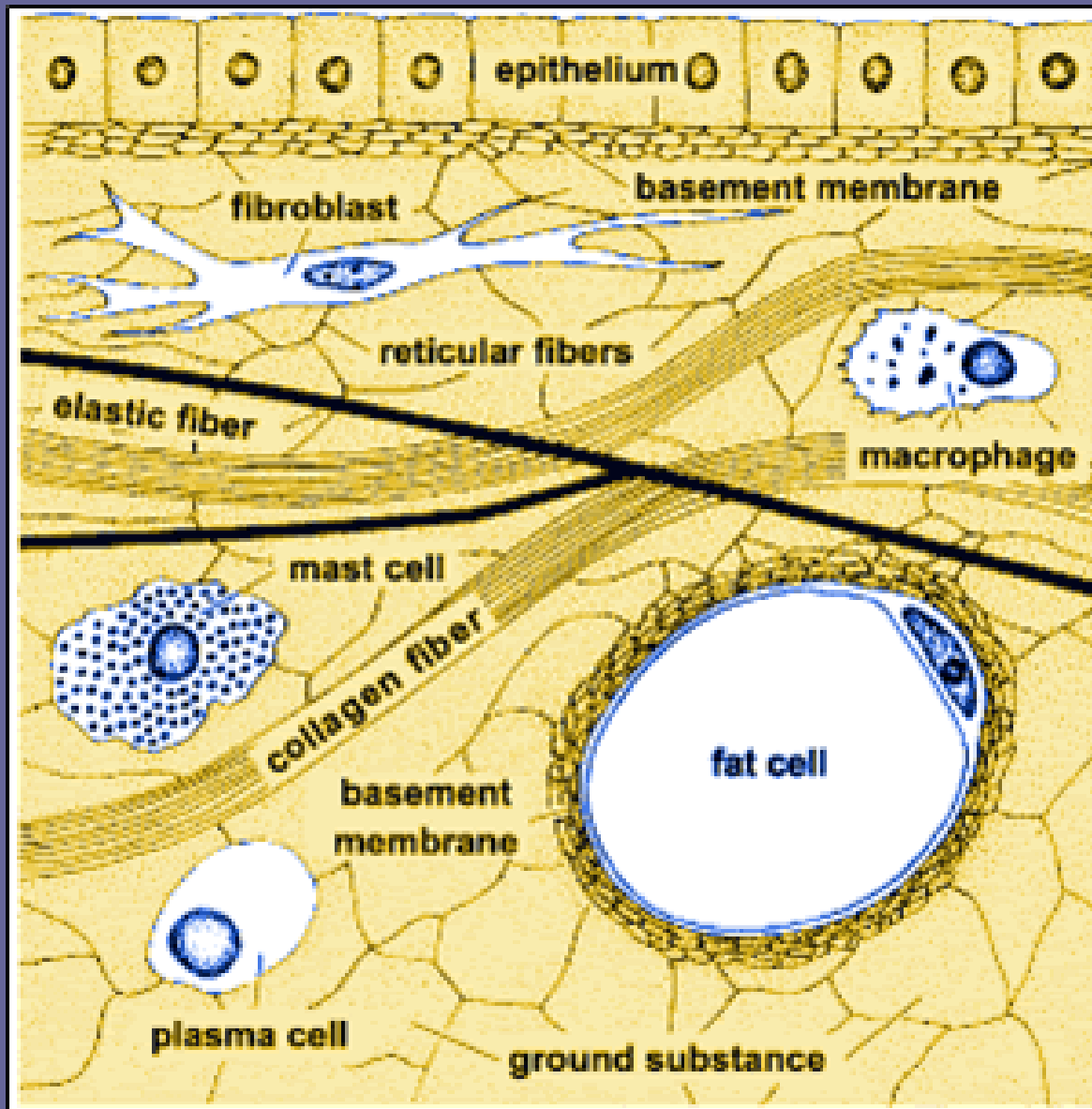
II. Connective tissue proper

A. features

1. matrix = ground substance
2. main cell = fibroblast
 - *produce 3 fibers
 - a. collagenous- white
 - protein collagen
 - flexible strength
 - b. elastic- yellow
 - protein elastin
 - gives elasticity/tone
 - c. reticular fibers
 - thin (collagen)



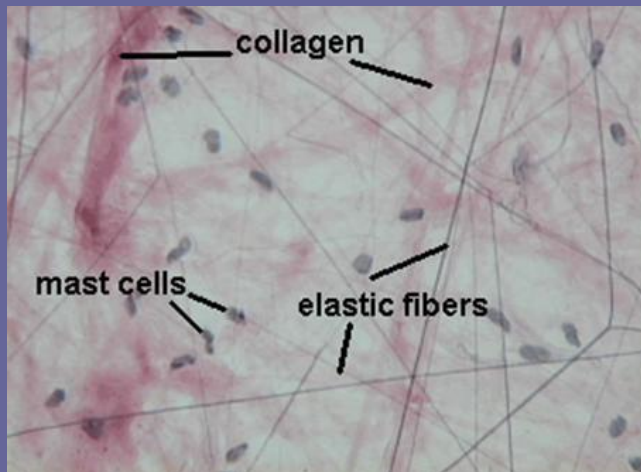
B. 5 types of CTP



1. Loose CT or areolar

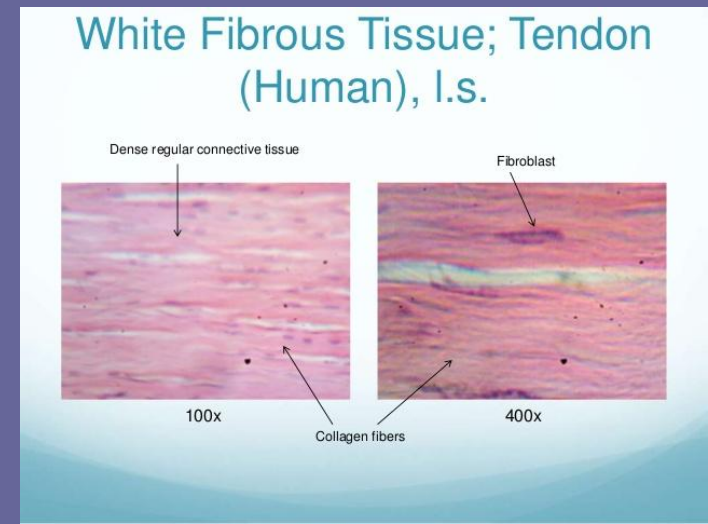
- a. everywhere -binding and packing
- b. skin to muscle
- c. surrounds muscle = fascia

- d. surrounds blood vessels w/
mast cells
 - produce heparin
(anticoagulant)
 - prevents blood from clotting
in vessels
 - also *histamine production
(allergies)
- e. contains tissue fluid
 - swelling = edema
- f. collagenous / elastic fibers



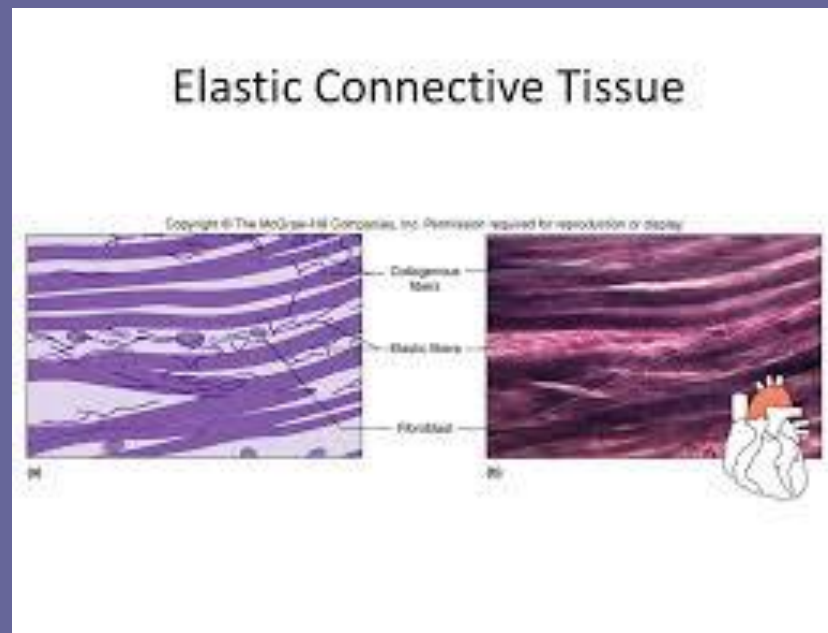
2. dense (white) fibrous CT

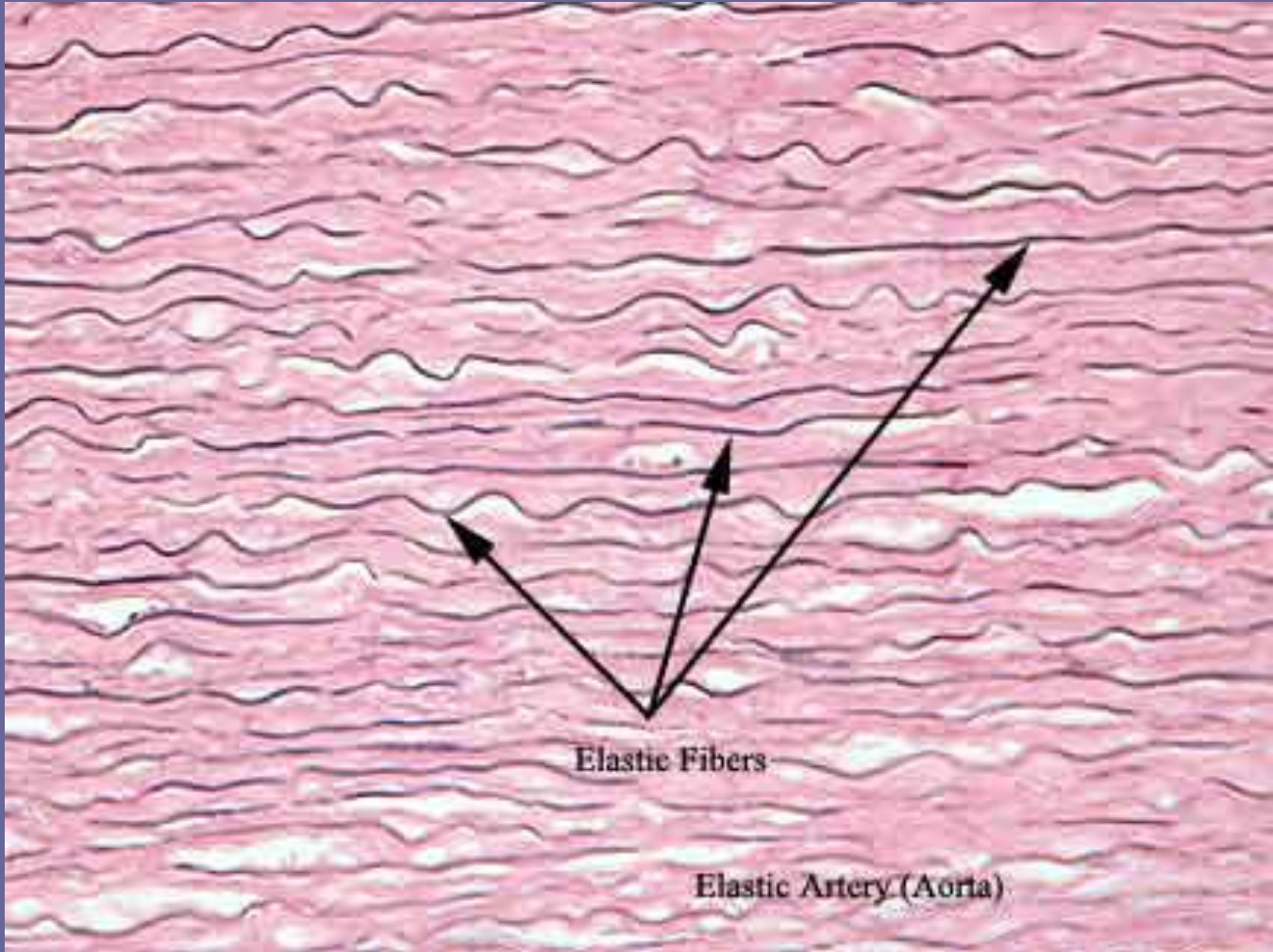
- a. collagen
- b. silvery white
- c. **poorly vasculated**- slow healing
- d. strong flexible :
 - tendons -muscles to bones
 - ligaments - bone to bone
 - sclera of eye
 - perichondrium- (cartilage)
 - periosteum (bone)



3. elastic connective tissue

- a. elastic fibers (yellow)
- b. large arteries
- c. larynx
- d. trachea and bronchial tubes



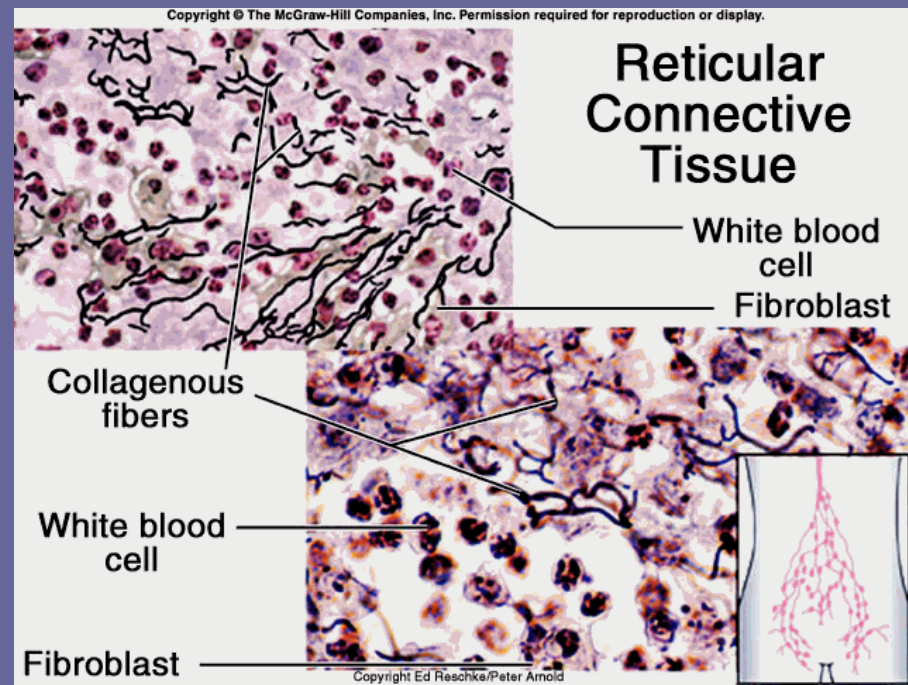


Elastic Fibers

Elastic Artery (Aorta)

4. reticular CT

- a. jelly like matrix
 - b. some phagocytic
 - c. liver, spleen, lymph nodes and bone marrow
- marrow



5. adipose tissue

a. specialized loose connective

b. adipocytes (fat cells)

c. store fat - swell

d. main areas:

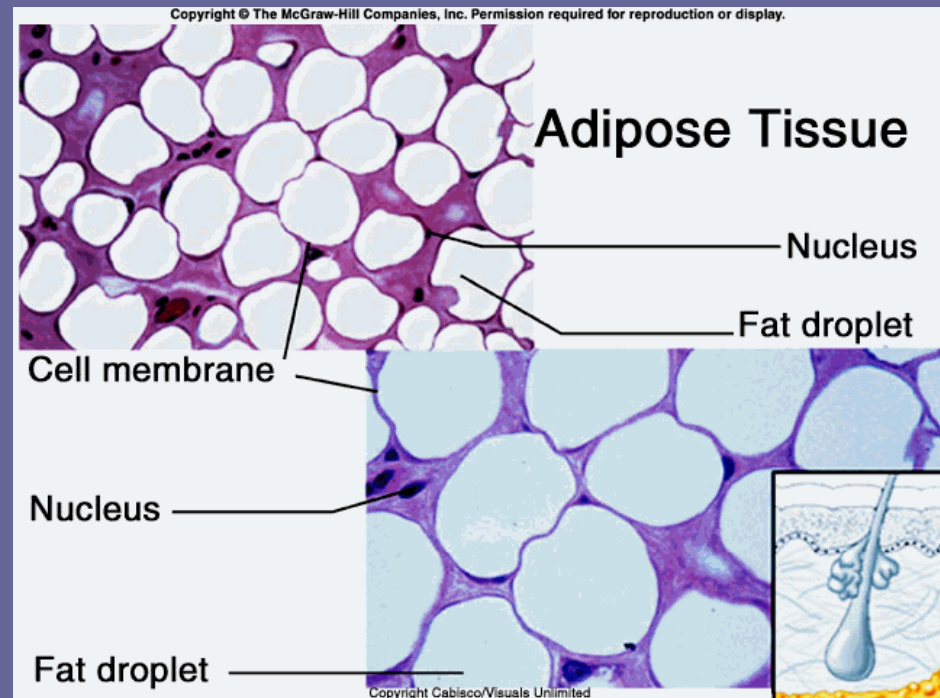
- kidneys
- hypodermis
- surface of heart
- joints
- breasts -females
- back of eyeball

e. function:

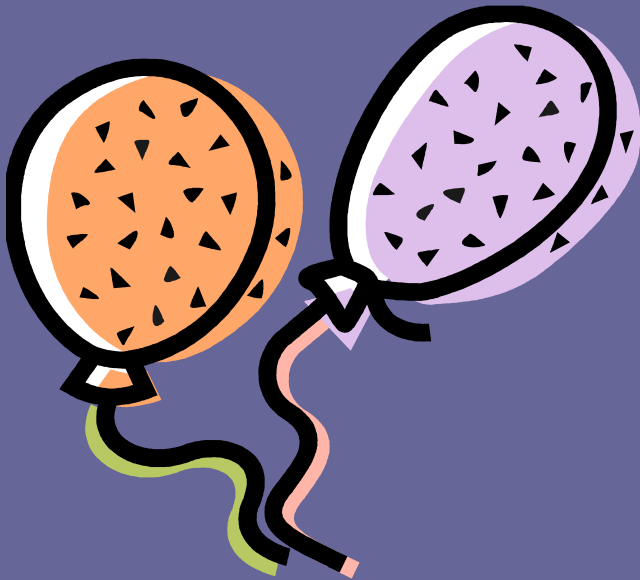
- food reserve
- protects
- insulator

f. dieting reduces fat not tissue

* liposuction- removes tissue



- *****analogy***** - balloon- 1st time blow it up very difficult then easier once stretched - easier to gain weight after dieting since cells already stretched*****



C. cartilage

1. facts-

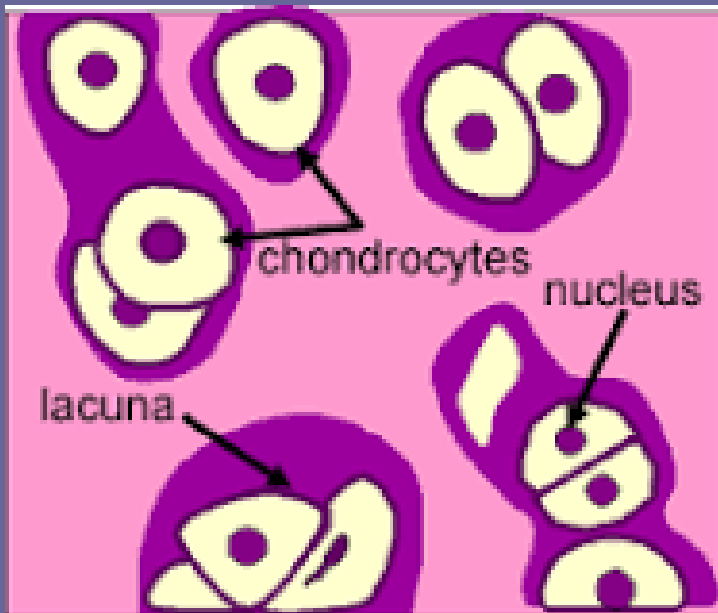
- a. elastic properties
- b. gristle (meat)
- c. cell = chondrocyte
 - occupy lacuna

d. surrounded by perichondrium

e. avascular-

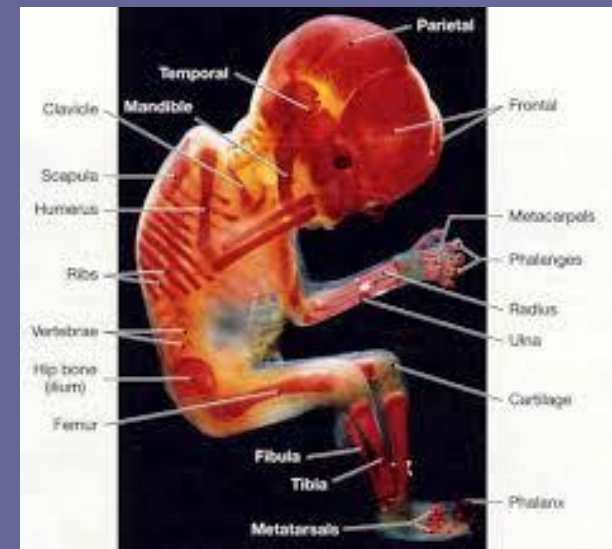
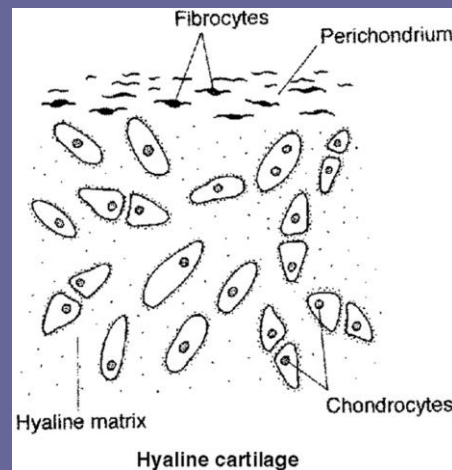
- difficult to heal

f. 3 types



2. Hyaline cartilage

- a. collagen -
- b. most common
 - ends of bones
 - trachea/bronchi
 - nose
 - ribs to sternum (costal cartilage)
- c. fetal skeleton-



3. fibrocartilage

a. collagen

b. Tension / compression

c. located-

- symphysis pubis

- intervertebral discs

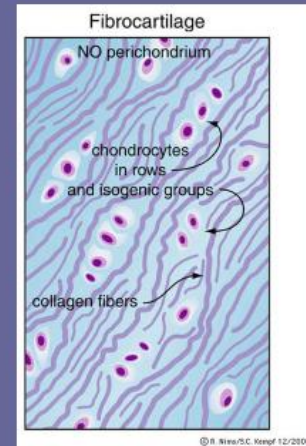
- knee joints

- FYI*compress during day (shorter at night)

- *age= irreversible compression

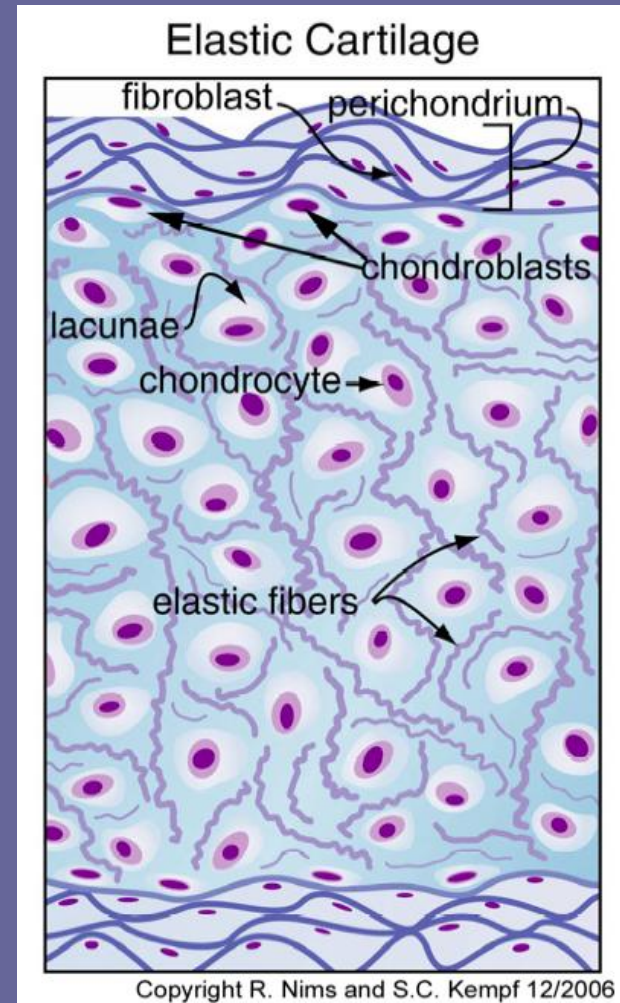
- *astronauts gain in height

-



4. elastic cartilage

- a. elastin-
- b. flexible
- c. ear, larynx



D. osseous tissue- bone

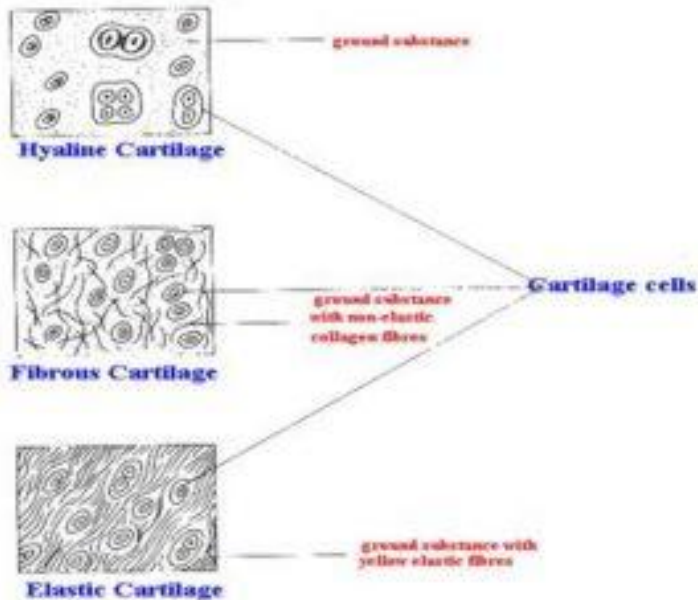
1. features

- a. rigid CaCO_3 & CaPO_4
- b. cell = osteocyte in lacuna

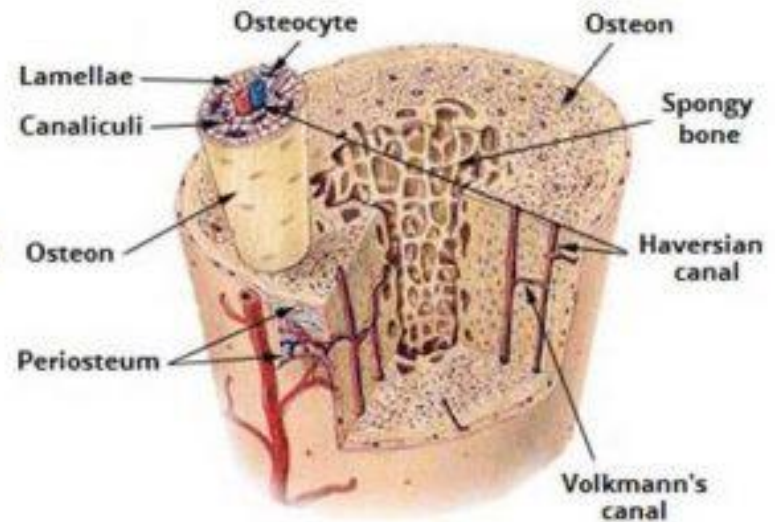


Supportive connective tissue

Cartilage



Bone

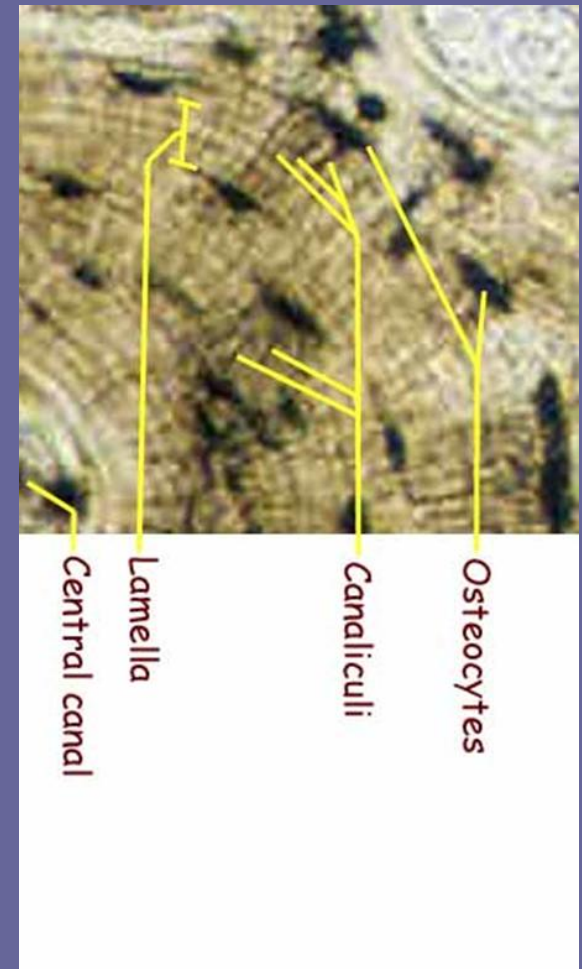


FYI

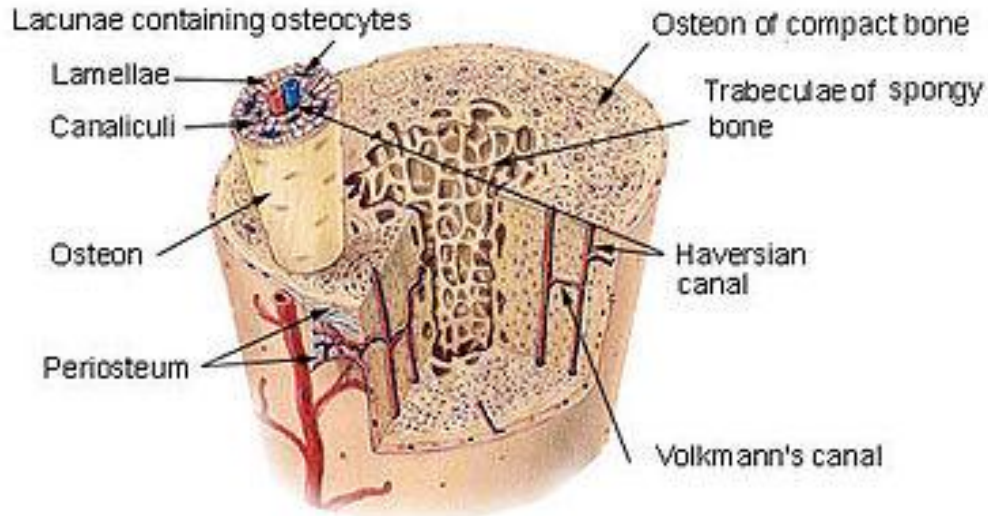
- *** take bone and place in vinegar for several days to remove salts- represents calcium deficiency (rickets) bones become pliable and bend under body weight*****
O.J. Simpson had this as a youth

2. Haversian system (osteon)

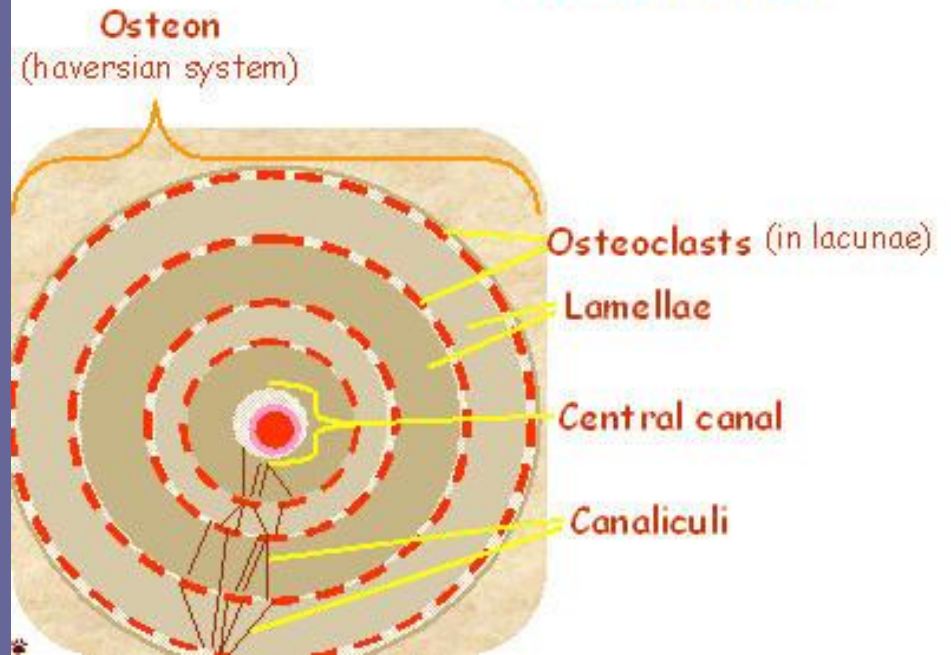
- a. osteocytes / lacuna form rings around haversian canal
 - vascular and nerve supply
- b. canaliculi: from each lacuna
 - nutrients to osteocytes
- c. inorganic material = lamellae
- d. connected by volkmanns canals



Compact Bone & Spongy (Cancellous Bone)



Osteon review



E. vascular tissue –blood

1. features

- a. viscous
- b. liquid matrix

2. erythrocytes (RBC)

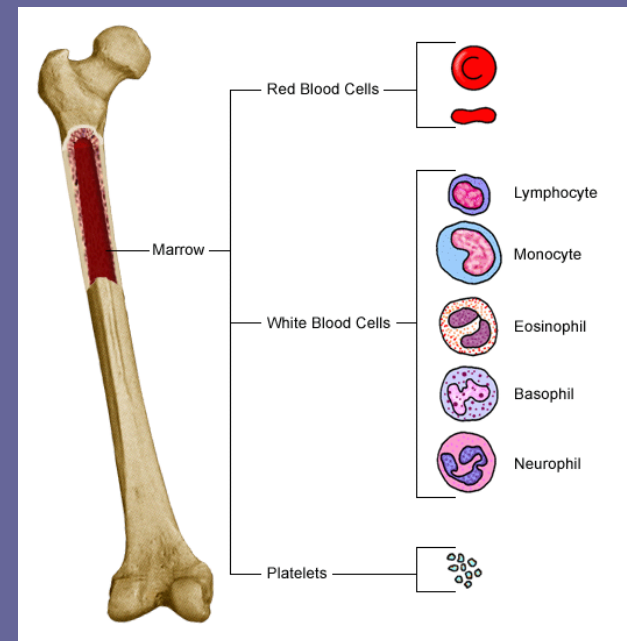
- a. nonnucleated
- b. O_2 / CO_2
- c. hemoglobin (Fe)
- d. infant= spleen/ marrow
- e. adult= marrow
- f. 120 days

3. leukocytes- WBC

- a. defense
- b. marrow / lymph tissue
- c. 5- 300 days

4. thrombocytes- platelets

- a. blood clots / fibrinogen





Neutrophils



Eosinophils



Basophils



Lymphocytes



Monocytes

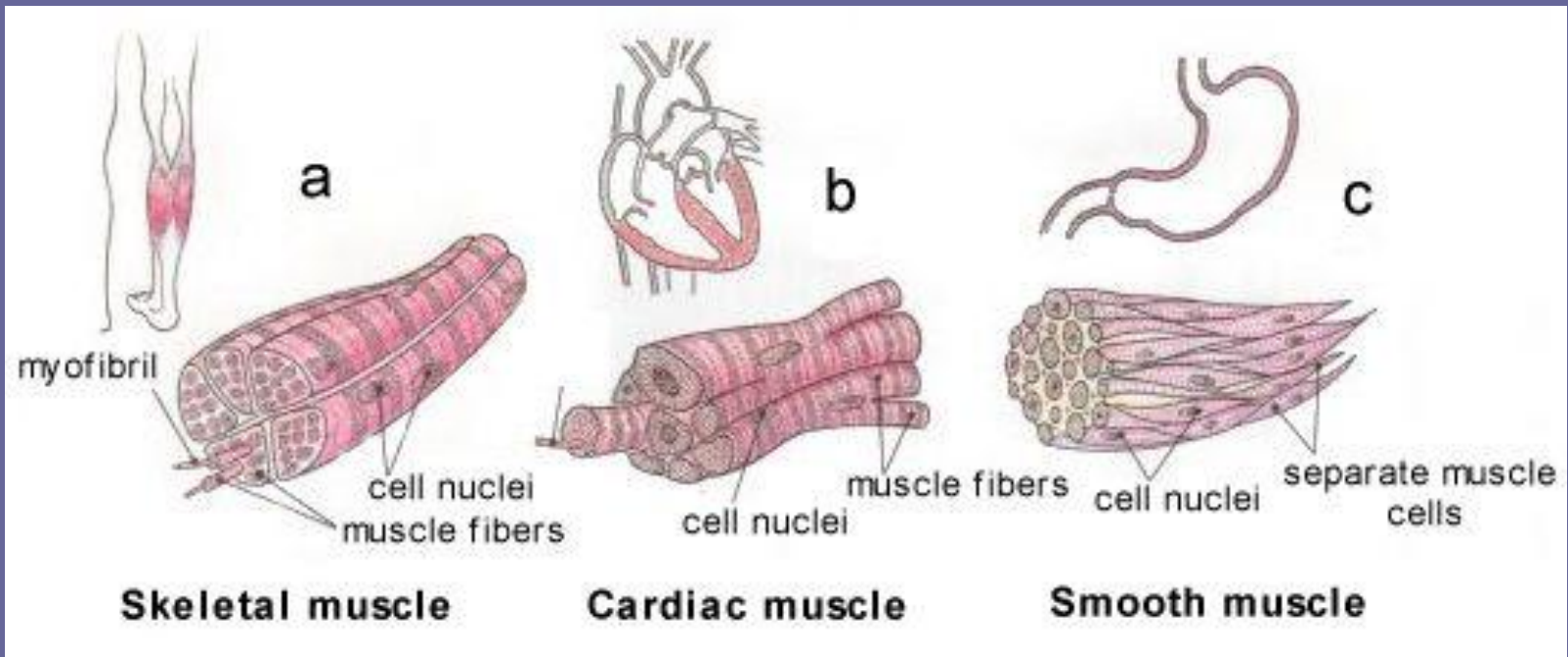


Platelets



Erythrocytes

Muscle Tissue



I. muscle tissue

A. functions

1. movement

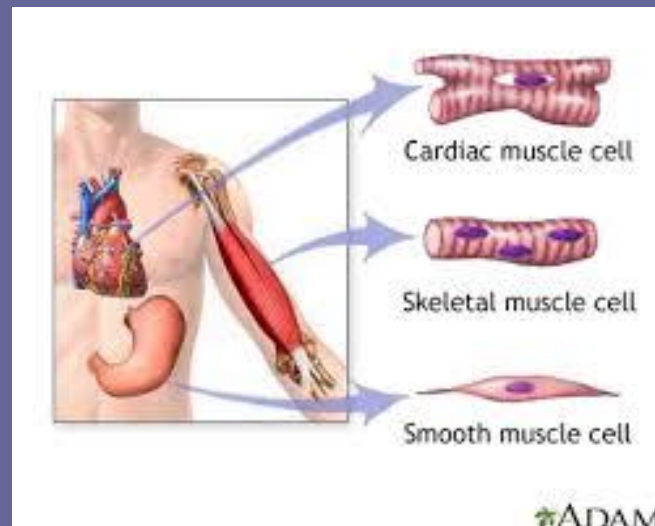
(blood, food, body)

2. heat

B. contract

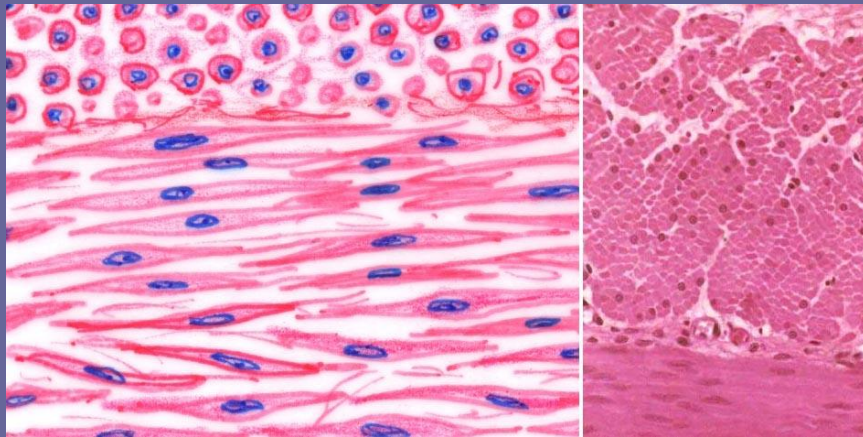
1. shortening fibers in response to stimuli

C. 3 types



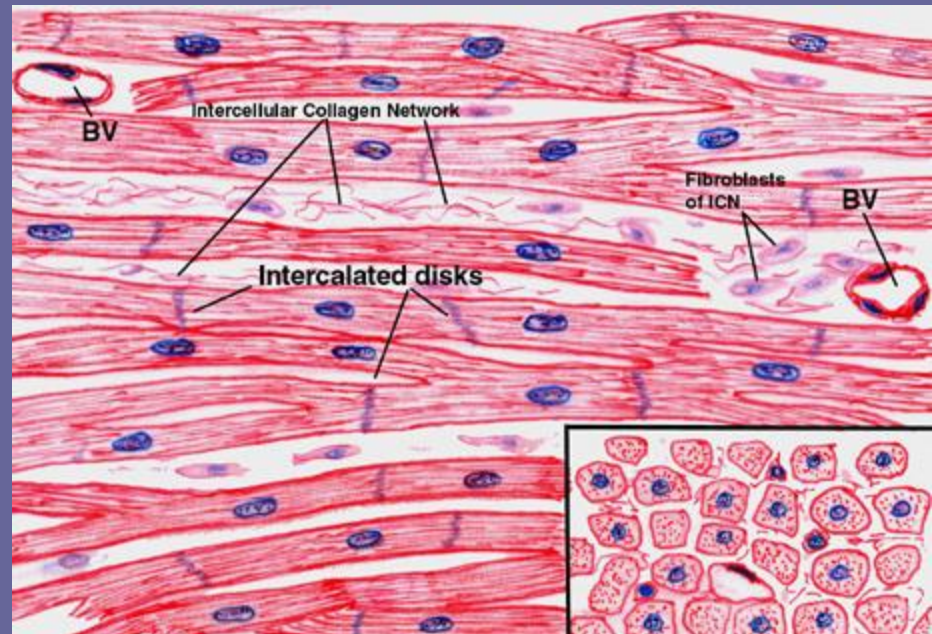
1. smooth

- a. organs
- b. involuntary
- c. long spindle shaped 1 nucleus
- d. no striations
- e. flattened sheets



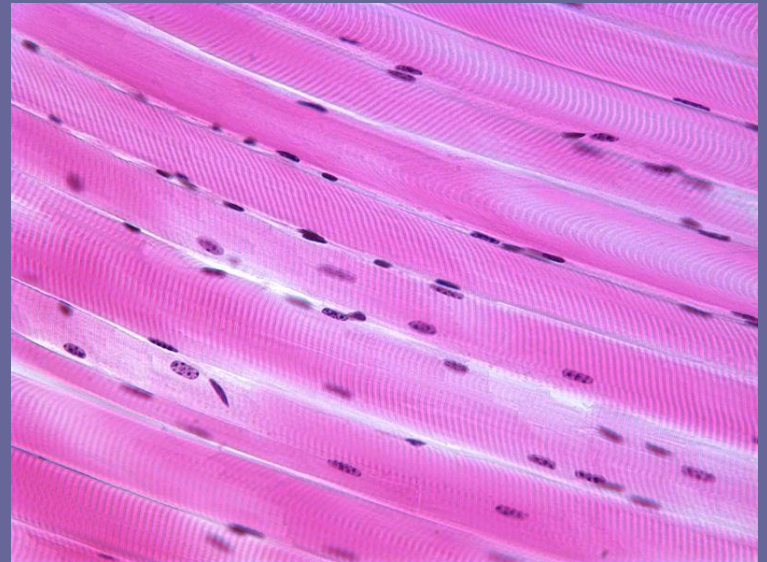
2. cardiac muscle

- a. heart
- b. branching fibers with intercalated discs
- c. Striated
- d. involuntary



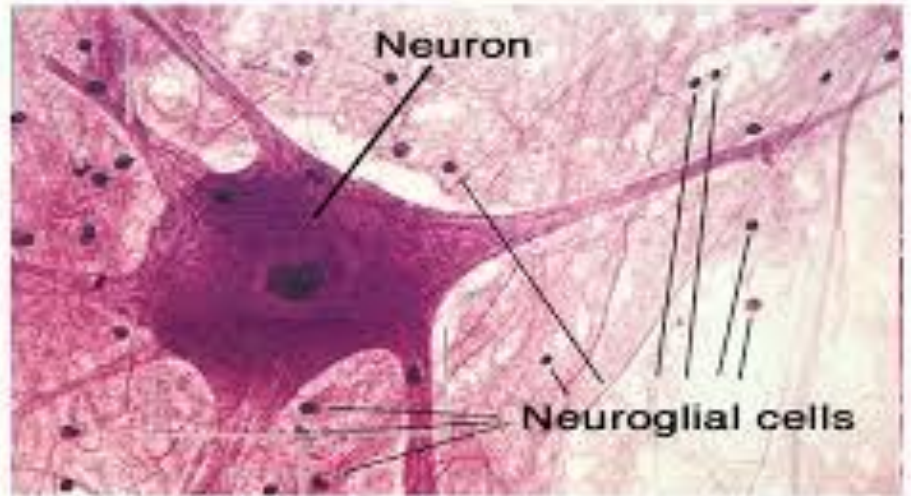
3. skeletal muscles

- a. use tendons
- b. voluntary
- c. elongated, multinucleated
- d. striations
- e. Visible parallel bundles



Nervous Tissue

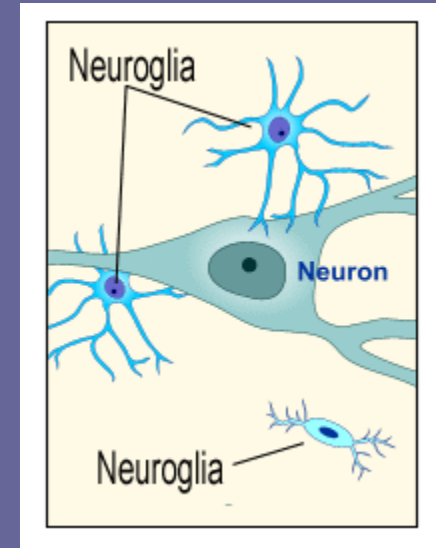
Nervous Tissue



I. Nervous Tissue

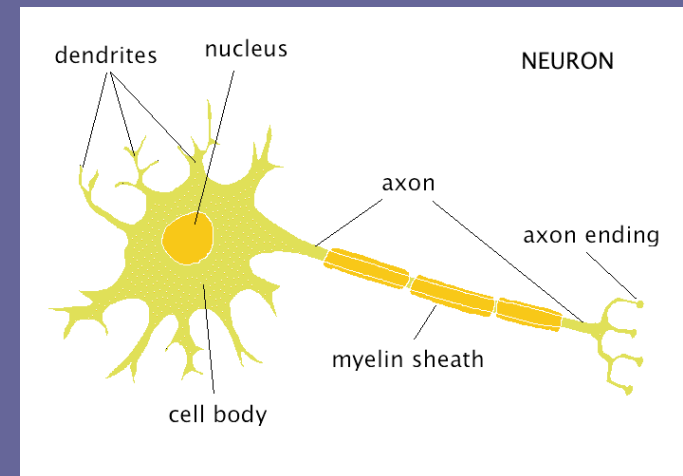
A. types

1. neurons
2. neuroglia



B. components of a neuron

1. cell body

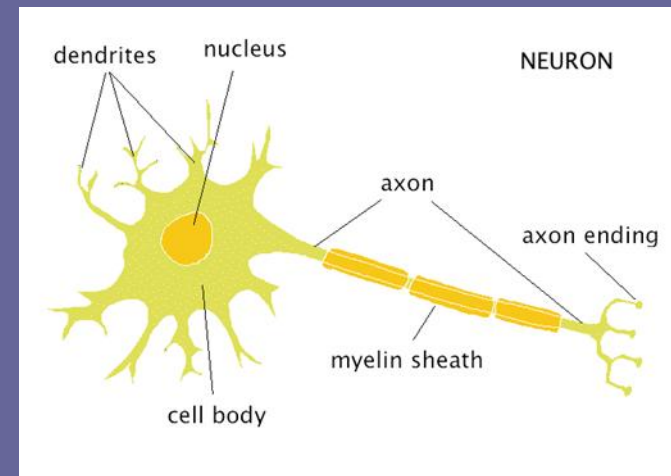


2. axon

- a. impulses away
- b. myelin sheath (fat) to insulate
- c. nerve fiber = axon covered by sheath
- d. nerve = bundle of nerve fibers

3. dendrite

- a. receive stimuli

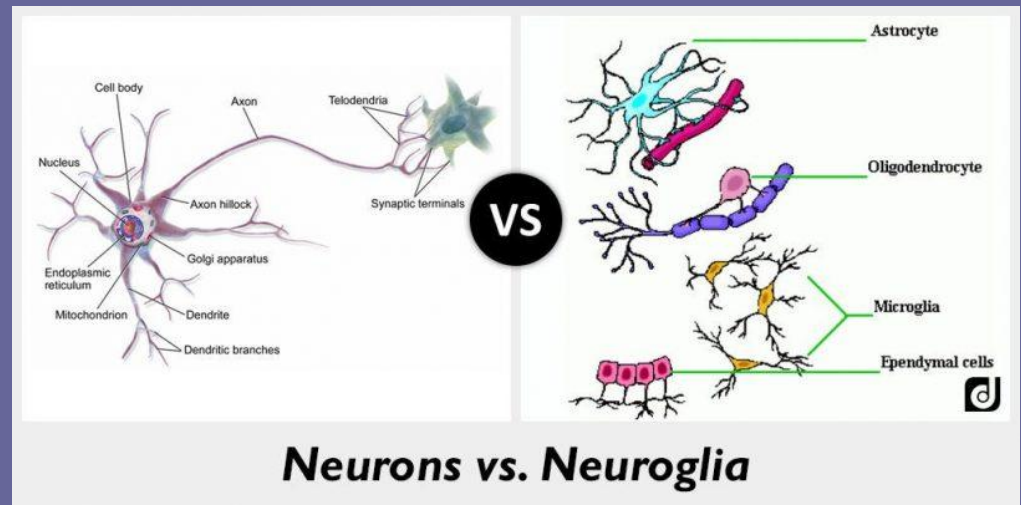


C. functions of neurons

1. respond
2. memory
3. think
4. regulate

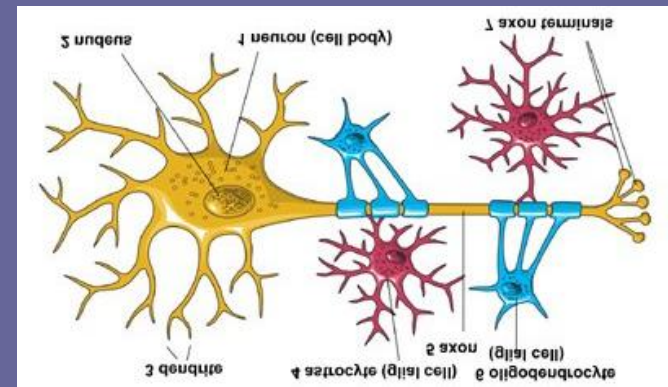
D. cannot repair?

1. very limited mitosis



E. Facts - neuroglia

1. 5-10x more abundant
2. limited mitosis
3. support and bind
4. some phagocytic
5. provide nutrients



DISEASE AND DYSFUNCTION



I. Tissue changes

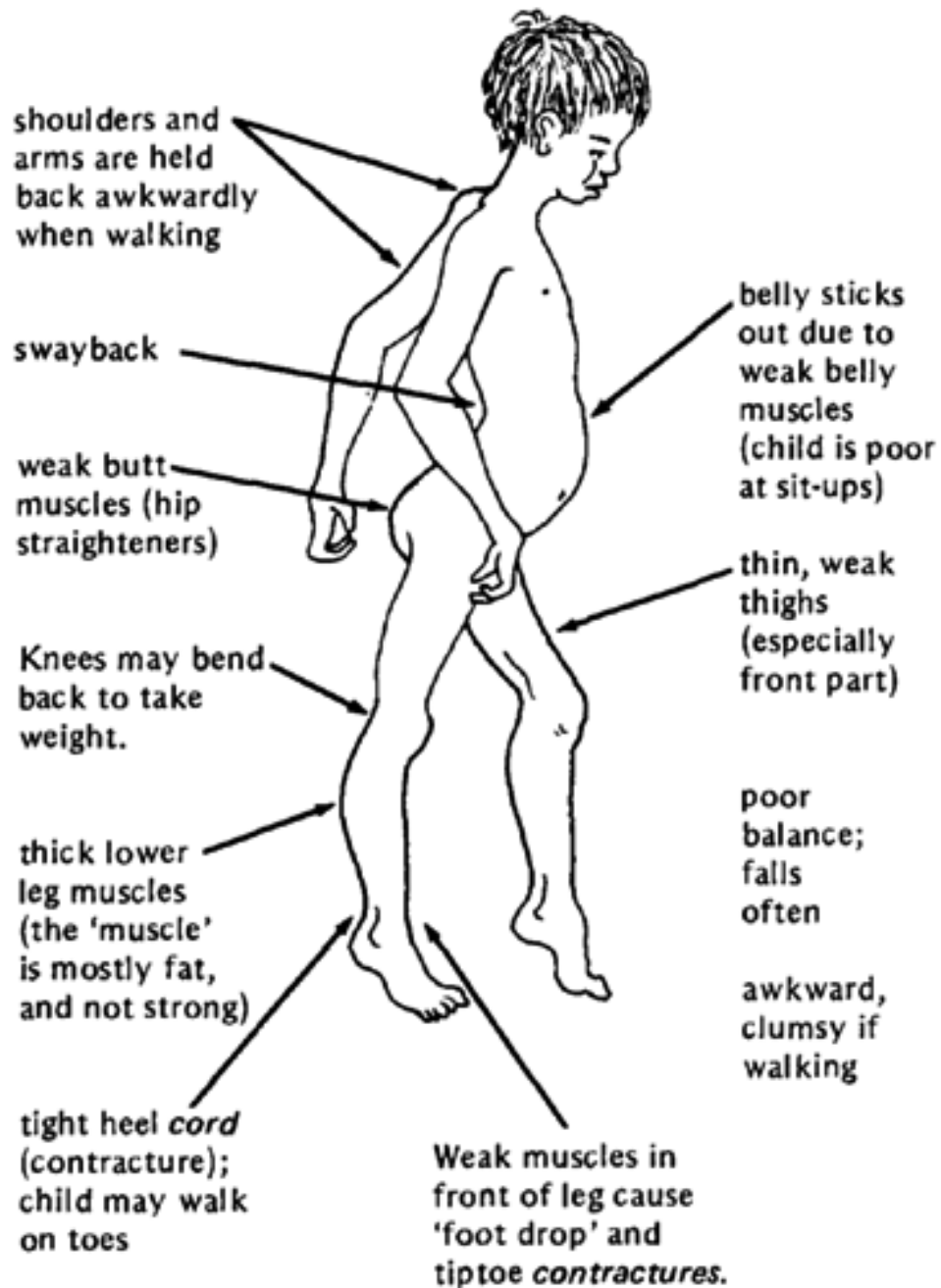
A. Atrophy

1. wasting away



B. types of atrophy

1. muscular atrophy
 - a. nervous system disease (polio)
 - b. low blood supply to muscles
2. senile atrophy
 - a. aging of tissue
3. disuse atrophy
 - a. inactivity (casts)
 - b. electronic stimulation reduces
4. muscular dystrophy
 - a. decrease muscle size and strength
 - b. loss of sarcoplasm



C. necrosis- cell/tissue death

1. opaque and whitish or yellow in color

D. gangrene-

1. massive necrosis
2. invasion of bacteria



E. somatic death- whole body.

1. changes

a. rigor mortis (muscle rigidity)

b. clotting of blood

c. cooling of body

2. changes predictable

a. approx time of death

II. tissue transplant

A. most successful :

1. autotransplant- from self

a. skin

2. isograft- genetically closely related

a. best = identical twins

3. homograft- same species nonrelated

4. heterografts- from different species

a. pig valves / human heart