Epithelial and Connective Tissues

- Epithelial tissues
  - Classes
  - Junctions
  - Glands
- Connective Tissues
  - Matrix
  - Cells
  - Types

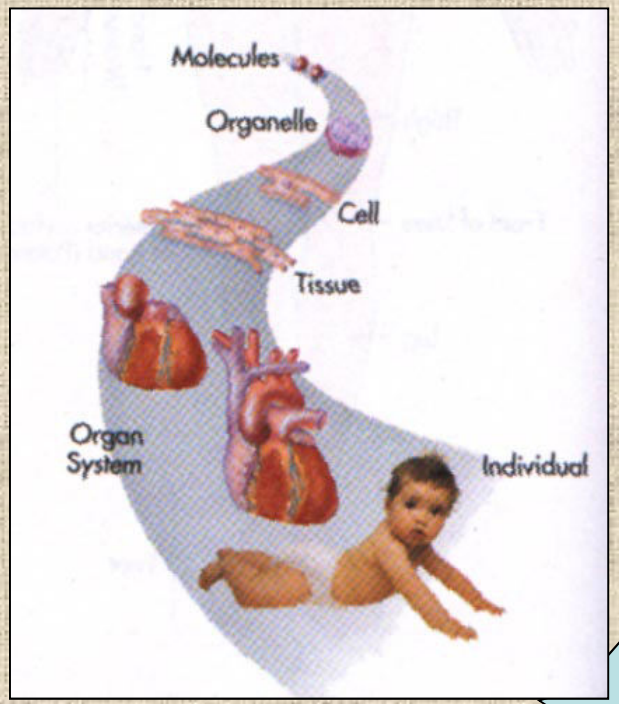
4 Types of Tissue

1)Epithelium

2)Connective

3)Muscle

4)Nervous



Tissues: groups of cells closely associated that have a similar structure and perform a related function

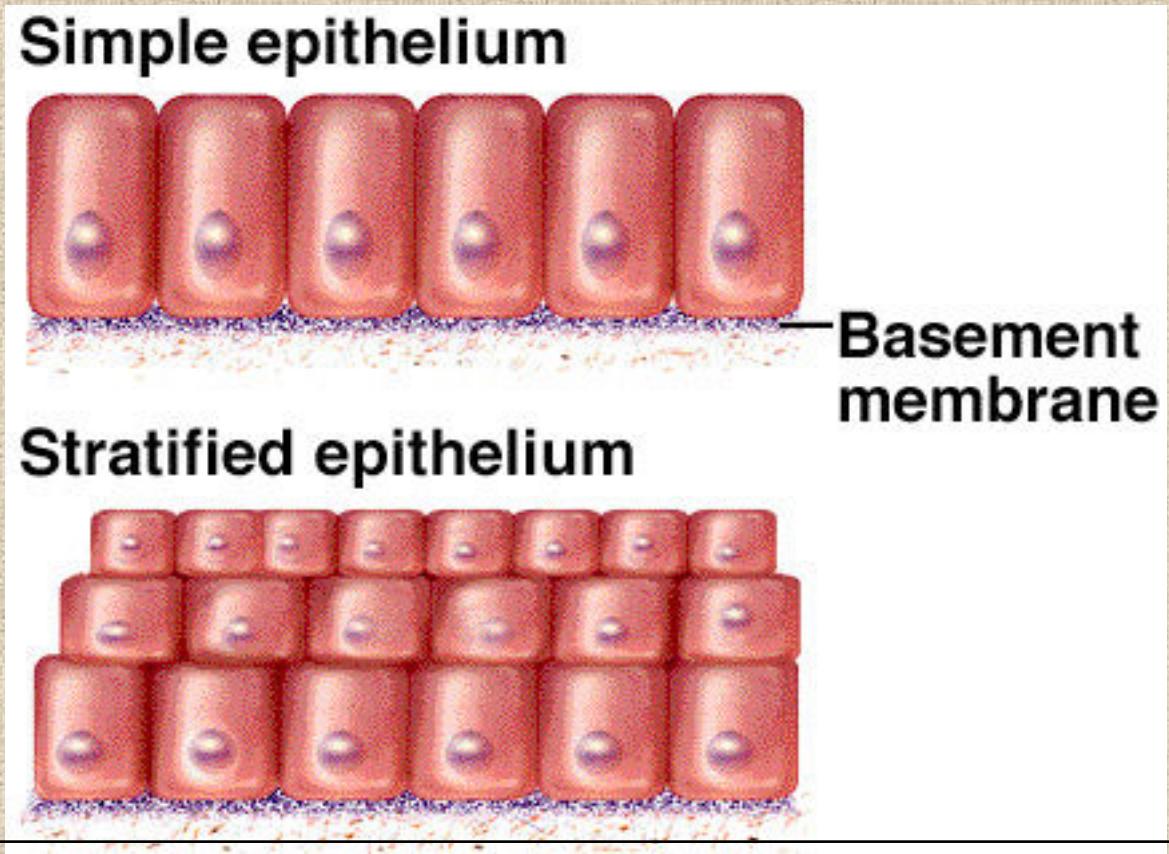
- Four types of tissue
  - **Epithelial = covering**
  - **Connective = support**
  - Muscle = movement
  - Nervous = control
- Most organs contain all 4 types
- Connective tissue has non-living extra-cellular material (matrix) between its cells

EPITHELIAL TISSUES

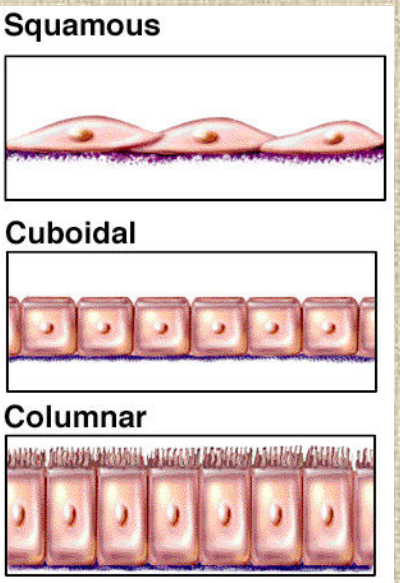
- Sheets of cells
- Specialized contacts/cell junctions (see below)
- Basal lamina: protein scaffolding secreted by epithelial cells
- Basement membrane: reticular fibers (crossed collagen network) that supports epithelium--really associated connective tissue
- Connective tissue support
- Nutrients from capillaries in underlying connective tissue
- Nerves pass through
- Easily regenerates
- E.g. skin, lining of gut, mucous membranes

Classes of Epithelia

- **Simple:** just one layer or cell shape
- **Stratified:** multiple layers and cell shapes



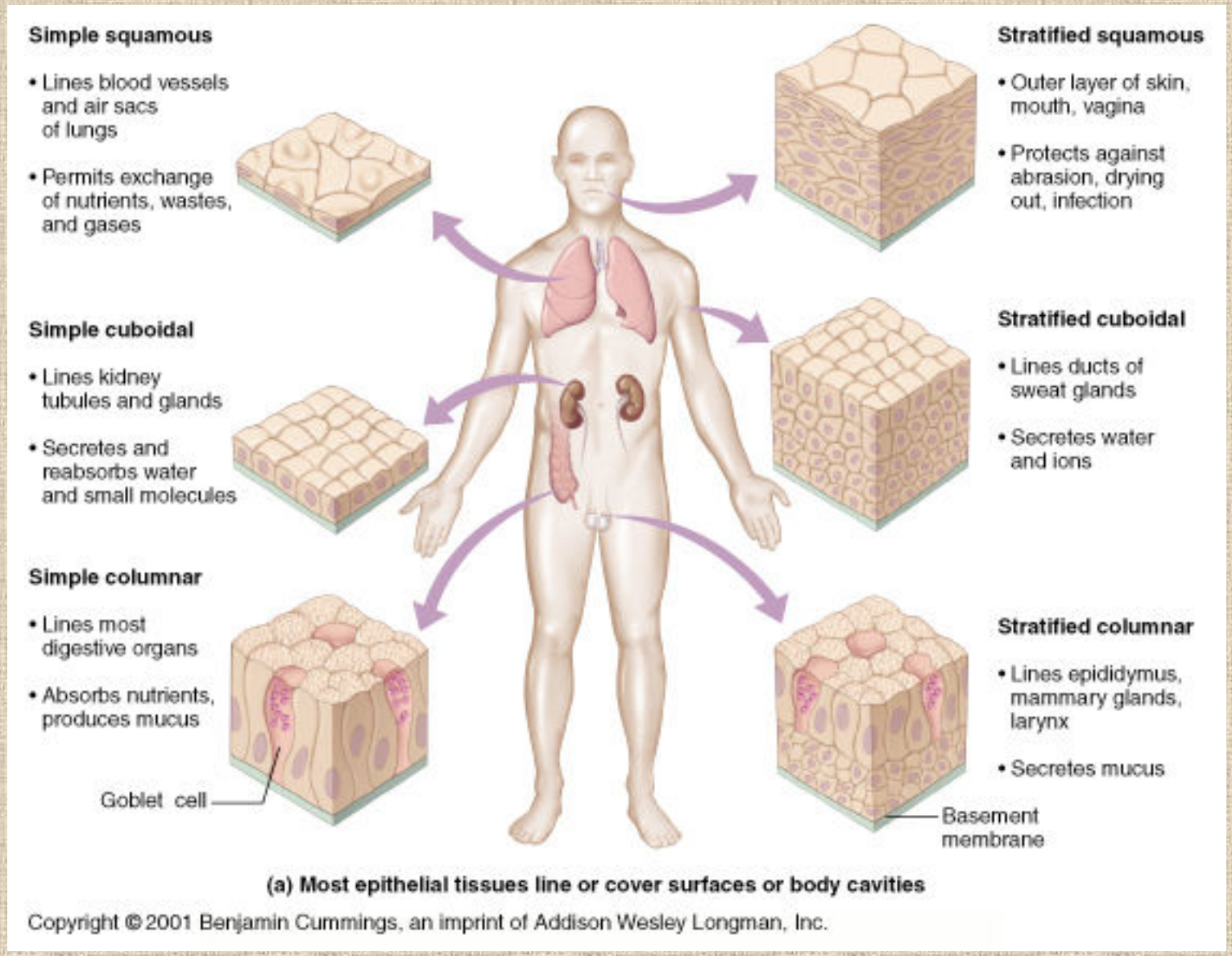
Simple Epithelia



Type	Cell shape	Example
Squamous	Squashed	Endothelium (lines blood vessels), mesothelium (serous lining of celom)
Cuboidal	Cubed	Walls of glands
Columnar	Columns	Lining of gut tube; sometimes with cilia like lining of uterine tube
Pseudo-stratified	Flat cells give rise to columns	With cilia in respiratory tubes to move mucous/particles out of lungs

Stratified Epithelia

- Squamous
  - E.g. epidermis
- Transitional epithelium
  - E.g. urinary structures--bladder
  - Stretches from 6 cells to 3 cells thick as bladder fills and expands

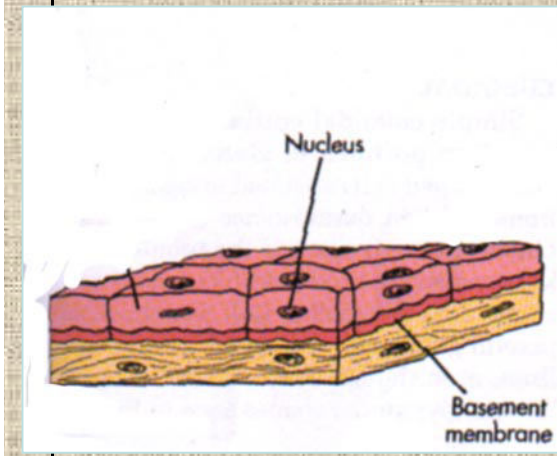


(a) Most epithelial tissues line or cover surfaces or body cavities

Quiz!!

Can You Identify the Classes of Epithelium?

A



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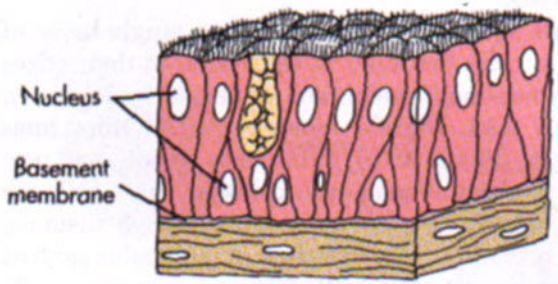

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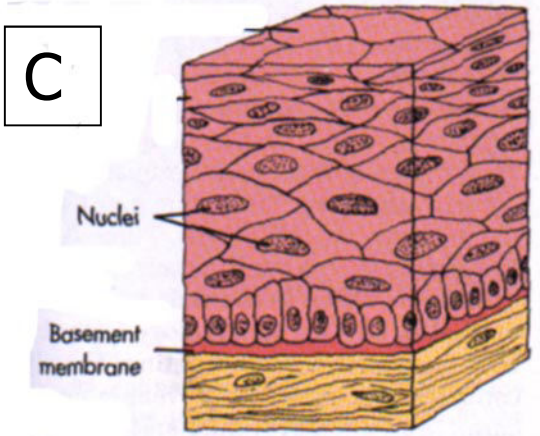

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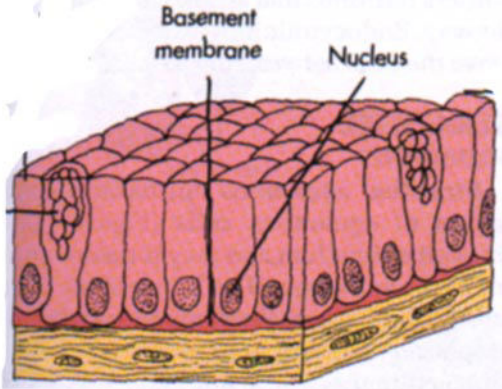

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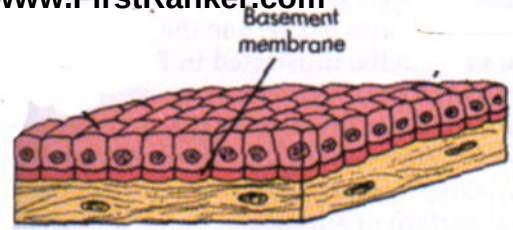

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Features of Apical Surface of Epithelium

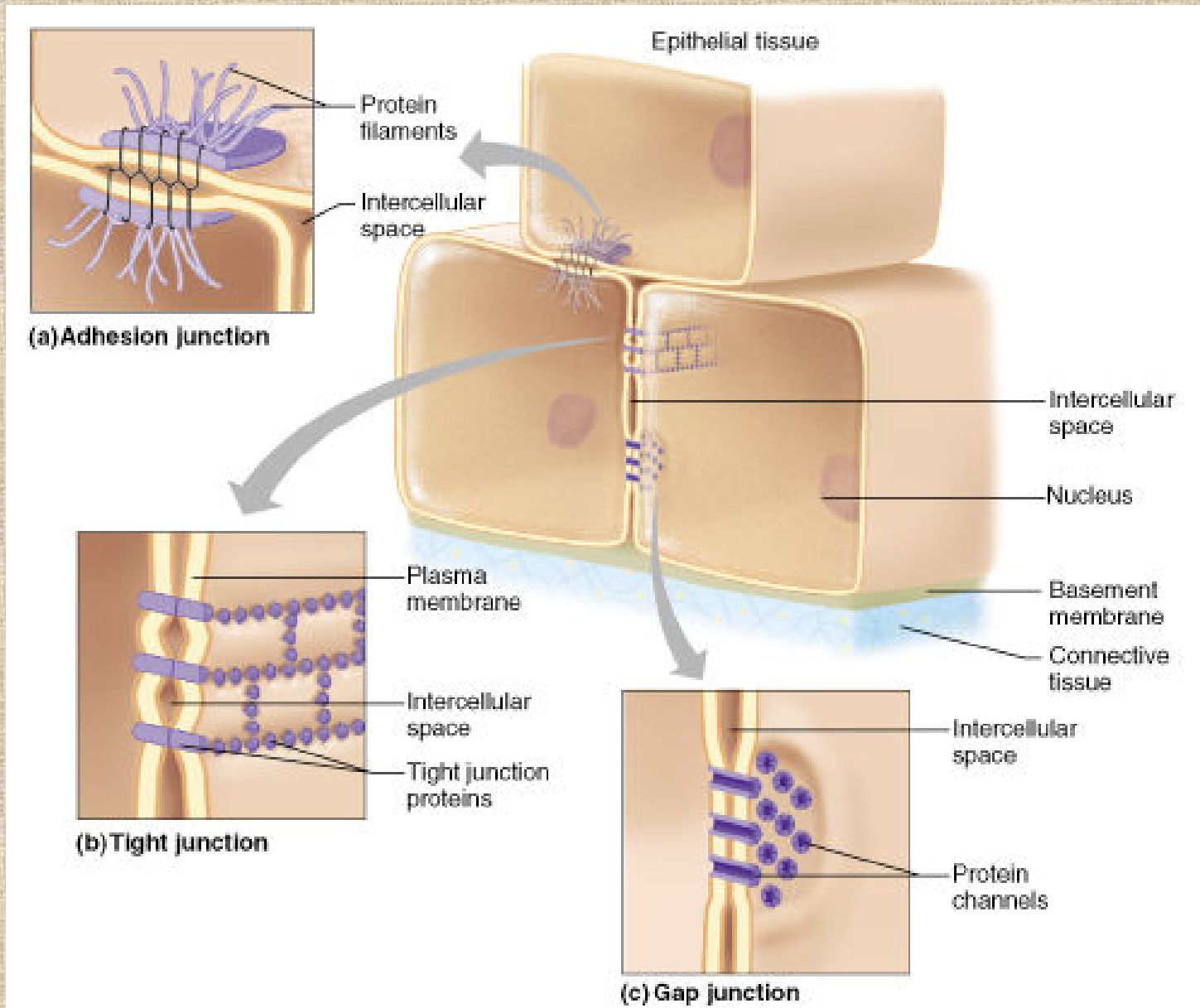
- Microvilli: (e.g) in small intestine
  - Finger-like extensions of the plasma membrane of apical epithelial cell
  - Increase surface area for absorption
- Cilia: (e.g) respiratory system
  - Whip-like, motile extensions
  - Moves mucus, etc. over epithelial surface .
- Flagella: (e.g) spermatozoa
  - Extra long cilia
  - Moves cell

Features of Lateral Surface of Epithelium

- Cells are connected to neighboring cells via:
  - Proteins-link.
  - Contour of cells-wavy contour fits together
  - Cell Junctions
    - Desmosomes-adhesive spots on lateral sides
    - Tight Junctions-at apical area, plasma membrane of adjacent cells fuse, nothing passes
    - Gap junction-spot-like junction occurring anywhere, lets small molecules pass

Cell Junctions

- Desmosome: binding spots between cells with proteins.
- Tight junctions: impermeable.
- Gap junctions: that let small molecules pass between cells



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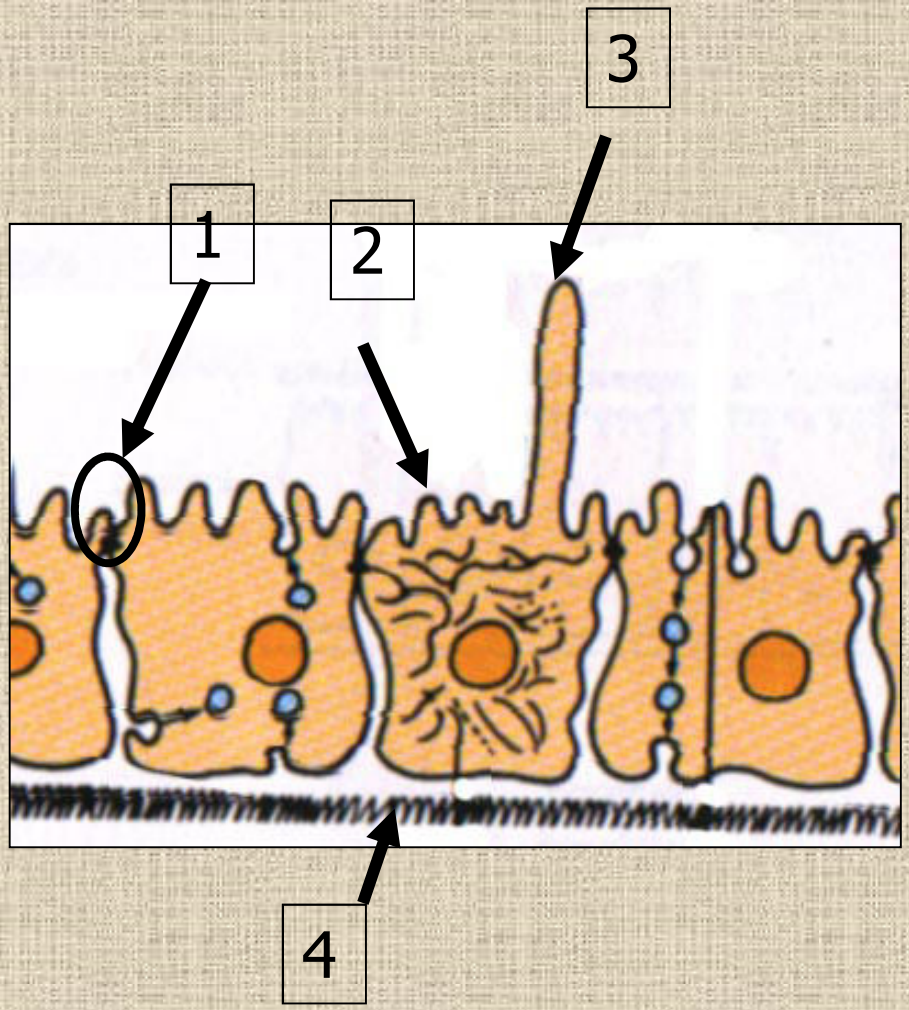
Features of the Basal Surface of Epithelium

- Basal lamina: supportive sheet between epithelium and underlying connective tissue
  - Selective filter
- Basement membrane = basal lamina plus underlying reticular fiber layer
  - Attaches epithelium to connective tissue below

Name that Epithelial Feature!

(name and location on cell)



- Cilia →3
- Tight junction →1
- Microvilli →2
- Basement membrane →4

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Thank You

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CONNECTIVE TISSUES

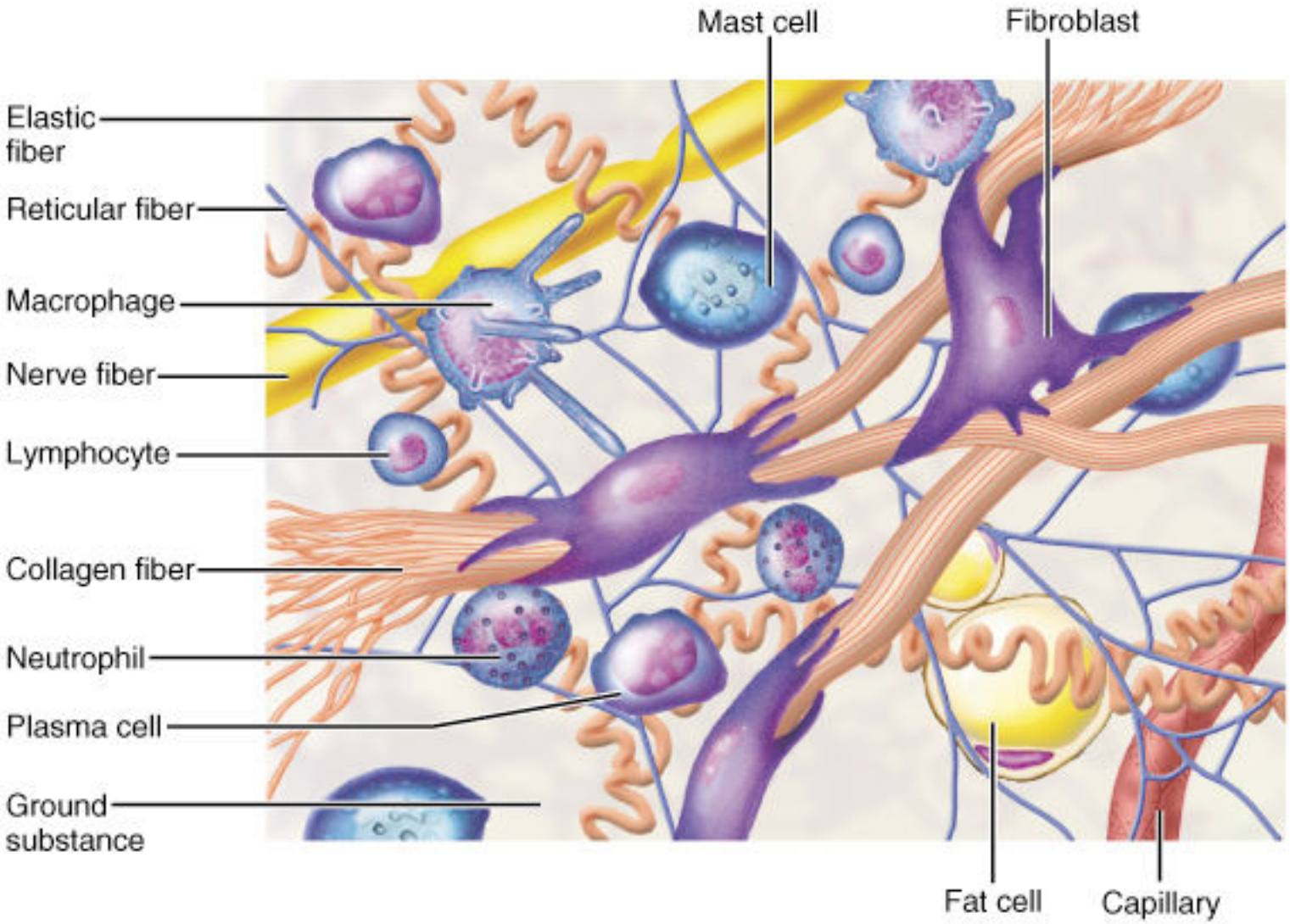
- "Areolar tissue" as model
- Universal in body
- Underlies epithelium, supports capillaries, small nn.
- Always originates from mesenchyme
- CELLS in MATRIX

Extracellular matrix

- Fibers
  - Collagen gives structure
  - Reticular fibers (crossed collagen) gives order
  - Elastin gives elasticity
- Ground substance
  - Jelly-like material made of sugar-protein molecules (proteoglycans)

Cells of Connective Tissues

- Fibroblasts make fibers
- Immune cells in areolar tissue
  - Macrophages
  - Plasma cells
  - Mast cells
  - Neutrophils, Lymphocytes



"Loose" connective tissues

- Adipose tissue mostly under skin and in mesenteries
- Reticular: organized 3-D network of fibers that support lots of cells
  - E.g. marrow, spleen, lymph nodes

"Dense" Connective tissues

- Irregular
  - Thick fibers running in many planes
  - E.g. dermis, fibrous capsules around organs
- Regular
  - Aligned parallel fibers
  - Resists tension
  - E.g. tendon, ligaments, aponeuroses
  - Sometimes with elastic fibers (e.g. ligamentum nuchae)

Other Connective Tissues

- Bone
- Cartilage
- Blood