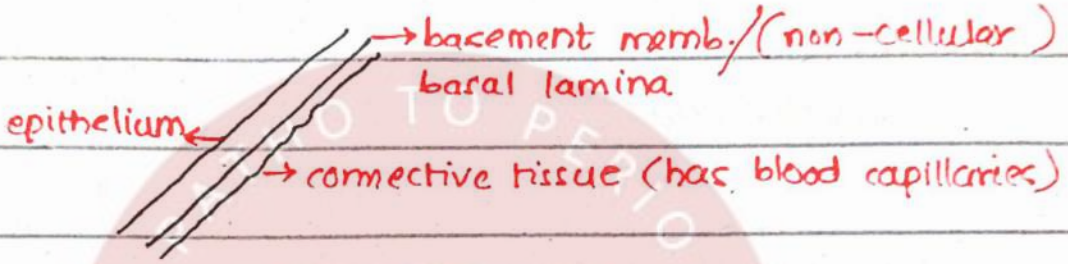
"EPITHELIUM"

epithelium
- avascular
- supported by loose connective tissue
- types
  - covering
  - glandular



GLANDULAR EPITHELIUM

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functions

- secretions
  - ↓ intracellular synthesis
    - ↓ stored in secretory vesicles
- excretions
  - ↓ no intracellular synthesis
    - ↓ no storage

COVERING EPITHELIUM

- also called "lining epithelia"
- has one/more layers of cell

functions

- covering external body surfaces e.g skin epidermis
- covers tubular passages e.g respiratory tract, GI-tract, urinogenital tract

Note :

- endothelium : lines blood vessels (or any other vessels) and internal of heart
- mesothelium : liming of body cavities

Characteristics of Epithelium

- cellular with little intercellular spaces
- usually avascular
- cells rest on basement membrane.
- cells show polarity
- cells may display surface modifications.

Generalized functions of epithelium

- secretion
- absorption
- exchange
- protection

Classification of Epithelium

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based on number of cell layers

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- Unilayered (simple epithelium)
- multilayered (stratified epithelium)
- Pseudostratified

UNILAYER / SIMPLE EPITHELIUM

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types

flat cells, height of cells < width of cells	equal width and height of cells	height of cells > width of cells
↓	↓	↓
"squamous epithelium"	"cuboidal epithelium"	"columnar epithelium"
↓	↓	↓
examples	examples	examples
MLE	RODE	SUGI
M – mesothelium (lines pericardial, pleural & peritoneal cavity)	R – Respiratory bronchioles	S – stomach
L – Lung alveoli	O – ovary outer surface	U – uterus
E – endothelium (internal heart, blood & lymph vessels)	D – distal convulated tubules	G – Gall bladder
	E – exocrine gland (small ducts)	I – Intestine

MULTILAYERED / STRATIFIED EPITHELIUM

- consists of multiple layers with basal layer resting on basement membrane.
- epithelium is named acc. to the shape of cells in the most superficial layers.

types

Stratified Ep. — Transitional Ep.

Stratified Epithelium

(layers of cells are arranged upon basement memb.)

types

1. Stratified Squamous Ep.

- superficial layer : squamous / flat cells
- deep layer : columnar / cuboidal cells

stratified Squamous Ep.

Keratinized (cornified)	Non-keratinzed (Non-Cornified)
- covers areas subjected to abrassion & desication	- covers areas subjected to abrassion but remains wet
- e.g skin	- e.g oraphayrnx, oral cavity, esophagus.

2. Stratified Cuboidal Epithelium

- superfacial layer : columnar cells.

e.g

- found in
  - larger ducts of exo. glands like
    - Pancreas
    - salivary glands
  - also lines ducts of sweat glands

- no absorptive / secretory function

3. Stratified Columnar Epethelium.

- surface layer : columnar cells
- deep layer : cuboidal / irregular

e.g

- conjunctiva of eye
- some parts of male urethra

Imp :

exocrine gland
- small ducts (simple cuboidal epithelium)
- large ducts (stratified cuboidal)

- In stratified squamous ep ; basal cells reproduce (mitosis) and replace cells of superficial layers.

- No such phenomena occurs in cuboidal ep. & columnar ep.

Transitional Epithelium / Urothelium

- specifically designed to withstand stretch
  ↓
  produced by distention of urinary passages due to collection & storage of urine till voided

- urothelium lines ;

  i, renal calyses ii, renal pelvis

  iii, ureters iv, urinary bladder

  v, proximal parts of male & female urethra.

- undistended urothelium → 6-8 cell layers
  (superficial layer cells are dome-shaped)

- distended form → 2-3 cell layers

PSEUDOSTRATIFIED EPITHELIUM / PSEUDOSTRATIFIED COLUMNAR EPITHELIUM

- single layer of cells with varying heights
- Nuclei appear at diff. levels, creating layered look.
- many have cilia on their apical surface especially in respiratory tract.

e.g

1- conducting parts of respiratory sys.
   - nose
   - nasophynx
   - trachea
   - bronchi

2- major genital ducts (epididymis & ductus deferens)

Tall cells of pseudostratified epithelium

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special structural modifications on apical surface

- kinocilia (conducting respiratory passages)
- stereocilia (male genital cells)

Note: simple columnar Ep. also has modifications on their apical surface
- kinocilia
- stereocilia
- microvilli

Imp Unicellular goblet cells have pseudostratified columnar Ep.

Two Special Varieties of Epithelial cells

- neuroepithelial cells (for sensations)
- myoepithelial cells (for contractions)

POLARITY

1. APICAL DOMAIN
   - microvilli
   - cilia
   - sTereocilia

- microvilli
  - can't be seen with ordinary microscope
  - incr surface area
  - present in luminal cells lining proximal convoluted tubules.

- cilia
  - seen with LM
  - also called kinocilia (due to its movement)
  - structure (axoneme, 9+2 pattern)
  - arise from basal body
  - dyeine arms cause movements

- stereocilia
  - seen with light microscope
  - can't move
  - has microfilaments
  - Location: i, epididymis & vas deferens lining (incr the surface area)
    ii, neuroepithelial cells of internal ear (nerve signal generation)

2. LATERAL DOMAIN:
   - cell junctions
   - cell communications

3. BASAL DOMAIN:
   - basement memb.
   - hemidesmosomes (junctions that anchors the epithelial cells to basal lamina)
   - infoldings of plasma-lemma