



*Dep. Of Pathogenic Analysis*

# **Histology lectures**

**Dr . SALEH. KADHIM MAJEED**





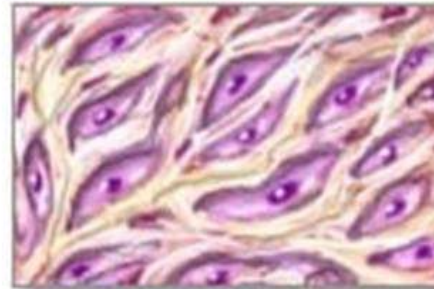
# Introduction to Cell Biology

The cell is the basic unit of organization or structure of all living matter. Within a selective and retentive semipermeable membrane, it contains a complete set of different kinds of units necessary to permit its own growth and reproduction from simple nutrients.

- All human structures are composed of just four basic types of tissue:

Four types of tissue

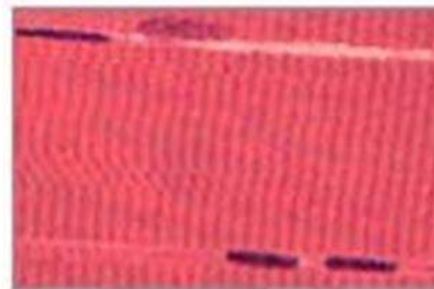
- *Epithelial tiss*
- *Connective tis*
- *Muscular tiss*
- *Nervous tiss*



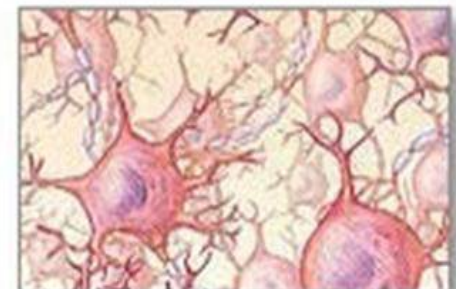
Connective tissue



Epithelial tissue



Muscle tissue



Nervous tissue

## Epithelial tissues

Are composed of closely aggregated polyhedral cells with very little extracellular substance. These cells have strong adhesion due to adhesion molecules, membrane interdigitation, and intercellular junctions.

- These features allow the cells to form cellular sheets that cover the surface the body and line it cavities or are arranged as three-dimensional secretory units.




- The principal functions of epithelial tissues are

1. Covering and lining of surfaces e.g. skin
2. Absorption e.g. intestines
3. Secretion e.g. glands
4. Sensation e.g. neuroepithelial cells
5. Contraction e.g. myoepithelial cells
6. Protection skin


# Types of epithelia

- Epithelia are divided into two main groups according to their structure and function :
  1. covering epithelia
  2. Glandular epithelia



In covering epithelia the cells are organized in layers that cover the external surface or line the cavities of the body.

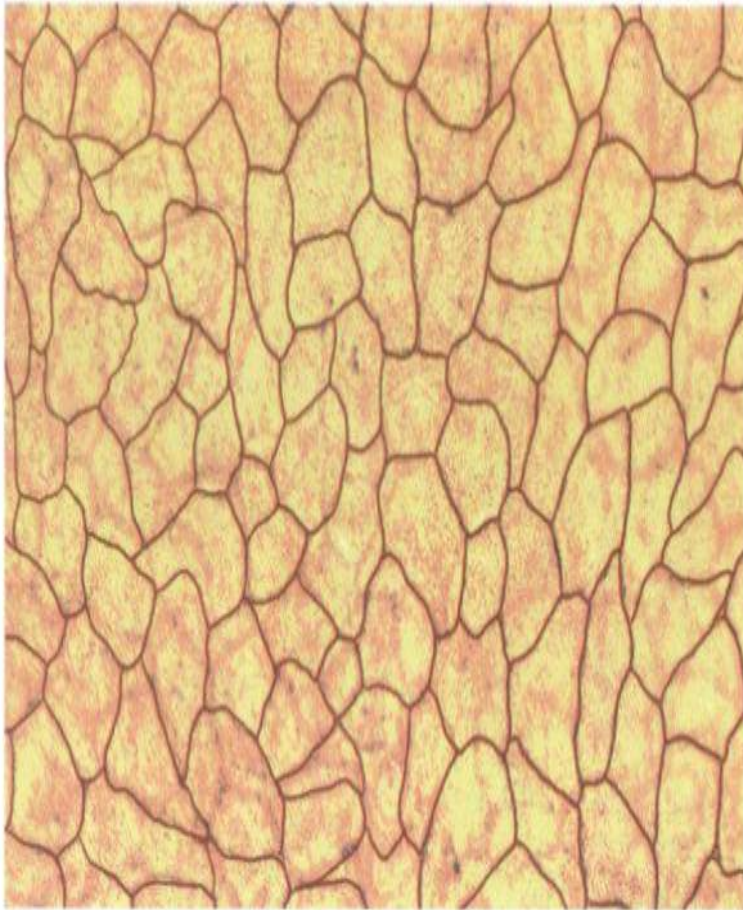
- They can be classified according in the number of cell layers and the morphological features of the cells in the surface layer.



- **Simple epithelium** : contains only one layer of cells stratified epithelium contains than one layer based on cell shape, simple epi. can be squamous, cuboidal, columnar.

- **Pseudostratified** : the nuclei appear to lie in various layers all the cells attached to the basal lamina.





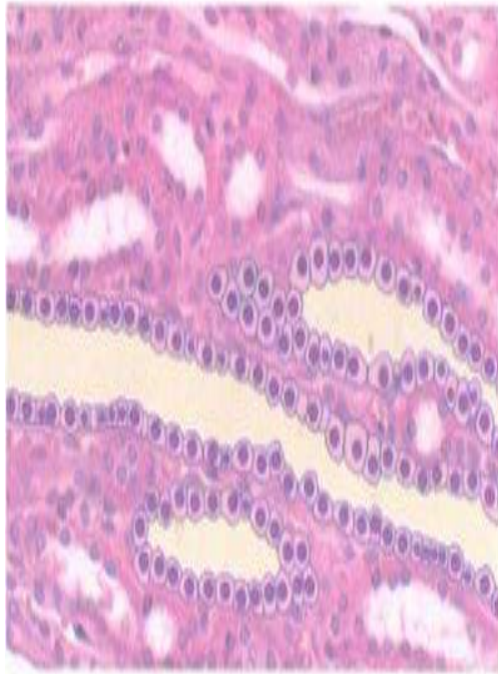
(a)



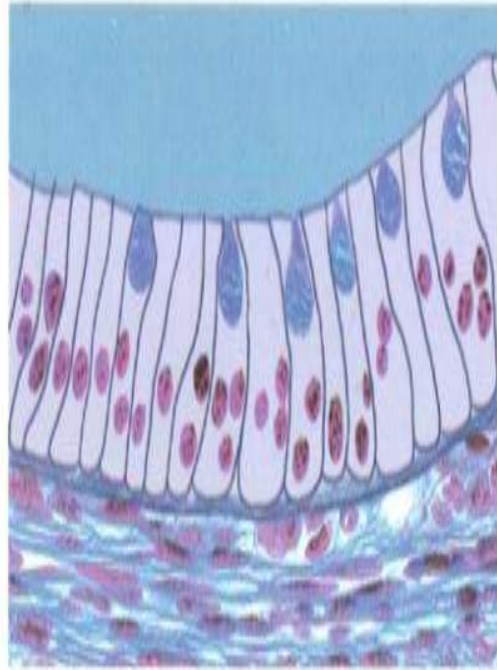
(b)

**Simple squamous epithelium x400**  
Figure 6.15

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(a)



(b)



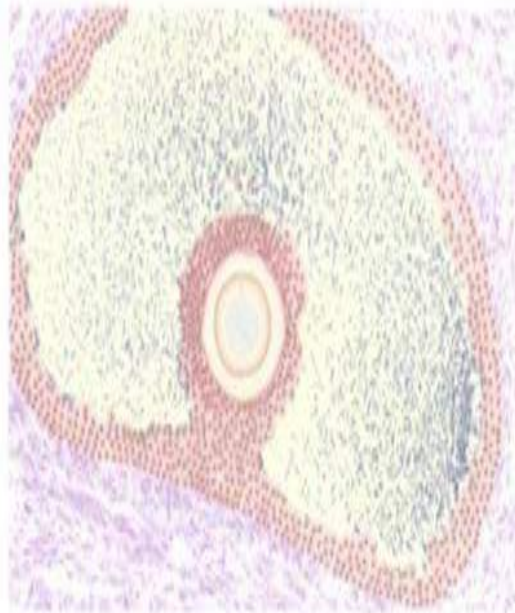
(c)

**Simple epithelia x400;1000b, c**  
Figure 6.16

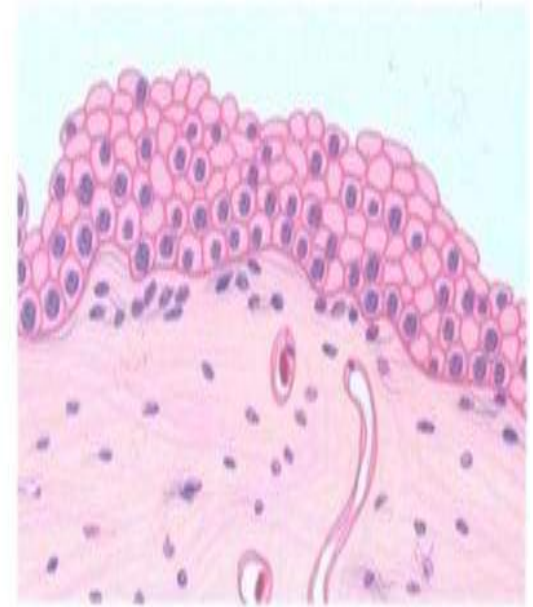
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(a)



(b)



(c)

**Stratified epithelia x400;200;400**  
**Figure 6.17**

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- **Stratified epithelial**

- 1. **Stratified squamous epi.:**

- a. Keratinize

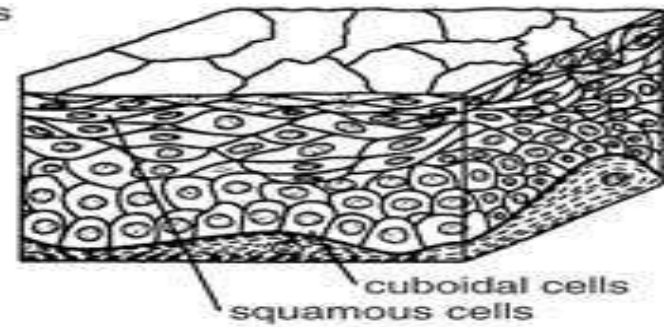
- b. Non keratinize

- **Keratinize:** The surface cells have died after having secreted a large amount of the tough protein keratin.

- **St. cuboidal epi.:** has cuboidal or rounded surface cells. sweat gland duct.
- **St. Columnar. Epi.:** Is a rare type in which col. Surface cells rest on cuboidal basal cell it is found in short transitional zones where a st. Epi. Grades into a columnar or pseudost.
- **Transitional:** This type of epi. Is adapted to stretching when the bladders empty the epi. Is up to six cells thick.

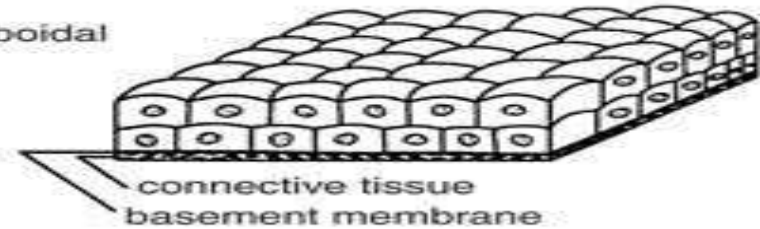
**Cells:** squamous cells apically, but basal layers vary from cuboidal to columnar  
**Nuclei:** centrally located  
**Functions:** protection

stratified squamous



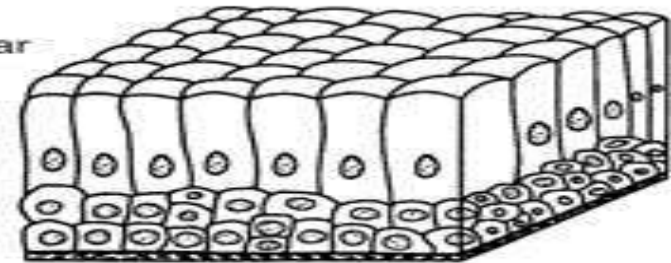
**Cells:** two layers  
**Nuclei:** centrally located, and spherical  
**Functions:** absorption, secretion

stratified cuboidal



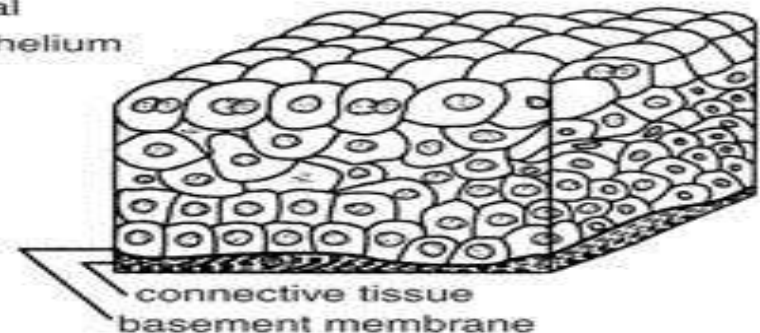
**Cells:** single layer of columnar cells on several layers of cuboidal (or many sided) cells  
**Nuclei:** basal and oval  
**Functions:** protection, secretion

stratified columnar



**Cells:** vary depending on stretch, apical cells often large, round, and binucleated  
**Nuclei:** centrally located  
**Functions:** distention (occurs only in bladder, ureter, and urethra)

transitional epithelium

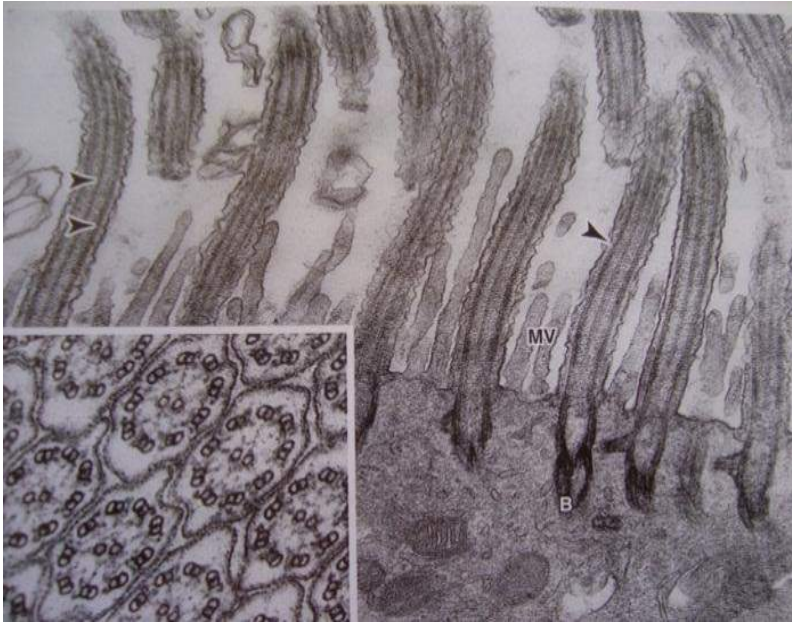


**Epithelial Tissues**

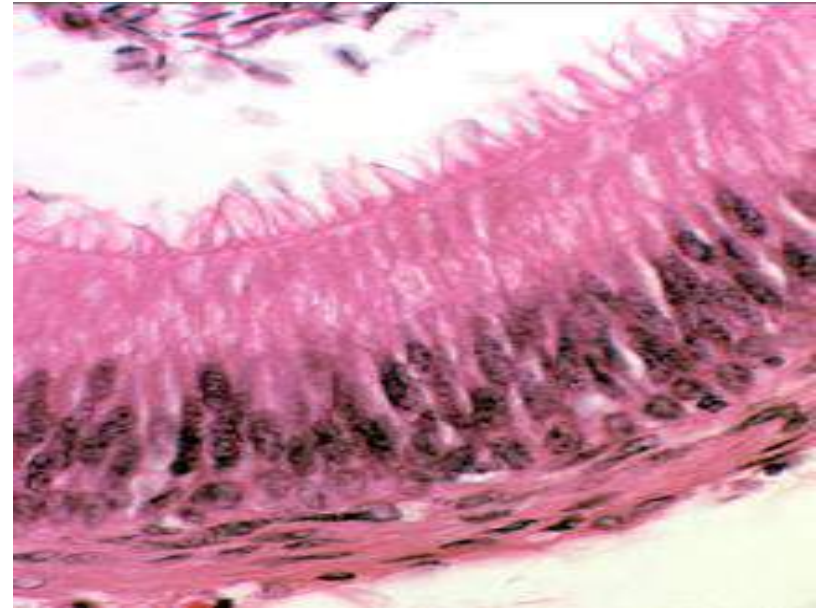


- **Specialization of the cell surface**

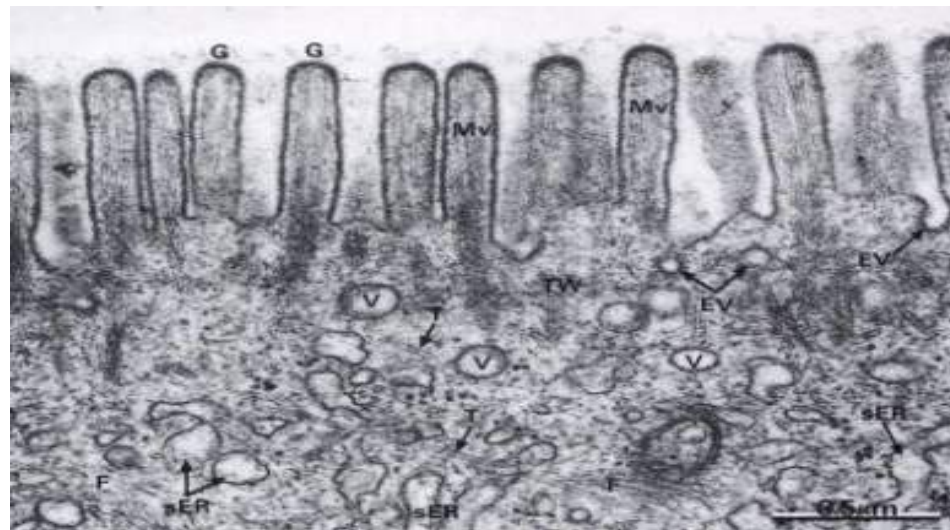
- **Microvili:** found in absorptive cell, proximal renal tubule. The glycocalyx is thicker than it is in most other cell.
- **Cilia and flagella:** cilia are cylindrical motile structure, surrounded by the cell membrane, cilia inserted into basal bodies at the apical pole of the cell.
- **flagella:** long structure the only functional flagellum in humans is the tail of sperm.
- **Stereocilia:** are long non-motile extensions of cells found in epididymis and ductus deferens



**Cilia and flagella**



**Stereocilia**



**Microvili**



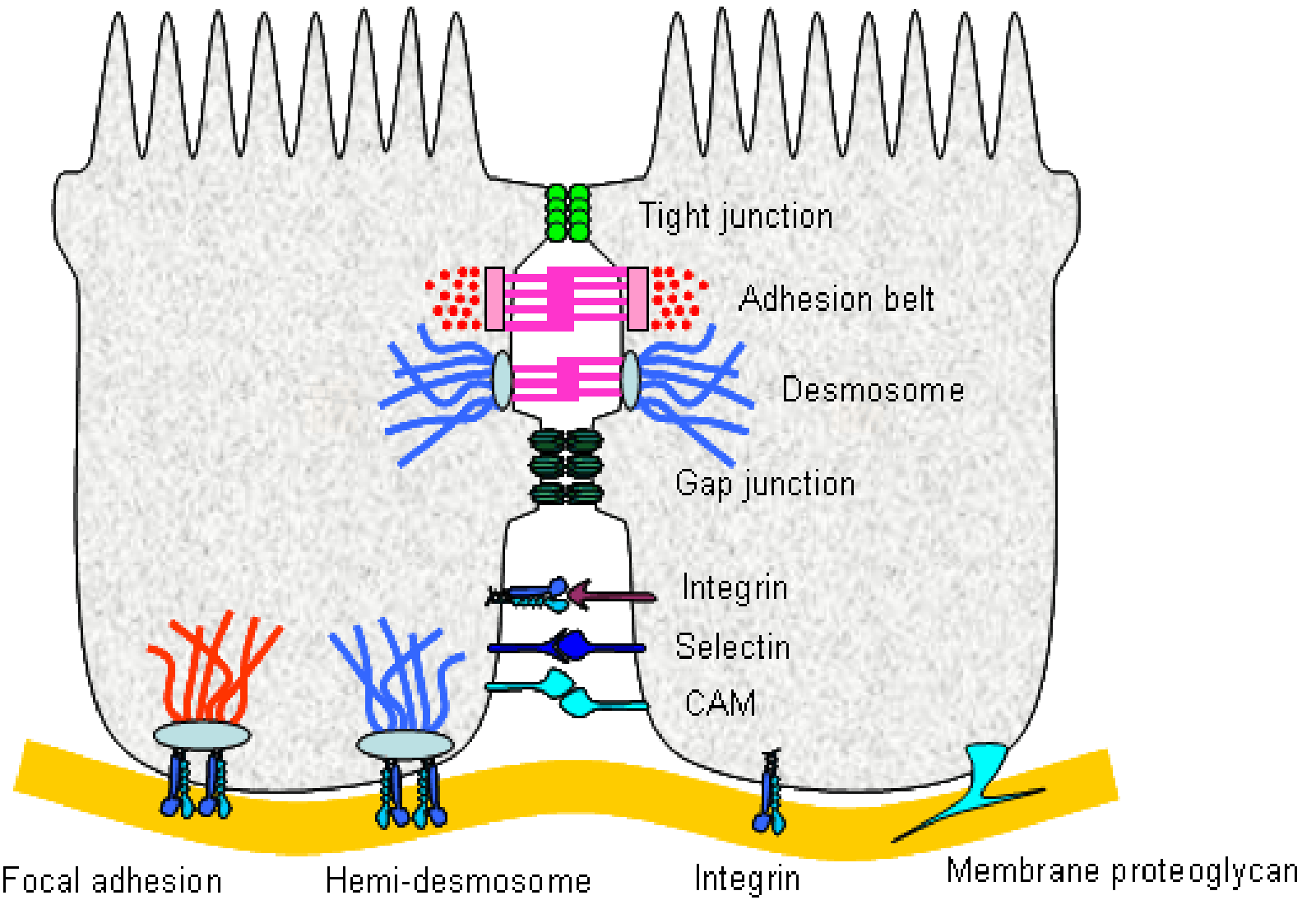
# Intercellular junctions

. **Desmosomes** : junction provides a mechanism for communication between adjacent cells.

. **Tight junction**: junction serves as sites of adhesion and as seals to prevent the flow of material through the space between epi. Cells.

. **Gap junction** : found in nearly all mammalian tissues, skeletal muscle being a major exception

**Hemidesmosomes** : observed in the contact zone between epi cells and basal lamina that bind the epithelial cells to the subjacent basal lamina tight junction





Thank

you

for

Listening