ARKAN
STUDY HOUSE

HISTOLOGY

2024

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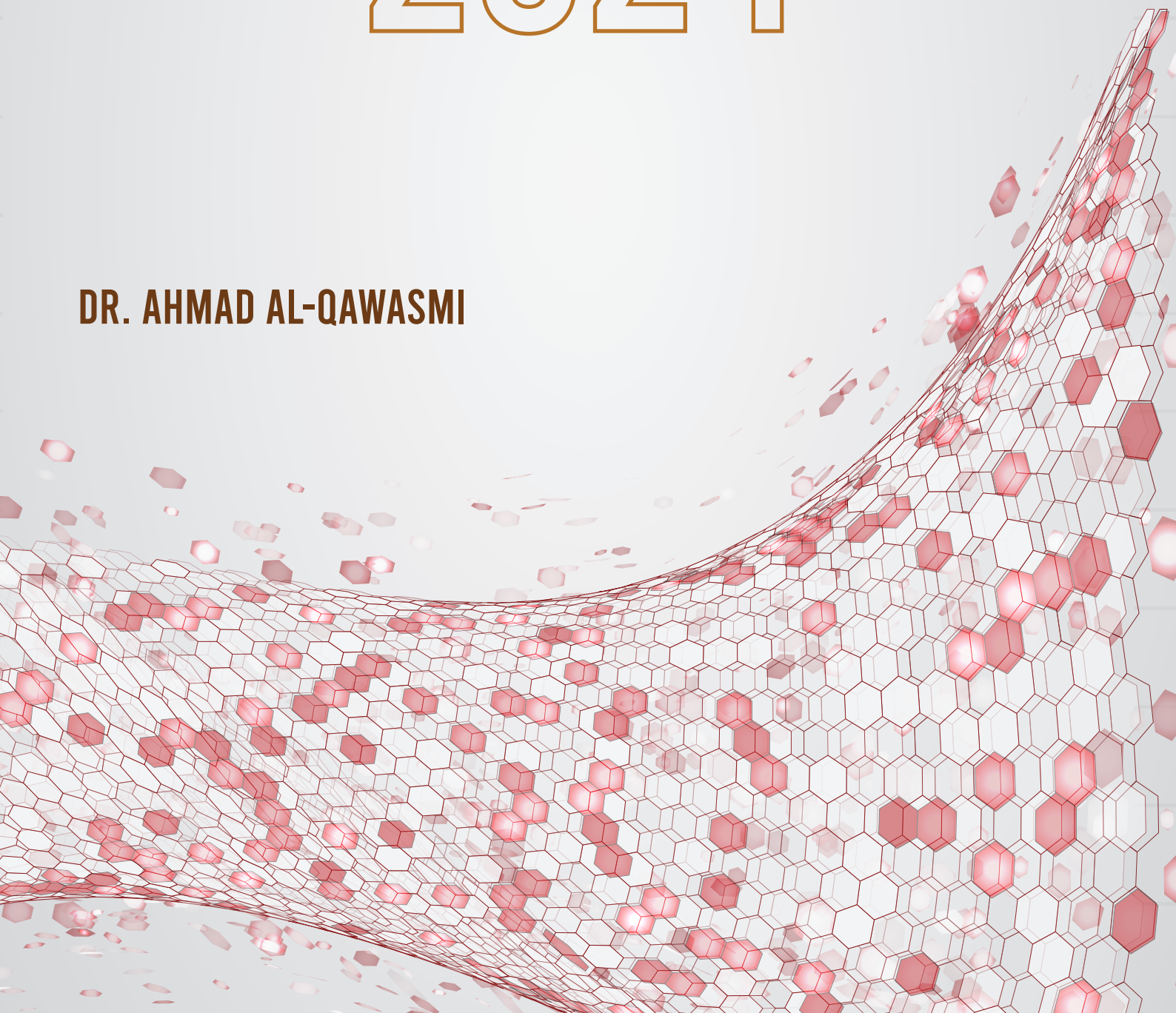


❖ Types of epithelial tissue

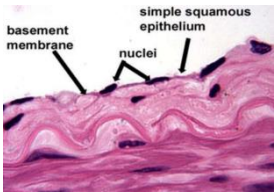
- Epithelium can be classified according to their function into *covering (lining)* or *glandular* epithelium

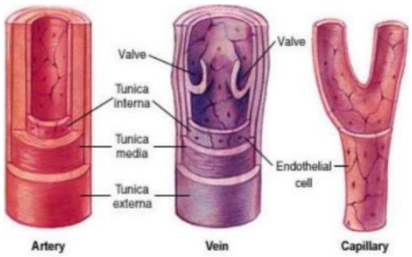
♦ *Covering (lining) epithelium*

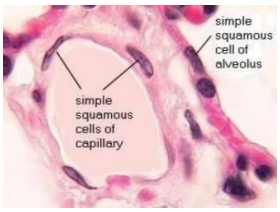
- It can be classified according cell shape into squamous, cuboidal and columnar
- It can be either simple (one layer), stratified (2 or more layers)

1. *Simple squamous epithelium*

- It is divided into 3 types:
  - ➢ ***Endothelium***
    - ✓ It is a thin layer of cells, with **nuclei** appear as thick basophilic structure and highly noticeable
    - ✓ It lines the walls of ***blood vessels***
    - ✓ It *regulates passage of substances*

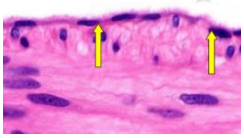


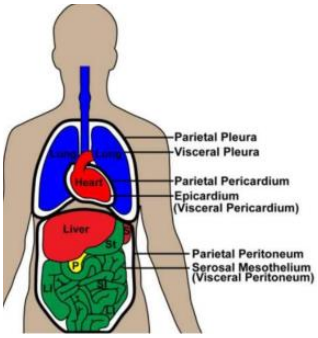




  - ➢ ***Alveolar epithelium***
    - ✓ It lines the walls of ***lung alveoli***
    - ✓ It *regulates gas exchange*

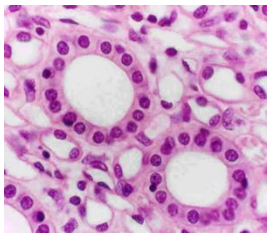
  - ➢ ***Mesothelium***
    - ✓ It ***covers*** the internal organs (***visceral***)
    - ✓ It ***lines*** the internal cavities and organs (***parietal***)
    - ✓ Mesothelium of the lung, it is called pleura
    - ✓ Mesothelium of the heart, it is called pericardium
    - ✓ Mesothelium of the abdomen, it is peritoneum
    - ✓ Mesothelium of the chest region, it is called mediastinum





2. *Simple cuboidal epithelium*

- The width of the cell is equal to the height of the cell
  - ➢ It is rich with organelles
  - ➢ It has a high level of active transport
- It is located in the *kidney tubules*, small *collecting ducts* of the kidney, glands and *ducts* (such as pancreas, salivary glands, thyroid gland), covering of the *ovaries*

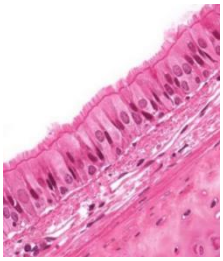


3. *Simple columnar epithelium*

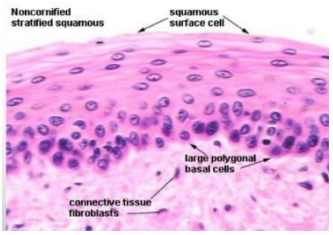
- Cells are tall, usually having microvilli or cilia
- Engaged in the ***protection*** of wet surfaces, ***absorption*** (microvilli) and ***secretion***
- Forms major ducts of exocrine glands
- When **ciliated** (fallopian tube, uterus), it helps in ***movement of fluid*** in the female genital tract
- Located in the *small intestine*, *stomach*, *gallbladder*, *oviduct* lining and *renal collecting ducts*

4. *Pseudostratified columnar epithelium*

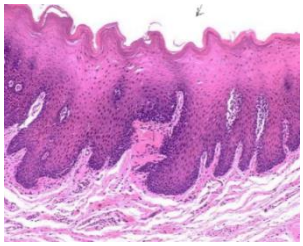
- Consist of one layer of cells where all cells are attached to the basement membrane but with irregularity in the structure (tall and small cells) so it appears as false stratification
- Located in the *respiratory tract* (trachea and bronchi, ciliated with goblet cells) and *male genital tract*



5. *Stratified squamous epithelium*

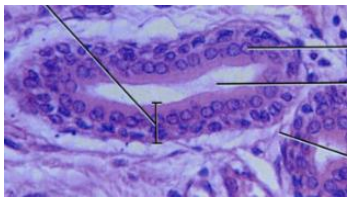


- It can be either keratinized or non-keratinized
- ***Non-keratinized (non-cornified)***
  - It consists of many layers of squamous cells, but the basal is polyhedral
  - Its importance is ***protection***
  - Located in the *oral cavity*, *pharynx*, *esophagus*, *anal canal*, *uterine cervix*, *vagina* and *cornea*



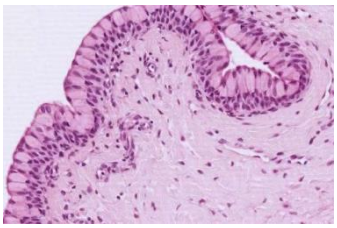
- ***Keratinized (cornified)***
  - Superficial <u>non-cellular</u> layers (dead cells) filled with *keratin filaments*
  - It is a ***<u>dry</u>*** tissue
  - Located in the *epidermis* of the skin

6. *Stratified cuboidal epithelium*



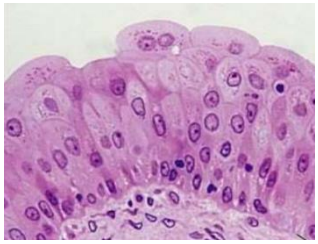
- It is a rare type
- Located in the *large ducts* of exocrine glandes and salivary glands

7. *Stratified columnar epithelium*

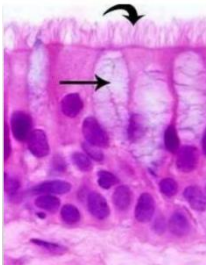


- It is a rare type
- Located in the *conjunctiva* (with goblet cells) and the inner aspect of the *eyelids*
- Its function is ***protection***

8. *Transitional epithelium (Urothelium)*



- Located in most of the *urinary* system parts (such as urinary bladder)
- Appears cuboidal when relaxed and squamous when stretched
- Consists of:
  - A single layer of small basal cells resting on a thin basement membrane
  - Intermediate region containing from one to several layers of cuboidal or low columnar cells
  - A superficial layer of large bulbous or elliptical ***umbrella cells***, sometimes **<u>binucleated</u>**
    - ✓ Protect the underlying cells against the potentially <u>cytotoxic effects of hypertonic urine</u>
- It allows ***stretching*** and ***protects*** the underlying tissues from the urine

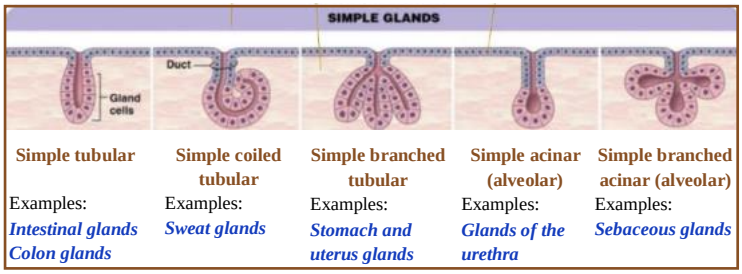


- ***Goblet cells*** are secretory cells that produce ***mucus***, mainly associated with simple, pseudostratified and stratified ***columnar*** which are usually ciliated to sweep mucus

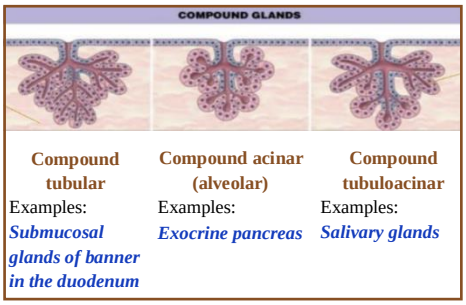
♦ *Secretory epithelium*

- Synthesize and release of substances; proteins, lipids, carbs, and proteins
- Glands are classified according to the number of their cells into:
  - Unicellular (goblet cells)
  - Multi cellular
- Glands are classified according to the presence of duct system into:
  - Exocrine (have a duct)
  - Endocrine (no duct)

- Glands develop from covering epithelia in the fetus by cell proliferation and growth then invagination into the underlying connective tissue, followed by further differentiation
  - If the gland ***retained its connection*** with the surface, it becomes **exocrine**
  - If the gland ***lost its connection*** with the surface where ***capillaries surround*** them to deliver their products, it becomes **endocrine**
- Multicellular exocrine glands are organized into secretory parts divided and separated by stroma
  - *Parenchyma:* the secretory part of the glands
  - *Stroma:* connective tissue that subdivides, surround and support the parenchyma, and includes:
    - ✓ *Capsule:* Dense connective tissue that surrounds some glands
    - ✓ *Septa:* Connective tissue that extend from the capsule divide the parenchyma into smaller compartments called lobes and lobules
- Types of secretion:
  - ***Merocrine:*** most common method of protein or glycoprotein secretion where it is done by *exocytosis* from membrane-bound vesicles or secretory granules, includes ***salivary*** glands
  - ***Apocrine:*** product accumulates at the *apical ends* of the cell, portions of which are then extruded to release the product with small amounts of cytoplasm and cell membrane, include ***mammary*** glands
  - ***Holocrine:*** cells accumulate product continuously as they enlarge and undergo terminal differentiation, culminating in *complete cell disruption* which releases the product and cell debris into the gland's lumen, includes ***sebaceous*** glands
- ***Simple glands:*** glands with unbranched duct such as salivary glands
- ***Compound glands:*** ducts with ducts having 2 or more branches



- Secretory products are categorized according to their nature into:
  - ***Serous cells (acinar):*** synthesize proteins (***not glycosylated***) such as digestive enzymes)
    - ✓ Well-developed RER and Golgi complexes, with secretory granules filling the apical region
    - ✓ *Intensely stained* (basophilic or eosinophilic)
  - ***Mucous cells (tubular):*** produce proteins ***highly glycosylated*** called mucin (which forms mucus when hydrated)
    - ✓ *Poorly stained* because mucin is hydrophilic and washed with water
  - ***Seromucous glands:*** have both serous acini and mucous tubules



- ***Myoepithelial cells:*** Contractile cells at the basal ends of the secretory cells, rich with actin and myosin
  - Long processes of these cells embrace an acinus causing strong contractions that serve to ***propel secretory products*** from acini into the duct system
  - They are related to the exocrine glands only
  - These cells can be detected by immunohistochemistry