Functions of epithelia
Glandular epithelia

Spatial arrangement of epithelia

- covering epithelia
- trabecular epithelia:
  liver, suprarenal
  cortex, islets of
  Langerhans
- reticular: thymus

Functions of epithelia

- to cover and protect
  - lining surfaces & cavities
  - barriers, immune function
- to transport
  - absorption: intestine; tubules of nephron
  - secretion: glands; Bowman’s capsule; tubules of nephron;
  - surface increased by microvilli and basolateral striation: proximal tubules, parotid gland
- to perceive
  - primary sensory epithelia: from the neuroectoderm; olfactory cells, photoreceptors
  - secondary sensory epithelia surrounded by dendrites: taste buds, hair cells of the organ of Corti
- to contract: myoepithelial cells

Glandular epithelia

- synthesis
- storage
- secretion

→ strongly depends on the blood supply and innervation

- proteins, peptides
- lipids (incl. steroid molecules)
- carbohydrates and proteins

Exocrine glands

- unicellular glands: goblet cells

- multicelullar exocrine glands:
  - secretory portion
    - tubular
      - simple: sweat glands; intestinal crypts;
      - branched: gastric glands
    - acinar
      - simple
      - branched: tarsal (Meibomian) glands
  - duct
    - simple (unbranched)
    - compound (branched)
      - tubular: Brunner’s glands
      - acinar: pancreas
      - tubuloacinar: sublingual, submandibular gland

Endocrine glands

- endocrine (ductless) →bloodstream
  - individual cells (DNES)
  - trabeculae: adenhypophysis, islets of Langerhans, adrenal cortex
  - follicles: thyroid gland

  - classical endocrine secretion (via bloodstream → target cells)
  - paracrine (via diffusion or local microcirculation → target cells)
  - autocrine (producing cells = target cells)

Secretion patterns

- merocrine: exocytosis of small quantities
  - sweat glands (eccrine)
  - salivary glands

  - merocrine **serous**
  - merocrine **mucous**

- holocrine: whole cells are shed and become part of the secretion
  - sebaceous glands

- apocrine: large droplets accumulated within and discharged with the apical cytoplasm
  - aromatic glands
  - breast gland

Serous vs. mucous cells/glands

- serous
  - rounded nucleus
  - abundant GER and zymogen granules → basophilic
  - watery, protein-rich secretion
  - e.g., parotid gland, pancreas

- mucous
  - flat nucleus in the basal compartment
  - mucus vesicles → pale cytoplasm
  - viscous secretion with glycoproteins
  - e.g., Brunner's glands, endocervical uterine glands

- seromucous (mixed glands)
  - serous demilunes (Gianuzzi)
  - e.g., trachea, submandibular and sublingual gland

Secretion patterns

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    - pancreas, parotid gland
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Functional histology of epithelia

- diffusion barrier
  - intestine
  - podocyes of the Bowman's capsule
  - type I alveolar pneumocytes
  - glands
  - plexus choroideus
- transport accross epithelia
  - Na^+/K^+-ATP-ase
  - membrane gradients
  - membrane permeability
  - pinocytosis + exocytosis on the opposite surface = transcytosis
- cytokeratin intermediate filaments

Functional histology of epithelia

- renewal of cells
  - renewal rate: 5D in small intestine, 14D in buccal mucosa, 30D in epidermis
  - proliferation
  - differentiation
  - desquamation
- metaplasia = one type of epithelium is replaced by another (both are differetiated)
  - simple columnar → stratified squamous non-keratinized (portio vaginalis cervicis)
  - pseudostratified columnar ciliated → stratified squamous non-keratinized (bronchi)
  - stratified sqamous non-keratinized → simple columnar mucous (oesophagus close to cardia)

Functional histology of epithelia

- differentiation of layers within stratified epithelia
- dysplasia – delayed cell maturation and differentiation
  - further cell divisions with abnormal growth and abnormal differentiation → may progress into neoplasia
- carcinoma – malignant tumor of epithelial origin
- adenocarcinoma – carcinoma originating from glands