CHAPTER 4 TISSUES

Tissues

• tissue = many cells w/ same structure and function
  • cell shape aids function
  • tissue shape aids function

• Histology = study of tissues

4 types of tissues

• Epithelial  coverings contact openings
• Connective  support connect other tissues
• Muscle  movement contraction
• Nerve  control conduct impulse

functions of epithelial tissues:

• protection
  • prevent passage across epithelia
• permeability
  • allows passage across epithelia
• lubrication of surfaces

characteristics of epithelia:

• contact opening
  • free surface
  • lumen
  • covers surfaces skin
  • lines hollow tubes respiratory tract digesive tract urinary tract blood vessels

• forms glands

• cellularity

• specialized contacts between cells
  • tight junctions zona occludens
    — seal between cell membranes
  • desmosomes anchoring junctions
    — hold cells together

• polarity
  — apical vs basal regions
• support by connective tissue
• basement membrane
  — basal lamina + reticular fibers

• avascular
  • no blood vessels

• regeneration
  • active mitosis of stem cells
definitions

- simple = one layer
- stratified = many layers
- squamous = flat
- cuboid = box like
- columnar = tall

need a smooth tissue?

- simple squamous epithelium
- where?
  - blood vessels = endothelium
  - serous membranes

need to exchange stuff?

- move stuff through the entire tissue
- thick or thin?
- thinnest tissue = simple squamous epithelium

- where?
  - capillaries
  - alveoli (lung)
  - kidney

need secretions?

- increase of what cell function?
- increase what part of cell?
- simple or stratified?
- simple cuboidal epithelium

- where?
  - glands
  - kidney

need secretion and absorption?

- need even more cytoplasm
- simple columnar epithelium

- why simple?
- where?
  - stomach
  - intestines

need to move stuff past the cell?

- cilia
- ciliated columnar epithelium
- pseudostratified ciliated columnar epithelium

- where?
  - respiratory tract – trachea
  - fallopian tube
need to increase the surface area?

- microvilli
- intestines
  - = brush border
- kidney
- vs. cilia!

need protection?

- thick or thin?
- stratified squamous epithelium
- where?
  - skin
  - mouth
  - esophagus
  - rectum
  - vagina

need a stretch?

- transitional epithelium
  - stratified becomes simple
  - many cuboidal layers can become squamous
- where?
  - urinary bladder
  - ureter

Glandular epithelium

produce and secrete

where they secrete to:

- **exocrine** secrete into ducts
  - ducts to epithelial surfaces
- **endocrine** secrete into blood
  - no ducts
  - hormones

exocrine glands

unicellular

- Goblet cells secrete mucus
  - intestines
  - respiratory tract

exocrine glands

multicellular

- sweat glands
- sebaceous glands
- digestive glands
- mammary glands

- gland simple cuboidal epithelium
- duct simple or stratified cuboidal epithelium
Connective Tissues

- connect and support other tissues
- cells + matrix
- matrix = stuff between cells
  - fibers = proteins
    - collagen = strength
    - elastin = stretch and recoil
    - reticular = network, thin fibers
- ground substance = gel-like fluid

connective tissue cells

- cells produce or maintain matrix
  - - cyte = cell; adult; maintain matrix
  - - blast = build matrix
- fibroblast = produces fibers
- adipocyte = fat cell
- osteocyte = bone cell
- osteoblast = bone producing cell
- chondroblast = cartilage producing cell

connective tissues vs epithelia

- epithelia = functions based on cells
- connective = functions based on matrix

types of connective tissues

- connective tissue proper
  - loose connective tissue
    - areolar c.t
    - adipose c.t.
    - reticular c.t.
  - dense connective tissue
    - dense regular c.t.
    - dense irregular c.t.
- cartilage
- bone
- blood

Areolar c.t.

- cells - fibroblast
  - mast cells (inflammation)
  - macrophages (phagocytosis)
- fibers - loose arrangement
  - collagen, elastin, reticular
- function: support
- defense
- where? under all epithelia ***
  - most organs
Adipose c.t.
• cell = adipocyte
• function:
  – energy storage
  – cushion
  – insulation
• where?
  • skin
  • kidney, eye
  • active organs: heart, muscle, kidney

reticular c.t.
• like areolar c.t., but only reticular fibers
• holds many cells of organ
  – liver
  – lymph nodes
  – spleen
  – bone marrow

Dense regular c.t.
• strength
• fibroblasts
• matrix
  – fibrous ct: mostly collagen
  – strength
  – tendons
  – ligament
  – artery wall
  – elastic ct: elastin > collagen
  – recoil
  – alveoli
  – artery wall

Dense irregular c.t.
• irregular arrangement of collagen fibers
• location: dermis
• organ capsules

Cartilage
• chondrocytes in lacunae
• matrix:
  – collagen
  – strength
  – water
  – decrease friction
• functions:
  – support
    – trachea
    – ear
    – nose
    – IVD = intervertebral disc
  – decrease friction
  – articular cartilage
  – bone growth
types of Cartilage

- hyaline cartilage
  - joints
  - ribs
  - trachea, larynx
- elastic cartilage
  - cartilage + elastic fibers
  - ear
  - epiglottis
- fibrocartilage
  - cartilage + collagen fibers
  - IVD
  - some joints

Bone

- cell = osteocyte
- matrix
  - collagen + Calcium
- Haversian systems = Osteons
- function: support, protect organs

Blood

- cells
  - RBC = erythrocyte
  - WBC = leukocyte
  - platelet = thrombocyte
- matrix
  - plasma

Muscle

- cells specialized for contraction
- 3 types:
  - skeletal
  - smooth
  - cardiac

skeletal muscle

- = voluntary muscle
  - conscious movement
- = striated muscle
  - striped appearance
- long, parallel cells
- function: moves skeleton

cardiac muscle

- = myocardium
- involuntary
- short, branching cells
- intercalated discs

smooth muscle

- = involuntary
- small, flat cells
- walls of organs and blood vessels
Nerve

• cell = neuron
  – cell body
  – processes dendrites
  – axon
• supporting cells = neuroglia

Membranes

• continuous sheets of epithelial + connective tissues
• cutaneous skin
• mucous lines tracts
• serous lines closed cavities

mucous membranes

• lines tracts that open to environment
  • digestive
  • respiratory
  • urinary
  • reproductive
• = mucosa

epithelial tissue varies
• areolar c.t. = lamina propria

serous membranes

• lines closed cavities
• simple squamous epith.secretes serous fluid
• 2 layers:
  – parietal
  – visceral

serous membranes

• Pleura
  • parietal pleura
  • visceral pleura

• Pericardium
  • parietal pericardium
  • visceral pericardium

• Peritoneum
  • parietal peritoneum
  • visceral peritoneum