

Chapter 18
10/6 8:00 am

- ⊕ Epithelium: contiguous (little ECM), cell junctions, avascular, polarized, basal lamina selective barrier, protective and metabolic function
- ⊕ Specializations: Keratinized, cilia, microvilli, apical secretion, infolding of plasma memb. microvilli have actin in them, cilia have microtubules.
- ⊕ To target a secretory vesicle to the apical or basolateral surface, vectorial transport is used. Two ways: direct sorting in the TGN (trans Golgi network) or random delivery combined with retrieval from the "wrong" surface (indirect sorting).
- ⊕ Trans epithelial transport can only happen because of the difference in membrane protein distribution between apical and basolateral surfaces.
- ⊕ All epithelia sit on a basal lamina. Lots of collagen IV here (sheets). The basal lamina not only serves as an attachment structure, but provides a barrier between the epithelium and the underlying connective tissue. It can have selective permeability (kidneys) and also serves as a reservoir for GF.

Tight junctions

- ⊕ Provides a seal between the apical ECM and basolateral ECM. However, some ions can get through with the help of TJ proteins (paracellular transport)
- ⊕ Claudins and occludins make up the tight junctions, both are linked to actin inside the cell
- ⊕ WBCs can temporarily destroy tight junctions during diapedesis.

GAP-junctions

- ⊕ connect the cytoplasm of cell A to cell B
- ⊕ made up of two hemi-channels (each ~~cell~~ cell provides 1)
- ⊕ everything < 1.2 kDa can get through. This allows ionic communication (e.g. passing on action potentials) and the metabolism of cells can be synchronized.
- ⊕ Gap-junctions are gated. Low pH or high $[Ca^{2+}]$ closes the channel. This is important so cell A can apoptose without killing cell B.

Anchoring junctions

- ⊕ Adherens junction
 - ⊕ hemidesmosome
 - ⊕ desmosome
- } see former lecture

Note: E-cadherin normally binds & sequesters β -catenin. β -catenin is a transcription factor needed for cell proliferation.

Chapter 19
10/6 12:10 pm

Connective tissues, cartilage and bone

- ⊕ functions: mechanical support, defense (immune cells found in some), communication (blood vessels run through it)

ECM determines properties

- ⊕ Resident vs. immigrant cells:

Resident cells are all those derived from mesenchymal stem cell ("born + raised")

Immigrant cells must travel to the connective tissue (WBCs etc)

Note: Osteoclast are from the hematopoietic lineage and are immigrant cells.

- ⊕ Know: Fibroblasts, white/brown fat cells, chondrocytes/blasts, osteocytes/blasts
Mast cells, osteoclasts

Cartilage formation:

Mesenchymal cells differentiate to chondroblasts. They secrete proteoglycans and collagen II \Rightarrow Lacunae formation and differentiation to chondrocytes.

There is appositional growth on the surface of the cartilage and interstitial growth.

No blood or nerve supply. Nutrients only by diffusion. Compression of cartilage necessary.

Bone formation

Two ways: mineralization of osteoid (intramembranous ossification) or deposition of bone matrix on pre-existing cartilage (endochondrial ossification).
However: growth is only appositional, remodeling occurs throughout life (Wolff's law).

- ⊕ Type I collagen: arrangement of collagen I determines bone structure (i.e. lamellar vs. cancellous)

⊕ osteocytes are in lacunae but stay connected through canaliculi with their filopodia.

⊕ Know how osteoclasts work.

⊕ Know how remodeling works and how Haversian systems are formed.