Intercellular connections

- What is intercellular connections
- Functions
- Types of intercellular connections
- Applied physiology

Note: Draw diagrams

- Intercellular connections are points of contact between the plasma membranes of adjacent cells. It consists of multi-protein complexes that provide contact between neighbouring cells or between a cell and the extracellular matrix.
- Functions of intercellular connections
  - Form fluid-tight seal between cells.
  - Anchor cells together or to extracellular materials.
  - Allow ions/molecules to pass from cell to another cell within a tissue
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Table 4.5: Types of intercellular connections.
A. Junctions that tie cells together
1. Tight junctions
2. Anchoring junctions
a. Cell to cell anchoring junctions
– Desmosome
– Zonula adherens
b. Cell to basal lamina anchoring junctions
– Hemidesmosome
– Focal adhesion
B. Junctions that allow transfer of ions and small molecules
1. Gap junctions

- Tight junctions/ Zonula occludens : Attach 2 cells near apical margins of the cells in epithelia
  - Location: Intestinal mucosa, Renal tubules, and the choroid plexus.
  - There are 3 main families of transmembrane proteins that contribute to tight junctions: **occludin, junctional adhesion molecules (JAMs),** and **claudins**.

  - Tight junctions permit the passage of some ions and solute in between adjacent cells **(paracellular pathway)**.
  - It helps in forming Selective permeability barrier in intestine and renal tubules, blood brain barrier in brain.

- **Zonula adherens**: is located on the basal side of the zonula occludens,
  - It is a major site of attachment for intracellular microfilaments.
  - It contains cadherins.
- **Desmosomes** are patches characterized by apposed thickenings of the membranes of two adjacent cells.
  - Attached to the desmosomes in each cell are intermediate filaments.
  - Between the two membrane thickenings the intercellular space contains cadherins.
- **Hemidesmosomes**: look like half-desmosomes that attach cells to the underlying basal lamina and are connected intracellularly to intermediate filaments. They contain integrins rather than cadherins.
- **Focal adhesions** also attach cells to their basal laminas. They are associated with actin filaments inside the cell, and they play an important role in cell movement. Between the two membrane thickenings the intercellular space contains Integrins.
- **Gap junctions:** At gap junctions, the intercellular space narrows from 25 nm to 3 nm, and units called **connexons** in the membrane of each cell are lined up with one another . Each connexon is made up of six protein subunits called **connexins.**
  - X-linked **Charcot–Marie–Tooth disease** is a peripheral neuropathy associated with mutation of one particular connexin gene
  - Cardiac muscles form functional synctitium due to presence of gap junctions in the intercalated disc.