RANIGANJ GIRLS' COLLEGE

DEPT OF ZOOLOGY

4th SEM / CC- VIII /unit – 1/ (CELL BIOLOGY)

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Cell Junctions

The plasma membranes of adjacent cells are usually separated by extracellular fluids that allow transport of nutrients and wastes to and from the bloodstream. In certain tissues, however, the membranes of adjacent cells may join and form a junction. Three kinds of cell junctions are recognized:

- **Desmosomes** are protein attachments between adjacent cells. Inside the plasma membrane, a desmosome bears a disk-shaped structure from which protein fibers extend into the cytoplasm. Desmosomes act like spot welds to hold together tissues that undergo considerable stress (such as skin or heart muscle).
- **Tight junctions** are tightly stitched seams between cells. The junction completely encircles each cell, preventing the movement of material between the cell. Tight junctions are characteristic of cells lining the digestive tract, where materials are required to pass through cells (rather than intercellular spaces) to penetrate the bloodstream.
- **Gap junctions** are narrow tunnels between cells that consist of proteins called connexons. The proteins allow only the passage of ions and small molecules. In this manner, gap junctions allow communication between cells through the exchange of materials or the transmission of electrical impulses.

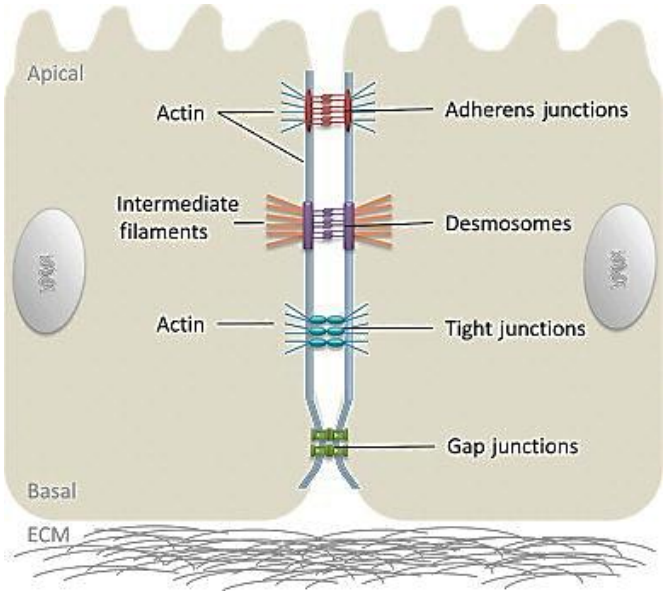

Fig : Three types of cell junctions

Detailed Note

Gap junctions

Functionally, **gap junctions** in animal cells are a lot like plasmodesmata in plant cells: they are channels between neighboring cells that allow for the transport of ions, water, and other substances3^33cubed. Structurally, however, gap junctions and plasmodesmata are quite different.
In vertebrates, gap junctions develop when a set of six membrane proteins called **connexins** form an elongated, donut-like structure called a **connexon**. When the pores, or "doughnut holes," of connexons in adjacent animal cells align, a channel forms between the cells. (Invertebrates also form gap junctions in a similar way, but use a different set of proteins called innexins.)

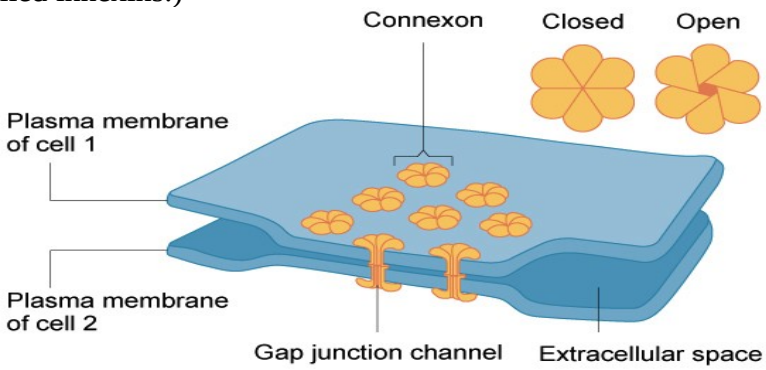

Fig: Gap junction

Image of the plasma membranes of two cells held together by gap junctions. Where two connexons from the different cells meet, they can form a channel leading from one cell into the next.
Gap junctions are particularly important in cardiac muscle: the electrical signal to contract spreads rapidly between heart muscle cells as ions pass through gap junctions, allowing the cells to contract in tandem.

Tight junctions

Not all junctions between cells produce cytoplasmic connections. Instead, **tight junctions** create a watertight seal between two adjacent animal cells.
At the site of a tight junction, cells are held tightly against each other by many individual groups of tight junction proteins called **claudins**, each of which interacts with a partner group on the opposite cell membrane. The groups are arranged into strands that form a branching network, with larger numbers of strands making for a tighter seal.

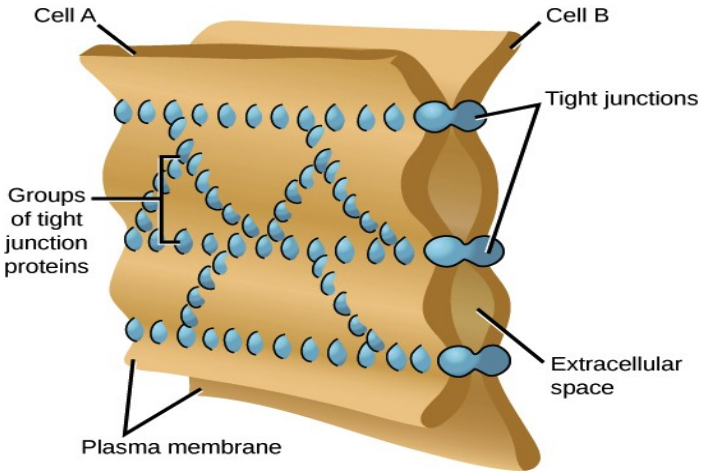

Fig: Tight junction

The tight junctions are like rivets, and they are arranged in multiple strands that form lines and triangles.
The purpose of tight junctions is to keep liquid from escaping between cells, allowing a layer of cells (i.e. those lining an organ) to act as an impermeable barrier. For example, the tight junctions between the epithelial cells lining your bladder prevent urine from leaking out into the extracellular space.

Desmosomes

Animal cells may also contain junctions called **desmosomes**, which act like spot welds between adjacent epithelial cells. A desmosome involves a complex of proteins. Some of these proteins extend across the membrane, while others anchor the junction within the cell.

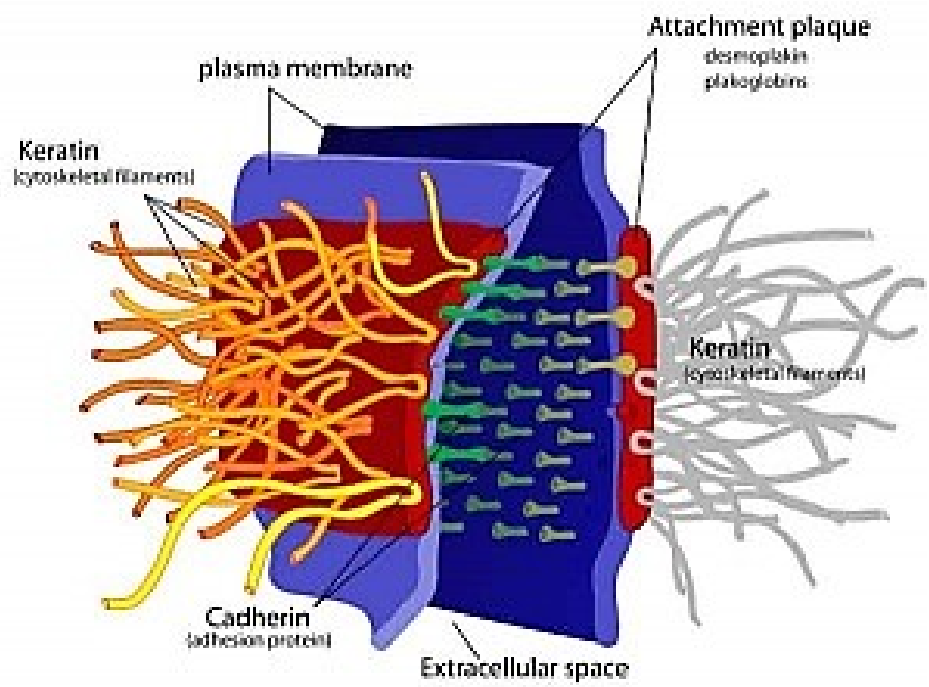

Fig: Desmosomes

Cadherins, specialized adhesion proteins, are found on the membranes of both cells and interact in the space between them, holding the membranes together. Inside the cell, the cadherins attach to a structure called the cytoplasmic plaque which connects to the intermediate filaments and helps anchor the junction.
Desmosomes pin adjacent cells together, ensuring that cells in organs and tissues that stretch, such as skin and cardiac muscle, remain connected in an unbroken sheet.