Intracellular junction and extracellular matrix

Intercellular junctions are structures which provide adhesion and communication between cells. They are mostly present in epithelial cells that are especially characterized by their strong attachment one to another and to extracellular matrix.

Intercellular junctions provide in this way stability to the epithelial tissue. The different multiprotein complexes each of these junctions have, allow also intercellular transport with the neighboring cells.

Functions of Intracellular junction:-

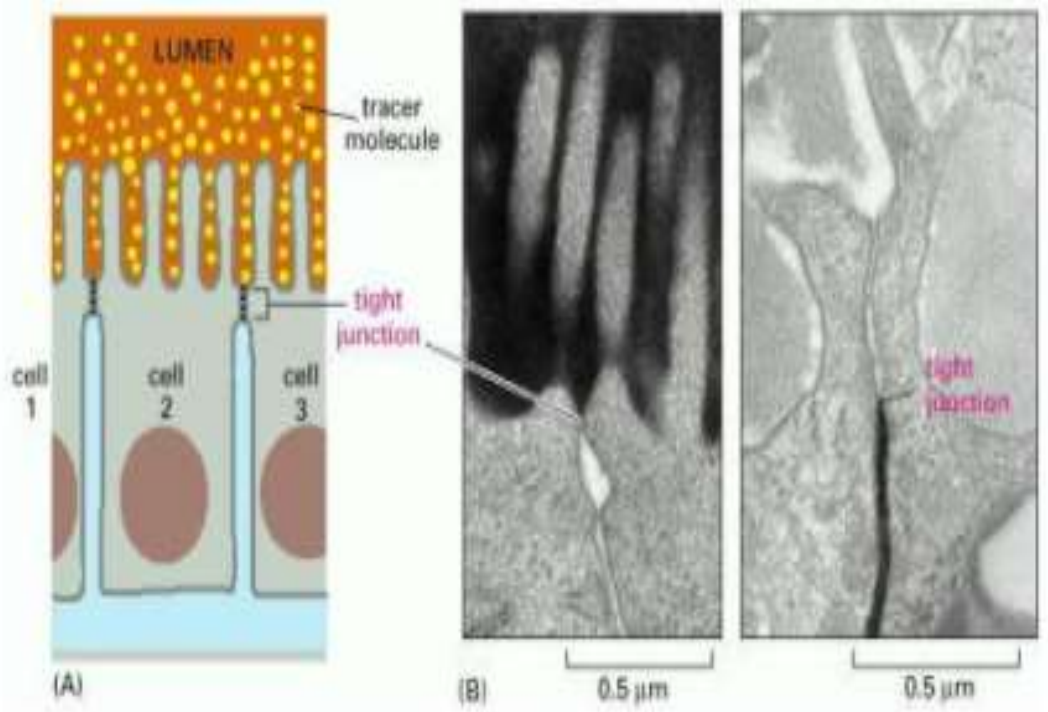
1. Help hold cells together
2. Important in enabling communication between neighboring cells via specialized protein complexes called communicating (gap) junctions.
3. Important in reducing stress placed upon cells.

Three different types of intercellular junctions can be distinguished according to their function:

- **Tight** or **occluding junctions**
- **Adherent** or **anchoring junctions**, including **desmosomes** and **hemidesmosomes**
- **Gap junctions**

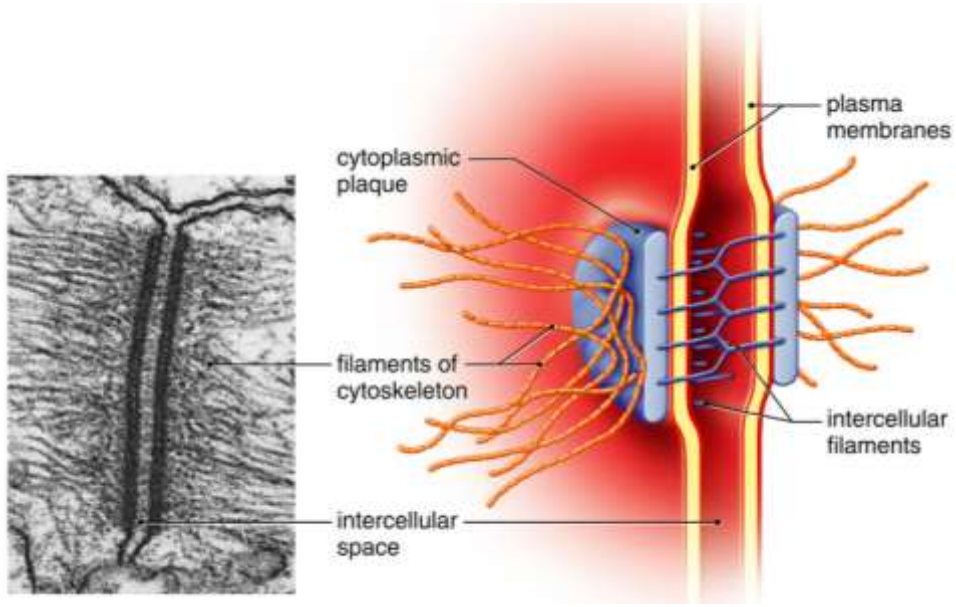
Tight junction,

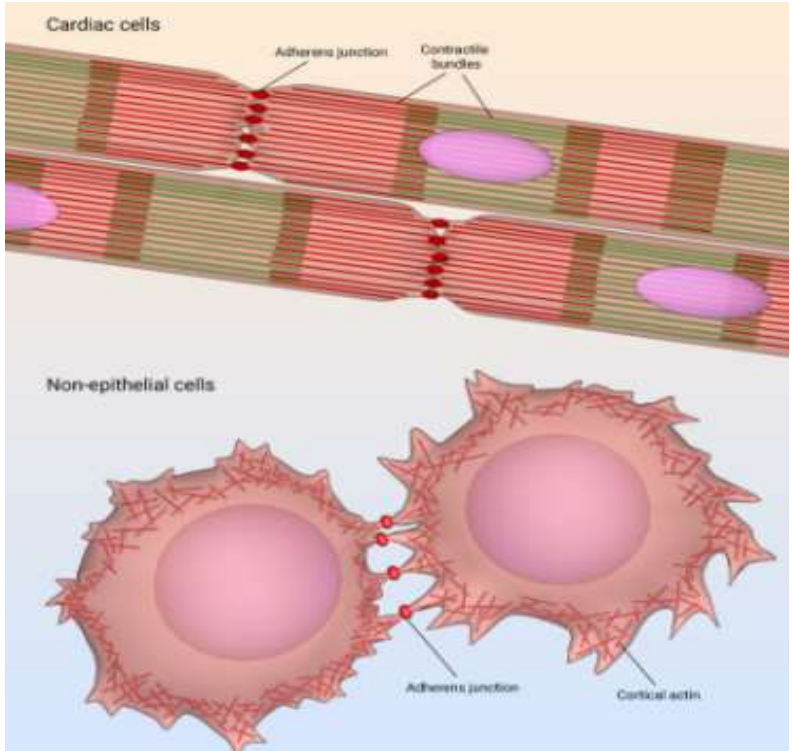
- Is a watertight seal between two adjacent animal cells. The cells are held tightly against each other by specific proteins. This tight adherence prevents materials from leaking between the cells.
- These junctions are typically found in epithelial tissues that line internal organs and cavities and comprise most of the skin. For example, the tight junctions of the epithelial cells lining the urinary bladder prevent urine from leaking out into the extracellular space.



Adhesion junctions

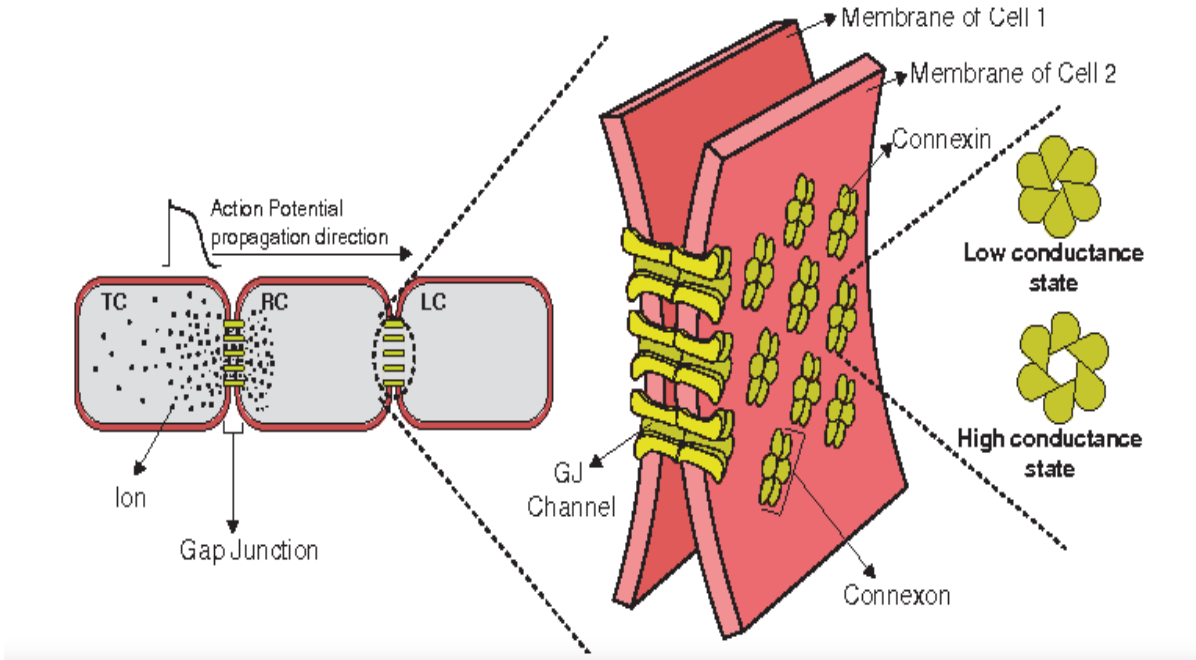
- Fasten cells together into strong sheets. Intermediate filaments made of keratin proteins anchor desmosomes in the cytoplasm.
- Short proteins called cadherins in the plasma membrane connect to intermediate filaments to create desmosomes. The cadherins join two adjacent cells together and maintain the cells in a sheet-like formation in organs and tissues that stretch, such as the skin, heart, and muscles.
- They let material pass through the intracellular spaces and keep the cells from being pulled apart.

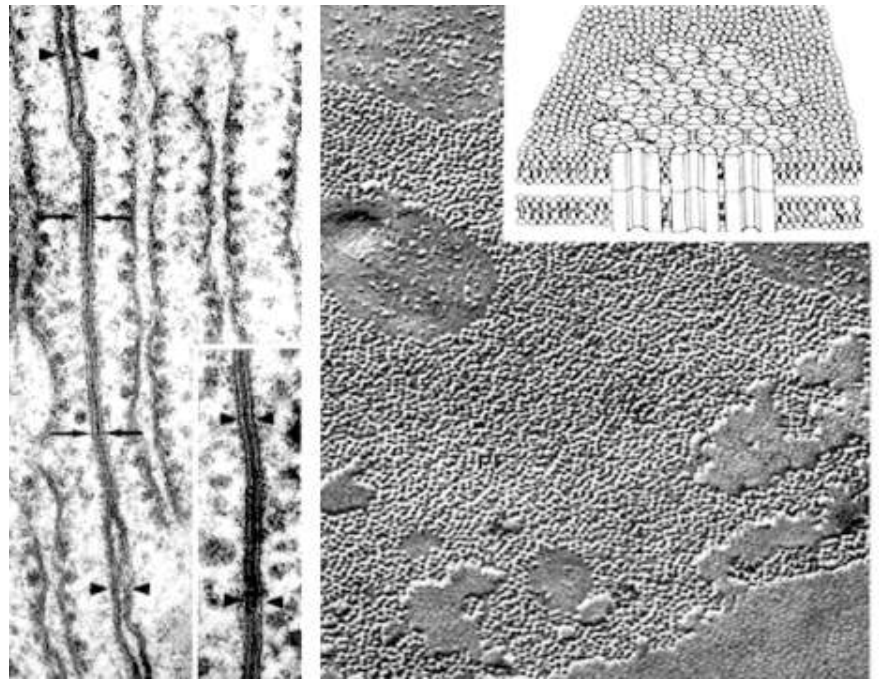




Gap junctions:

- They connect cells and work as channels between adjacent cells that allow for the transport of ions (signal molecules), nutrients, and other substances that enable cells to communicate.
- A gap junction consists of proteins named *connexin*. Six of them form together a complex called *connexon*. This complex has a hydrophilic pore.
- Gap junctions are particularly important in cardiac muscle. The electrical signal for the muscle to contract is passed efficiently through gap junctions, which allows the heart muscle cells to contract in tandem.

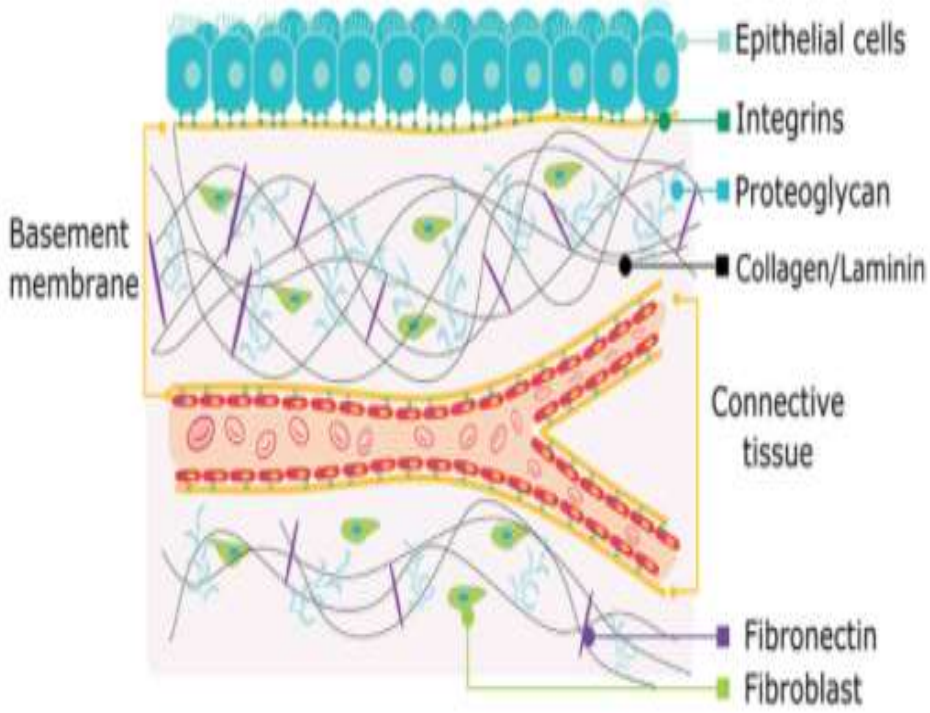


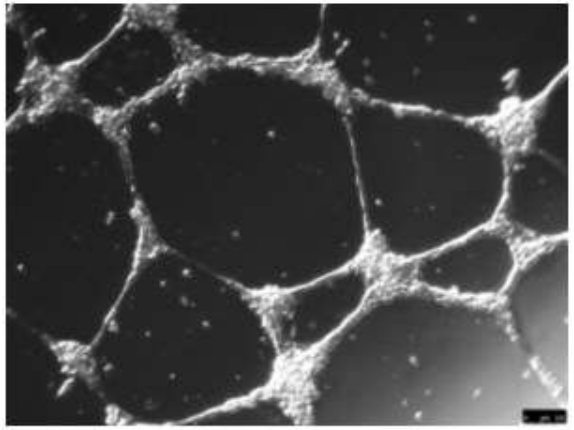


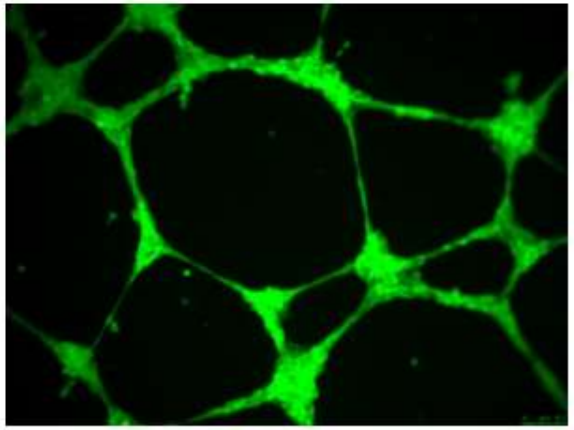
Extracellular matrix:

Is the non-cellular component extensive molecule network composed of three major components: protein, glycosaminoglycan, and glycoconjugate.

Is present within all tissues and organs and provides not only as an essential physical scaffolding for cell attachment and bind together, but also initiates the important biochemical and biomechanical actions that are required for tissue morphogenesis, differentiation, adhesion, migration, proliferation and homeostasis. So, it transmits the chemical messengers to cells







Release in the cell

- All cells release their waste products after the metabolic activity, by a prosses called exocytosis.
- Cells also release ATP as a source of energy by cell respiration.
- The cells release some components according to their specific job, for example neurons release chemical compounds to send a signal to another neurons, cells of glands release hormones and growth factors, immune cells release type of proteins called cytokines as a response for immune defense mechanism
- Some cells releasing are not useful, for example when viruses attack a cell, so they replicated and release in a large amount and infected another cells.

Death of the cells

Cell death is an important process in the body as it promotes the removal of unwanted cells.

Why do cells die?

Cell death is an important process in the body. It removes cells in situations including:

- When cells are not needed, such as during certain stages of development.
- To create a structure in the body, for example, the outer layer of the skin is made of dead cells.
- To remove excess cells, such as white blood cells after an infection has been cleared.
- If cells are damaged, such as by radiation or toxins.
- When cells are infected by viruses.

How do cells die?

- Cells can die because they are damaged, but most cells die by killing themselves.
- There are several distinct ways in which a cell can die. Some occur by an organized, ‘programmed’ process. Some cell death processes leave no trace of the dead cell, whereas others activate the immune system with substances from the dead cell.
- Failure of cells to die, or cells dying when they shouldn’t, can lead to or exacerbate many diseases.

How does cell death impact health?

- Many diseases are associated with abnormal cell death. Some examples of this are:

Cancer	Cancer cells often resist cell death, even after anti-cancer treatment.
Autoimmunity e.g. Lupus, type 1 diabetes	Immune cells that attack the body's own tissues normally die. If this cell death does not occur it can cause diseases such as lupus or type 1 diabetes.
Viral infection	Viruses need to keep a cell alive in order to reproduce. Cell death can therefore prevent viral replication.
Heart attack	Many cells, including those in the heart and brain, trigger their apoptosis machinery when they lose their blood supply.

Thanks for attention

Questions