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Opinion Article

Brief Note on Stable Cell-Cell Interactions

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DESCRIPTION

Cell adhesion inside a tissue and managing the form and function of cells both require stable cell-cell connections. Cell junctions, which are multi protein complexes that facilitate contact between nearby cells, and are involved in the persistent relationships. Cell junctions allow epithelial cell sheets to be retained and function appropriately. These junctions are particularly crucial in the organisation of tissues. Cells of one kind can only adhere to cells of the same tissue and not to cells from another tissue.

Different Junctions of Stable cell-cell interactions are:

- Tight Junctions
- Anchoring Junctions
- Gap Junctions
- Plant cell-cell interactions

Tight junctions

Tight junctions are multi-protein complexes that connect cells in the same tissue and prevent water and water-soluble compounds from moving between them.They also serve to separate the extracellular fluid surrounding epithelial cells' apical and basolateral membranes. These junctions form a continuous band between the membranes of neighbouring epithelial cells slightly below the apical surface. Adjacent cells form tight connections to create a bond between different tissues and bodily cavities. The apical surface of gastrointestinal epithelial cells, for example, acts as a selective permeable barrier that isolates the body from the external environment. The permeability of these junctions is determined by a number of parameters, including the protein composition of the junction, tissue type, and cell signalling.

Many different proteins make up tight junctions. Occludin, claudin, junctional adhesion molecules (JAMs), and tricellulins are the four primary transmembrane proteins. The extracellular domains of these proteins establish the tight junction barrier by interacting with the protein domains on neighbouring cells in homophilic (between proteins of the same sort) and heterophilic (between proteins of different types) ways. Their cytoplasmic domains interacting with the cell cytoskeleton.

Anchoring junctions

Only adherens junctions and desmosomes are engaged in cell-cell interactions, out of the three types of anchoring junctions. Both can be found in a variety of cell types. Adhesive connections on the lateral membranes of adjacent epithelial cells join them. They're found directly below tight intersections. Cell adhesion molecules from the cadherin family make up adherens junctions. There are over 100 different varieties of cadherins, each corresponding to a particular type of cell or tissue with differing anchoring requirements. E-, N-, and P-cadherins are the most frequent. E-cadherin is the most prevalent protein in epithelial cells of adherens junctions.

Desmosomes, which are found right below adherens junctions, provide strength and durability to cells and tissues. Desmosomes are also involved in cell-to-cell communication.

Gap junctions

Gap junctions, which allow tiny molecules to diffuse between adjacent cells, are the primary site of cell-cell signalling or communication. Gap junctions in vertebrates are made up of transmembrane proteins called connexins. Ions, sugars, and other tiny molecules can travel *via* hexagonal pores or channels formed by them. Each pore is made up of 12 connexin molecules, six of which form a hemichannel on one cell membrane and interact with a hemichannel on the other. Many factors influence the permeability of these junctions, including pH and Ca^{2+} concentration.

The ability of receptor proteins on the cell surface to bind specific signalling chemicals released by other cells is known as direct-contact signalling. Cell signalling allows cells to communicate with each other, with surrounding cells (paracrine), and even with cells that are far away (endocrine). This binding causes a conformational change in the receptor, which causes the associated cell to respond. Changes in gene expression and cytoskeleton structure are examples of these reactions. A variety of proteins, carbohydrates, and lipids extend outward from the plasma membrane's extracellular and act as signals.

Plant cell-cell interactions

Plant cells have cell walls that act as barriers to cell-to-cell contact. This barrier is broken down by plasmodesmata, which are specialised junctions. They connect the cytosols of neighbouring cells in a similar way to gap junctions.

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CONCLUSION

These junctions are responsible for cell communication and arrangement inside a tissue such as interactions between immune system cells or those engaged in tissue inflammation are ephemeral or temporary. Intercellular interactions between cells and the extracellular matrix and cellular communication failure can lead to unregulated cell proliferation and malignancy.