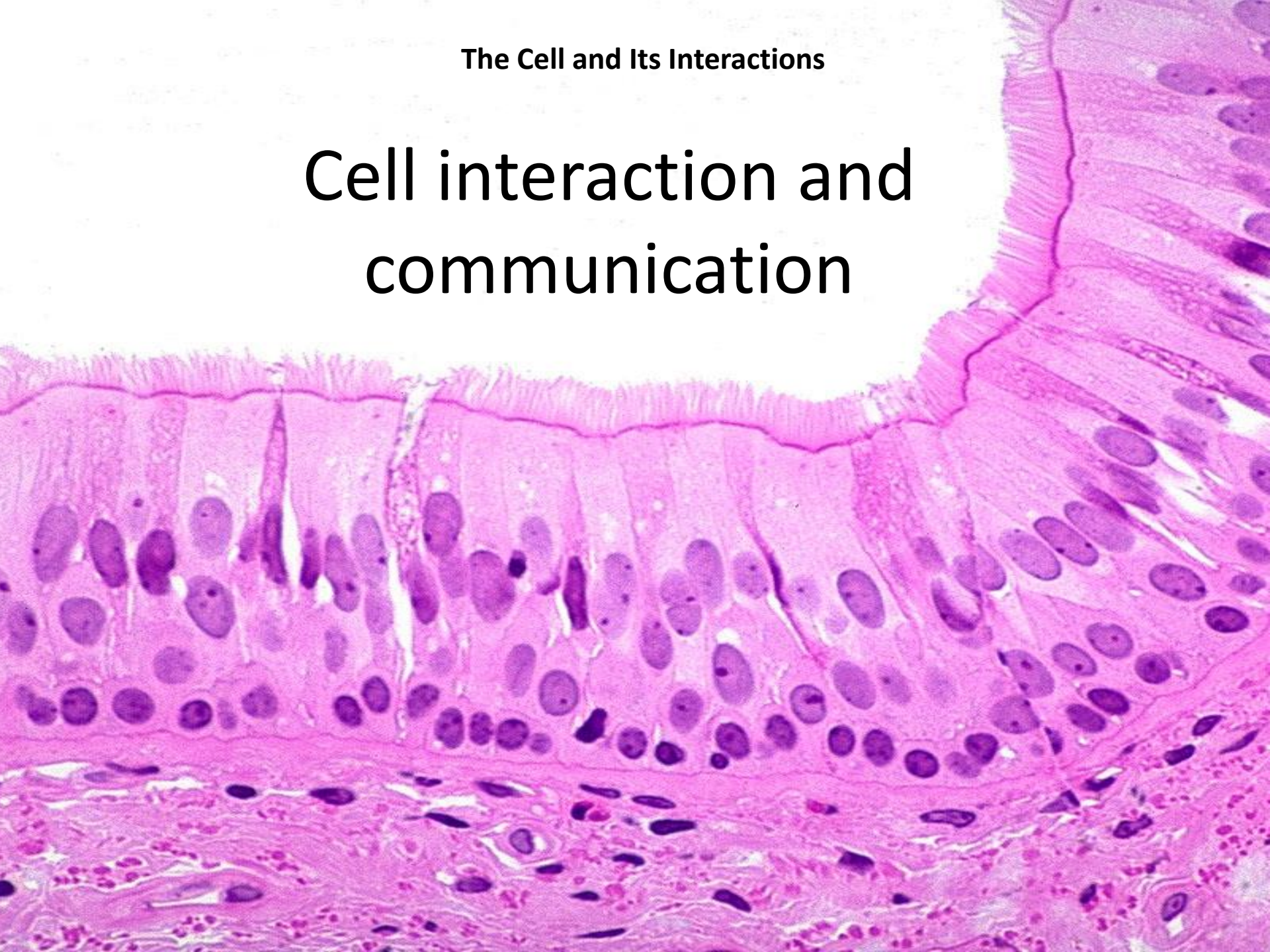
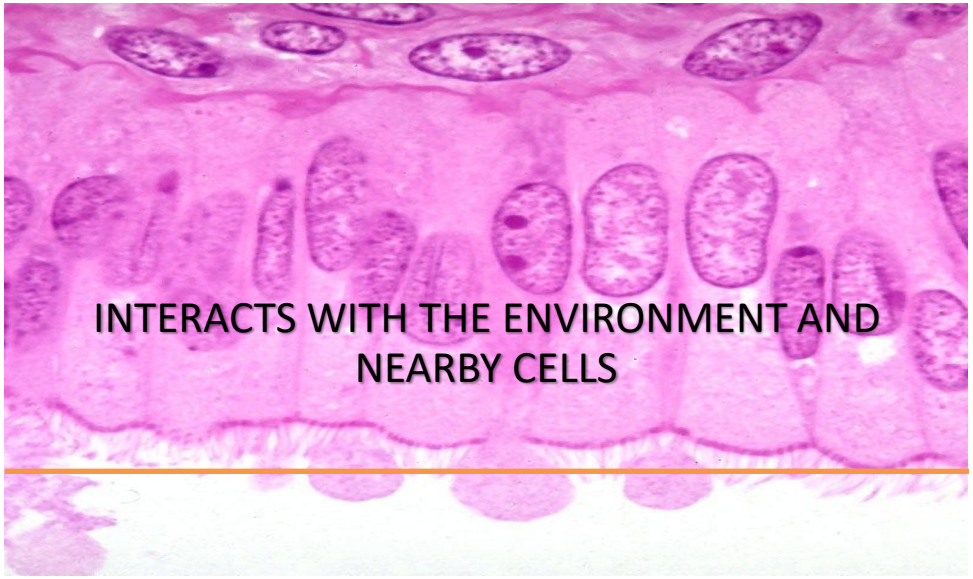
Cell interaction and communication



NTRODUCTION:

THE CELL AS A RELATIONAL UNIT

THE CELL IS NOT AN ISOLATED ENTITY BUT A RELATIONAL ONE.

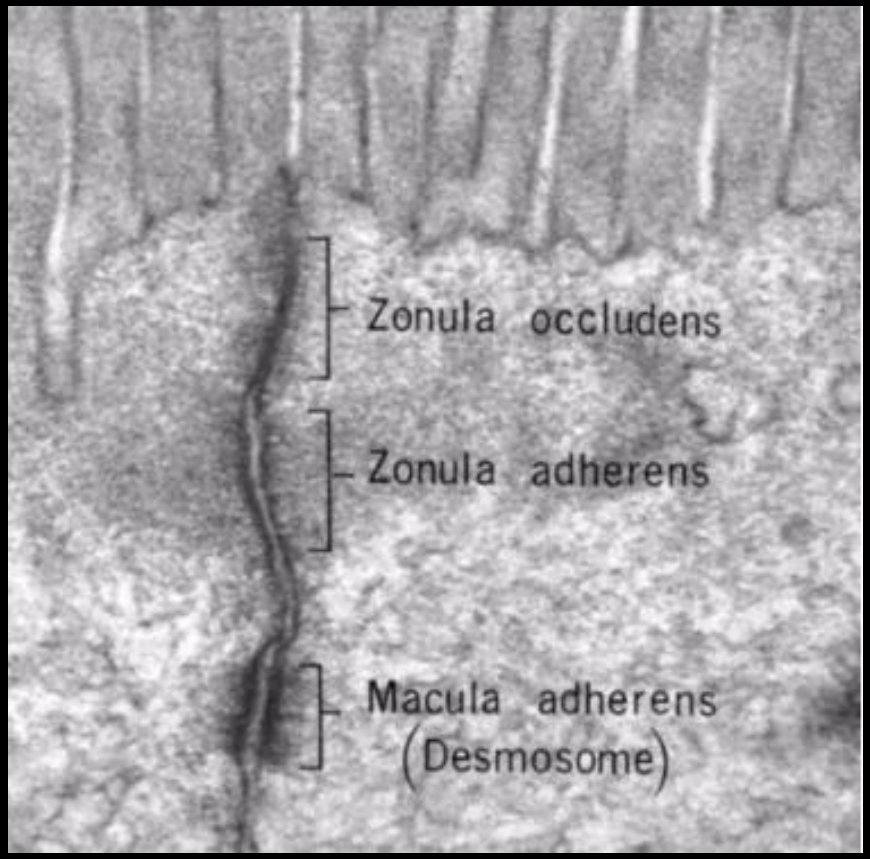


CELL JUNCTIONS OF THE PLASMA MEMBRANE

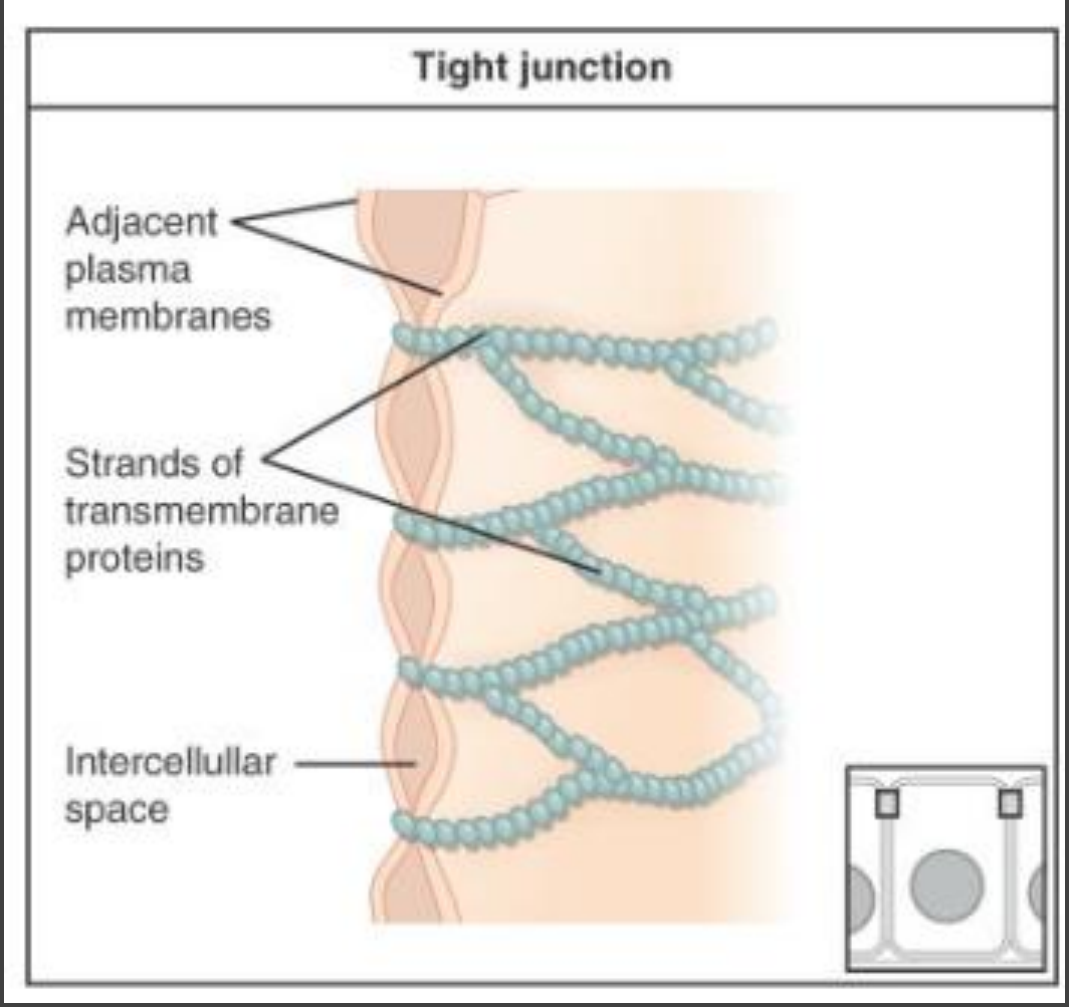
1. **Tight junctions (Occluding junctions)**
   Seal the cells together and maintain polarity.

2. **Desmosomes (Anchoring junctions)**
   Anchor cells and provide mechanical strength.

3. **Gap junctions (Communicating junctions)**
   Allow the exchange of ions and small molecules.



1 TIGHT JUNCTIONS



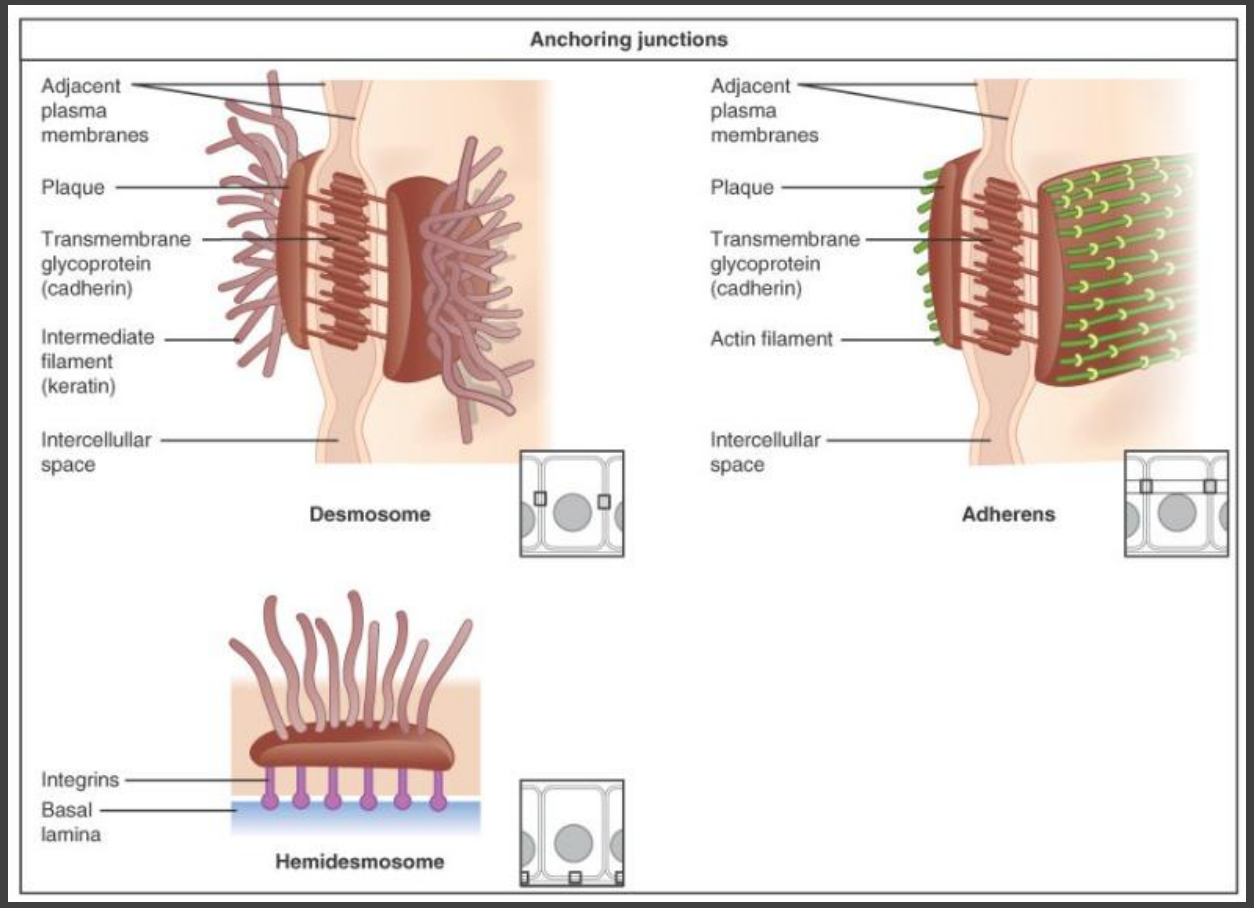
TIGHT JUNCTIONS

SEAL ADJACENT CELLS, PREVENTING MOLECULES FROM PASSING THROUGH THE INTERCELLULAR SPACE.

THEY ARE FORMED BY TRANSMEMBRANE PROTEINS SUCH AS ***CLAUDIN*** AND **OCCLUDIN**, WHICH BIND TOGETHER IN A CONTINUOUS MANNER.

THEY FORM A SELECTIVE BARRIER (E.G., INTESTINAL EPITHELIUM) AND CELLULAR POLARITY, SEPARATING THE APICAL DOMAIN FROM THE BASOLATERAL DOMAIN.

2 DESMOSOMES - MACULA ADHERENS - HEMIDESMOSOME

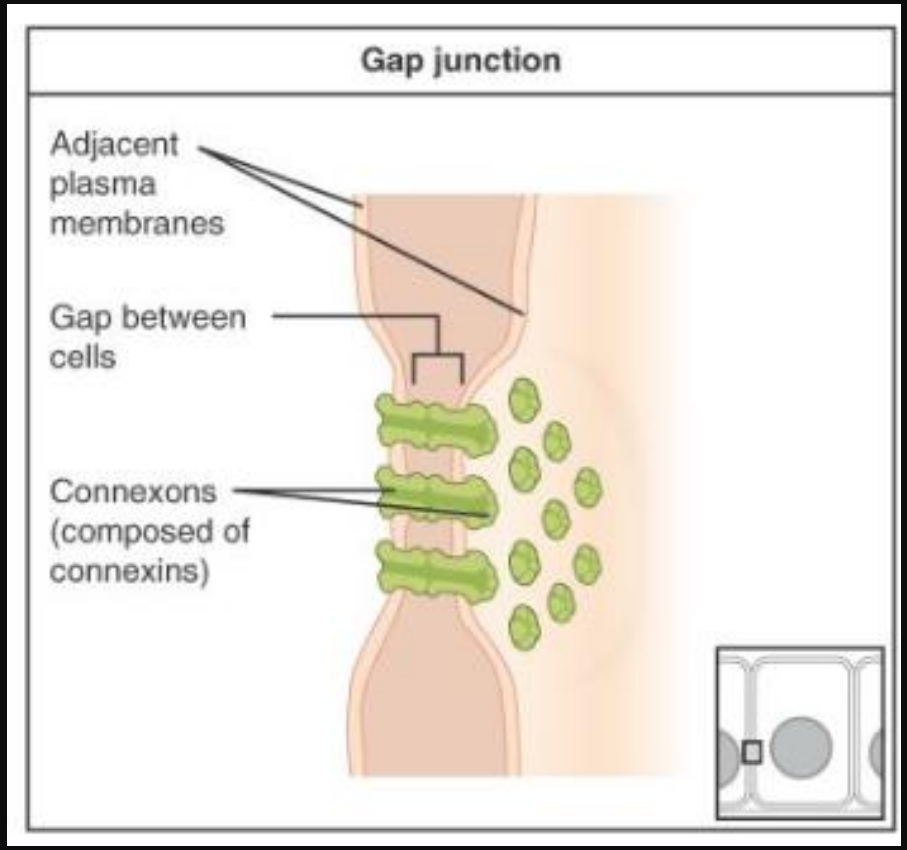


THEY PROVIDE MECHANICAL STRENGTH.

3 Gap junctions

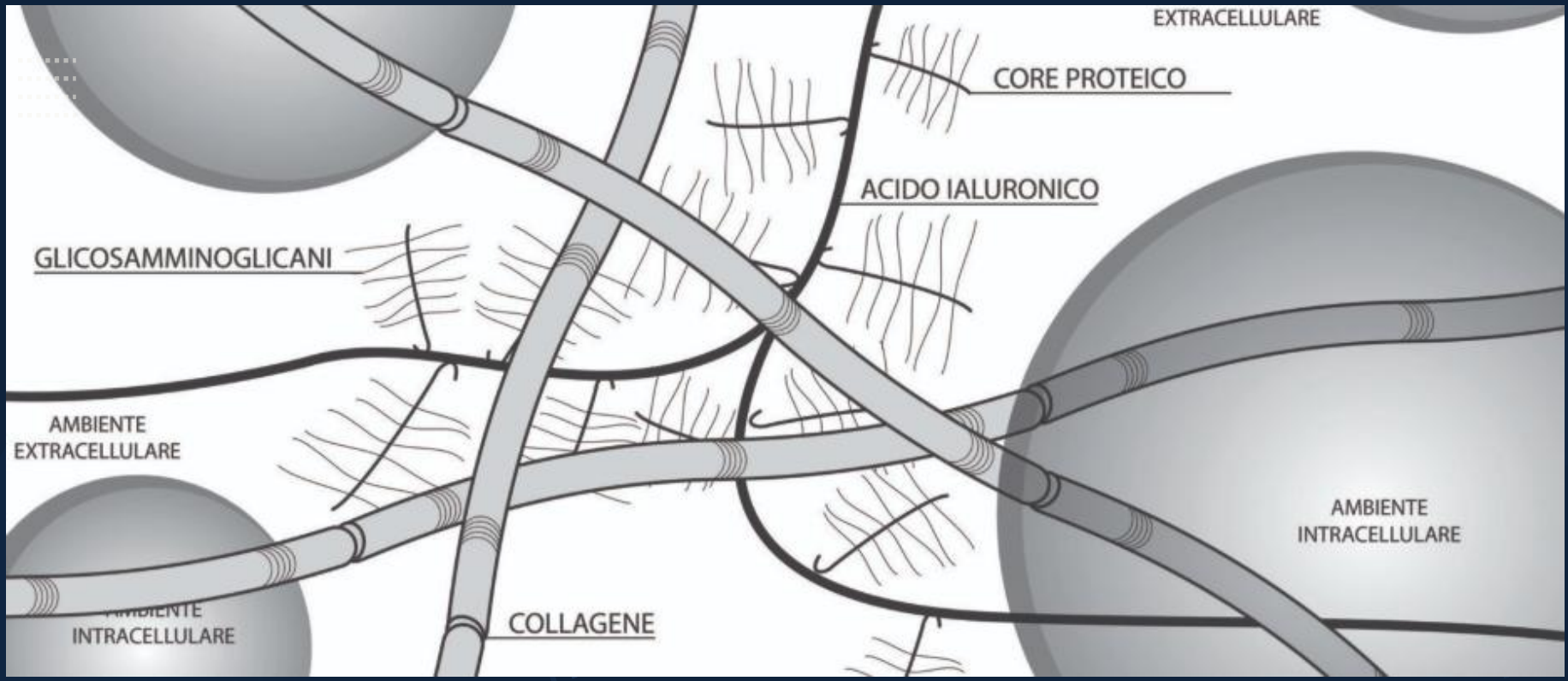
- Channels formed by connexons (connexins))

- Direct communication between cells



SUMMARY OF THE STRUCTURE AND FUNCTION OF CELLULAR JUNCTIONS

Type of junction	Main proteins	Function	Example
Tight junctions	Claudins, Occludins	Barrier, polarity	Intestinal epithelium
Desmosomes	Desmogleins Keratin	Mechanical strength	Epidermis
Gap junctions	Connexins	Direct communication	Cardiac tissue



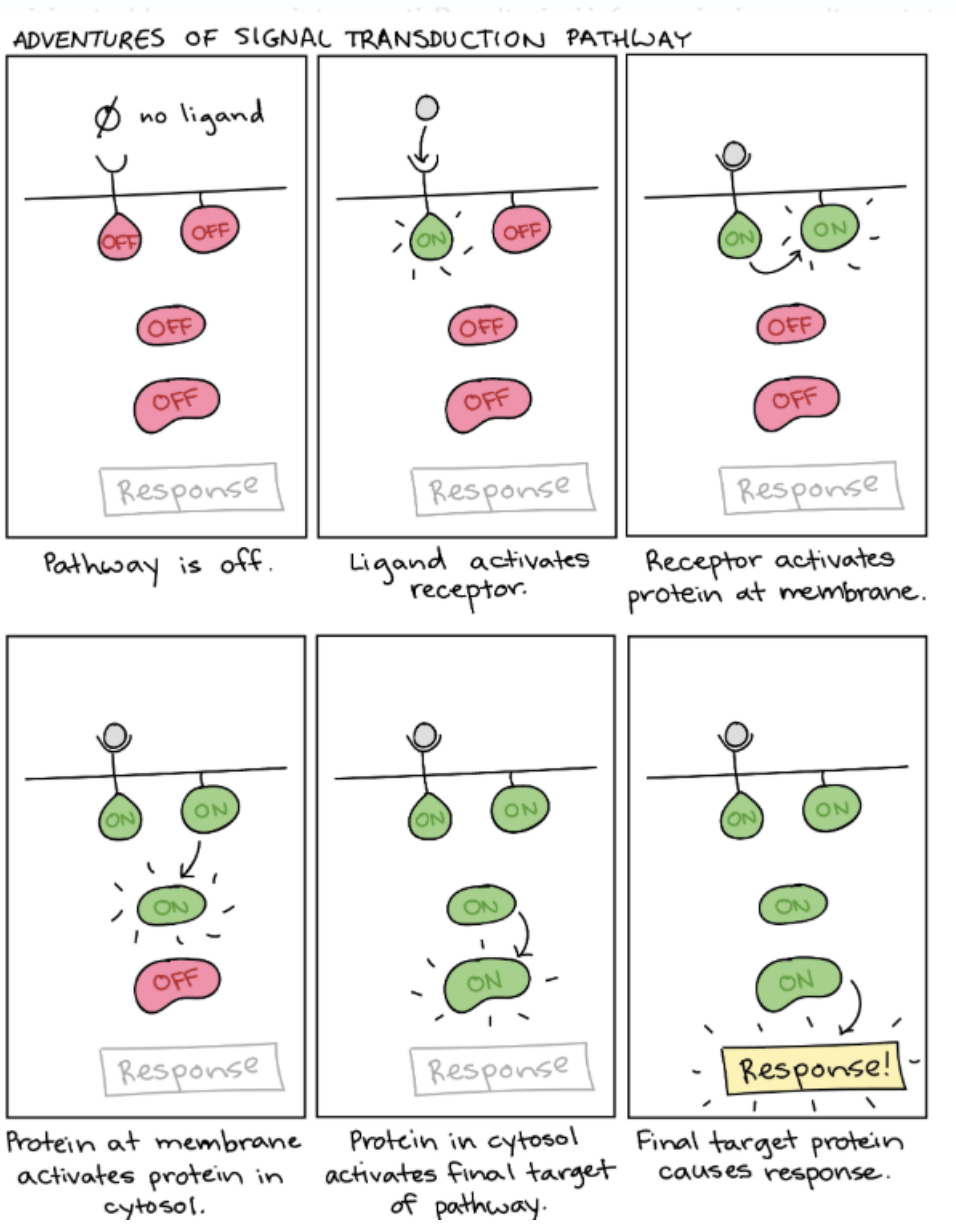
EXTRACELLULAR MATRIX (ECM)

It is not empty space but a functional structure.

CELL–CELL AND CELL-ENVIRONMENT COMMUNICATION

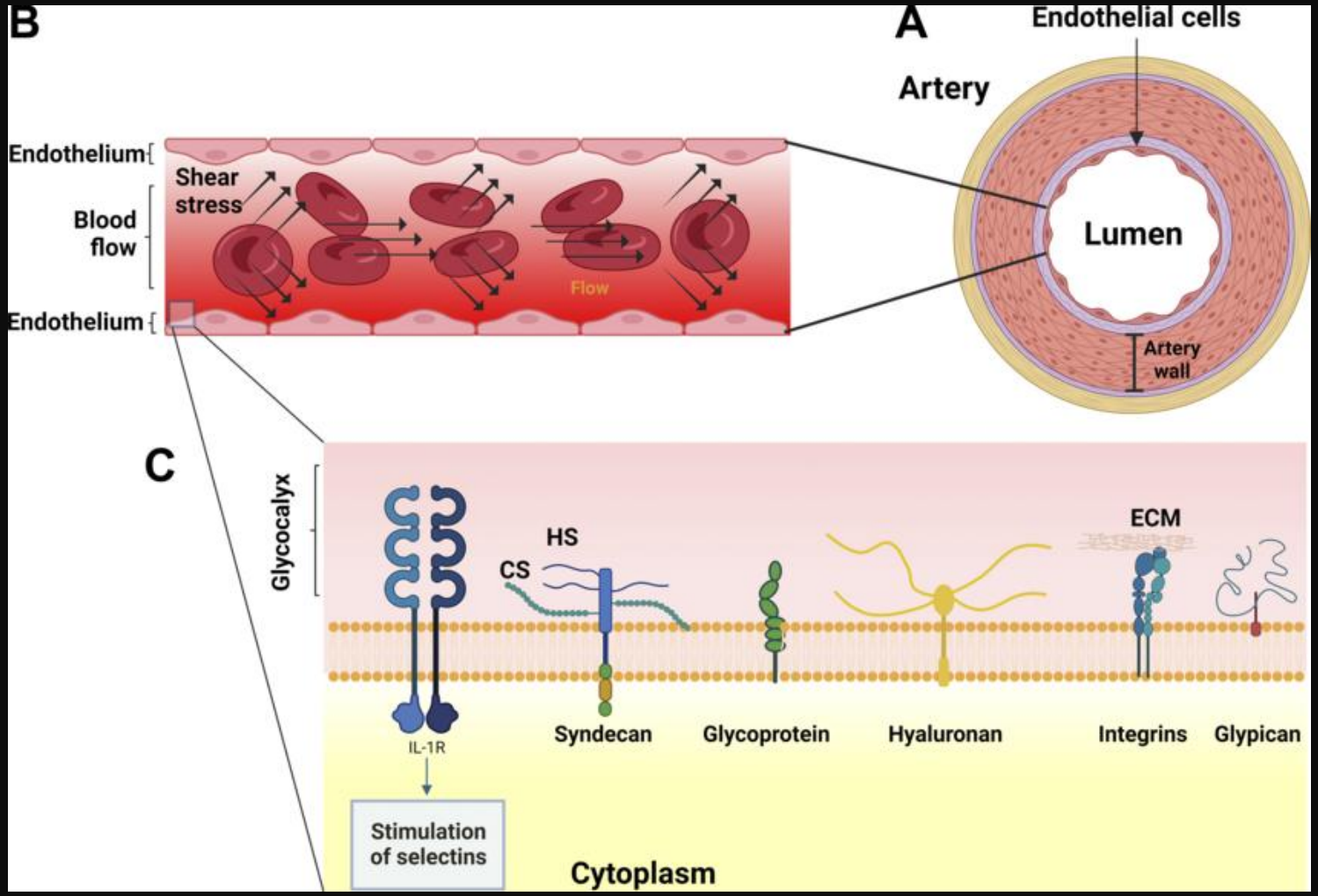
TYPES OF COMMUNICATION

- Chemical signals
- Mechanical signals
- Signaling pathways



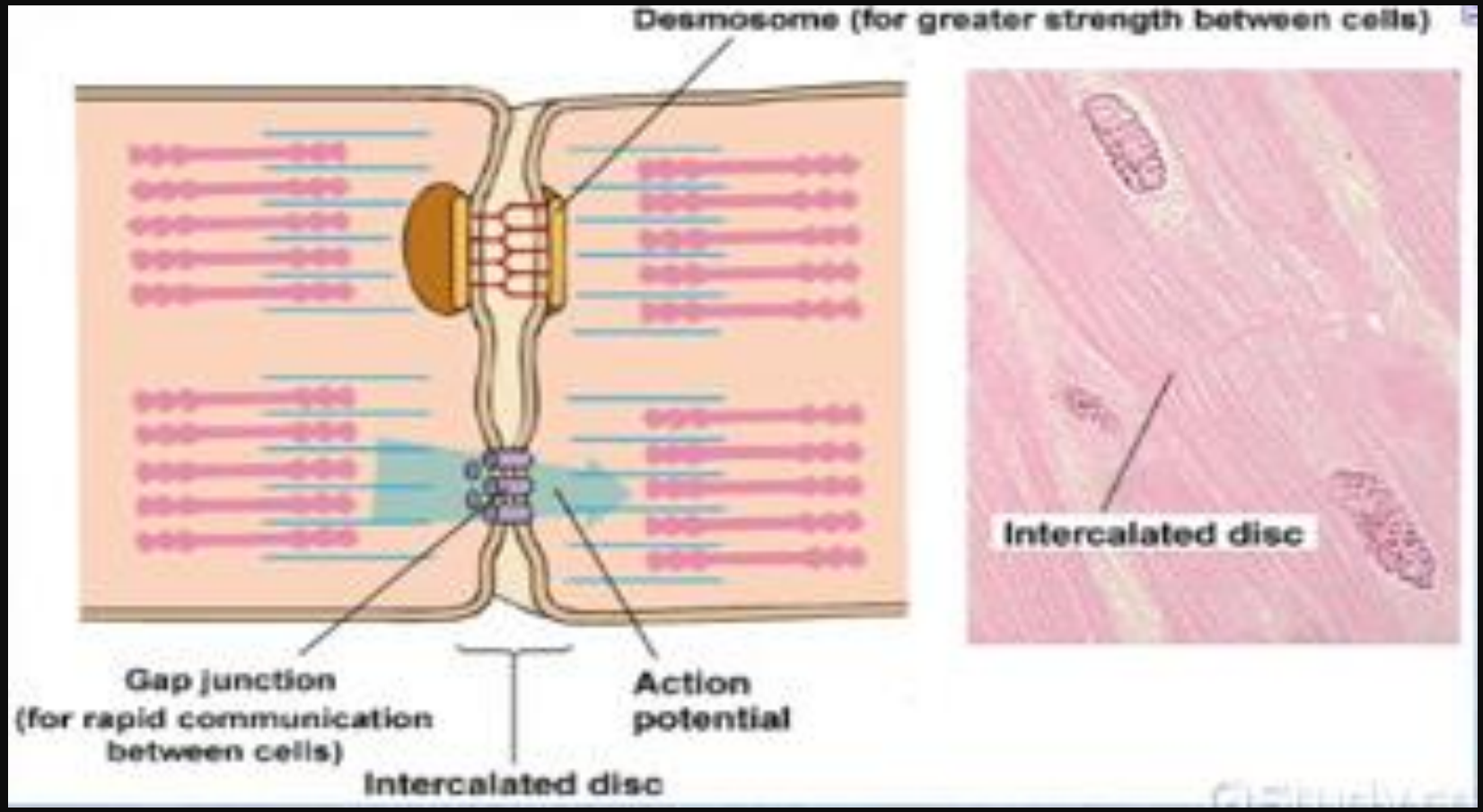
Cell-environment communication

Endothelial cells respond to blood flow by modulating vasodilation.



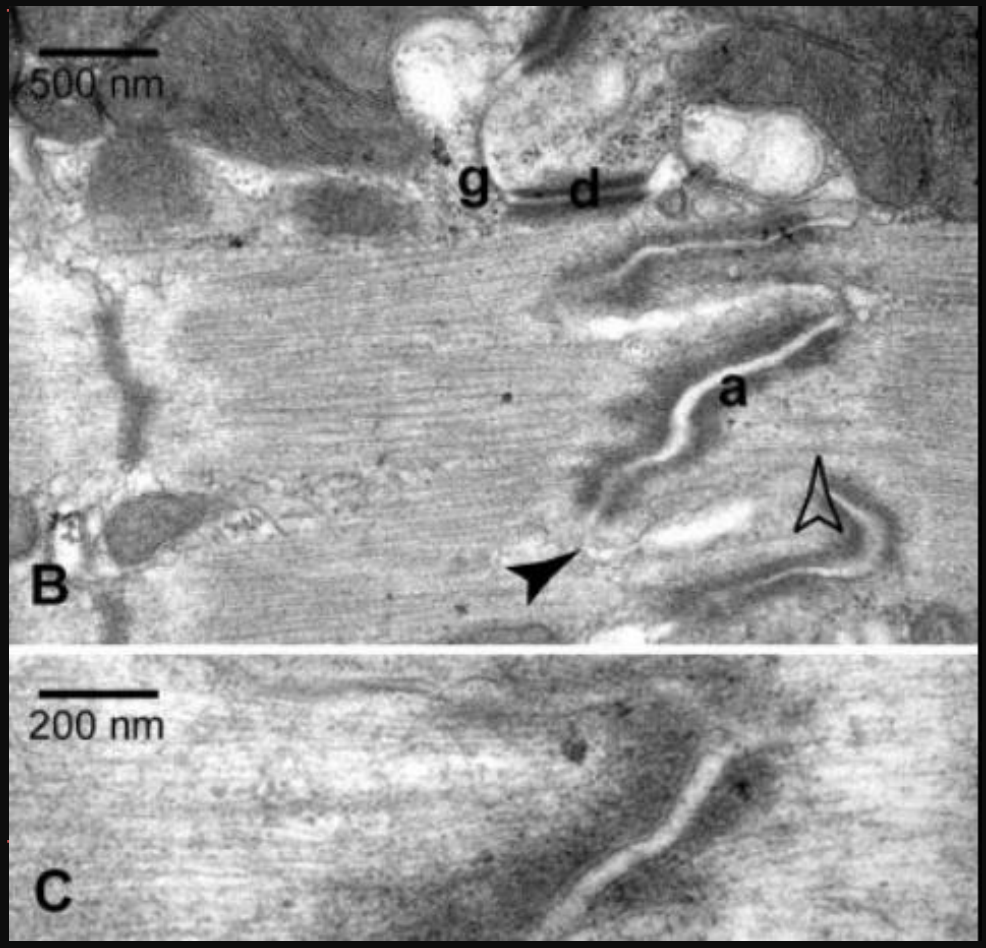
CELL-CELL COMMUNICATION IN TISSUES

Diagram of the cardiac INTERCALATED DISC with desmosomes and gap junctions



COMUNICAZIONE CELLULA- CELLULA NEI TESSUTI

Micrografia di DISCO INTERCALARE cardiaco con desmosomi e gap junctions



Physiological Examples

- **Heart:** desmosomes + gap junctions = synchronous contraction
- **Endothelium:** responds to blood flow
- **Epithelial tissues:** selective barrier and polarity

Conclusion

- The cell is a node in a dynamic network
- Junctions, the extracellular matrix (ECM), and chemical signals create cooperation
- Basis for understanding tissues and physiological functions