

What is Cell Adhesion?

- **Cell adhesion** is the process by which cells **stick to each other** (cell-to-cell) or to the **extracellular matrix (ECM)** (cell-to-surface).
 - It's like the "**glue**" that helps cells stay organized and communicate within tissues.
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Why is Cell Adhesion Important?

- It is **essential for forming tissues and organs** in multicellular organisms.
 - It helps maintain **structural integrity** (e.g., skin cells stick together).
 - It plays a role in **cell signaling, growth, healing, and immune responses**.
 - Problems in cell adhesion can lead to diseases like **cancer (tumor cells lose adhesion)** or **inflammation**.
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Types of Cell Adhesion

There are two main types:

1. **Cell-to-Cell Adhesion**

- Cells stick directly to neighboring cells.
- Example: Epithelial cells forming a layer of skin.

2. **Cell-to-Extracellular Matrix (ECM) Adhesion**

- Cells attach to proteins like collagen or fibronectin in the surrounding matrix.
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Cell Adhesion Molecules (CAMs)

Special proteins on the cell surface allow cells to stick.

The major types are:

1. Cadherins

- Calcium-dependent molecules.
- Help cells attach to other similar cells.
- Important in tissue formation (e.g., during embryonic development).

2. Integrins

- Help cells attach to the **extracellular matrix (ECM)**.
- Also send signals into the cell to control movement and survival.

3. Selectins

- Help white blood cells stick to blood vessel walls during **inflammation**.

4. Immunoglobulin-like CAMs (Ig-CAMs)

- Play roles in **immune cell adhesion**.

Adhesion Structures

Cells create junctions that work like "Velcro":

- **Tight junctions:** Seal cells together (like waterproofing).
 - **Adherens junctions:** Link cells via actin filaments.
 - **Desmosomes:** Provide strong "spot welds" between cells.
 - **Hemidesmosomes:** Anchor cells to the ECM.
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Cell Adhesion in Real Life

- **Wound healing:** Cells migrate and stick to close wounds.
 - **Immune system:** White blood cells stick to infected areas.
 - **Cancer:** Tumor cells lose adhesion, allowing them to spread (metastasis).
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Example Analogy

Think of cell adhesion like **bricks in a wall**:

- **Cadherins** = cement that holds bricks (cells) together.
- **Integrins** = anchors that connect the wall to the ground (ECM).