

Cell adhesion molecules

Presented by –

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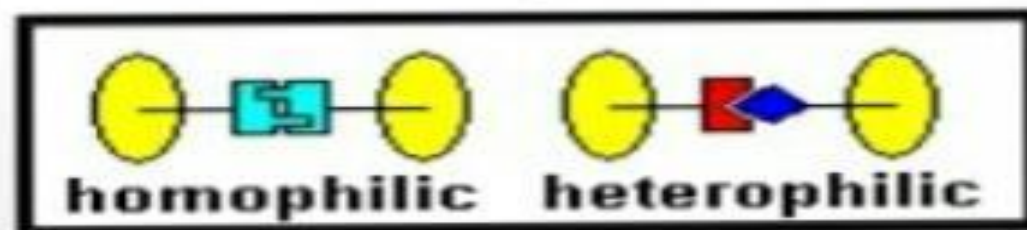
D. P. College Bilaspur

What are CAMs?

- ▶ **Cell adhesion molecules (CAMs)** are glycoproteins located on the cell surface. These proteins are typically trans membrane receptors and are composed of three domains:
- ▶ **intracellular domain.....**with cytoskeleton
- ▶ **trans membrane domain...**with CAMs
- ▶ **extracellular domain...**with extracellular matrix
- ▶ CAMs are involved in binding with other cells or with the extracellular matrix (ECM).
- ▶ help cells to stick to each other and to their surroundings.

How CAMs bind with other cells?

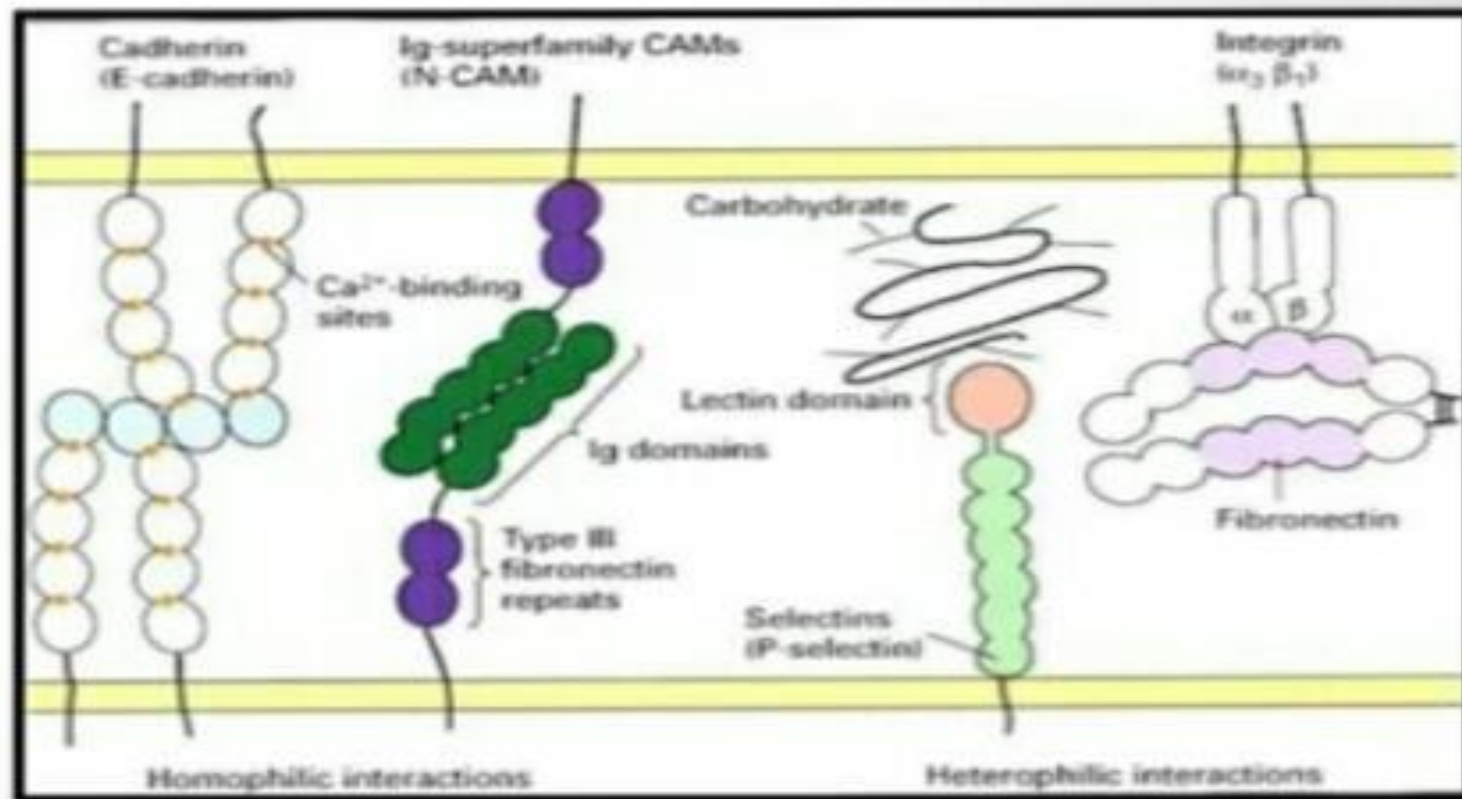
- ▶ **Cell adhesion receptors** enable cells to recognize and bind molecules on other cells or in the extracellular matrix.
- ▶ **Cell adhesion receptors** can form
- ▶ **Homophilic** (or homotypic) adhesions – between same type of molecules(Cadherin – cadherin)
- ▶ **Heterophilic** (or heterotypic) adhesions –between different type of molecules(Selectins – mucins)



Classification of CAMs

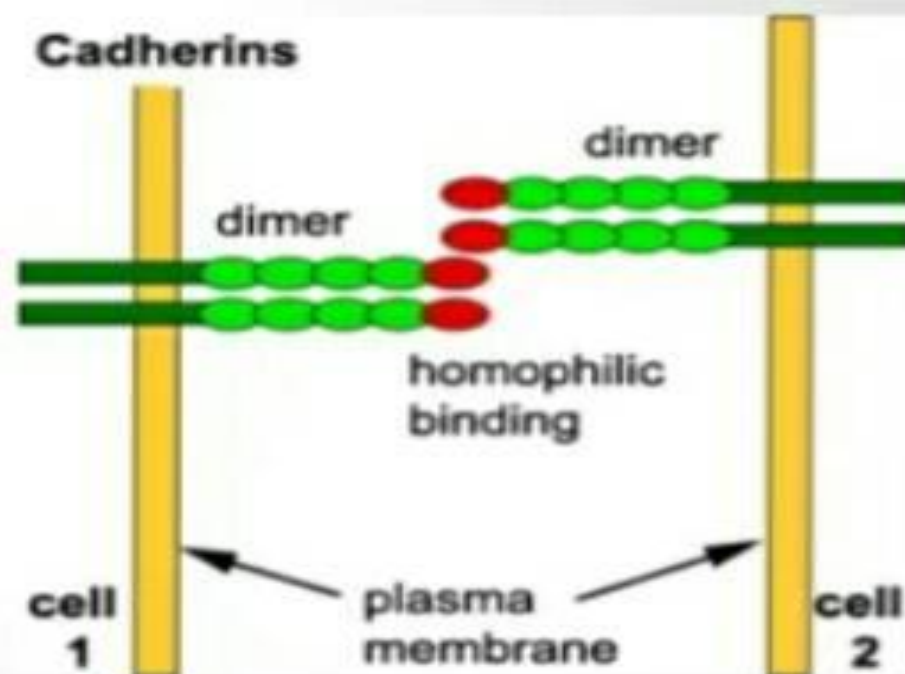
Most of the cell adhesion molecules belong to five major protein families:

- ▶ **Cadherins**
- ▶ **IgSuper family CAMs**
- ▶ **Selectins**
- ▶ **Integrins**
- ▶ **Mucins**



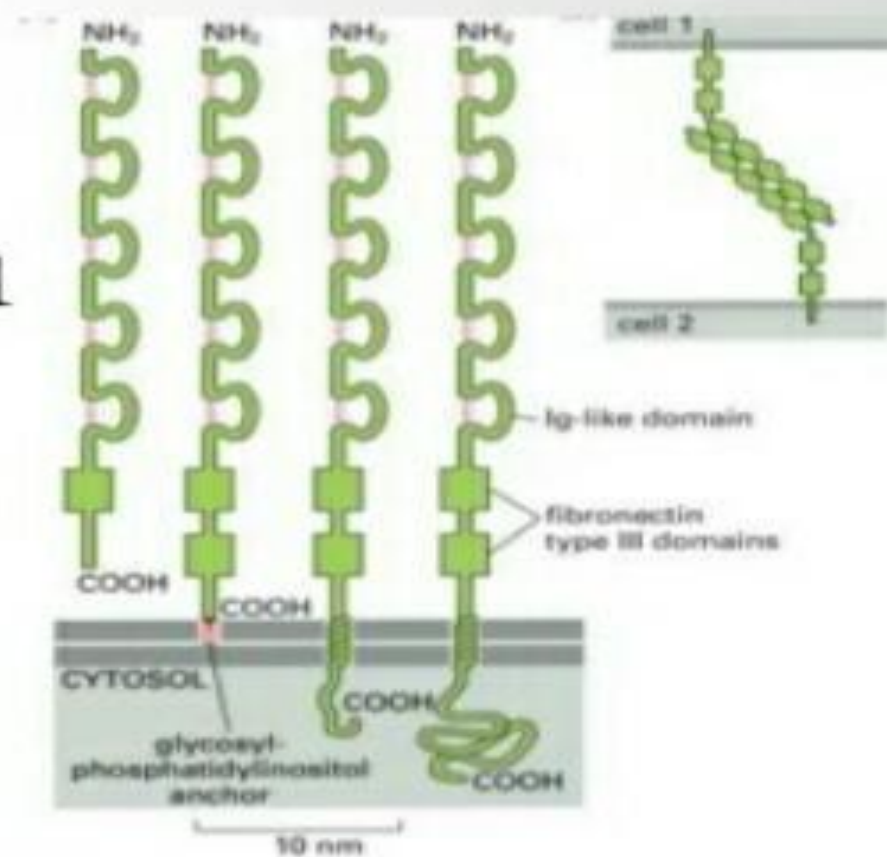
Cadherins

- ▶ The cadherins are **calcium-dependent adhesion** molecules plays important role in cell adhesion by forming desmosomes.
- ▶ **Sub classes**
 - ✓ Neural (N)-Cadherin
 - ✓ Placental(P)- Cadherin
 - ✓ Epithelial(E)-Cadherin
- ▶ They exhibit homophilic adhesion.
- ▶ The failure of cadherin mediated cell-cell adhesion cascade -----breast cancer.



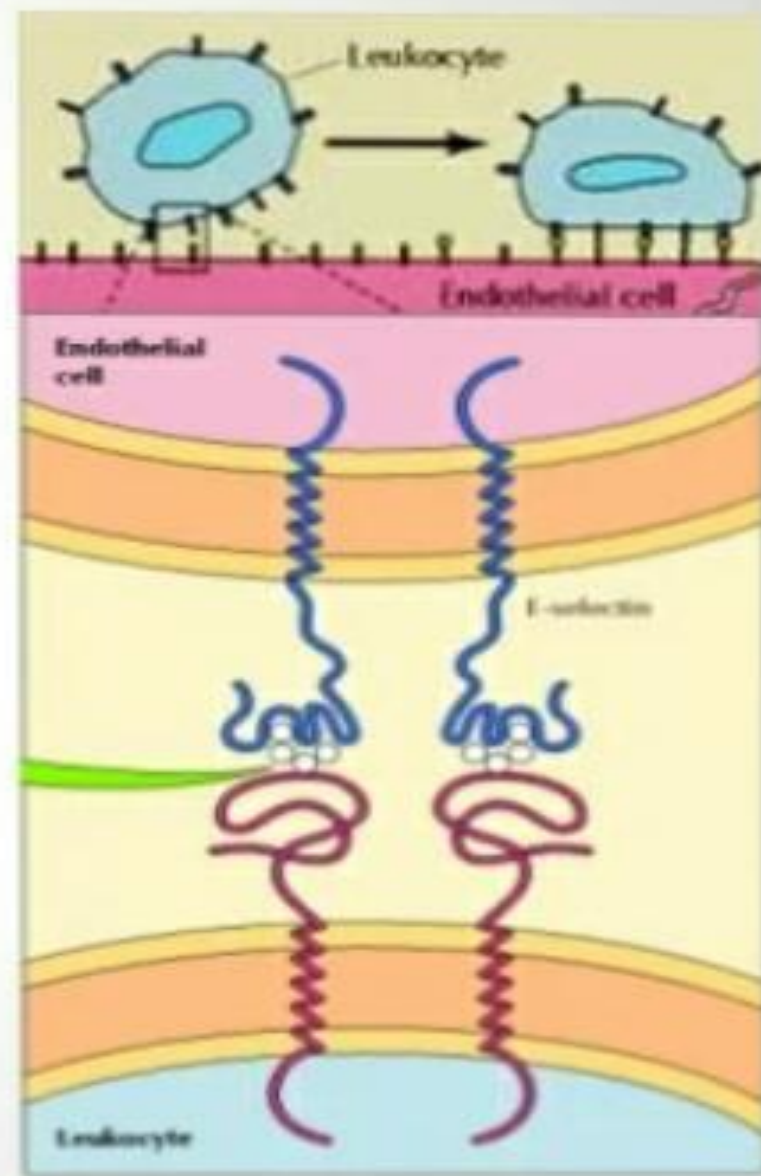
IG SUPERFAMILY CAMS

- ▶ The Ig superfamily CAMs are **calcium-independent trans membrane glycoproteins**.
- ▶ Members includes: **ICAM, VCAM-1, PECAM-1, NCAM**.
- ▶ function by both homophilic and heterophilic binding
- ▶ Involved in recognition, binding or adhesion processes of cells.
- ▶ all possess an extracellular region known as immunoglobulin domains or folds.



SELECTINS

- ▶ The selectins are a family of **divalent cation dependent glycoproteins**.
- ▶ They are carbohydrate-binding proteins.
- ▶ Members includes:
 - ❖ **Endothelial (E)-selectin**
 - ❖ **Leukocyte (L)-selectin**
 - ❖ **Platelet (P)-selectin**
- ▶ plays an important role in many host defense mechanisms.



Integrins

- ▶ **Integrins** are a diverse and large group of **heterodimeric glycoproteins**.

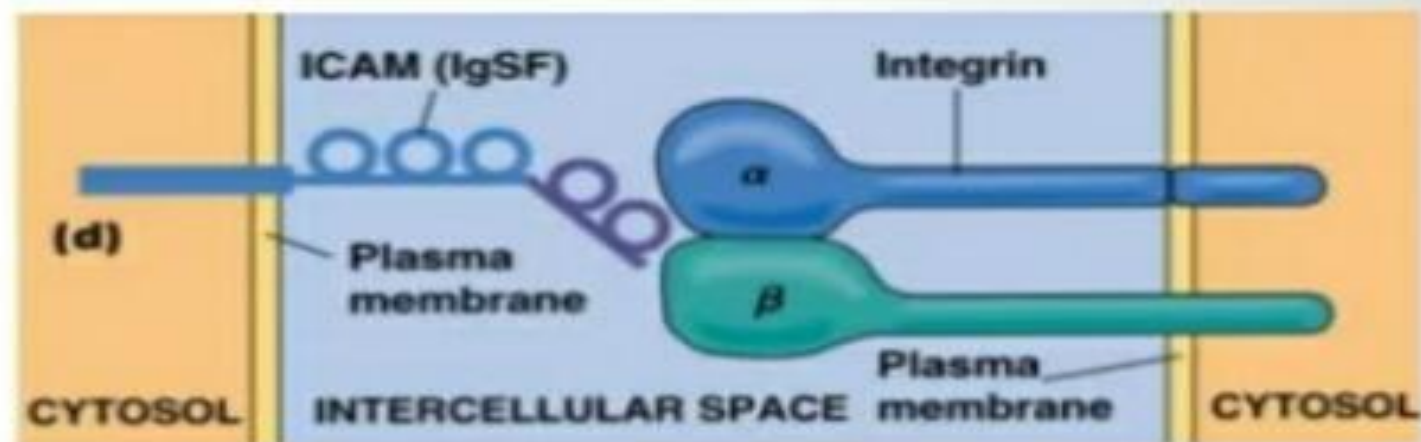
- ▶ **alpha and beta..**

both participate in binding.

- ▶ Eight sub families..

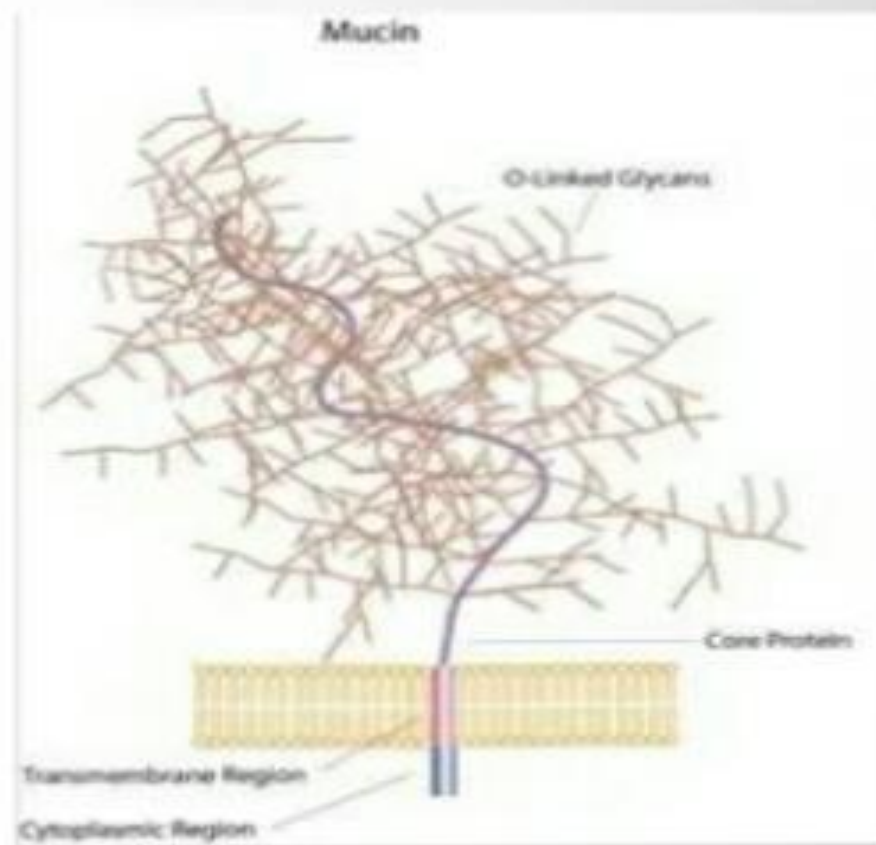
β_1 through β_8 .

- ▶ Integrins participate in cell-cell adhesion , in binding and interactions of cells with components of the extracellular matrix such as fibronectin.



Mucins

- ▶ The Mucins are the group of serine and threonine-rich protein and hydroxyproline enabling post-translational O-glycosylation.
- ▶ Their extended structure allows them to present sulfated carbohydrate moieties as binding site for selectins



Role/Function of CAMs

Cell adhesion molecules have following functions:

- Involvement in inflammation
- Tumorigenesis
- Establishment of the blood-brain barrier
- Involvement in lymphocyte homing
- In regulation of apoptosis.

Conclusion

- ▶ Special interactions between molecule expressed on the surface of leukocytes (receptor) and molecule on the surface of potential target cells (ligands) are important mechanism in cell-cell communication. These surface molecules collectively called cell adhesion molecule.
- ▶ They are classified into five major families.
- ▶ Despite of their various role, malfunctioning of CAMs leads to **breast cancer, leukocyte adhesion deficiency (LAD) syndrome , epithelial cell cancer**

A winter scene with a snow-covered path through a forest of snow-laden trees, illuminated by warm golden light.

Thanks