

Leukocyte differentiation antigens and cell-adhesion molecules



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Part I

Membrane molecules of immune cell

- Receptors: TCR, BCR, CR, CKR, FcR
- MHC Class I and class II molecules
- Co-stimulating molecules
- Cell Adhesion Molecules

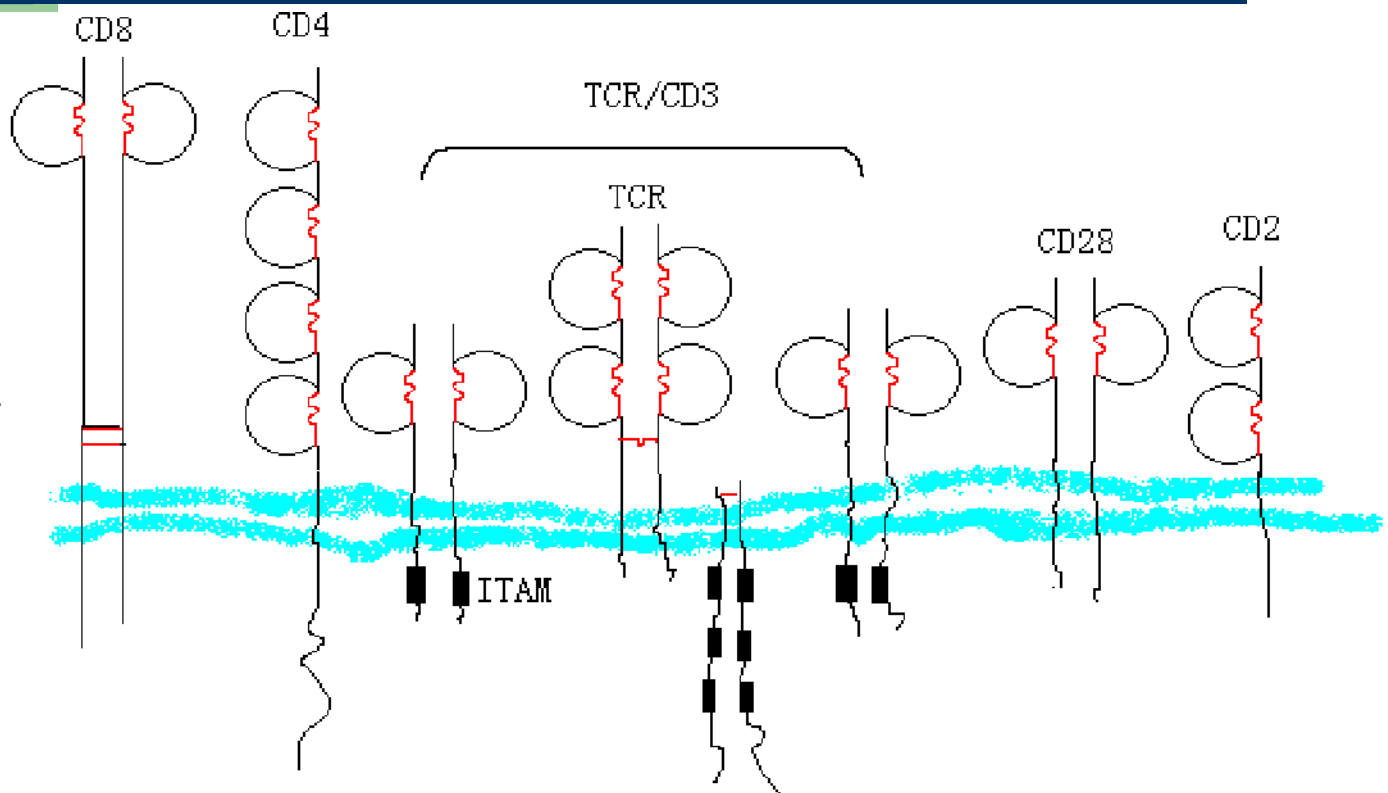
Part II Definition of leukocyte differentiation antigen and CD

- **Leukocyte differentiation antigen:** Cell surface molecules expressed or disappeared in different lineage, in different differentiation stages, or in the course of cell activation.

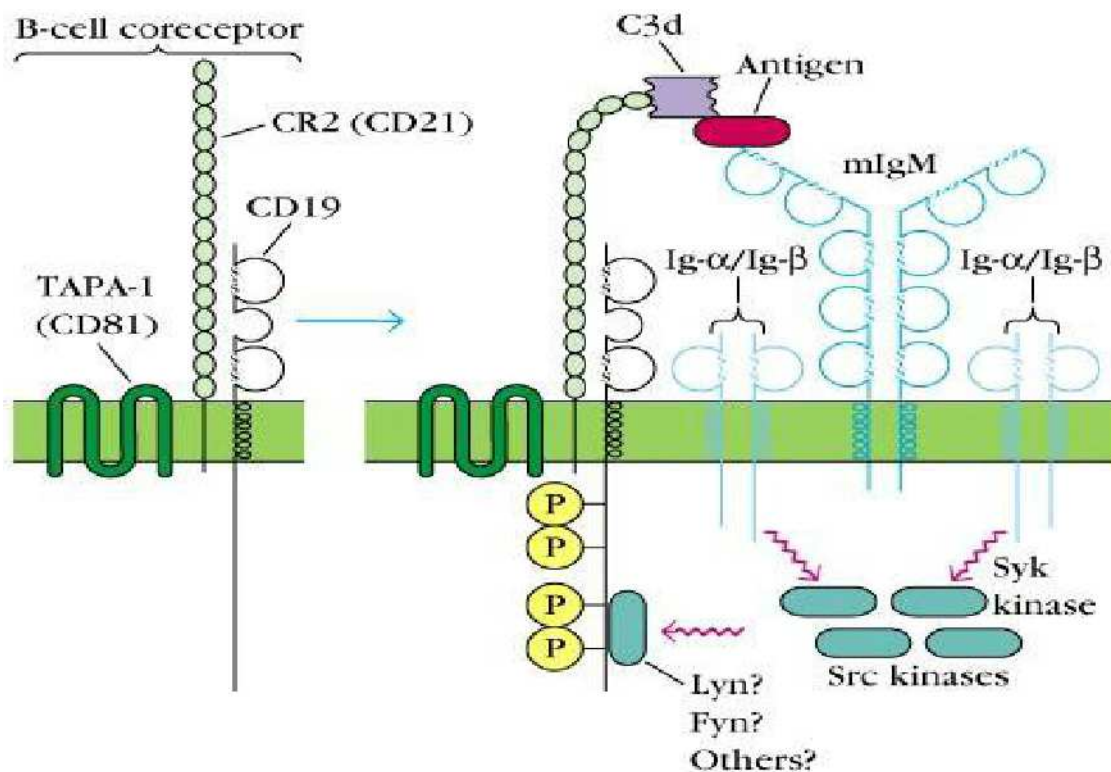
- **CD: cluster of differentiation**

The same differentiation antigen recognized by different monoclonal antibody from different lab are called CD.

CDs which take part in T cell recognition, adhesion and activation



CDs which take part in B cell recognition, adhesion and activation





Part III

Definition, classification and functions of adhesion molecules

1. What is adhesion molecule?

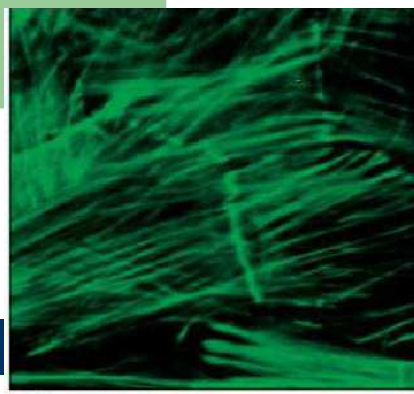
- A collective name for those molecules mediating intercellular adhesion or adhesion between cell and extracellular matrix.

2. Classification

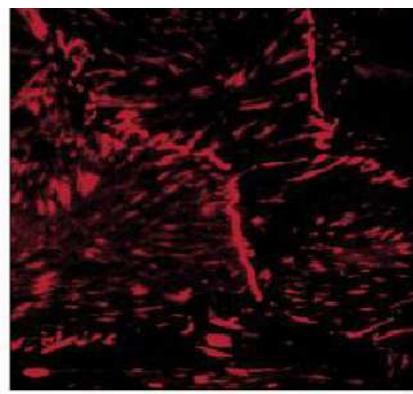
- Integrin family
- Selectin family
- Immunoglobulin (Ig) superfamily
- Cadherin family
- Mucin-like family
- Other adhesion molecules

Integrins

- Integrins consist of α and β chains.
- According to β subunits, Integrins are divided into eight groups: $\beta 1$ - $\beta 8$
- VLA-4 (**V**ery **L**ate **A**ntigen-4), ligand VCAM-1
LFA-1 (**L**ymphocyte **F**unction-associated **A**ntigen-1), ligand ICAM-1,2,3



(A)



10 μm

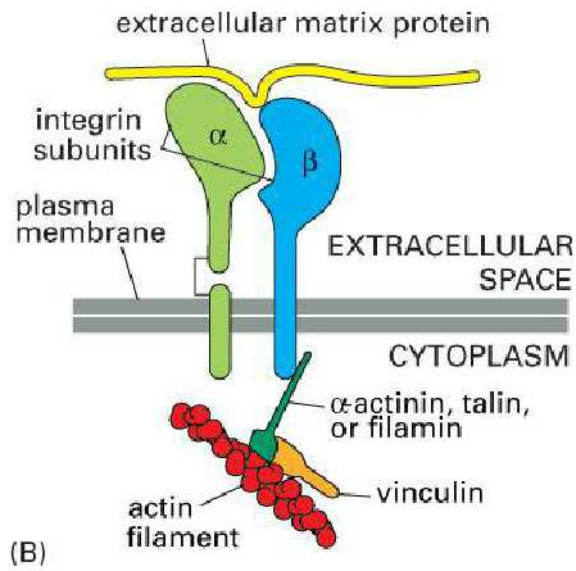
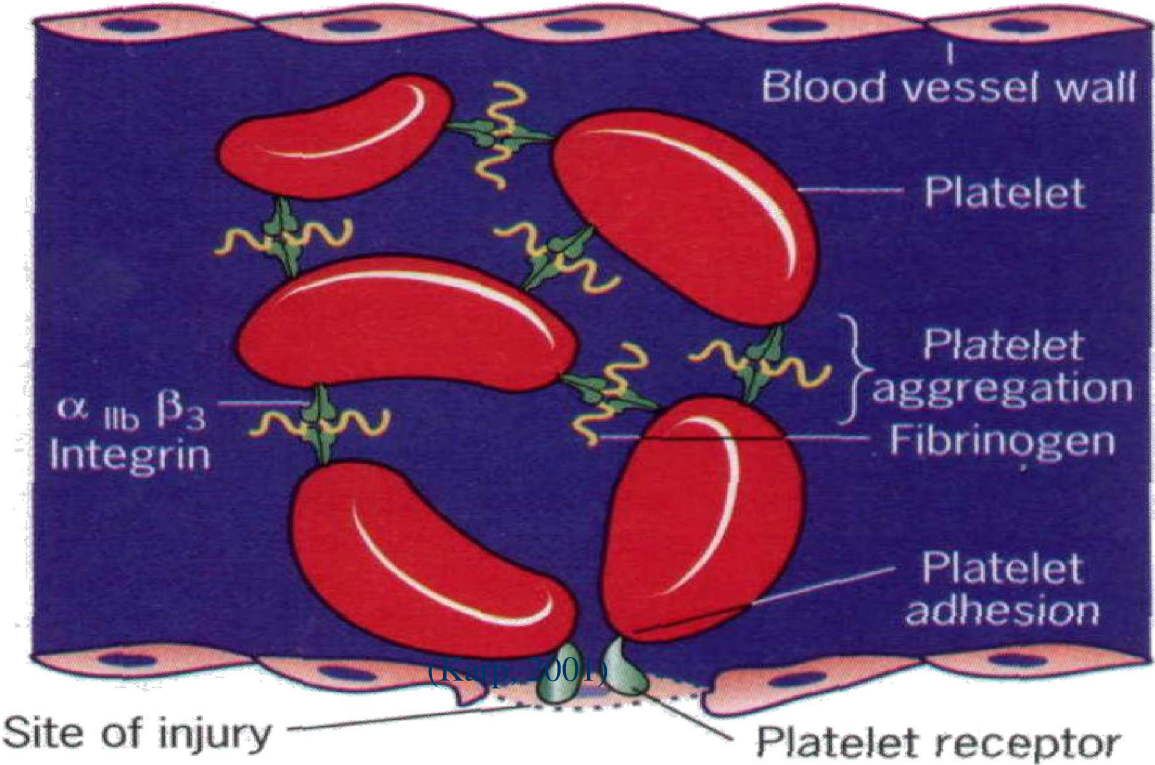


Figure 19-12. Molecular Biology of the Cell, 4th Edition.

Integrin and platelet aggregation



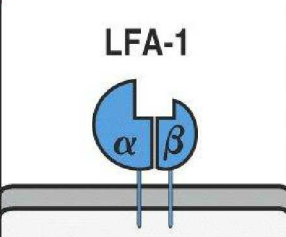
		Name	Tissue distribution	Ligand
Integrins Bind to cell-adhesion molecules and extracellular matrix. Strong adhesion	 <p style="text-align: center;">LFA-1</p> <p style="text-align: center;">α β</p>	$\alpha_L:\beta_2$ (LFA-1, CD11a/CD18)	Monocytes, T cells, macrophages, neutrophils, dendritic cells	ICAMs
		$\alpha_M:\beta_2$ (CR3, Mac-1, CD11b/CD18)	Neutrophils, monocytes, macrophages	ICAM-1, iC3b, fibrinogen
		$\alpha_X:\beta_2$ (CR4, p150.95, CD11c/CD18)	Dendritic cells, macrophages, neutrophils	iC3b
		$\alpha_5:\beta_1$ (VLA-5, CD49d/CD29)	Monocytes, macrophages	Fibronectin

Figure 2-42 part 2 of 3 Immunobiology, 6/e. (© Garland Science 2005)

Selectin family

- **Selectins consist of one peptide chain.**
- **The three family members include: E-selectin, L-selectin, and P-selectin.**

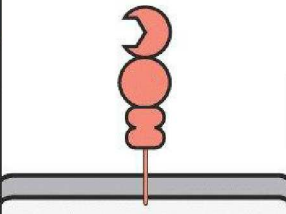
		Name	Tissue distribution	Ligand
Selectins	<p>P-selectin</p> 	P-selectin (PADGEM, CD62P)	Activated endothelium and platelets	PSGL-1, sialyl-Lewis ^x
Bind carbohydrates. Initiate leukocyte-endothelial interaction		E-selectin (ELAM-1, CD62E)	Activated endothelium	Sialyl-Lewis ^x

Figure 2-42 part 1 of 3 Immunobiology, 6/e. (© Garland Science 2005)

3. Functions of adhesion molecules

- **Act as co-receptor and co-stimulator in cell-cell recognition in immunity**
- **Participate in the adhesion of leukocyte and vascular endothelial cell during inflammation**
- **Participate in lymphocyte homing**

Participate in the adhesion of leukocyte and vascular endothelial cell during inflammation

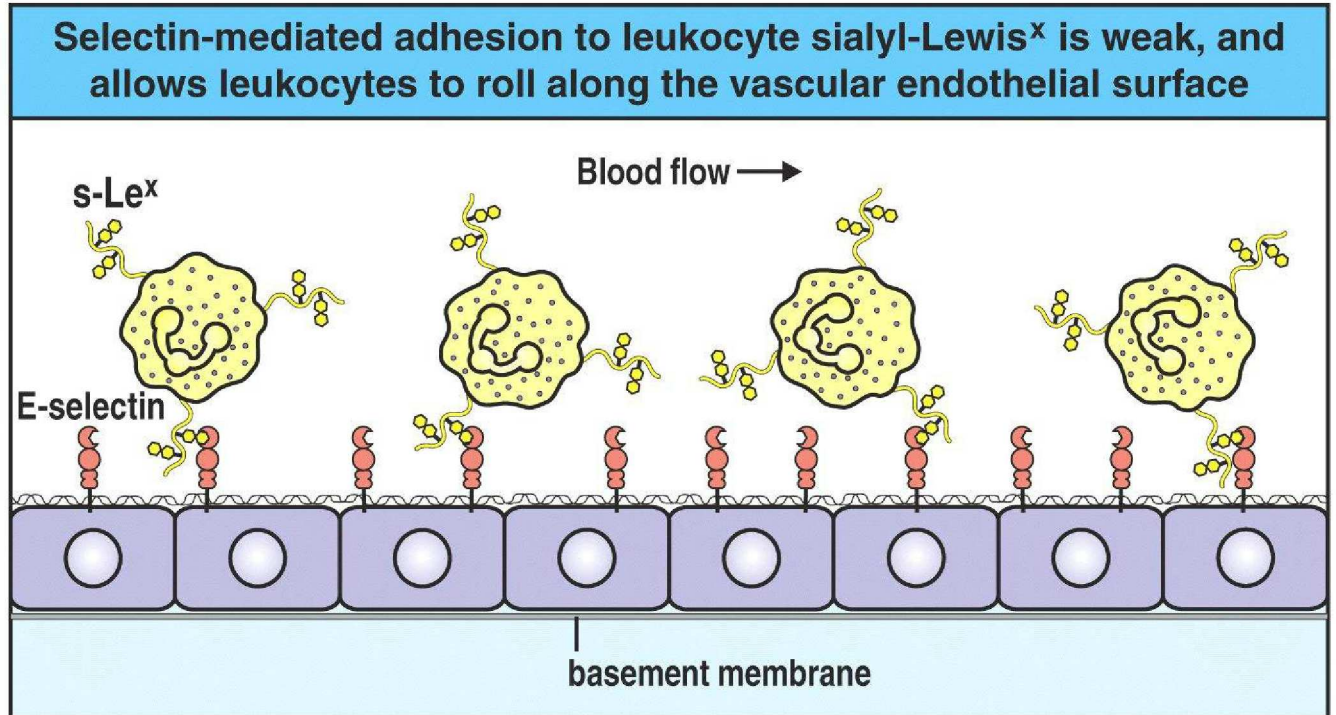


Figure 2-44 part 2 of 3 Immunobiology, 6/e. (© Garland Science 2005)

Participate in the adhesion of leukocyte and vascular endothelial cell during inflammation

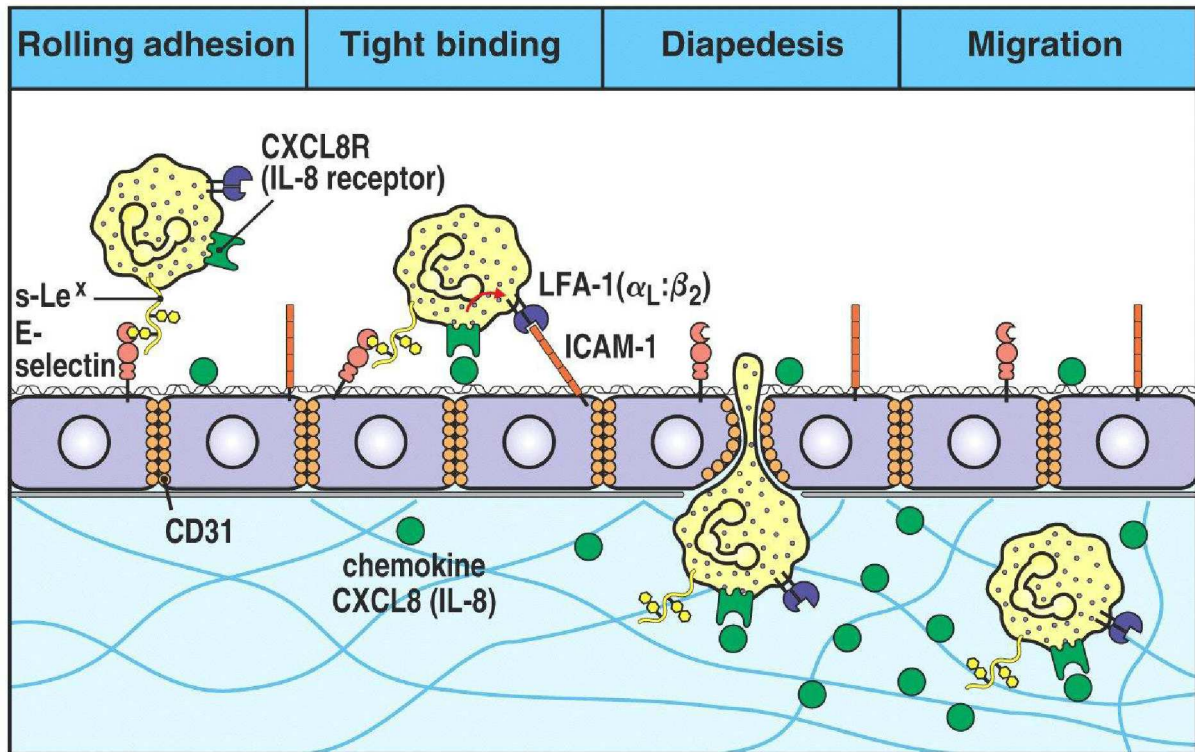
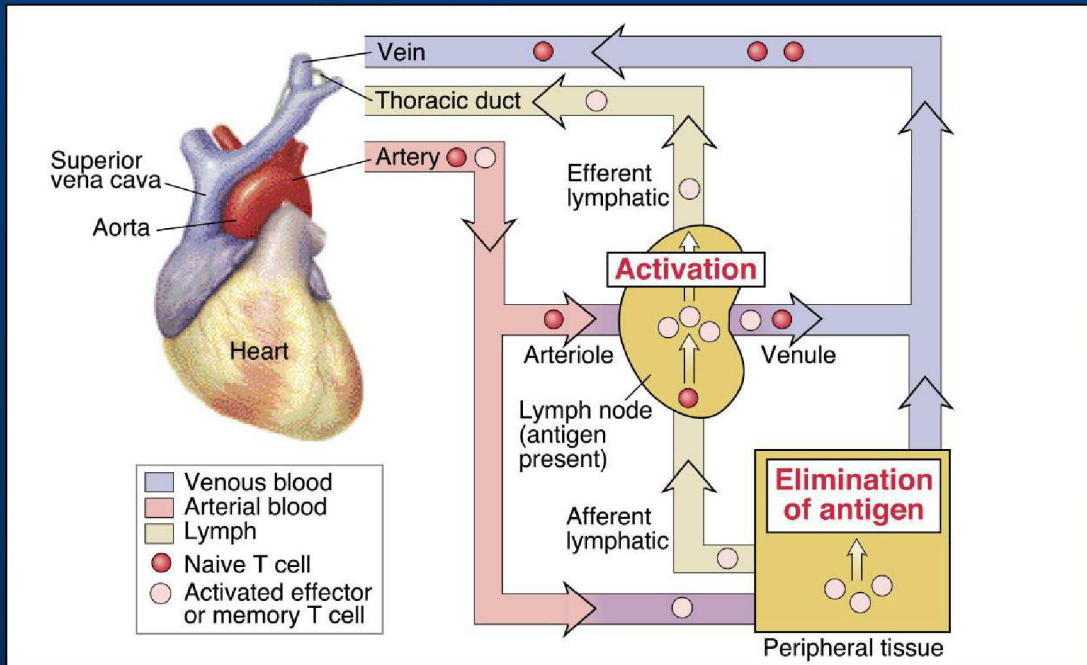


Figure 2-44 part 3 of 3 Immunobiology, 6/e. (© Garland Science 2005)

Participate in lymphocyte homing

Slide 2-19

T lymphocyte recirculation



From Abbas, Lichtman, & Pober: Cellular and Molecular Immunology. W.B. Saunders, 1999, Fig. 2-14