

# Interaktionen von RNAs und Proteinen

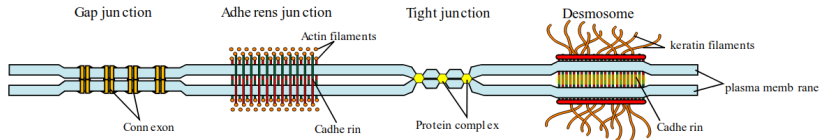
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SS2018

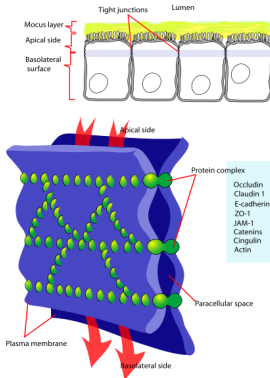
# Cell-Cell Interactions

- ▶ contact between neighboring cells within a tissue
- ▶ controlling the shape and function of cells
- ▶ between cells of the same type, e.g. epithelial cell sheets
  
- ▶ tight junctions
- ▶ anchoring junctions
  - ▶ adherens junctions
  - ▶ desmosome
- ▶ gap junctions



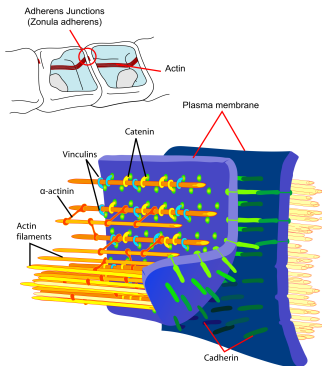
# Tight Junctions

- ▶ continuous band located just below the apical surface
- ▶ between the membranes of neighboring epithelial cells
- ▶ function: separates the external from the internal, produce a seal
- ▶ proteins involved: occludin, claudin, junctional adhesion molecules (JAMs)
- ▶ anchor: cytoskeleton



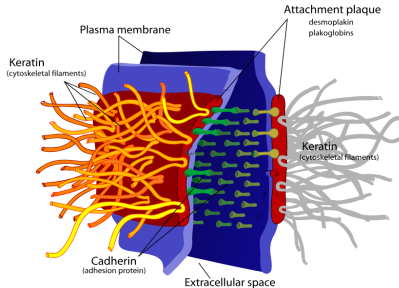
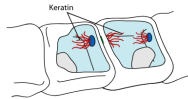
# Adherens Junctions

- ▶ continuous band located just below tight junctions
- ▶ function: give shape and tension to cells and tissues and cell-cell signaling
- ▶ proteins involved: cadherin (over diff. 100 types)
- ▶ anchor: actin filaments



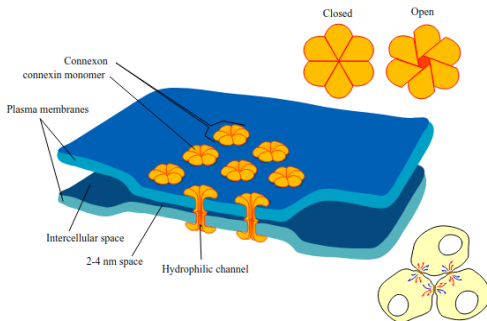
# Desmosomes

- ▶ individual sites located just below adherens junctions
- ▶ function: provide strength and durability to cells and tissues also in cell-cell signaling
- ▶ proteins involved: plakins, specialized cadherin  
extracellular domains interact with each other
- ▶ anchor: keratin



## Gap Junctions

- ▶ form pores between cells  
permeability is regulated, e.g. by pH,  $\text{Ca}^{2+}$
- ▶ function: main sites of cell communication  
diffusion of small molecules
- ▶ proteins involved: in vertebrates – connexins extracellular domains interact with each other
- ▶ anchor: keratin



# Cell Adhesion and Communication

- ▶ **homophilic interactions:** an adhesion molecule on one cell interact with an **identical** molecule on the other cell
- ▶ **heterophilic interactions:** an adhesion molecule on one cell serves as the receptor for a particular adhesion molecule on the other cell

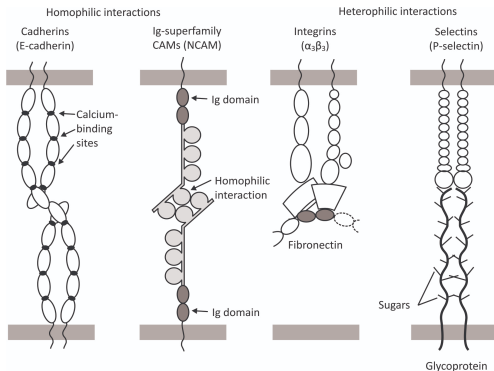
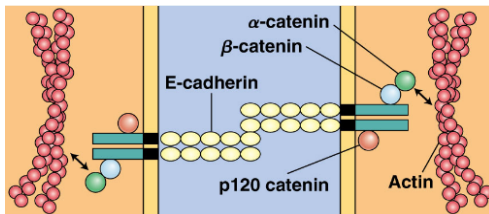
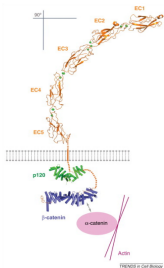


Fig. : Structure of various types of cell adhesion molecules

# Cadherin and Protocadherin

## Cadherins

- ▶  $\text{Ca}^{2+}$ -dependent adhesion molecule
- ▶ extracellular domain: (N-glycosylated) Cadherin repeats
- ▶ from unicellular animals with multicellular life stages to mammals
- ▶ morphogenetic processes e.g. embryonic cell layer separation  
induction of tissue polarity, synapse formation, physical homeostasis of mature tissues





# Calcium-independent Adhesion Molecules (IgCAM)

## CAMs

- ▶  $\text{Ca}^{2+}$ -**independent** adhesion molecule
- ▶ extracellular domain: (N-glycosylated) immunoglobulin-like domains
- ▶ most diverse superfamily of CAMs

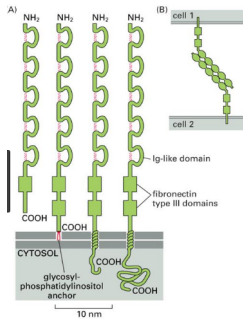
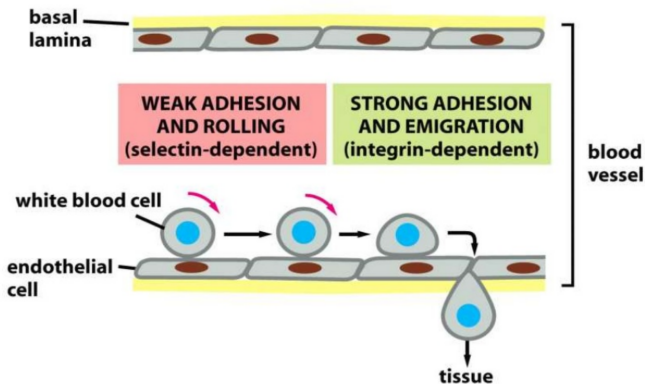


Figure 19-31. Molecular Biology of the Cell, 4th Edition.

# Lymphocyte Homing

How white blood cells (lymphocytes) get to the site of infection.

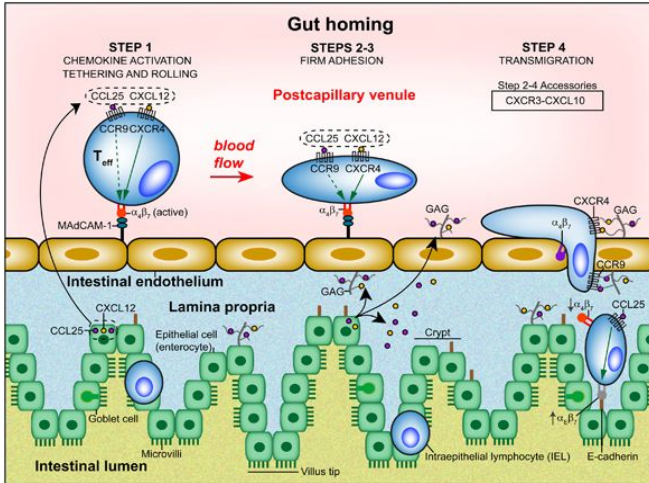
## Overview



# Lymphocyte Homing

How white blood cells (lymphocytes) get to the site of infection.

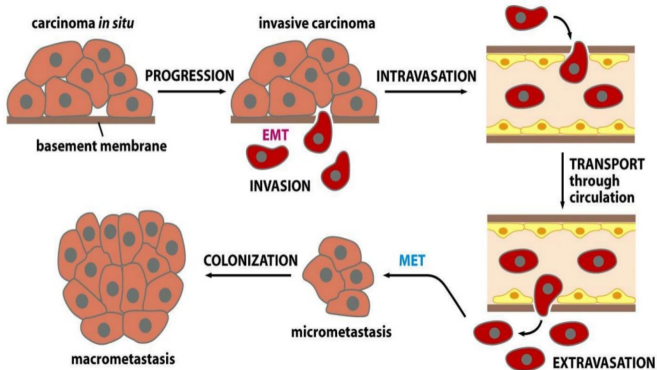
## Gut homing in more Detail



# Cancer: Metastasis

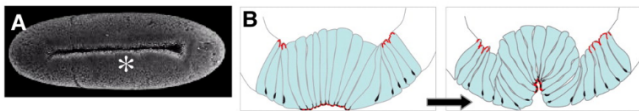
How tumorous cancers forms metastases.

## Overview



# Cell Adhesion and Shape in Development

*Drosophila*  
Ventral furrow  
formation



Gastrulation movements in *Drosophila*, Epithelial bending during mesoderm invagination of *Drosophila*.

“(A) Stage 6 scanning electron microscopic (SEM) image (ventral view, anterior to the left), courtesy of FlyBase (<http://flybase.bio.indiana.edu/>). (B) Schematic of invagination process at stages 5 (left) and 6 (right); transverse sections (TS) at level indicated by the asterisk in A, ventral side down. Red spots, RhoGEF2; black spots,  $\beta$ -catenin. Based on data from Kölsch et al. (Kölsch et al., 2007).”

Matthias Hammerschmidt, Doris Wedlich, *Regulated adhesion as a driving force of gastrulation movements*  
Development 2008 135:3625–3641;