

## **Keeping the Good Stuff In and the Bad Stuff Out The Dynamic Cell Membrane**

### **Biological Membrane Structure**

- The general structure of membranes is known as the fluid mosaic model.
- The phospholipid bilayer is like a “lake” in which a variety of proteins “float.”
- Lipids maintain a bilayer organization spontaneously—helps membranes fuse during phagocytosis, vesicle formation, etc.
- Membranes may vary in lipid composition
- Phospholipids vary—fatty acid chain length, degree of saturation, phosphate groups
- Membranes may be up to 25 percent cholesterol
- Phospholipid bilayer is flexible, and the interior is fluid, allowing lateral movement of molecules.
- Fluidity depends on temperature and lipid composition.
- Membranes contain proteins, the number of proteins varies with cell function
- Some membrane proteins extend across the lipid bilayer—with hydrophobic and hydrophilic regions or domains.
- The proteins and lipids in the membrane are independent and only interact noncovalently.

Two types of membrane proteins:

- Integral membrane proteins span the bilayer, hydrophilic ends protrude on either side.
- Peripheral membrane proteins do not penetrate the bilayer.
- Transmembrane proteins may have different domains on either side of the membrane.
- The two sides of the membrane can have very different properties.
- Some membrane proteins can move freely within the bilayer, while some are anchored to a specific region.
- Some can be anchored by cytoskeleton elements, or lipid rafts—lipids in semisolid state.
- Membranes are dynamic and are constantly forming, transforming, fusing, and breaking down.

- Membranes have carbohydrates or proteins on the outer surface that serve as recognition sites for other cells and molecules.
  - Glycolipids
  - Glycoproteins

### **Cell adhesion and recognition**

- Cells arrange themselves in groups by cell recognition and cell adhesion.
- These processes can be studied in sponge cells—the cells are easily separated and will come back together again.
- Binding of cells is usually homotypic: the same molecule sticks out from both cells and forms a bond.
- Some binding is heterotypic: the cells have different proteins.

Cell junctions are specialized structures that hold cells together:

- Tight junctions
- Desmosomes
- Gap junctions