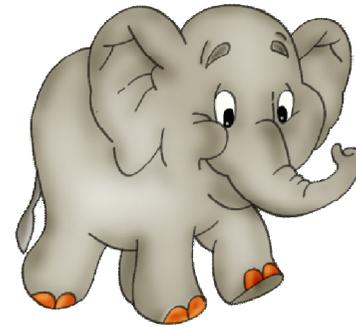


CELLULAR PHYSIOLOGY



Cells

- Basic living unit of structure & function of the body.
- > 100 trillion cells in body.
- very small (10-20 μM in diameter).
- highly organized.
- variety of shapes & sizes.
- each type of cells has a special function.

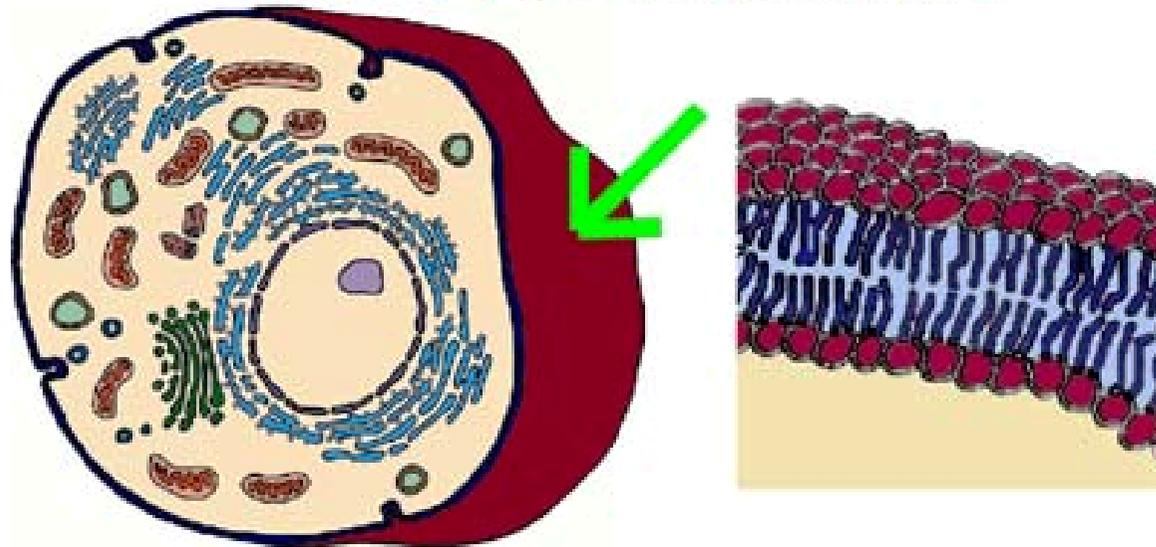


Cell differentiation

During development, cells differentiate and take on specific shapes and functions. Each cell in the body inherits identical genetic information but no one cell uses all this information.

- All Cells share certain characteristics:
 - general cell structure & components.
 - general mechanisms for changing nutrients to energy.
 - deliver end products into their surrounding fluid.
 - almost all have the ability to reproduce.

Cell Membrane



= PLASMA MEMBRANE

= PLASMALEMMMA

Functions of a cell membrane:

1. Physical isolation

physical barrier that separates ICF from the surrounding ECF.

2. Regulation of exchange with the environment

entry of ions and nutrients into the cell, the elimination of cellular waste and the release of products

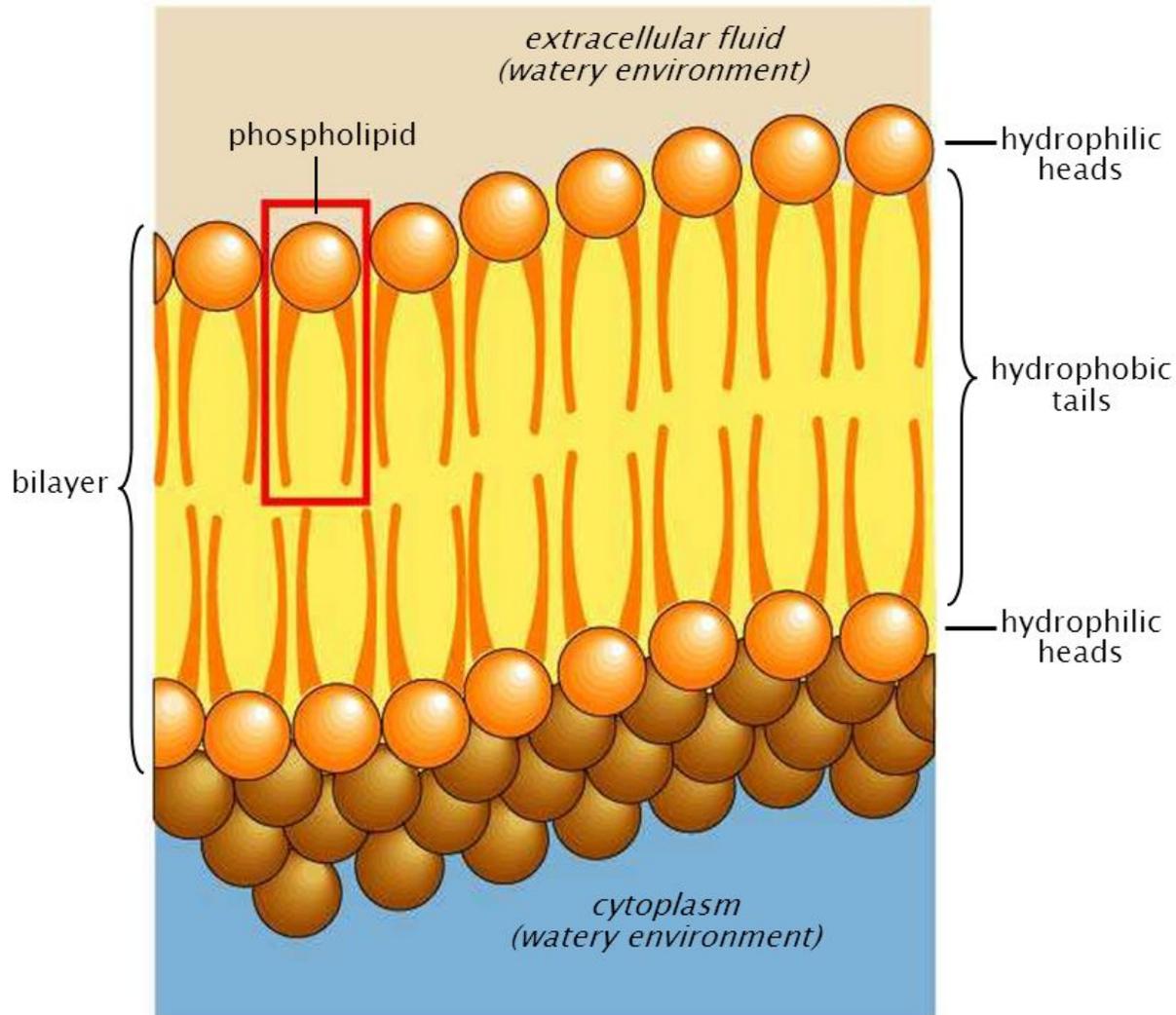
3. Communication between the cell and its environment

proteins that enable the cell to recognize and respond to molecules or to changes

4. Structural support

Proteins in the cell membrane hold the cytoskeleton to maintain cell shape.

Double layer (*bilayer*) of phospholipids with protein and carbohydrate molecules inserted in them (mostly lipid+protein)
~8 nm



Lipids of cell membranes are mostly phospholipids arranged in a bilayer, so that the phosphate heads are on the membrane surfaces and the lipid tails are hidden in the center of the membrane

Types of membrane proteins:

Peripheral

integral (transmembrane and lipid-anchored)

CYTOSKELETON

1. Cell shape; Mechanical strength
2. Internal organization; stabilize the positions of organelles, cells are dynamic.
3. Intracellular transport; railroad truck
4. Assembly of cells into tissues
5. Movement

MITOCHONDRIA

They have a double wall that creates two separate compartments.

Inside the inner membrane, the matrix contains enzymes, ribosomes, granules and its own **mitochondrial DNA** with a different nucleotide sequence.

Intermembrane space plays a role in ATP productions.

Number of mitochondria in a cell is related to the cell's energy need.

Mitochondrias can replicate themselves.

ENDOPLASMIC RETICULUM

A network of interconnected of membrane tubes with three major functions: synthesis, storage and transposrt of biomolecules.

Rough; is the main site for protein synthesis. Proteins are assebled on ribosomes attached to the cytoplasmic surface of the rough ER, then inserted into the rough ER lumen, where they undergo chemical modification.

The smooth ER lacks ribosomes, is the main sites for the synthesis of fatty acids, steroids, and lipids.

Golgi receives proteins made on the rough ER, modifies them and packages them into the vesicles.

Cytoplasmic vesicles are two kinds: **secretory** and **storage**. Secretory vesicles contain proteins that will be released. Storage vesicles never leave the cytoplasm.

Nucleus contains the cell DNA that controls all cell processes.

Communication between the nucleus and cytosol occurs through the nuclear pore complexes.

Ions and small molecules move freely through this channel but transport of large molecules such as proteins or RNA needs energy.