THE CELL

Learning Objectives:

1. Define organic and inorganic compounds and state examples of each.
2. List the components of the cell membrane and state it functions.
3. Describe the organelles of the cell and the role each plays.
4. Understand the significance of cellular inclusions and their role in cell function.
5. Describe the surface specializations of the cell covered in lecture and their function.

The cell is the fundamental structural and functional unit of all organisms.

A. GENERAL STRUCTURE

A wide variety of cells of different sizes and shapes are found in the human body. Many of these cells have very unique characteristics that allow them to perform their specific function. However, although they are morphologically different, most cells have three common components. These include a cell membrane, a nucleus and cytoplasm. These will be described in this lecture. Before doing this however some basic information related to the composition of cells will be reviewed.

B. CHEMICAL COMPOSITION

The body is composed, for the most part, of the following elements:

Oxygen (O)	65%
Carbon (C)	18%
Hydrogen (H)	10%
Nitrogen (N)	3%

In addition it contains small amounts of elements such as Calcium (Ca), Potassium (K), Sodium (Na), Phosphorus (P), Magnesium (Mg), Chloride (Cl) and Sulfur (S).

Many of these elements combine to form the various "macromolecules" or compounds which are the so-called "building blocks" of cell structure.

In general, all cells contain the following:

Inorganic compounds -

Examples:

a. water
b. electrolytes (acids, bases, salts)

Organic compounds -

Types of Organic Compounds

1. Protein
   The structure and function of each protein is determined by the number and sequence of its amino acids. Examples include:

   - structural
   - enzymes
   - hormones

2. Carbohydrates (CH0)

   Examples: monosaccharides, disaccharides, polysaccharides

3. Lipids

   Examples: fats, cholesterol, phospholipids

4. Nucleic acids

   Examples: DNA (deoxyribonucleic acid), RNA (ribonucleic acid)

C. MAJOR COMPONENTS OF CELLS

1. Cell Membrane (plasma membrane)

   a. Composed of:

      1.

      2.

      3.

b. General structure – "Fluid Mosaic Model"

Current theory for the arrangement of the components of the cell membrane: Lipid components (amphipathic molecules) are arranged in a bilayer which acts somewhat like a fluid. Proteins and carbohydrates float like icebergs in this sea of lipid. Note: Amphipathic molecules have a polar and nonpolar end.

c. Function

1. Compartmentalization

2. Regulation of movement of materials from one area to another.

   Selectively permeable

3. Provides for intercellular interactions
   - allows communication between cells
   - cell-cell recognition sites.

4. Provides recognition sites

Note: Extracellular fluid is located outside of the cell membrane. The extracellular fluid located closest to the outer surface of the membrane is called interstitial fluid.

2. Nucleus – cells "command center"

   a) structure

      1. chromatin

      2. nuclear envelope

      3. nucleolus

   b) function

      1.

      2.

      3.

3. CYTOPLASM – substance located within the cell. This includes the following: