Section 1 Structural Organization of the Human Body

- **1.1** Levels of Organization (Chapter 1 pg 4-5)
- **1.2** Cells (Chapter 3 pages 83-96)
- **1.3** Tissues (Chapter 4 pages 116-137

Section1.1 Levels of Structural Organization

- Chemical
    - Atoms and Molecules (chapter 2)
    - Organelles (chapter 3)
- Cellular
    - Cells (Chapter 3)
- Tissue
    - Groups of similar cells (chapter 4)
- Organ
    - Contains two or more types of tissues
- Organismal
    - All organ systems

Cells

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- Organismal functions depend on individual and collective cell functions
- Biochemical activities of cells dictated by their shapes or forms, and specific subcellular structures

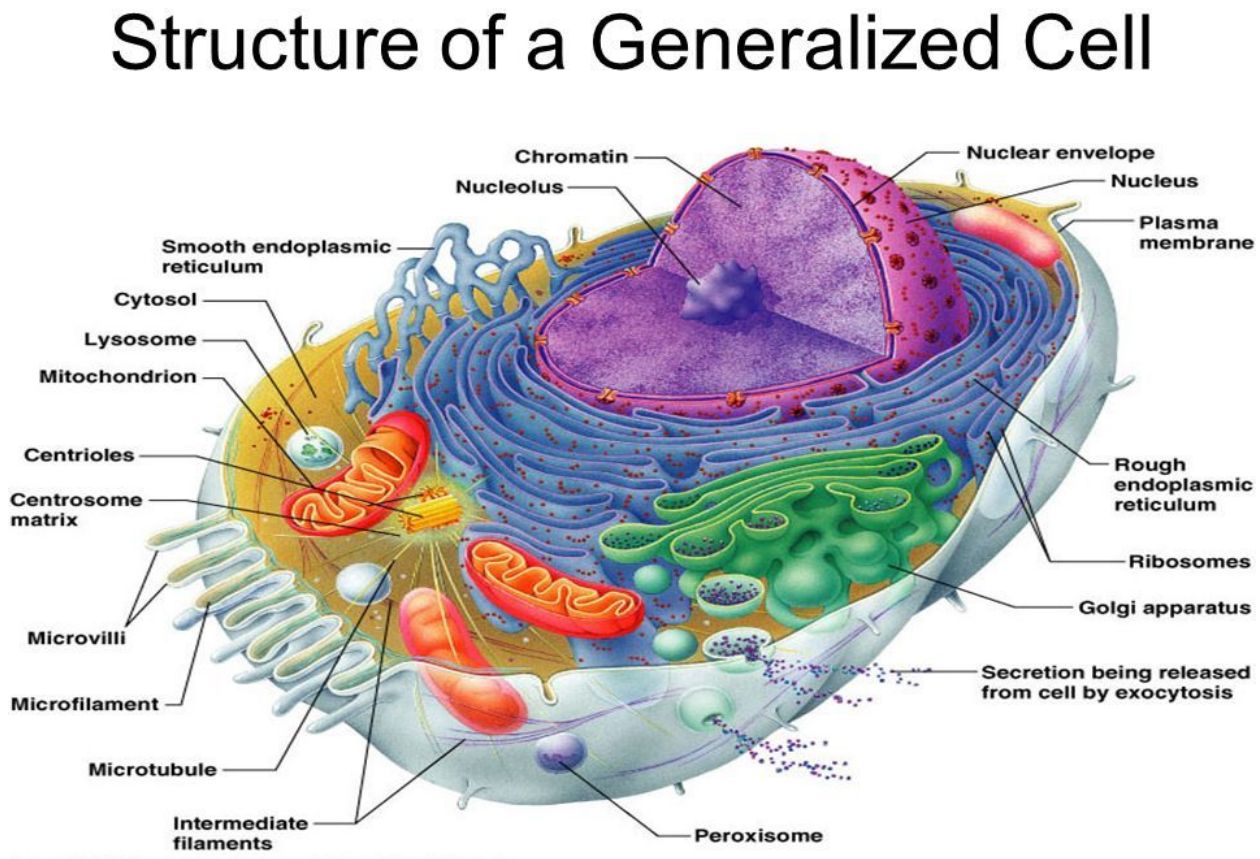
Cellular Theory

- The cell is the smallest unit of life
- All organisms are made of one or more cells.
- Cells are
    - Structural and functional unit of life
    - Different cell types have different functions within an organism
    - Functions of cells are dictated by their **shapes**, **type** and **relative number fo the subcellular structures they contain.**

- Cells only arise from other cells
    - Mitosis
    - Sperm and ovum through meiosis

Generalized Cells

- All cells have some common structures and functions
- Humans cells have three basic parts
    - **Plasma Membrane**
    - **Cytoplasm**
    - **Nucleus**



Cell Part	Structure	Function

Plasma Membrane	• Membrane made of **lipid bilayers**
	  ○ **Phospholipid bilayer**
	  ○ **Cholesterol bilayer**
	• Proteins are embedded within it
	  ○ They may be on one face or extend through the lipid bilayer
	  ○ Most externally facing proteins have attached sugar groups
		• Serves as an external cell barrier
		• Transports of substances in and out of the cell
		• Maintains resting potential that is essential for functioning excitable cells
		• Externally facing proteins act as receptors
		• Transport proteins
		• Cell-to-cell recognition.

Mitochondria	• Rod-like • Double membrane structures • Inner membrane folded into projections called **CRISTAE**	• Site of ATP synthesis • Powerhouse of the cell
Ribosome	• Dense particles consisting of **two subunits** ○ **Composed of ribosomal DNA and protein.** • Free or attached to rough ER	• Site of protein synthesis
Rough ER	• Membranous system enclosing a cavity • **Cistern** and coiling through the cytoplasm • Studded with ribosomes	• Sugar groups are attached to proteins within the CISTERNS • Proteins are bound in vesicles for transport to the Golgi Body and other sites • External face synthesizes phospholipids
Golgi Body	• A stack of flattened membranes and associated vesicles close to the nucleus.	• **Packages**, **modifies** and **segregates proteins** for secretion from the cell, Inclusion in lysosomes, incorporation into the plasma membrane.

Peroxisomes	● Membranous sacs of catalase and oxidase enzymes	● Enzymes detoxify a toxic substances ● Most important enzyme, **catalase,** breaks down hydrogen peroxide.
Lysosomes	● Membranous sac containing **acid hydrolases**	● **The site of intracellular digestion**
Microtubules	● Cylindrical structures made of **tubulin** proteins	● Support the cell and give shape ● Involved intracellular movement ● **Form centrioles and cilia and flagella if present.**
Microfilament	● Fine filaments composed of the protein actin	● Involved in muscle contraction and other types of intracellular movements ● **Help form cells' cytoskeleton**
Intermediate filaments	● **Protein fibres** composition varies	● The stable cytoskeletal elements ● Resist mechanical forces acting on a cell
Inclusions	● Varied includes stored nutrients such as **lipid droplets** and **glycogen granules, protein crystals, pigment granules**	● Storage for nutrients, waste and cell products
Cellular Extensions		
Cilia	● Short cell-surface projections ● Each cilium composed of **NINE PAIRS of microtubules** surrounding a central pair	● Coordinated movement creates a unidirectional current that propels substances across cell surfaces.
Flagellum	● Like a cilium but longer ● One example in humans is the sperm tail	● Propels the cell
Microvilli	● **Tubular** extensions of the plasma membrane ● Contains bundle of actin filaments	● Increase surface area for absorption

NUCLEUS		
Nucleus	● Largest organelle ● Surrounded by a nuclear envelope ● Contains fluid **nucleoplasm, nucleoli, and chromatin**	● Control center of the cell; ● Responsible for transmitting genetic info an provided instruction for protein synthesis ●
Nuclear Membrane	● Double-membrane pierced by pores ● Outer membrane continuous with the endoplasmic reticulum	● Separates the nucleoplasm from the cytoplasm and regulates the passage of substances to and from the nucleus
Nucleolus	● Dense spherical (non-membrane-bounded) bodies ● Composed of ribosomal RNA and proteins	● Site of ribosome subunit manufacture
Chromatin	● Granular, threadlike material composed of DNA and histone proteins	● DNA constitutes the genes