Cells are the basic structural and functional units of all living organisms, including the human body. Here is a comprehensive overview of cells and their functions:

Cell Structure:

Plasma Membrane: The outer boundary of the cell that separates it from its environment, controlling the movement of substances in and out of the cell.

Cytoplasm: The jelly-like substance within the cell where organelles are suspended.

Nucleus: The central organelle that houses the cell's genetic material (DNA) and controls cellular activities.

Organelles and Their Functions:

Mitochondria: Powerhouses of the cell, responsible for generating energy (ATP) through cellular respiration.

Endoplasmic Reticulum (ER):

Rough ER: Involved in protein synthesis and transport.

Smooth ER: Synthesizes lipids and detoxifies harmful substances.

Golgi Apparatus: Modifies, sorts, and packages proteins and lipids for transport within or outside the cell.

Ribosomes: Sites of protein synthesis, either free in the cytoplasm or attached to the rough ER.

Lysosomes: Contain enzymes to digest and recycle cellular waste and foreign materials.

Cytoskeleton: Provides structural support, helps in cell movement, and facilitates intracellular transport.

Centrioles: Aid in cell division (mitosis and meiosis) by organizing microtubules of the spindle apparatus.

Vacuoles: Store water, ions, and nutrients; maintain turgor pressure in plant cells.

Chloroplasts (in plant cells): Site of photosynthesis, where sunlight is converted into chemical energy (glucose).