

SNS COLLEGE OF ALLIED HEALTH SCIENCE

Affiliated to The Tamil Nadu Dr. M.G.R Medical University, Chennai

DEPARTMENT OF RADIOGRAPHY AND IMAGING TECHNOLOGY

COURSE NAME : HUMAN ANATOMY AND PHYSIOLOGY RELEVANT TO RADIOLOGY

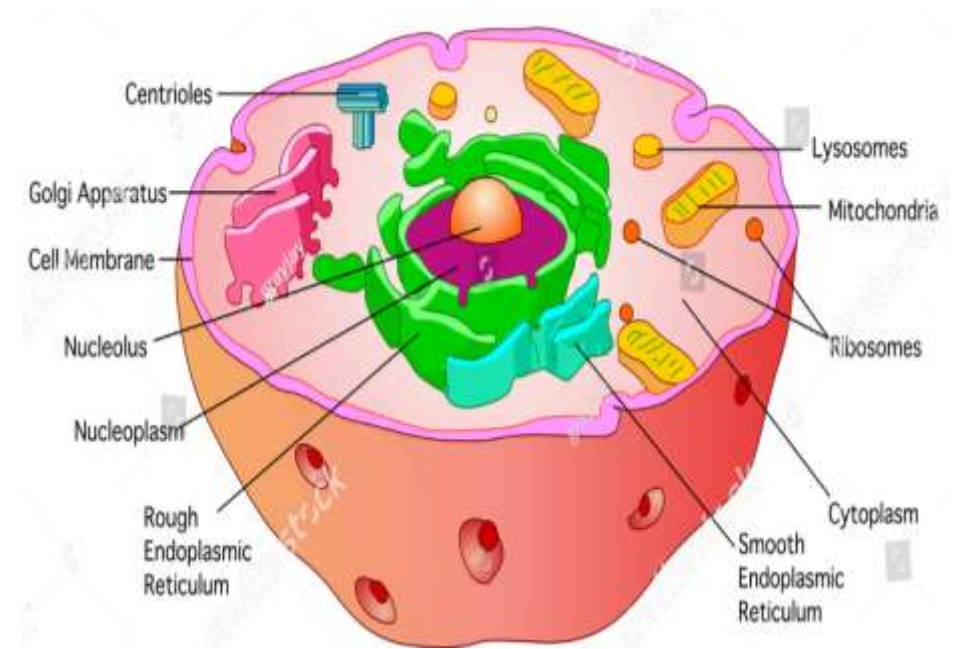
UNIT : GENERAL STRUCTURE OF HUMAN BODY

TOPIC :CELL – STRUCTURE AND FUNCTION

FACULTY NAME : MRS.G.HELANA JOY

INTRODUCTION TO ANATOMY (Define)

- The fundamental structural and functional unit of all known living organisms.
- Smallest unit of life that can replicate independently.
- Humans are multicellular organisms, comprised of trillions of cells.
- Different cell types (e.g., nerve cells, muscle cells, blood cells) have specialized functions.



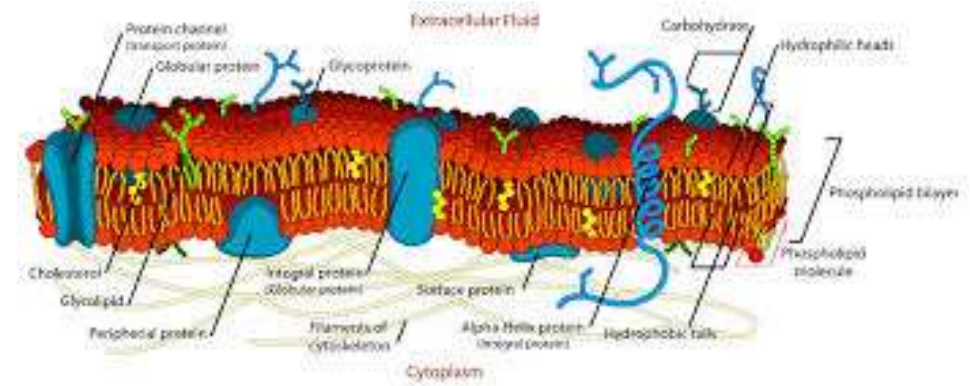
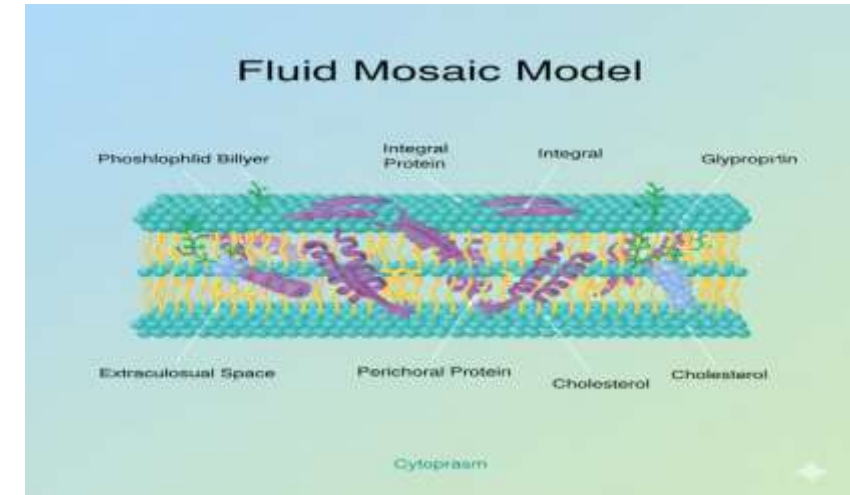
THE CELL MEMBRANE (PLASMA MEMBRANE)

Structure: Phospholipid bilayer with embedded proteins, cholesterol, and carbohydrates.

Fluid mosaic model: Dynamic, semi-permeable barrier.

Functions:

- Selective permeability: regulates passage of substances.
- Cell recognition.
- Cell signaling (receptors).
- Cell adhesion.
-

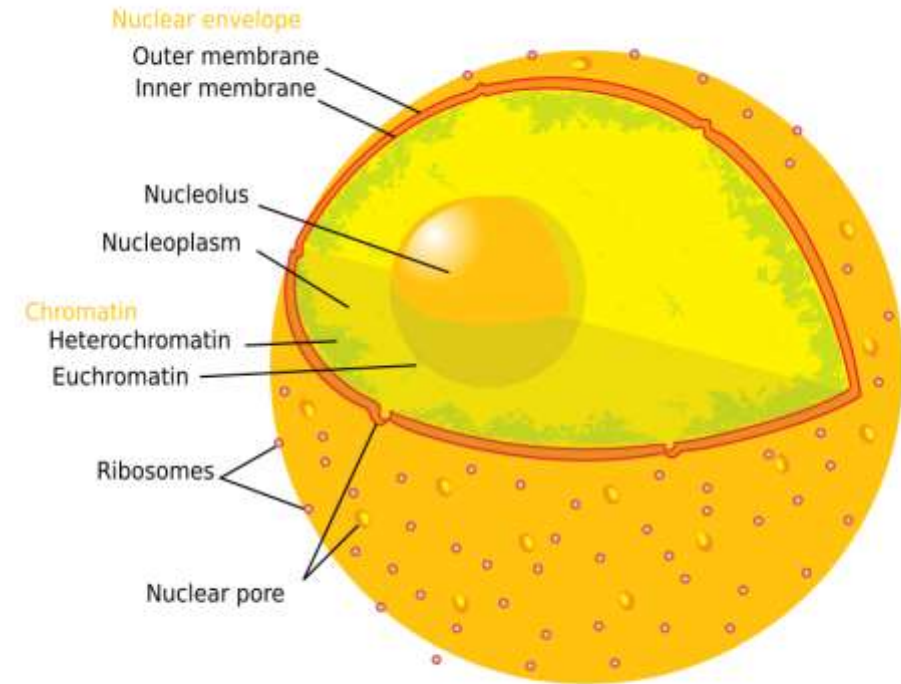


THE NUCLEUS

Structure: Nuclear envelope (double membrane), nuclear pores, nucleolus, chromatin (DNA + proteins).

Function:

- Houses the cell's genetic material (DNA).
- Controls cell growth, metabolism, and reproduction.
- Site of ribosome synthesis (nucleolus).
- Directs protein synthesis.



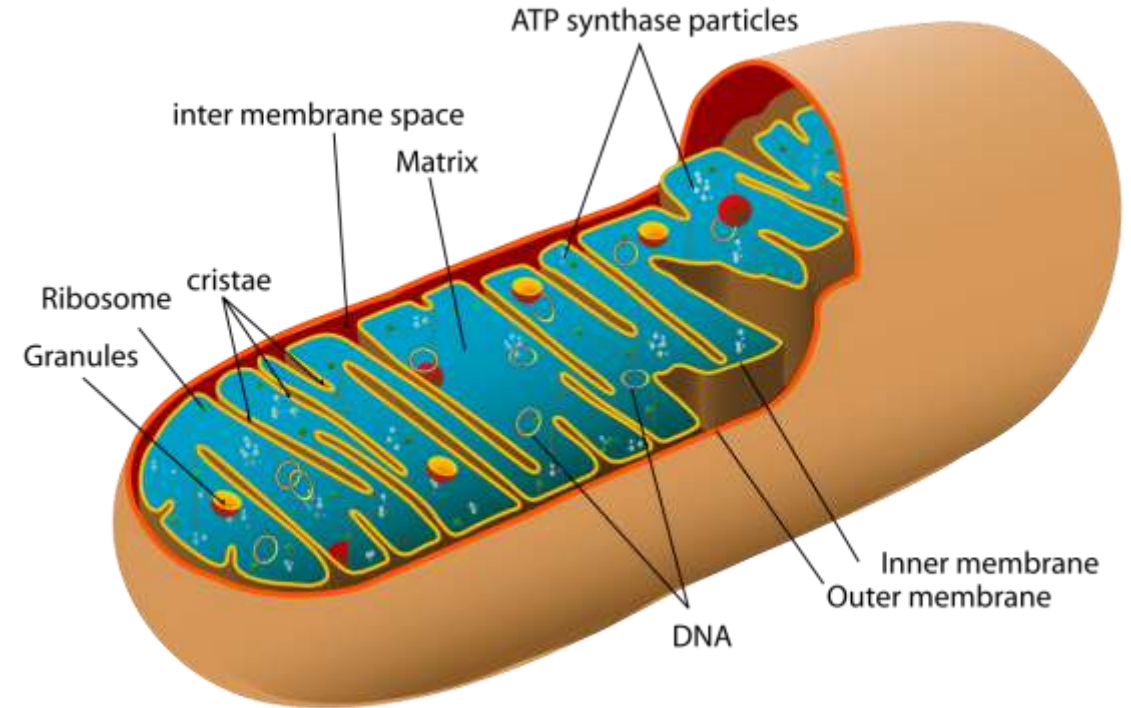
MITOCHONDRIA- Powerhouses of the Cell

Structure: Double membrane; outer smooth, inner folded into cristae; contains matrix with DNA and ribosomes.

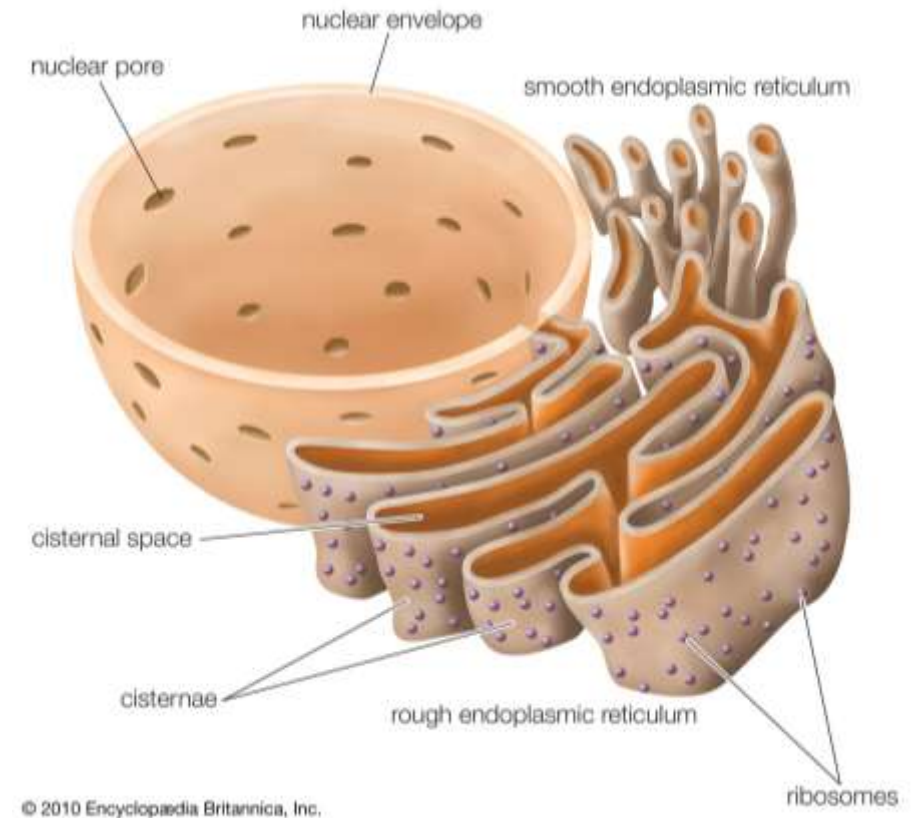
- Known as the "powerhouse" of the cell.

Functions:

- Site of cellular respiration.
- Generates ATP (adenosine triphosphate) – the cell's energy currency.



ENDOPLASMIC RETICULUM (ER)

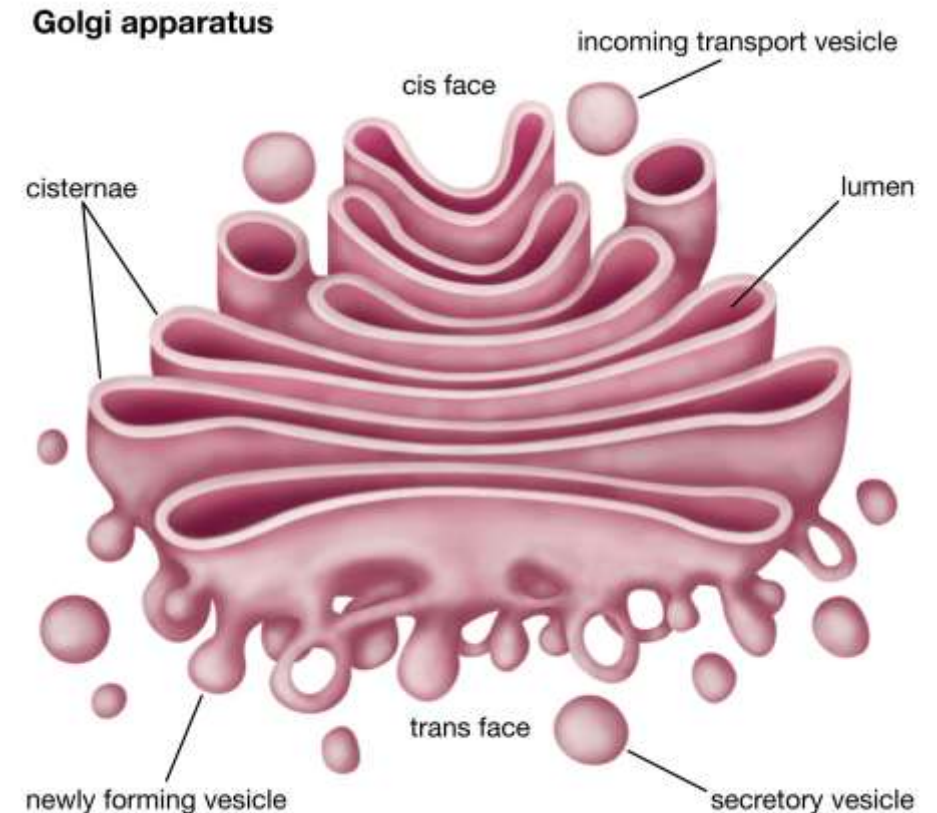


GOLGI APPARATUS

Structure: Stack of flattened membrane-bound sacs called cisternae.

Function:

- Modifies, sorts, and packages proteins and lipids from the ER.
- "Post office" of the cell.
- Forms lysosomes and secretory vesicles.



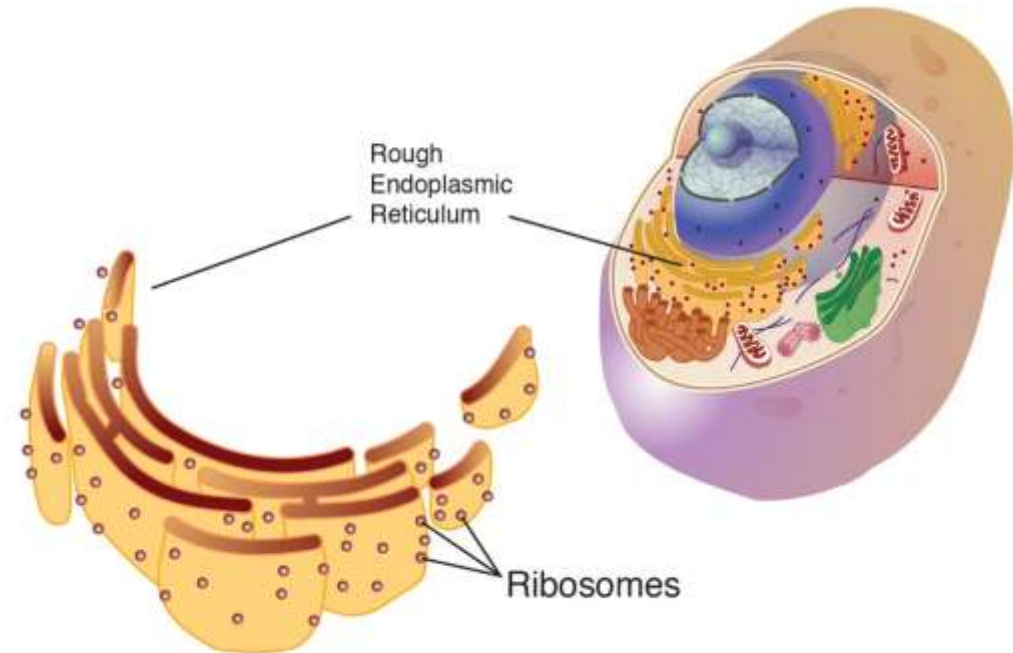
© Encyclopædia Britannica, Inc.

RIBOSOMES - PROTEIN FACTORIES

Structure: Composed of ribosomal RNA (rRNA) and protein. Two subunits (large and small).

Location: Free in the cytoplasm or attached to the rough ER.

Function: Site of protein synthesis (translation of mRNA into protein).



LYSOSOMES AND OTHER ORGANELLES

Lysosomes: Membrane-bound sacs with hydrolytic enzymes; digest waste and foreign materials.

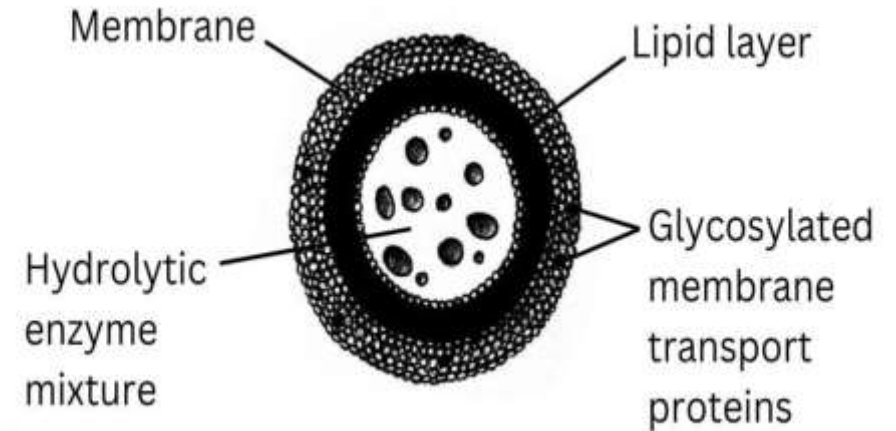
Other organelles:

Ribosomes: Protein synthesis (free or bound to ER).

Cytoskeleton: Microtubules, microfilaments, intermediate filaments for structure and movement.

Centrioles: Organize microtubules during cell division.

Functions: Lysosomes act as "recycling centers"; cytoskeleton provides support and enables motility.



CYTOPLASM AND OVERALL CELL FUNCTIONS



Cytoplasm: Gel-like fluid (cytosol) filling the cell; site of metabolic reactions.

Key functions of the cell:

- *Metabolism:* Energy production and biosynthesis.
- *Growth and division:* Mitosis/meiosis.
- *Response to stimuli:* Signaling pathways.
- *Homeostasis:* Maintaining internal balance

CYTOSKELETON - CELL'S INTERNAL FRAMEWORK

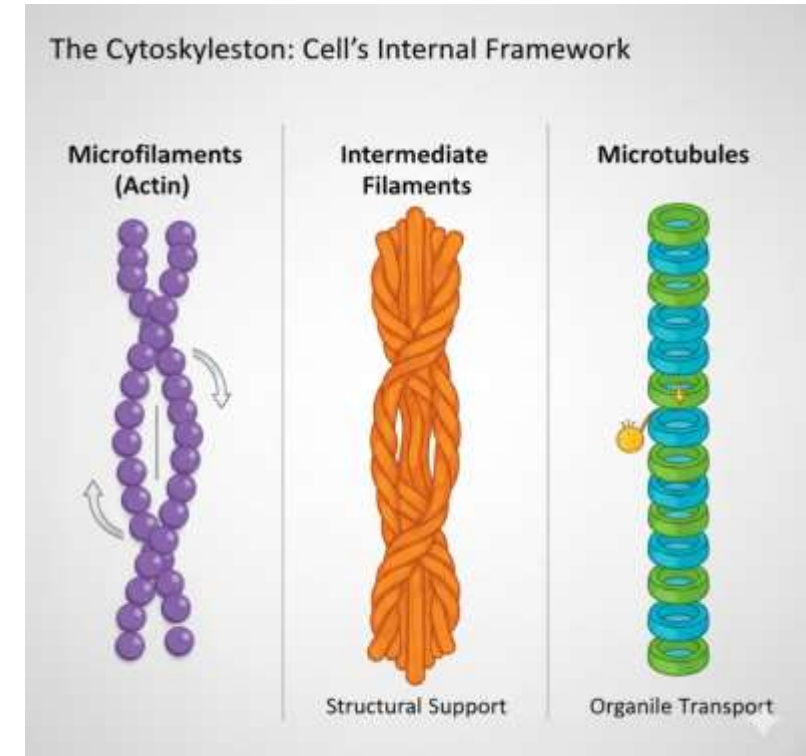
Structure: Network of protein filaments throughout the cytoplasm.

Components:

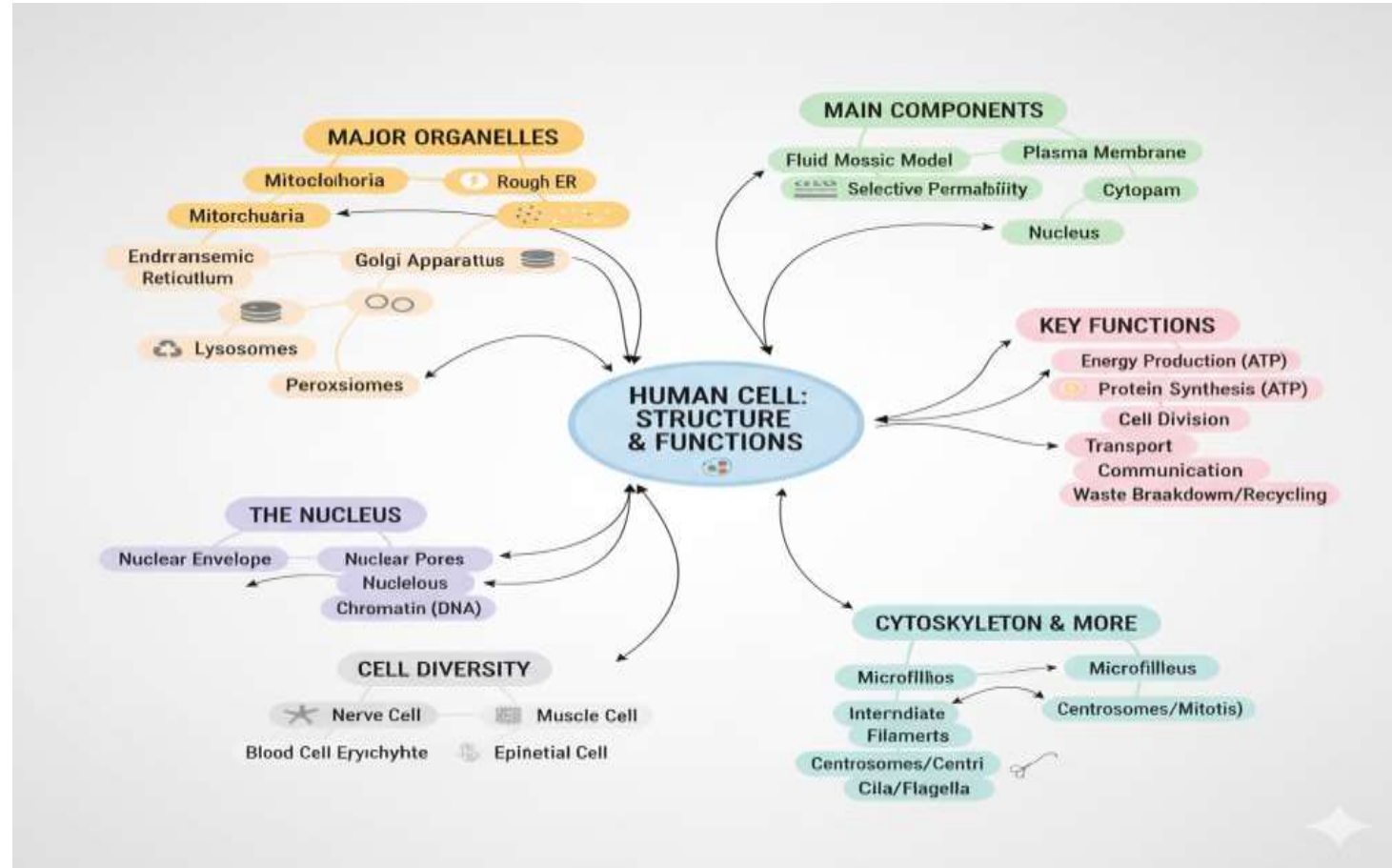
- **Microfilaments (Actin Filaments):** Cell shape, muscle contraction, cell division.
- **Intermediate Filaments:** Provide structural support, anchor organelles.
- **Microtubules:** Cell shape, organelle movement, cilia/flagella, mitotic spindle.

Function:

- Maintains cell shape.
- Anchors organelles.
- Aids in cell movement and division.
- Intracellular transport.



SUMMARY



References

- Clark, M. A., Douglas, M., & Choi, J. (2018, March 28). *Biology 2e*. OpenStax.
<https://openstax.org/details/books/biology-2e>
- <https://byjus.com/biology/cells/>
- <https://openstax.org/books/biology-2e/pages/4-1-studying-cells>