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 : ELEMENTARY TISSUE OF HUMAN BODY

TOPIC :EPITHELIAL TISSUE, MUSCULAR TISSUE, CONNECTIVE TISSUES AND NERVOUS TISSUE.

FACULTY NAME : MRS.G.HELANA JOY

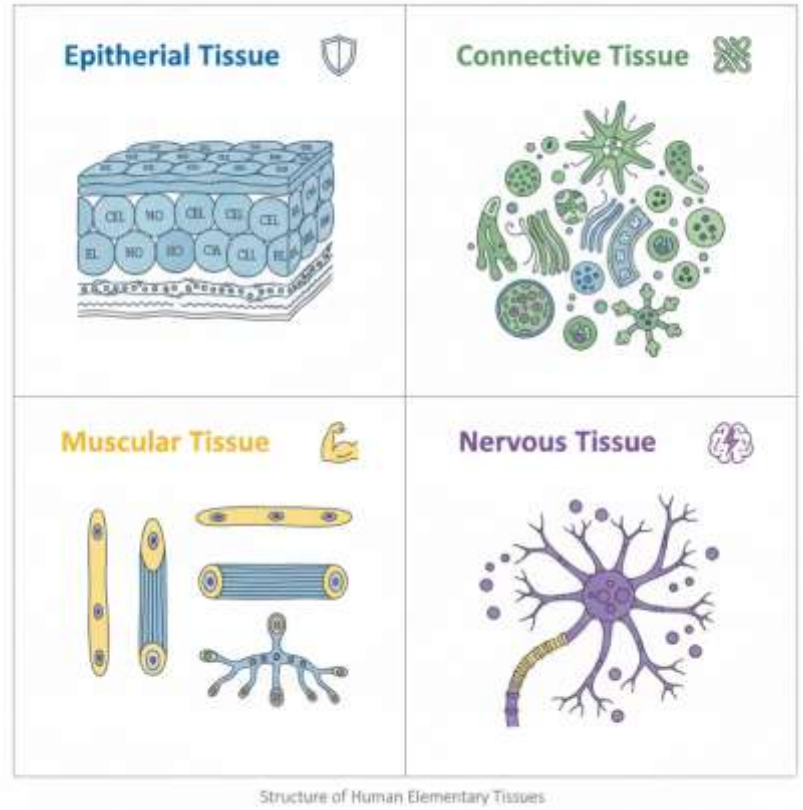
INTRODUCTION TO TISSUE (Define)

What are Tissues?

- Groups of similar cells performing specific functions.
- Form organs and organ systems.

Four Primary Tissue Types:

- Epithelial Tissue
- Connective Tissue
- Muscular Tissue
- Nervous Tissue



Structure of Human Elementary Tissues

EPITHELIAL TISSUE - OVERVIEW

Definition: Tissue that covers body surfaces, lines body cavities, and forms glands.

Key Characteristics:

•Closely packed cells, little extracellular matrix.

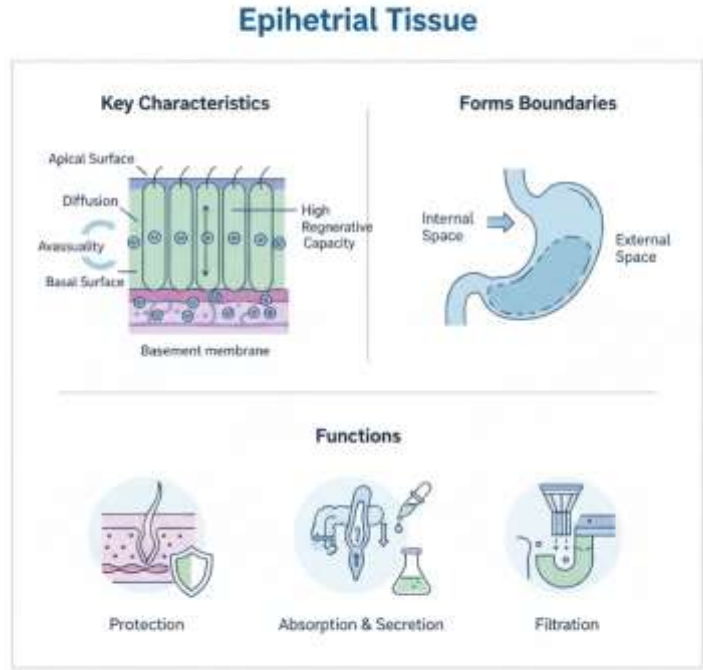
•Avascular (no direct blood supply); nourished by diffusion.

•Forms boundaries.

•High regenerative capacity.

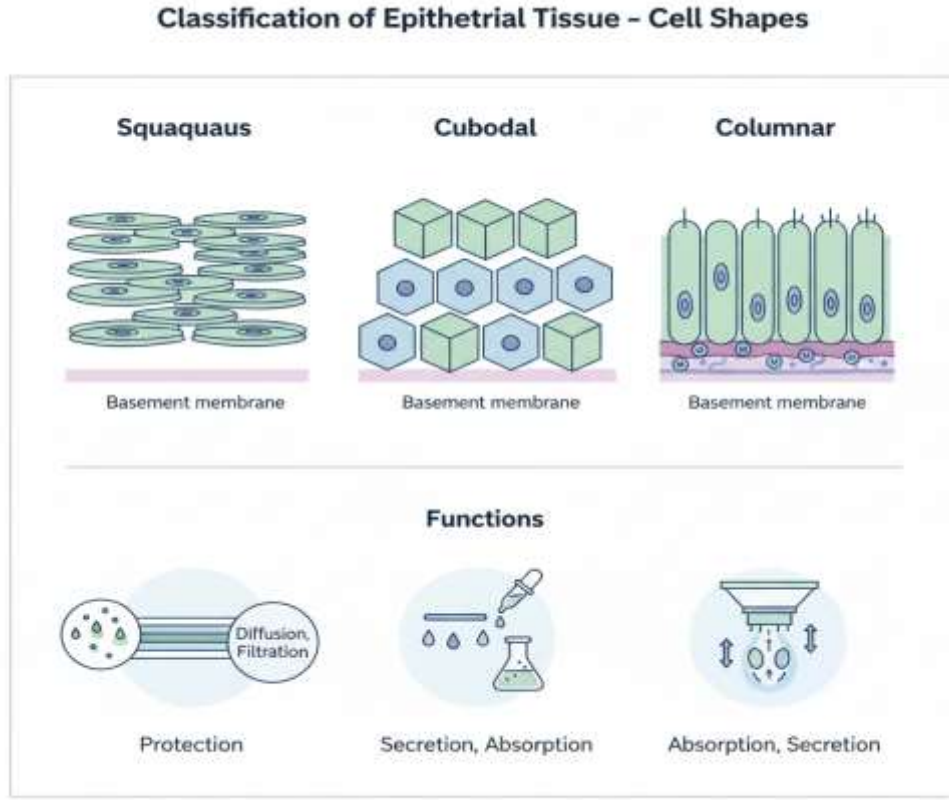
•Apical and basal surfaces.

Functions: Protection, absorption, filtration, excretion, secretion, sensory reception.



CLASSIFICATION OF EPITHELIAL TISSUE - CELL SHAPES

•**Squamous:** Flat, scale-like cells (diffusion, filtration).
•**Cuboidal:** Cube-shaped cells (secretion, absorption).
•**Columnar:** Tall, column-shaped cells (absorption, secretion).



CLASSIFICATION OF EPITHELIAL TISSUE - LAYERS

Simple Epithelium: Single layer of cells (absorption, secretion, filtration).

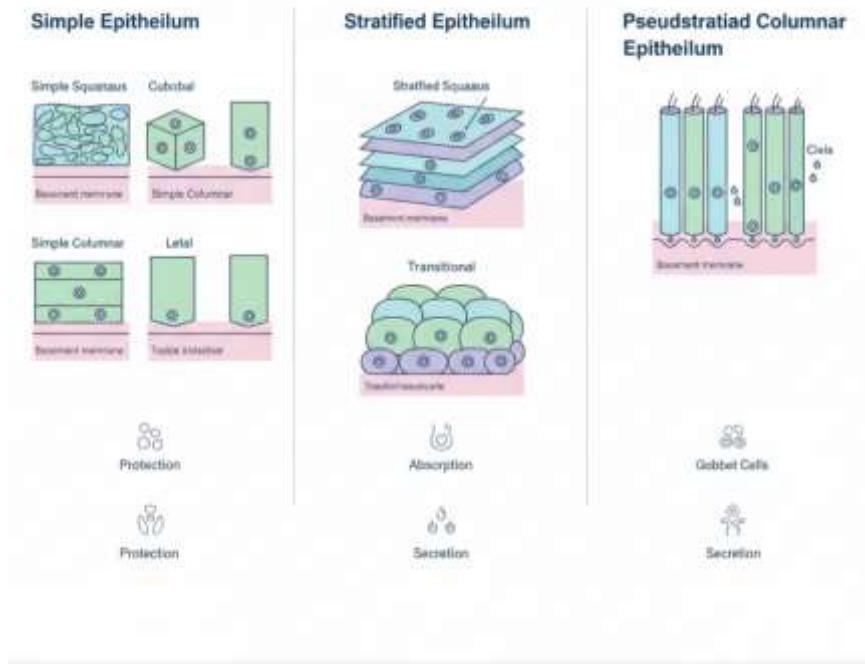
•Examples: lining of blood vessels (simple squamous), kidney tubules (simple cuboidal), digestive tract (simple columnar).

Stratified Epithelium: Two or more layers of cells (protection).

•Examples: skin (stratified squamous), lining of bladder (transitional).

Pseudostratified Columnar Epithelium: Appears stratified but is a single layer (secretion, propulsion of mucus).

•Example: lining of trachea.



CONNECTIVE TISSUE - OVERVIEW

Definition: Most abundant and widely distributed tissue type.

Key Characteristics:

•Cells widely scattered, embedded in an abundant extracellular matrix.

•Vascularized (except cartilage).

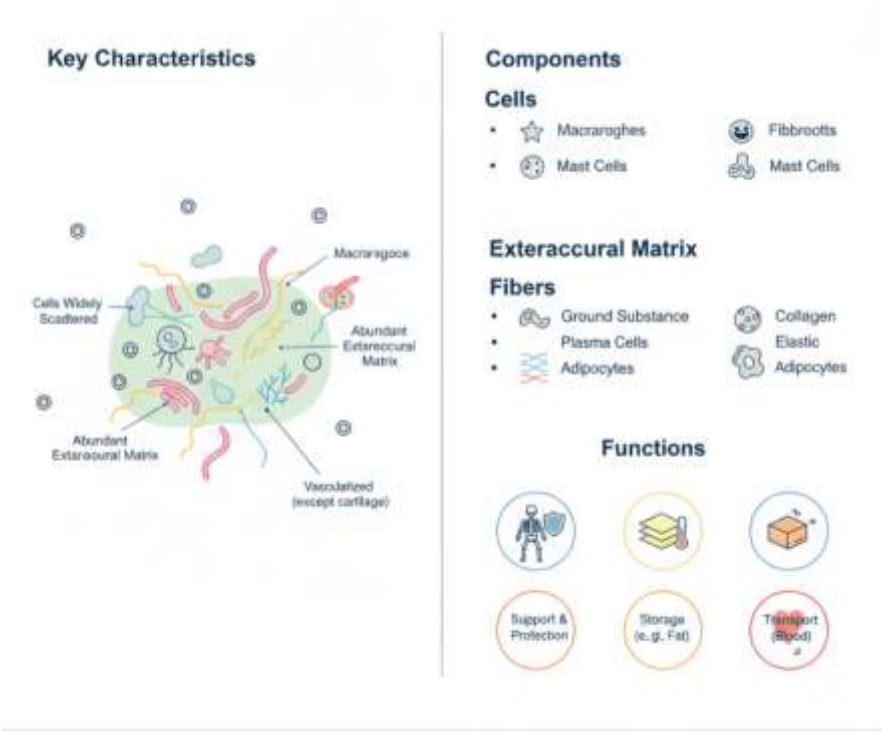
•Diverse functions.

Components:

Cells: Fibroblasts (most common), macrophages, mast cells, plasma cells, adipocytes.

Extracellular Matrix: Ground substance (unstructured material that fills space between cells) + Fibers (collagen, elastic, reticular).

Functions: Support, protection, insulation, storage, transport.



TYPES OF CONNECTIVE TISSUE - PROPER

Loose Connective Tissue:

•Areolar: Supports epithelia, holds organs in place.

•Adipose: Fat storage, insulation, shock absorption.

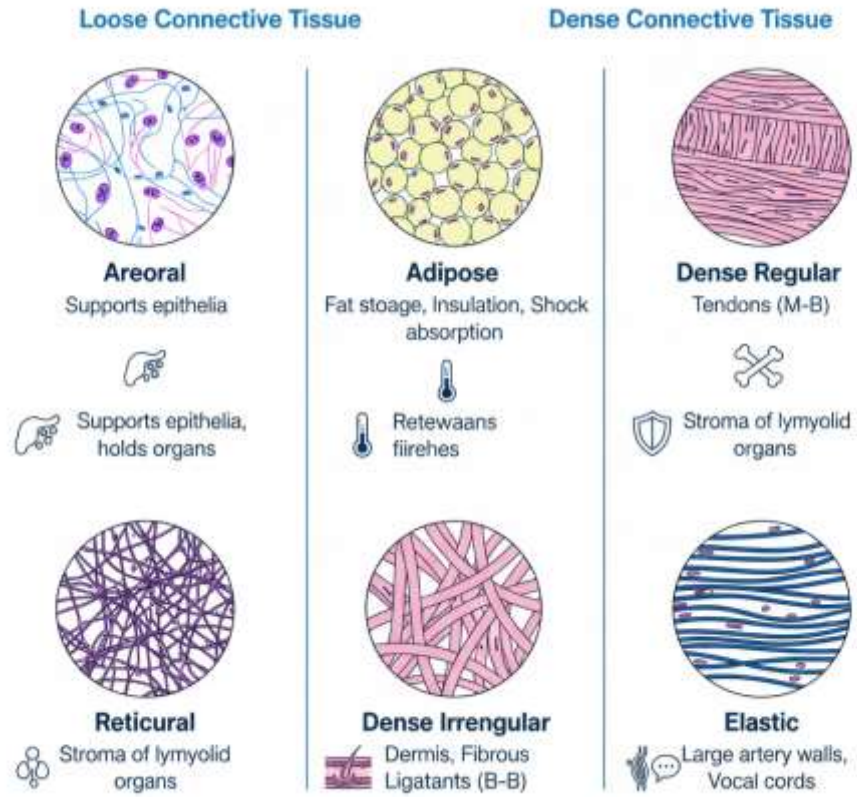
•Reticular: Forms stroma of lymphoid organs (spleen, lymph nodes).

Dense Connective Tissue:

•Dense Regular: Tendons (muscle to bone), ligaments (bone to bone).

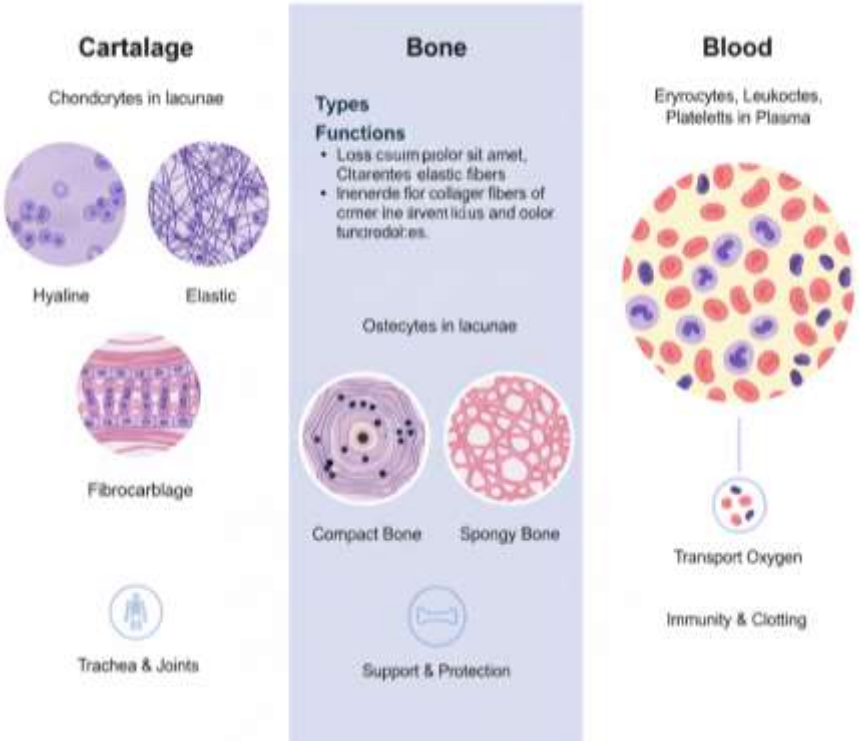
•Dense Irregular: Dermis of skin, fibrous capsules of organs.

•Elastic: Walls of large arteries, vocal cords.



TYPES OF CONNECTIVE TISSUE - SPECIALIZED

Cartilage: (Chondrocytes in lacunae)
•Hyaline: Most common, articular surfaces, trachea, nose.
•Elastic: External ear, epiglottis.
•Fibrocartilage: Intervertebral discs, menisci of knee.
Bone: (Osteocytes in lacunae)
•Compact Bone: Dense, outer layer.
•Spongy Bone: Trabecular, inner layer.
Blood: (Erythrocytes, leukocytes, platelets in plasma)



MUSCULAR TISSUE - OVERVIEW

Definition: Specialized for contraction, generating force and movement.

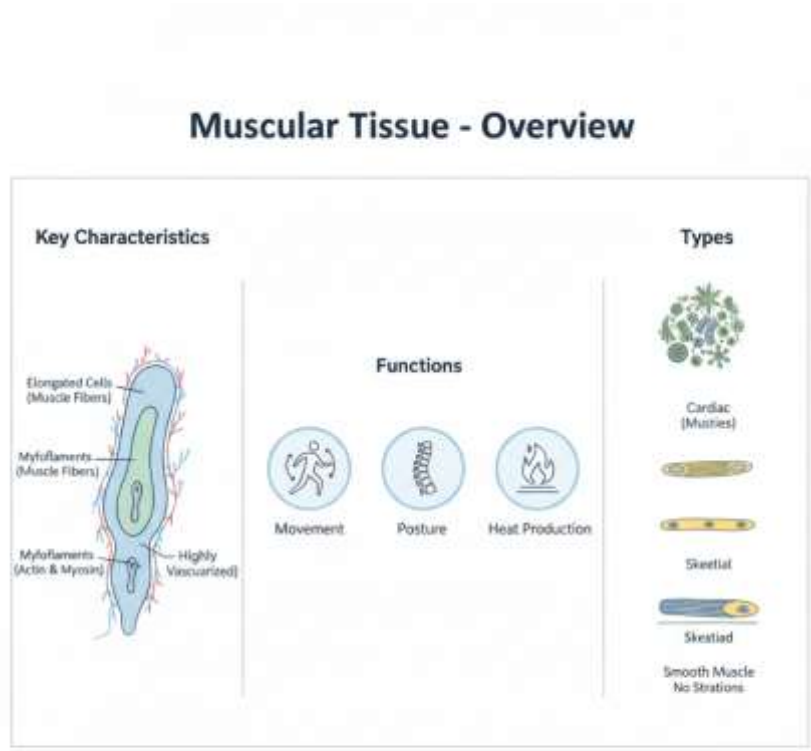
Key Characteristics:

•Elongated cells (muscle fibers).

•Contains myofilaments (actin and myosin) for contraction.

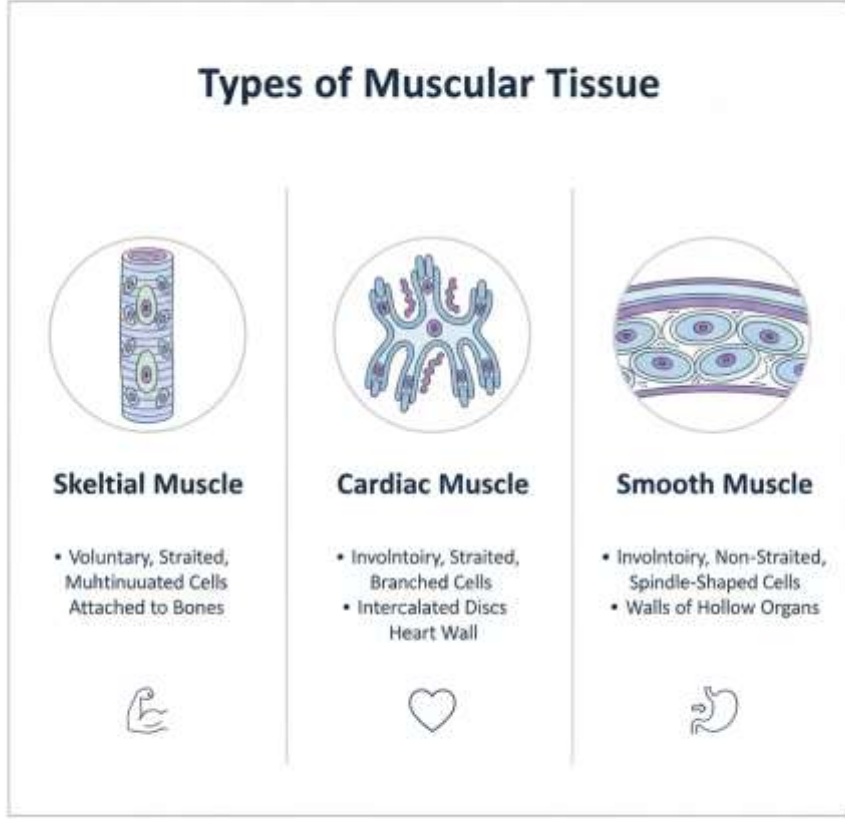
•Highly vascularized.

Functions: Movement, posture, heat production.



TYPES OF MUSCULAR TISSUE

Skeletal Muscle:
•Voluntary control.
•Striated (bands).
•Multinucleated, long cylindrical cells.
•Location: Attached to bones.
Cardiac Muscle:
•Involuntary control.
•Striated.
•Uninucleated, branched cells with intercalated discs.
•Location: Wall of the heart.
Smooth Muscle:
•Involuntary control.
•Non-striated.
•Uninucleated, spindle-shaped cells.
•Location: Walls of hollow organs (digestive tract, blood vessels).



NERVOUS TISSUE - OVERVIEW

Definition: Responsible for communication and control throughout the body.

Key Characteristics:

•Highly specialized cells.

•Irritability (ability to respond to stimuli).

•Conductivity (ability to transmit electrical impulses).

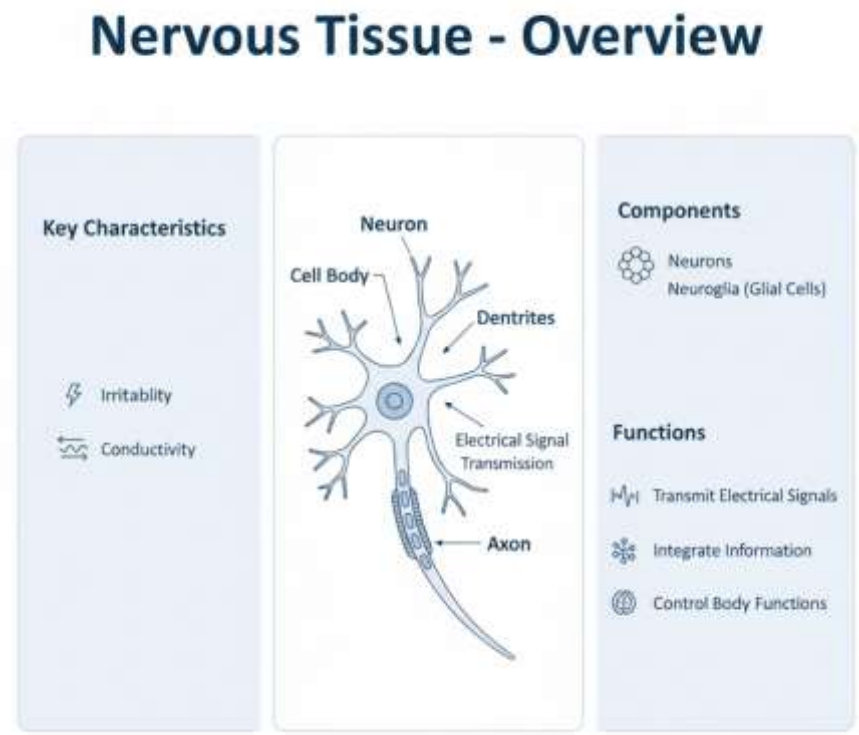
Components:

•**Neurons:** Excitable cells that transmit electrical signals (nerve impulses).

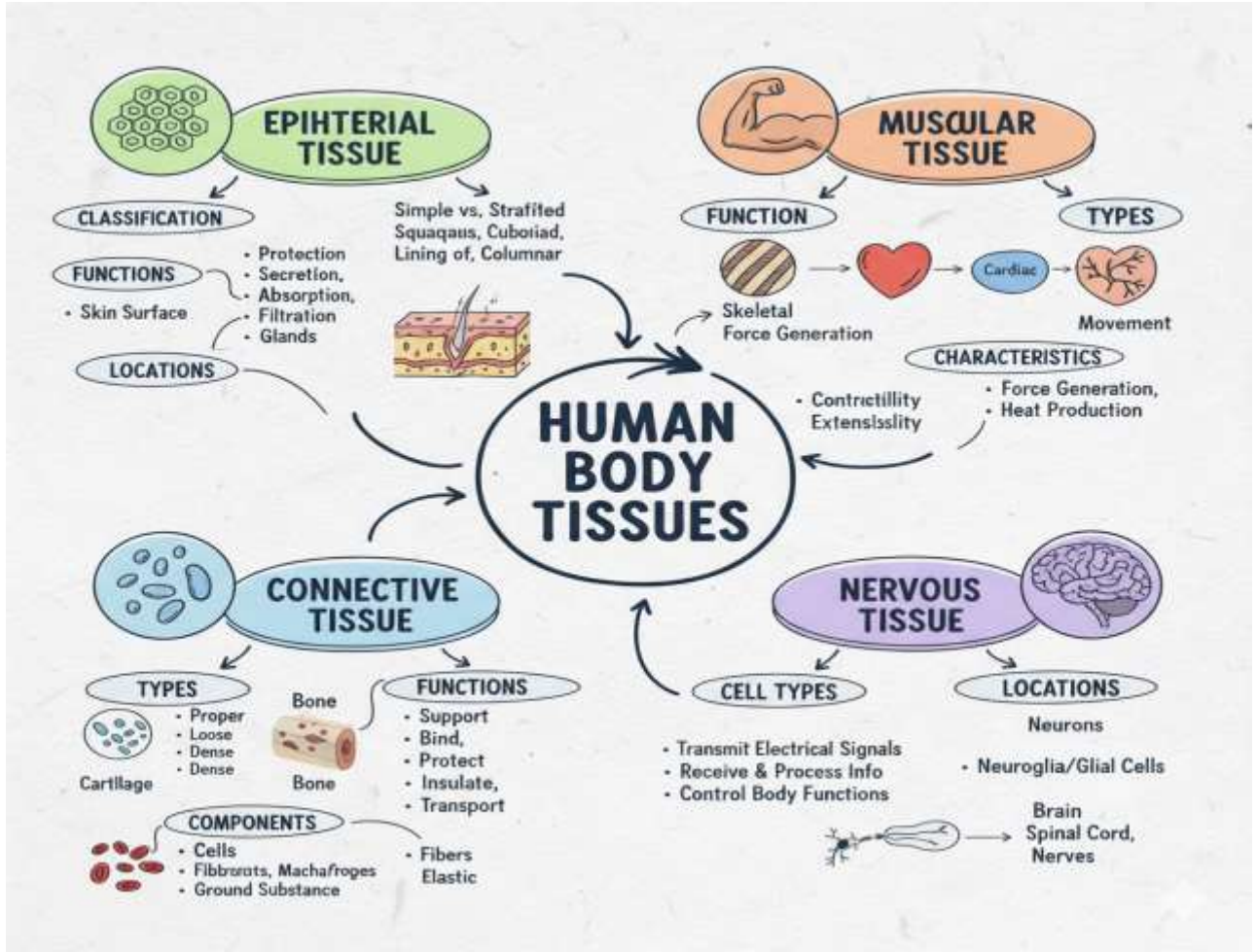
  •Cell body, dendrites, axon.

•**Neuroglia (Glial Cells):** Support, insulate, and protect neurons.

Functions: Transmit electrical signals, integrate information, control body functions.



SUMMARY


EPIHTERIAL TISSUE
CLASSIFICATION
Simple vs, Strafited Squaqaus, Cuboiiad, Lining of, Columnar
FUNCTIONS
• Protection
• Secretion,
• Absorption,
• Filtration
• Glands
• Skin Surface
LOCATIONS
MUSCULAR TISSUE
FUNCTION
TYPES
Cardiac
Skeletal Force Generation
Movement
CHARACTERISTICS
• Force Generation,
• Heat Production
• Contractility Extensisslity
HUMAN BODY TISSUES
CONNECTIVE TISSUE
TYPES
• Proper
• Loose
• Dense
• Dense
Cartilage
Bone
Bone
FUNCTIONS
• Support
• Bind,
• Protect
• Insulate,
• Transport
COMPONENTS
• Cells
• Fibbrouts, Macha/ropes
• Ground Substance
• Fibers Elastic
NERVOUS TISSUE
CELL TYPES
• Transmit Electrical Signals
• Receive & Process Info
• Control Body Functions
LOCATIONS
Neurons
• Neuroglia/Glial Cells
Brain
Spinal Cord,
Nerves

References

- OpenStax. (2022). Anatomy and physiology 2e. OpenStax CNX. https://openstax.org/details/books/anatomy-and-physiology-2e
- **https://openstax.org/books/anatomy-and-physiology-2e/pages/4-1-types-of-tissues**
- **https://openstax.org/books/anatomy-and-physiology-2e/pages/4-chapter-review**