

HUMAN TISSUES AND CELL MEMBRANES

HUMAN TISSUES

Human tissues are groups of cells with similar structures and functions that work together to perform specific tasks in the body. There are four primary types of human tissues: epithelial, connective, muscle, and nervous tissues. Each type has distinct characteristics and plays essential roles in maintaining the structure and function of organs and organ systems.

1. Epithelial Tissue:

Structure:

Composed of tightly packed cells with little to no extracellular matrix.

Cells are closely connected by junctions.

May have one or multiple layers.

Function:

Covers body surfaces, both internal and external.

Forms protective barriers.

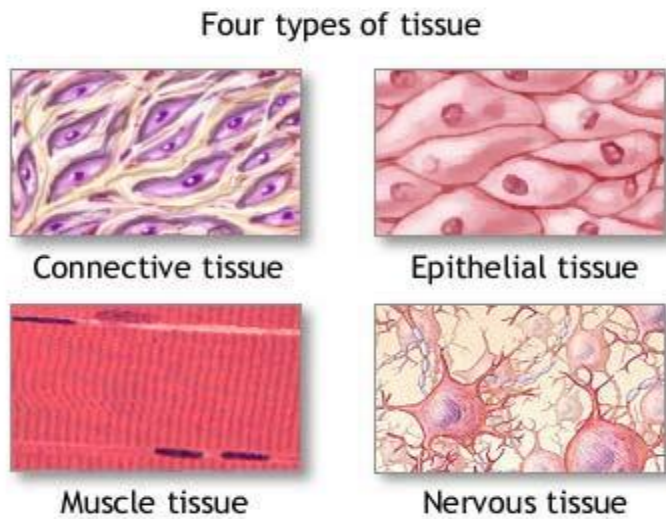
Involved in absorption, secretion, and sensation.

Classified based on shape (squamous, cuboidal, columnar) and layering (simple, stratified).

Examples:

Skin epithelium (stratified squamous).

Lining of the gastrointestinal tract (simple columnar).



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2. Connective Tissue:

Structure:

Cells dispersed in an extracellular matrix containing fibers and ground substance.

Varying degrees of vascularity.

Function:

Supports, binds together, and protects tissues and organs.

Provides structural framework.

Participates in energy storage, immune response, and transport.

Examples:

Bone (osseous tissue).

Blood (liquid connective tissue).

Adipose tissue (fat).

3. Muscle Tissue:

Structure:

Consists of elongated cells called muscle fibers.

Contractile proteins (actin and myosin) responsible for movement.

Function:

Generates force and movement.

Maintains posture.

Produces heat.

Types:

Skeletal Muscle: Attached to bones; voluntary control.

Smooth Muscle: Found in walls of organs; involuntary control.

Cardiac Muscle: Forms the heart; involuntary control.

4. Nervous Tissue:

Structure:

Composed of neurons (nerve cells) and glial cells.

Neurons transmit electrical impulses.

Glial cells support and protect neurons.

Function:

Coordinates and regulates body functions.

Processes and transmits information.

Components:

Neurons: Transmit electrical signals.

Glial Cells: Support and protect neurons; include astrocytes, oligodendrocytes, microglia, and Schwann cells.

These tissues work together to form organs, and organs, in turn, constitute organ systems. The organization and specialization of tissues contribute to the overall structure and function of the human body. For example, the skin is composed of epithelial tissue, connective tissue, and nervous tissue, working together to provide protection, sensation, and thermoregulation.

HUMAN MEMBRANES

Human membranes are structures composed of one or more layers of cells and/or connective tissue that serve various functions within the body. There are several types of membranes in the human body, each with specific roles and locations. Here are some important human membranes:

1. Epithelial Membranes:

Cutaneous Membrane (Skin):

Composed of stratified squamous epithelium and underlying connective tissue.

Functions include protection, sensation, and thermoregulation.

2. Mucous Membranes (Mucosae):

Lines cavities and tubes that open to the outside of the body.

Consists of epithelium (usually stratified or simple columnar) and an underlying layer of connective tissue (lamina propria).

Functions include secretion, absorption, and protection.

Found in the respiratory, digestive, urinary, and reproductive tracts.

3. Serous Membranes (Serosae):

Lines closed body cavities, such as the thoracic and abdominal cavities.

Consists of a simple squamous epithelium (mesothelium) and a thin layer of connective tissue.

Produces serous fluid, which lubricates and reduces friction between the layers during organ movements.

Examples include the pleura (lining the lungs), pericardium (lining the heart), and peritoneum (lining the abdominal organs).

4. Synovial Membranes:

Lines joint cavities.

Composed of connective tissue.

Produces synovial fluid, which lubricates and nourishes the joint.

Functions include reducing friction and providing nutrients to the cartilage within joints.

5. Meninges:

Three protective membranes that surround the brain and spinal cord.

Composed of connective tissue.

Provide physical stability and protection to the central nervous system.

6. Peritoneum:

A type of serous membrane that lines the abdominal cavity and covers the abdominal organs.

Consists of a parietal layer (lining the cavity) and a visceral layer (covering the organs).

Produces peritoneal fluid, which reduces friction during organ movement.

7. Pericardium:

A type of serous membrane that surrounds the heart.

Consists of a fibrous pericardium (outer layer) and a serous pericardium (inner layer).

Produces pericardial fluid to reduce friction during heartbeats.

These membranes play crucial roles in protecting, lubricating, and facilitating the functioning of various organs and systems in the human body. They help maintain the integrity of body cavities, organs, and their surrounding structures.

GLANDS

Glands are organs or tissues in the body that produce and secrete substances for various functions. These secretions can be hormones, enzymes, mucus, sweat, or other substances that play specific roles in maintaining homeostasis and facilitating bodily functions. Here are some types of glands in the human body, along with their functions:

1. Endocrine Glands:

Examples: Pituitary gland, thyroid gland, adrenal glands, pancreas, gonads (testes and ovaries).

Function:

Secrete hormones directly into the bloodstream.

Regulate various physiological processes, including metabolism, growth, reproduction, and stress response.

2. Exocrine Glands:

Examples: Salivary glands, sweat glands, sebaceous glands, mammary glands, digestive glands (pancreas).

Function:

Secrete substances through ducts that lead to body surfaces or cavities.

Include glands that produce saliva, sweat, oil, mucus, and digestive enzymes.

3. Salivary Glands:

Examples: Parotid glands, submandibular glands, sublingual glands.

Function:

Produce saliva containing enzymes (amylase) for the digestion of carbohydrates.

Lubricate and initiate the breakdown of food.

4. Sweat Glands:

Examples: Eccrine glands, apocrine glands.

Function:

Eccrine glands regulate body temperature by producing watery sweat.

Apocrine glands, found in areas like the axillae, produce a thicker secretion that can be involved in body odor.

5. Sebaceous Glands:

Location: Found in the skin, connected to hair follicles.

Function:

Secrete sebum (an oily substance) to lubricate the skin and hair.

Helps prevent drying and protects against bacteria.

6. Mammary Glands:

Location: Female breasts.

Function:

Produce milk during lactation to nourish infants.

7. Digestive Glands:

Examples: Salivary glands, gastric glands, pancreatic glands, intestinal glands.

Function:

Secrete enzymes and other substances to aid in the digestion and absorption of nutrients.

8. Pineal Gland:

Location: Brain.

Function:

Produces melatonin, a hormone that regulates sleep-wake cycles (circadian rhythms).

9. Thymus:

Location: Upper chest.

Function:

Produces hormones (thymosin) that play a role in the development and maturation of T lymphocytes (a type of white blood cell).

These glands collectively contribute to the regulation of various physiological processes, ensuring the body functions properly and maintains internal balance. The endocrine glands, in particular, play a crucial role in communication within the body through the release of hormones into the bloodstream.

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