



## CHAPTER 1: THE HUMAN BODY - AN ORIENTATION

### AN OVERVIEW OF ANATOMY & PHYSIOLOGY

#### ANATOMY

- The study of the **structure** and **shape** of the body and body parts & their **relationships** to one another. The term anatomy comes from the Greek words meaning to cut (**tomy**) apart (**ana**).

#### 2. Subdivisions of Anatomy

- Gross anatomy (macroscopic anatomy)** – the study of large, easily observable structures (by naked eye), such as the heart or bone.
- Microscopic anatomy (cytology, histology)** – the study of very small structures, where a magnifying lens or microscope is needed.

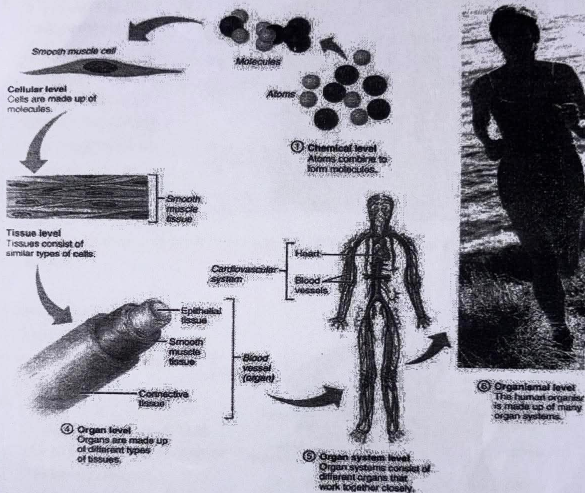
#### PHYSIOLOGY

- The study of how the body and its parts **work or function** **physio** = nature, **ology** = the study of.
- Like anatomy, physiology has many subdivisions. For example, **neurophysiology** explains the working of the nervous system, and **cardiac physiology** studies the function of the heart.

#### LEVELS OF STRUCTURAL ORGANIZATIONS <sup>C1, T, 03</sup>

- Chemical Level** – the simplest level of the structural level. At this level, **atoms**, tiny building blocks of matter, combine to **form molecules**.
- Cell Level** – molecules form organelles, such as the **nucleus and mitochondria**, which make up cells.
- Tissue level** – groups of **similar cells that have a common function**.

4. **Organ level** - an organ is a structure composed of 2 or more tissue types that performs a specific function.
5. **Organ System** - is a group of organs that work together to accomplish a common purpose (each organ has its own job to do)
6. **Organismal level** - represents the highest level of structural organization (total of 11 organ systems).



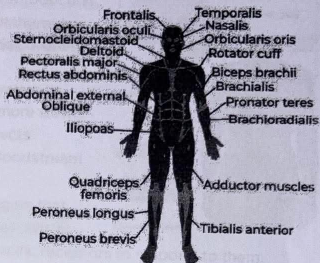
#### Quick Review Questions:

1. List the six levels of structural organization from simplest to most complex.
2. Give an example of an organ that is made up of all four basic tissue types.
3. What is meant by "emergent properties," and why is this concept important in understanding body function?
4. How can a disruption at the cellular level (e.g., a genetic mutation) affect the organismal level?

### 3. Muscular System

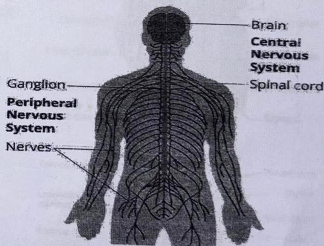
- Functions to contract or shorten
- Viewed as machines of the body
- Allows manipulation of the environment, locomotion and facial expression, maintains posture; produces heat
- Composed of three types of muscle tissue: skeletal, cardiac, and smooth.
- Makes up about 40–50% of total body weight, mostly skeletal muscle.

### Muscular System



### 4. Nervous System

- The body's fast acting control system
- Consist of the brain, spinal cord, nerves and sensory receptors
- Responds to internal and external changes by activating appropriate muscles and glands
- Communicates using electrical signals (nerve impulses/action potentials) and chemical signals (neurotransmitters) at synapses.
- Divided into two main parts: the central nervous system (CNS) — brain and spinal cord — and the peripheral nervous system (PNS) — all the nerves branching out from the CNS to the rest of the body.



#### 4 Major types of Tissue: (E, C, M, N)

- Epithelial** - also referred to as epithelium, refers to the sheets of cells that cover exterior surfaces of the body, lines internal cavities and passageways, and forms certain glands. (No blood vessels)

Classifications of Epithelial Cells: **Squamous** (Flattened or Thinned),

**Cuboidal** (Box Like), or **Columnar** (Rectangular, Taller than it is Wide).

Cell Layers of Epithelial Cells: **Simple**, **Stratified**, and **Pseudostratified**.

Classification Shapes

Arrangement or layers

Simple - only 1 layer

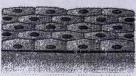
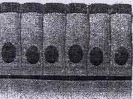
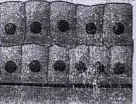
Stratified - 2 or more layers

Pseudostratified - only one layer  
fake layer

Transport of nutrients

Secretion -

Absorption

|          | Simple                                                                                                          | Stratified                                                                                                          |                                                                                                                           |
|----------|-----------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| Squamous | <br>Simple squamous epithelium | <br>Stratified squamous epithelium |                                                                                                                           |
| Cuboidal | <br>Simple cuboidal epithelium | <br>Stratified cuboidal epithelium |                                                                                                                           |
| Columnar | <br>Simple columnar epithelium | <br>Stratified columnar epithelium | <br>Pseudostratified columnar epithelium |

- Connective** - as its name implies, binds the cells and organs of the body together and functions in the protection, support, and integration of all parts of the body. binds the cell and organs / support part of the body

- Muscle** - is **excitable**, responding to stimulation and contracting to provide movement, and occurs as three major types: skeletal (voluntary) muscle, smooth muscle, and cardiac muscle in the heart.

- Nervous** - is **also excitable**, allowing the propagation of electrochemical signals in the form of nerve impulses that communicate between different regions of the body.

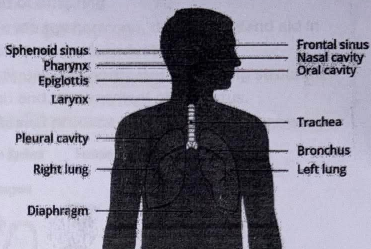
skeletal (voluntary)  
- attached to skeleton

non-striated / involuntary  
involuntary

striated, striated, branched cells  
intercalated disk

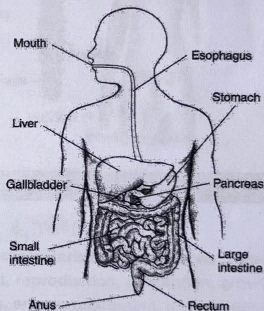
## 8. Respiratory System

- Keeps blood constantly supplied with oxygen and removes carbon dioxide
- Consist of **nasal passages, pharynx, larynx, trachea, bronchi and lungs.**
- Works closely with the cardiovascular system.
- Divided into two main parts: the **upper respiratory tract** (nose, pharynx, larynx) and the **lower respiratory tract** (trachea, bronchi, lungs).



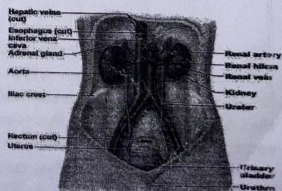
## 9. Digestive System

- Breaks food down into absorbable units that enters the blood for distribution to body cells
- Consist of **oral cavity, esophagus, stomach, small and large intestines and rectum.**
- Also includes accessory organs — **teeth, tongue, salivary glands, liver, gallbladder, and pancreas** — which aid digestion without food passing through them.



## 10. Urinary System

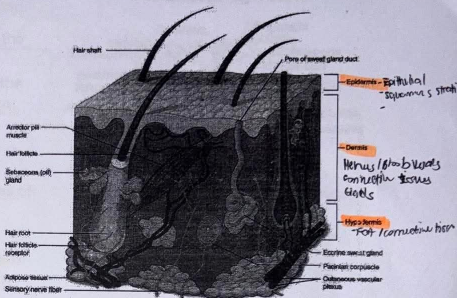
- Eliminates nitrogenous waste from the body, regulates water, electrolytes and acid-base balance of the blood
- Also known as **excretory system**
- Consist of **kidneys, ureters, bladder and urethra**



## ORGAN SYSTEM OVERVIEW

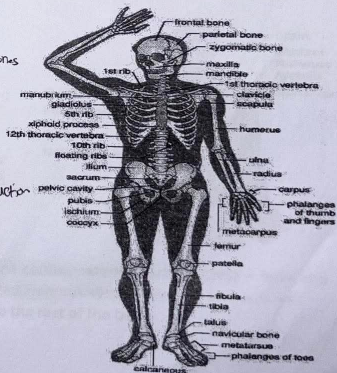
### 1. Integumentary System

- the external covering of the body, or the skin.
- Waterproofs the body and cushions and protects the deeper tissue from injury.
- Excretes salts and urea in perspiration and helps regulate body temperature.
- Largest organ of the body – covers about 1.5 to 2.0 square meters in an adult and accounts for about 15% of total body weight.



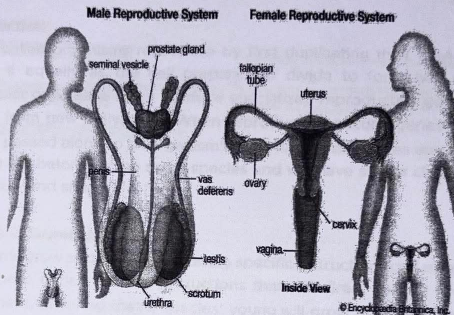
### 2. Skeletal System

- consist of bones, cartilages, ligaments, and joints. *connects bones*
- supports the body and provides framework that the skeletal muscles use to cause movement.
- It also has a protective function. *blood cell production*
- Hematopoiesis or formation of blood cells takes place within the cavity of the skeleton.
- Hard substance of bones acts as storehouse for minerals.



## Reproductive System

- Overall function is production of offspring.
- **Testes**- produce sperm and male sex hormone, ducts and gland aid in delivery of viable sperm to the female reproductive tract
- **Ovaries**- produce eggs and female sex hormones, remaining structures serves as sites for fertilization and development of the fetus.
- **Mammary glands of female breast** produce milk to nourish the newborn



## MAINTAINING LIFE

### CHARACTERISTICS OF LIFE (O, S, R, R, D, G, R)

- All living organisms share several key characteristics or functions: order, sensitivity or response to the environment, reproduction, adaptation, growth and development, regulation, homeostasis, energy processing, and evolution. When viewed together, these nine characteristics serve to define life.

#### **Order** *structural organization*

- Organisms are highly organized, coordinated structures that consist of one or more cells. Even very simple, single-celled organisms are remarkably complex: inside each cell, atoms make up molecules; these in turn make up cell organelles and other cellular inclusions. In multicellular organisms, similar cells form tissues. Tissues, in turn, collaborate to create organs (body structures with a distinct function). Organs work together to form organ systems.

## SURVIVAL NEEDS

| NEED             | KEY POINTS                                                                                                                                                                                                                |
|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water            | <ul style="list-style-type: none"> <li>- Most abundant substance in the body</li> <li>- Required for metabolic processes</li> <li>- Required for transport of substances</li> <li>- Regulates body temperature</li> </ul> |
| Food             | <ul style="list-style-type: none"> <li>- Provides necessary nutrients</li> <li>- Supplies energy</li> <li>- Supplies raw materials</li> </ul>                                                                             |
| Oxygen (Gas)     | <ul style="list-style-type: none"> <li>- One-fifth of air</li> <li>- Used to release energy from nutrients</li> </ul>                                                                                                     |
| Heat/Temperature | <ul style="list-style-type: none"> <li>- Form of energy</li> <li>- Partly controls rate of metabolic reactions</li> </ul>                                                                                                 |
| Pressure         | <ul style="list-style-type: none"> <li>- Application of force on an object</li> <li>- Atmospheric pressure — Important for breathing</li> <li>- Hydrostatic pressure — keeps blood flowing</li> </ul>                     |

- Metabolic processes  
 - transport of substances  
 - Regulate Temp

## HOMEOSTASIS

- The ability of the body to maintain a relatively stable internal conditions event though the outside world is continuously changing.
- Indicates a dynamic state if equilibrium, or a balance in which internal conditions change and vary but always within relatively narrow limits.
- It is dynamic because it is constantly adjusting to the changes that the body's systems encounter. It is equilibrium because body functions are kept within specific ranges or normal limits.
- Homeostasis means "steady state", to maintain at an "optimum level", to set a common ground. The human body is continuously compensating what it gains and what it loses, to be able to ensure the biological processes in the body to be done efficiently.

### Maintenance of Homeostasis by Feedback loops:

- When a change occurs in an animal's environment, an adjustment must be made. The receptor senses the change in the environment, then sends a signal

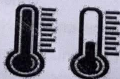
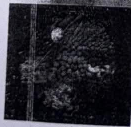
2. **Movement**- includes all the activities promoted by the muscular system, such as propelling ourselves from one place to another (walking, swimming) and manipulating the external environment with our fingers.
3. **Responsiveness or irritability**- ability to sense changes (stimuli) in the environment and then to react to them.
4. **Digestion**- Process by which complex food products are broken down into simpler substances.
5. **Metabolism**- Breaking down complex substances into simpler building blocks, making larger structures from smaller ones.
6. **Excretion**- Removal of waste products from the body
7. **Reproduction**- Formation of new individual offspring
8. **Growth**- Increase in size and number of cells therefore increase in size of an individual or organ *katag lumani and # of cell or lumaki, katagi na ang organism*
9. **Respiration**- Exchange of respiratory gases between organism and its environment
10. **Absorption**- Movement of molecules through a membrane and into the body fluids for transport to cells for use
11. **Secretion**- Production and release of important substances for diverse body functions
12. **Circulation**- Movement of body fluids containing many substances from one body area to another

### SURVIVAL NEEDS

The human body has certain basic survival needs — factors it must have in adequate, controlled amounts to stay alive. Having these needs met isn't enough on its own — the body also needs homeostasis, meaning these factors must be present in the right quality and quantity. Too much or too little of any of them can be just as harmful as having none.



The five basic survival needs are: water, nutrients (food), oxygen, heat/temperature, and pressure.



to the **control center** (in most cases, the **brain**) which in turn generates a response that is signaled to an **effector**. Homeostasis is controlled by the **nervous and endocrine system of mammals**.

- Homeostasis is maintained by negative feedback loops. Positive feedback loops actually push the organism further out of homeostasis but may be necessary for life to occur.

### EXAMPLES OF HOMEOSTASIS

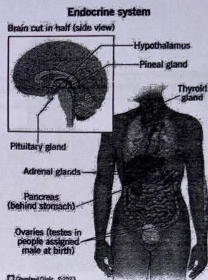
| Negative Feedback Mechanism maintains | Positive Feedback Mechanism |
|---------------------------------------|-----------------------------|
| Body Temperature                      | Child Birth                 |
| Blood Pressure                        | Blood Clotting              |
| Blood Sugar                           | Ovulation                   |
| Blood PH                              | Lactation                   |

### TYPES OF HOMEOSTATIC FEEDBACK SYSTEM/MECHANISM:

- **Positive Feedback**
  - intensifies a change in the body's physiological condition rather than reversing it, maintains the direction of the stimulus, possibly accelerating it.
  - A deviation from the normal range results in more change, and the system moves farther away from the normal range. Positive feedback in the body is normal only when there is a definite end point
- **Negative Feedback**
  - Any homeostatic process that changes the direction of the stimulus.
  - It may either increase or decrease the stimulus, but the stimulus is not allowed to continue as it did before the receptor sensed it.
  - if a level is too high, the body does something to bring it down, and conversely, if a level is too low, the body does something to make it go up. Hence the term negative feedback.

## 5. Endocrine System Gland and hormones

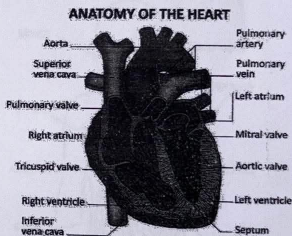
- Glands secrete hormones that regulate processes such as growth and reproduction
- Consist of **pituitary, thyroid, parathyroids, adrenal, thymus, pancreas, pineal, ovaries, testes**
- Works alongside the nervous system to maintain homeostasis but acts more slowly and produces longer-lasting effects (hormones travel through the bloodstream rather than nerve impulses).
- Hormones are chemical messengers that travel through the blood to target cells or organs, which must have the specific receptors to respond to them.



Maintain balance  
Receptor  
Effector

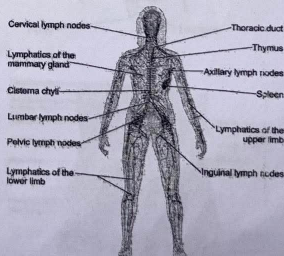
## 6. Cardiovascular System

- Consist of heart and blood vessels
- Blood vessels transport blood, which carries oxygen, carbon dioxide, nutrients, waste
- The heart acts as the pump, arteries carry blood away from the heart, veins return blood to the heart, and capillaries are the site of exchange between blood and tissues.



## 7. Lymphatic System

- consist of the lymphatic vessels, lymph nodes, lymphoid organs (spleen, tonsils)
- Picks up fluid leaked from blood vessels and returns it to the blood, houses white blood cells involved in immunity.



## Sensitivity or Response to Stimuli

- Organisms respond to diverse stimuli. For example, plants can bend toward a source of light, climb on fences and walls, or respond to touch. Even tiny bacteria can move toward or away from chemicals (a process called **chemotaxis**) or light (**phototaxis**). **Movement toward a stimulus is considered a positive response**, while **movement away from a stimulus is considered a negative response**.

## Reproduction

- **Single-celled organisms** reproduce by first duplicating their DNA and then dividing it equally as the cell prepares to divide to form two new cells. **Multicellular organisms** often produce specialized reproductive germline cells that will form new individuals. When reproduction occurs, genes containing DNA are passed along to an organism's offspring. These genes ensure that the offspring will belong to the same species and will have similar characteristics, such as size and shape.

## Growth and Development

- Organisms grow and develop following **specific instructions coded for by their genes**. These genes provide instructions that will direct cellular growth and development, ensuring that a species' young will grow up to exhibit many of the same characteristics as its parents.

## Regulations *(Paggabay ng mga organo and cell sa loob ng body)*

- Even the smallest organisms are complex and require multiple regulatory mechanisms to coordinate internal functions, respond to stimuli, and cope with environmental stresses. **Two examples of internal functions regulated in an organism are nutrient transport and blood flow**. **Organs (groups of tissues working together) perform specific functions, such as carrying oxygen throughout the body, removing wastes, delivering nutrients to every cell, and cooling the body.**

## NECESSARY FUNCTIONS OF LIFE

1. **Maintaining Boundaries** - preventing entry of potentially damaging or unnecessary substance.

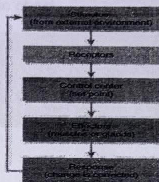
M, M, R and I, D, M E, G, R, A, S, C

## HOMEOSTATIC CONTROL MECHANISMS

Processes for maintaining or restoring homeostasis;

There are three (3) parts:

1. **Receptor** - receives information that something in the environment is changing. A change in the internal or external environment is called a stimulus and is detected by a receptor. sensory receptor monitors a physiological value. This value is reported to the control center.
2. **Control Center** - receives and processes information from the sensory receptor.
3. **Effector** - responds to the commands of the control center by either opposing or enhancing the stimulus. The effector is a muscle (that contracts or relaxes) or a gland that secretes.



## THE LANGUAGE OF ANATOMY

### ANATOMICAL POSITION

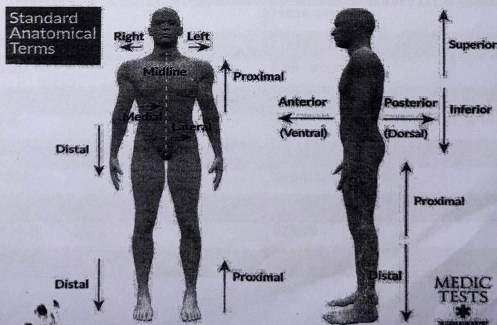
- The body is erect with the feet parallel and the arms hanging at the sides with the palms facing forward.

### DIRECTIONAL TERMS

- Allow medical personnel and anatomist to explain exactly where one body structure is in relation to another.

| Term                  | Definition                                                                         | Example                                  |
|-----------------------|------------------------------------------------------------------------------------|------------------------------------------|
| A. Superior           | Toward the head end or upper part of a structure or the body; above.               | The forehead is superior to the nose.    |
| B. Inferior           | Away from the head end or toward the lower part of a structure of the body; below. | The navel is inferior to the breastbone. |
| C. Ventral (Anterior) | Toward or at the front of the body; in front of.                                   | The breastbone is anterior to the spine. |

|                       |                                                                                                |                                           |
|-----------------------|------------------------------------------------------------------------------------------------|-------------------------------------------|
| D. Dorsal (Posterior) | Toward or at the back side of the body; behind.                                                | The heart is posterior to the breastbone. |
| E. Medial             | Toward or at the midline of the body; on the inner side of.                                    | The heart is medial to the arm.           |
| F. Lateral            | Away from the midline of the body; on the outer side of.                                       | The arms are lateral to the chest.        |
| G. Proximal (Malayo)  | Close to the origin of the body part or the point of attachment of a limb to the body trunk.   | The elbow is proximal to the shoulder.    |
| H. Distal (Malayo)    | Farther from the origin of a body part or the point of attachment of a limb to the body trunk. | The knee is distal to the thigh.          |
| I. Superficial        | Toward or at the body surface.                                                                 | The skin is superficial to the skeleton.  |
| J. Deep (Internal)    | Away from the body surface; more internal.                                                     | The lungs are deep to the rib cage.       |



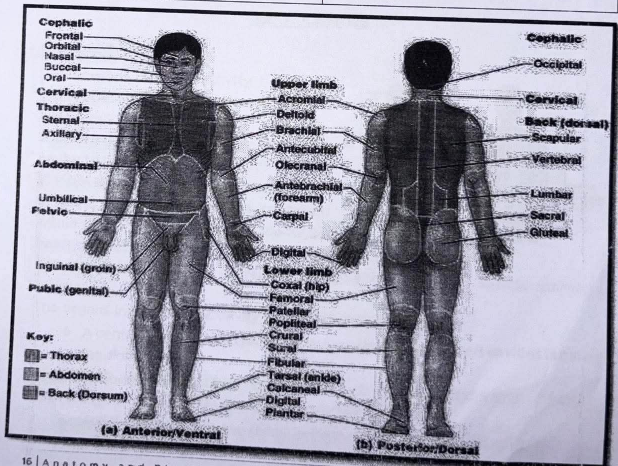
## REGIONAL TERMS

### ANTERIOR BODY LANDMARKS

|    |                               |                                                  |
|----|-------------------------------|--------------------------------------------------|
|    | Abdominal (kudwa)             | Anterior body trunk inferior to ribs             |
|    | Acromial                      | - Point of shoulder                              |
| A5 | Antebrachial                  | Forearm                                          |
|    | Antecubital                   | Anterior surface of elbow                        |
|    | Axillary                      | Armpit                                           |
| B2 | Brachial                      | Arm                                              |
|    | Buccal                        | Cheek area                                       |
|    | Carpal                        | Wrist                                            |
| C4 | Cervical                      | Neck region                                      |
|    | Coxal                         | Hip                                              |
|    | Crural                        | Leg                                              |
|    | Deltoid                       | Curve of shoulder formed by large deltoid muscle |
| D2 | Digital                       | Fingers; toes                                    |
|    | Femoral                       | Thigh                                            |
| F3 | Fibular                       | Lateral part of leg                              |
|    | Frontal                       | Forehead                                         |
|    | Inguinal                      | Area where thigh meets body trunk groin          |
| I  | Nasal                         | Nose area                                        |
| N  | Oral                          | Mouth                                            |
| O2 | Orbital                       | Eye area                                         |
|    | Patellar                      | Anterior knee                                    |
| P3 | Pelvic                        | Area overlying the pelvis anteriorly             |
|    | Pubic                         | Genital region                                   |
| S  | Sternal                       | Breastbone area                                  |
|    | Tarsal                        | Ankle region                                     |
| T2 | Thoracic, <del>Anterior</del> | Chest                                            |
|    | Umbilical <del>Anterior</del> | Navel                                            |

## POSTERIOR BODY LANDMARKS

|           |                                              |
|-----------|----------------------------------------------|
| Calcaneal | Heel of foot                                 |
| Cephalic  | Head                                         |
| Femoral   | Thigh                                        |
| Gluteal   | Buttock                                      |
| Lumbar    | Area of the back between ribs and hips       |
| Occipital | Posterior surface of head                    |
| Olecranal | Posterior surface of elbow                   |
| Popliteal | Posterior knee area                          |
| Sacral    | Area between hips                            |
| Scapular  | Shoulder blade region                        |
| Sural     | The posterior surface of lower leg; the calf |
| Vertebral | Area of the spine                            |



**Serous membranes** *fluid na nasa lobos ng organ para hindi sila magkasalanan*

- is a thin membrane that lines the internal body cavities and organs such as the heart, lungs, and abdominal cavity. The thin membrane is made up of **mesothelium tissue** which originates from the **mesoderm**. The serous membrane **allows for frictionless movement in a number of vital organs**.  
Structures: **Visceral serous membranes, Parietal serous membranes, Fluid-filled cavity**

The three sets of serous membranes and cavities:

### **Pericardium**

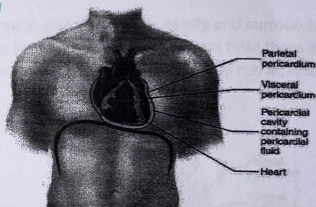
- The pericardium is a thin sac that surrounds your heart. It protects and lubricates your heart and keeps it in place within your chest.

#### **Layers in the Pericardium:**

- **Parietal (Fibrous) pericardium** is

**the outer layer**. It's made from thick connective tissue and is attached to your diaphragm. It holds your heart in place in the chest cavity and protects from infections.

- **Visceral (Serous) pericardium** is the inner layer. It's further divided into two more layers: the **visceral** and **parietal** layers. The serous pericardium helps to lubricate your heart.



**Pericardial Cavity** is a potential space between the opposing layers of the serous pericardium's parietal and visceral layer,

### **Pleura** *lungs*

- is a vital part of the **respiratory tract**. Its role is to cushion the lung and reduce any friction that may develop between the lung, rib cage, and chest cavity.

#### **Pleura Layers:**

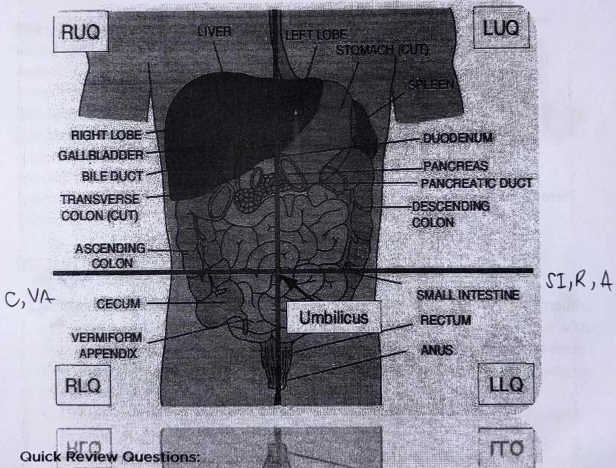
- **Visceral pleura** is the thin, slippery membrane that covers the surface of the lungs and dips into the areas separating the different lobes of the lungs (called the hilum).

## 4 QUADRANTS OF ABDOMINOPELVIC CAVITY

The abdominopelvic cavity is commonly divided into four quadrants using two imaginary lines that intersect at the umbilicus (navel): one horizontal (transumbilical) line and one vertical (median) line.

### Quadrants of Abdominopelvic Cavity:

1. Right Upper Quadrant (RUQ) *L, R lobe, G, B, Transverse colon, ascending colon*
2. Left Upper Quadrant (LUQ) *L lobe, stomach, spleen, pancreas, pancreatic duct, descending colon*
3. Right Lower Quadrant (RLQ)
4. Left Lower Quadrant (LLQ)



### Quick Review Questions:

1. Which quadrant would you expect a patient with appendicitis to report pain in?
2. Name at least two organs found in the Left Upper Quadrant (LUQ).
3. Why is it important to use the patient's right and left, rather than the observers, when documenting quadrant findings?

## BODY PLANES AND SECTIONS

### 3 Types of Planes

- Sagittal section** - a cut along the lengthwise or longitudinal, plane of the body, dividing the body into right and left parts. *left and right*  
 - **Midsagittal or median section** - if the cut is down the median plane of the body and the right and left part are equal in size. *(largely equal)*
- Frontal or coronal section** - is a cut along a lengthwise plane that divides the body into anterior and posterior parts. *Front and Back*
- Transverse or cross Section** - *UP and DOWN*  
 A horizontal plane; divides the body or any of its parts into upper and lower parts.

### ANATOMICAL PLANES

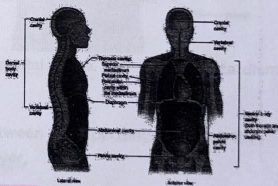


## BODY CAVITIES

### Dorsal Body Cavity

Subdivisions of Dorsal Cavity

- Cranial cavity** - The space inside the bony skull;
- Spinal cavity** - Extends from the cranial cavity to the end of the vertebral column;
- Ventral cavity** - Located at the anterior, or front, of the trunk. Organs contained within this body cavity include the lungs, heart, stomach, intestines, and reproductive organs.
- Thoracic Cavity** - This is separated by a dome shape muscle called diaphragm



The organs in the thoracic cavity (lungs, heart and others)

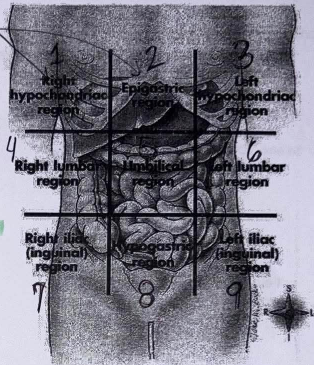
- ❖ A central region that separates the lungs into right and left cavities is called **mediastinum**.

- Abdominopelvic Cavity** - subdivided into superior **abdominal cavity** containing the stomach, liver, intestines and other organs.

- ❖ **Pelvic Cavity** containing reproductive organs, bladder and rectum.

## 9 REGIONS OF ABDOMINOPELVIC CAVITY

1. Right Hypochondriac Region
2. Epigastric Region
3. Left Hypochondriac Region
4. Right Lumbar Region
5. Umbilical Region
6. Left Lumbar Region
7. Right Iliac (Iliac) Region
8. Hypogastric Region
9. Left Iliac (Iliac) Region



The 9 regions of abdominopelvic cavity provide a more precise anatomical localization than the 4-quadrant method — useful in detailed anatomical study, surgical planning, and radiology. Each region corresponds closely to specific organs, making it easier to predict which organs might be involved when a specific region shows abnormal findings.

### OPEN BODY CAVITIES

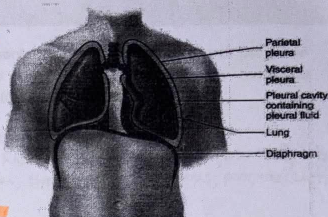
- **Oral and Digestive Cavities** - the oral cavity, commonly called the mouth, contains the teeth and tongue. This cavity is part of and continuous with the cavity of the digestive organs, which opens to the exterior at the anus.
- **Nasal Cavity** - located within and posterior to the nose, the nasal cavity is part of the respiratory system passageways
- **Orbital cavities** - the orbital cavities in the skull house the eyes and present them in an anterior position
- **Middle ear cavities** - the middle ear cavities carved into the skull lie just medial to the eardrums. These cavities contain tiny bones that transmit sound vibrations to the hearing receptors in the inner ears.

-----END OF CHAPTER 1-----

- **Nucleus** - is an organelle that contains a cell's genes.
- **Nuclear Envelope** - It is a double-membrane structure that surrounds the nucleus. It is also referred to as the nuclear envelope.
- **Nucleolus** - a spherical structure found in the cell's nucleus whose primary function is to produce and assemble the cell's ribosomes. The nucleolus is also where ribosomal RNA genes are transcribed.
- **Centrosome** - It is a small organelle found near the nucleus, which has a thick center with radiating tubules. The centrosomes are where microtubules are produced.
- **Lysosome** - They are round organelles surrounded by a membrane and comprising digestive enzymes which help in digestion, excretion and in the cell renewal process.
- **Cytoplasm** - A jelly-like material which contains all the cell organelles, enclosed within the cell membrane. The substance found within the cell nucleus, contained by the nuclear membrane is called the nucleoplasm.
- **Golgi Apparatus** - A flat, smooth layered, sac-like organelle which is located near the nucleus and involved in manufacturing, storing, packing and transporting the particles throughout the cell. *Transporting*
- **Ribosome** - They are small organelles made up of RNA-rich cytoplasmic granules, and they are the sites of protein synthesis.
- **Endoplasmic Reticulum** - This cellular organelle is composed of a thin, winding network of membranous sacs originating from the nucleus. To produce proteins for the rest of the cell to function.
  - **Smooth ER** - does not have ribosomes attached and is a major site for lipid synthesis.
  - **Rough ER** - with ribosomes attached and is a major site for protein synthesis.
- **Centrioles** - organizing microtubules that serve as the cell's skeletal system. They help determine the locations of the nucleus and other organelles within the cell.

The cell is the basic structural and functional unit of life. A human body contains trillions of cells, varying widely in size, shape, and function depending on their role (e.g., long, thin nerve cells vs. small, round red blood cells).

- **Parietal pleura** is the outer membrane that **lines the inner chest wall** and diaphragm (the muscle separating the chest and abdominal cavities).



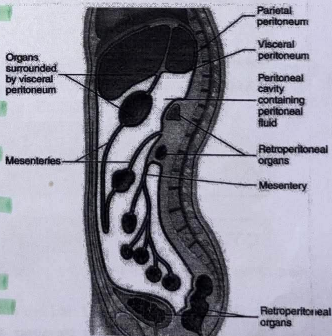
**Pleural Cavity** is also known as the **intrapleural space**. It contains **pleural fluid secreted by the mesothelial cells**. The fluid allows the layers to glide over each other as the lungs inflate and deflate during respiration (breathing).

### **Peritoneum** → intestine

- A sheet of smooth tissue that lines your abdominopelvic cavity and surrounds your abdominal organs. It pads and insulates your organs, helps hold them in place and secretes a lubricating fluid to reduce friction when they rub against each other.

### **Peritoneum Layers:**

- **Parietal peritoneum** – an outer layer which adheres to the anterior and posterior abdominal walls.
- **Visceral peritoneum** – an inner layer which lines the abdominal organs. It's made when parietal peritoneum reflects from the abdominal wall to the viscera.



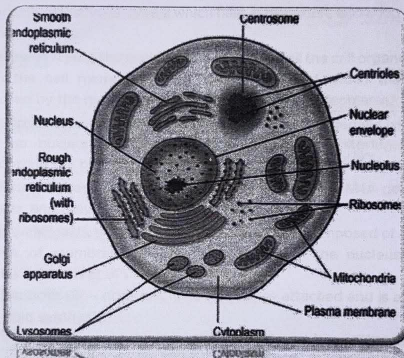
**Peritoneal Cavity** - is a potential space found between the parietal and visceral layers of the peritoneum. The cavity is filled with a small amount of serous peritoneal fluid secreted by the mesothelial cells which line the peritoneum.

## CHAPTER 2: CELLS, TISSUES, GLANDS AND MEMBRANES

### CELLS

- The smallest unit that can live on its own and that makes up all living organisms and the tissues of the body.
- A cell has three main parts: the cell membrane, the nucleus, and the cytoplasm. The cell membrane surrounds the cell and controls the substances that go into and out of the cell.

#### CELL STRUCTURE:



#### ANATOMY OF THE CELL:

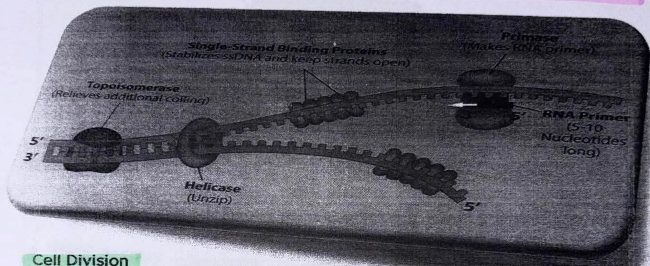
- **Cell Membrane** - All cells have a cell membrane that separates the inside and the outside of the cell, and controls what goes in and comes out. The cell membrane surrounds a cell's cytoplasm, which is a jelly-like substance containing the cell's parts.
- **Organelles** - carries out a specific function in the cell. A cell's organelles work alone and together to keep the whole cell functioning.
- **Mitochondria** - are organelles that break down sugars. This process releases energy that the cell can use. They are the powerhouse of a cell as they play an important role in releasing energy.

## CELL CYCLE

This process allows for the replacement and repair damaged tissue. The cell cycle includes **two major phases**: a **nondividing phase called interphase**, and **cell division (mitosis)**.

### Interphase

- Most of the cell's life is during interphase, wherein it does their normal function and it is the preparation for **DNA replication**. **DNA replication** is the biological process of producing two identical replicas of DNA from one original DNA.



### Cell Division

- It is the formation of two daughter cells from one parent cell. These are formed during the **mitosis phase**, and the sex cells necessary for reproduction are formed through meiosis.

### Mitosis

- During mitosis, a parent cell divides to form two daughter cells with the same amount and type of DNA as the parent cell. Because DNA determines the structure and function of cells, the daughter cells, which have the same DNA as the parent cell, can have the same structure and perform the same functions as the parent cell.

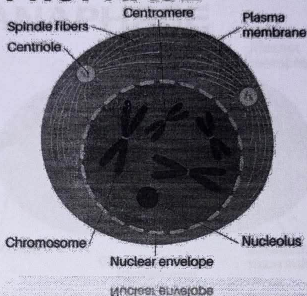
### MITOSIS IS DIVIDED INTO FOUR STAGES:

1. **PROPHASE**
2. **METAPHASE**
3. **ANAPHASE**
4. **TELOPHASE**

## 1. Prophase

- The chromatin condenses making the chromosome visible. Spindle fibers attach to the centromeres of each chromosome. Then at late stage, the nucleolus and nuclear envelope disappear.

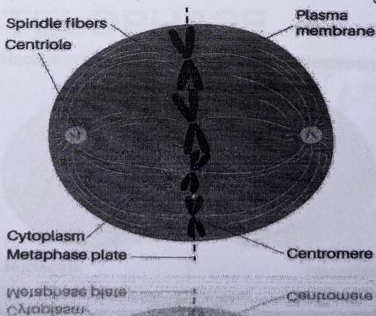
### PROPHASE



## 2. Metaphase

- The chromosomes align near the center of the cell. The movement of the chromosomes is regulated by the attached spindle fibers.

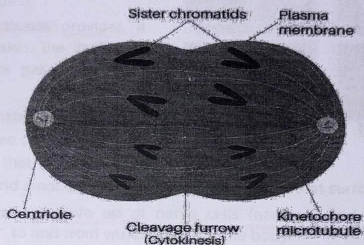
### METAPHASE



### 3. Anaphase

- Where the chromatids separate. When this happens, each chromatid is then called a chromosome. At this point, two identical sets of 46 chromosomes are present in the cell. They're moved toward the centriole at one of the poles of the cells. When they've reached the pole, cytoplasm begins to divide.

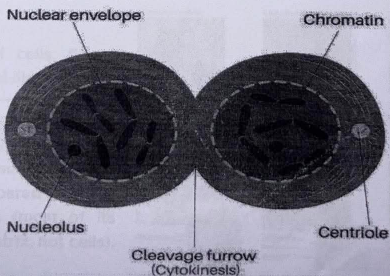
## ANAPHASE



### 4. Telophase

- The chromosomes in each of the daughter cells become organized to form two separate nuclei, one in each newly formed daughter cell. The chromosomes begin to unravel and resemble the genetic material during interphase.

## TELOPHASE



## CLASSIFICATION OF CONNECTIVE TISSUES

### Connective tissue proper

#### **Loose** (fewer fibers, more ground substance)

- Areolar
- Adipose
- Reticular

#### **Dense** (more fibers, less ground substance)

- Dense, regular collagenous
- Dense, regular elastic
- Dense, irregular collagenous (not shown)
- Dense, irregular elastic (not shown)

### Support connective tissue

#### **Cartilage** (semisolid matrix)

- Hyaline
- Fibrocartilage
- Elastic

#### **Bone** (solid matrix)

- Spongy
- Compact

### Fluid Connective tissue

#### **Blood**

#### **Hemopoietic tissue**

- Red marrow
- Yellow marrow

A. Loose Connective tissue consists of relatively few protein fibers, with numerous spaces filled with ground substance and fluid.

### 3 Subdivisions of LCT

#### 1. **The extracellular matrix of Areolar connective tissue**

- ✓ Fibroblasts are responsible for producing this matrix
- ✓ it attaches the skin to underlying tissues and provide nourishment for the structures with which is associated

#### 2. **Adipose connective tissue**

- ✓ consists of adipocytes, or fat cells, which contain large amounts of lipid for energy storage

### 3 Types of Cartilage:

1. **Hyaline** – the most abundant type of cartilage and has many functions. It is found in the ends of the bones where they come together to form joints which could withstand repeated compression.
2. **Fibrocartilage** – has more collagen than hyaline cartilage. As addition that it could withstand repeated compression, can also withstand pulling or tearing forces.
3. **Elastic cartilage** – has elastic fibers rather than just collagen. It is able to recoil to its original shape.

Bone is a hard connective tissue that consists of living cells and a mineralized matrix. Made of **osteocytes or bone cells**. The strength and rigidity of the mineralized matrix enable bones to support and protect other tissues and organs.

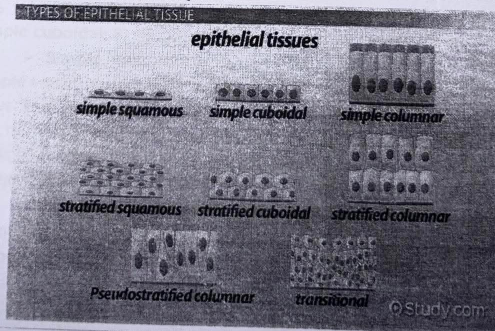
### 2 Types of Bones:

- **Spongy bone** – has spaces/gap inside the bone (internal portion of the bone)
- **Compact bone** – has no spaces and is more solid (external portion of the bone)

### Fluid connective tissue

Blood is unique because the matrix is liquid, enabling blood cells and platelets, collective called formed elements, to move through blood vessels.

**Epithelial Tissue** - Epithelial tissues are widespread throughout the body. They form the covering of all body surfaces, line body cavities and hollow organs, and are the major tissue in glands. They perform a variety of functions that include protection, secretion, absorption, excretion, filtration, diffusion, and sensory reception.

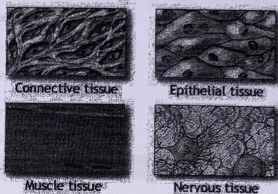


## TISSUES

There are 4 basic types of tissue: **connective tissue**, **epithelial tissue**, **muscle tissue**, and **nervous tissue**.

- **Connective tissue** supports other tissues and binds them together (bone, blood, and lymph tissues).
- **Epithelial tissue** provides a covering (skin, the linings of the various passages inside the body).
- **Muscle tissue** includes striated (also called voluntary) muscles that move the skeleton, and smooth muscle, such as the muscles that surround the stomach.
- **Nerve tissue** is made up of nerve cells (neurons) and is used to carry "messages" to and from various parts of the body.

Four types of tissue



**Connective Tissue** - Tissue that supports, protects, and gives structure to other tissues and organs in the body. Connective tissue also stores fat, helps move nutrients and other substances between tissues and organs, and helps repair damaged tissue. Connective tissue is made up of cells, fibers, and a gel-like substance.

Types of connective tissue include bone, cartilage, fat, blood, and lymphatic tissue.

Made up of cells, fibers, and a gel-like ground substance — collectively called the **extracellular matrix**, which is what makes connective tissue unique compared to other tissue types (most of its volume is matrix, not cells).

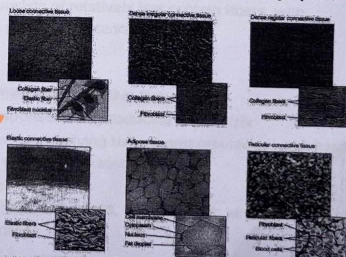


FIGURE Types of typical connective tissues

- ✓ Also pads and protects parts of the body and acts as a thermal insulator

### 3. Reticular connective tissue

- ✓ it is the framework of lymphatic tissue, such as in the spleen and lymph nodes, as well as in bone marrow and liver.

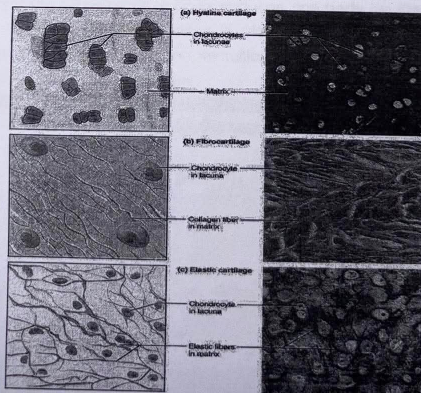
B. **Dense connective tissue** has relatively large number of protein fibers that form thick bundles and fill nearly all of the extracellular space. These protein fibers produced by fibroblasts. The two major subcategories of dense connective tissue: **collagenous and elastic.**

#### 2 Subcategories of Dense collagenous connective tissue:

- **Dense Regular** – the collagen fibers oriented in the same direction (tendons and ligaments)
- **Dense Irregular** – the collagen fibers oriented in different directions (dermis and in organ capsules)

### C. Supportive connective tissue

**Cartilage** is composed by **chondrocytes or cartilage cells**. It provides support, but if bent or slightly compressed, it resumes its original shape. Nutrients are hard to get into it since blood vessels couldn't penetrate the interior of it resulting to very slow recovery after injury.



are secretion and absorption. This epithelial type is found in the small collecting ducts of the kidneys, pancreas, and salivary glands.

#### > Simple Columnar

Simple columnar epithelium is a single row of tall, closely packed cells, aligned in a row. These cells are found in areas with high secretory function (such as the wall of the stomach), or absorptive areas (as in small intestine). They possess cellular extensions (e.g., microvilli in the small intestine, or the cilia found almost exclusively in the female reproductive tract).

#### > Pseudostratified

These are simple columnar epithelial cells whose nuclei appear at different heights, giving the misleading (hence pseudo) impression that the epithelium is stratified when the cells are viewed in cross section.

Pseudostratified epithelium can also possess fine hair-like extensions of their apical (luminal) membrane called cilia. In this case, the epithelium is described as ciliated pseudostratified epithelium. Ciliated epithelium is found in the airways (nose, bronchi) but is also found in the uterus and fallopian tubes of females, where the cilia propel the ovum to the uterus.

## II. Stratified Epithelia

Stratified epithelium differs from simple epithelium by being multilayered. It is therefore found where body linings have to withstand mechanical or chemical insults. These are more durable and protection is one their major functions. Since stratified epithelium consists of two or more layers, the basal cells divide and push towards the apex, and in the process flatten the apical cells. It can be columnar, cuboidal, or squamous type. However, it can also have the following specializations: Keratinized and Transitional.

- o **Stratified Squamous (Keratinized) epithelium** forms a thick epithelium because it consists of several layers of cells. The deepest cells are cuboidal or columnar and can divide and produce new cells. As these newly formed cells are pushed to the surface, they become flat and thin, and the cytoplasm is replaced by the protein "keratin". The thick layer provides protection from abrasion and forms a barrier that prevents microorganisms and toxic chemicals from entering the body.
- o **Stratified Cuboidal epithelium** consists of more than one layer of cuboidal epithelial cells. This epithelial type is relatively rare and is found in sweat gland ducts, ovarian follicular cells, and the salivary glands. It functions in absorption, secretion, and protection.

### Stratum Corneum

- Outmost layer of epidermis,
- 20 to 30 layers of dead squamous cells filled with keratin and accounts for 75 % of epidermal thickness.
- This layer is coated and surrounded by lipid, which acts as waterproofing material.
- protects against light, heat, bacteria, chemicals.

### Stratum Lucidum

- A smooth, seemingly translucent layer that is found only on thick skin of palms, soles and digits. Located in between of Stratum Corneum and Stratum Granulosum.

### Stratum Granulosum

- Has grainy appearance due to further changes to the keratinocytes as they are pushed from the Stratum Spinosum.
- Generates large amount of keratin which is fibrous.

### Stratum Spinosum

- It is characterized by its spiny appearance due to the desmosomes, which are cell junctions that connect keratinocytes, creating a strong and flexible skin structure. Located just above the Stratum Basale.

### Stratum Basale (Stratum Germinativum)

- Deepest layer of the epidermis.
- Consist of cuboidal-columnar shaped cells that undergo mitotic divisions about every 19 days. This stratum is a single layer of cells and firmly attached to dermis.

Common conditions associated with Stratum Corneum:

#### Dandruff

- Excessive sloughing of corneum from the surface of the scalp

#### Callus

- Hard skin, forms when the skin has been exposed to frequent friction resulting in increased layers of corneum and thickened area.

#### Corn

- Occurs when the corneum thickens to form a cone-shaped structure over a bony prominence.

## CLASSIFICATION OF EPITHELIUM

| Number of Layers of Category                          |                                                                                                                                                                                                                                                              |
|-------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Single (single layer of cells)                        | <ul style="list-style-type: none"> <li>• Squamous</li> <li>• Cuboidal</li> <li>• Columnar</li> </ul>                                                                                                                                                         |
| Stratified (more than one layer of cells)             | <ul style="list-style-type: none"> <li>• Squamous                             <ul style="list-style-type: none"> <li>➢ Non-Keratinized (moist)</li> <li>➢ Keratinized</li> </ul> </li> <li>• Cuboidal (very rare)</li> <li>• Columnar (very rare)</li> </ul> |
| Pseudostratified (modification of simple epithelium)  | Columnar                                                                                                                                                                                                                                                     |
| Translational (modification of stratified epithelium) | Roughly cuboidal to columnar when not stretched and squamous-like when stretched                                                                                                                                                                             |

### I. Simple Epithelia

Simple epithelium consists of a single layer of cells. They are typically where absorption, secretion and filtration occur. The thinness of the epithelial barrier facilitates these processes.

Simple epithelial tissues are generally classified by the shape of their cells. The four major classes of simple epithelium are: 1) simple squamous; 2) simple cuboidal; 3) simple columnar; and 4) pseudostratified.

#### ➤ Simple Squamous

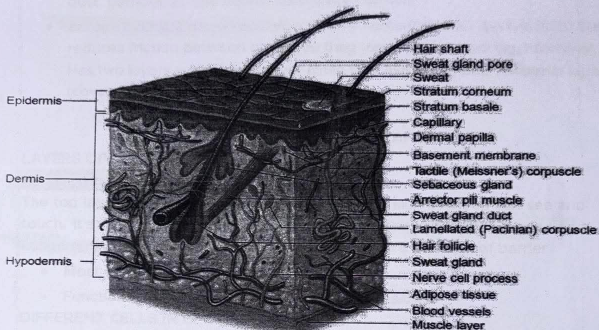
Simple squamous epithelium cells are flat in shape and arranged in a single layer. This single layer is thin enough to form a membrane that compounds can move through via passive diffusion. This epithelial type is found in the walls of capillaries, linings of the pericardium, and the linings of the alveoli of the lungs.

#### ➤ Simple Cuboidal

Simple cuboidal epithelium consists of a single-layered cells that are as tall as they are wide. The important functions of the simple cuboidal epithelium

## CHAPTER 3: THE INTEGUMENTARY SYSTEM

The skin is the largest and heaviest organ outside your body. It weighs about six pounds (or more) and is approximately 2 millimeters thick — thinner on sensitive areas like eyelids, and thicker on surfaces that take more stress, like the soles of your feet. One inch of your skin contains nearly 19 million cells.



### FUNCTIONS OF THE INTEGUMENTARY SYSTEM:

1. **Protection** - Acts as a physical barrier against mechanical injury, chemicals, UV radiation, and invading pathogens; also prevents excessive water loss from the body.
2. **Sensation** - Contains sensory receptors that detect touch, pressure, pain, and temperature, keeping the body aware of and responsive to its environment.
3. **Vitamin D Production** - Skin cells synthesize vitamin D when exposed to UV rays from sunlight; vitamin D is essential for calcium absorption and bone health.
4. **Temperature Regulations** - Helps maintain normal body temperature through sweating (cooling) and adjusting blood flow to the skin (vasodilation to release heat, vasoconstriction to conserve heat).
5. **Excretion** - Removes small amounts of waste products such as salts, water, and urea through perspiration (sweat).

## CLASSIFICATION OF BODY MEMBRANES:

### Epithelial membranes

- **Cutaneous membranes** - Technically the skin itself — composed of the epidermis (epithelial tissue) and dermis (connective tissue); the only epithelial membrane directly exposed to open air.
- **Mucous membranes** - Produces mucus to keep the lining moist and trap dust, pathogens, and debris; also called mucosa.
- **Serous membranes** - Produces a watery, lubricating fluid (serous fluid) that reduces friction between organs as they move (e.g., breathing, heartbeat). Has two layers — a **parietal layer** (lines the cavity wall) and a **visceral layer** (covers the organ itself).

### CONNECTIVE TISSUE MEMBRANES

#### LAYERS OF THE SKIN

##### Epidermis

The top layer of your skin. This is the part of your skin that you can see and touch. It's made up of three types of cells: **melanocytes**, **keratinocytes** and **Langerhans**. It gives your skin its color and provides a waterproof barrier

- Most cells of epidermis are keratinocytes
- Function: prevent water loss and resist abrasions.

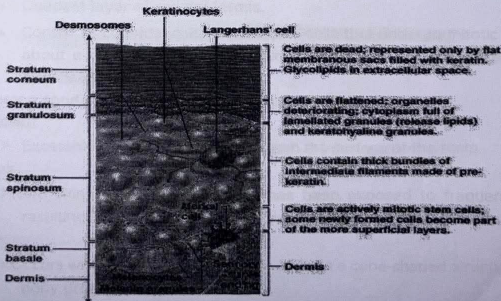
#### DIFFERENT CELLS IN EPIDERMIS

**Keratinocyte** - it manufactures and stores the protein "keratin".

**Merkel's cells** - serves as touch receptors.

**Melanocyte** - produces "melanin" (pigment).

#### Layers of the Epidermis



- **Stratified Columnar epithelium** consists of more than one layer of epithelial cells, but only the surface cells are columnar. The deeper layers are irregular or cuboidal in shape. Like stratified cuboidal epithelium, stratified columnar epithelium is relatively rare.
- **Transitional epithelium** is a special type of stratified epithelium that can be greatly stretched. In the unstretched state, transitional epithelium consists of five or more layers of columnar or cuboidal that are often dome-shaped at the free surface.

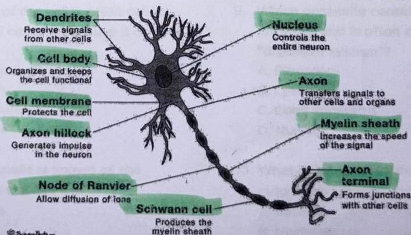
**A. Muscle Tissue** – main function of muscle tissue is to contract, or shorten, making movement possible. Sometimes it is called **muscle fibers** because they often resemble tiny threads.

#### B. Types of Muscle Tissue

|                 | Main features                                                                                                                                                                            | Location                                                                          | Type of cells                                                                     | Histology                                                                         |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| Skeletal muscle | <ul style="list-style-type: none"> <li>- Fibers : striated, tubular and multi nucleated</li> <li>- Voluntary</li> <li>- Usually attached to skeleton</li> </ul>                          |  |  |  |
| Smooth muscle   | <ul style="list-style-type: none"> <li>- Fibers : non-striated, spindle-shaped, and uninucleated.</li> <li>- Involuntary</li> <li>- Usually covering wall of internal organs.</li> </ul> |  |  |  |
| Cardiac muscle  | <ul style="list-style-type: none"> <li>- Fibers : striated, branched and uninucleated.</li> <li>- Involuntary</li> <li>- Only covering walls of the heart.</li> </ul>                    |  |  |  |

**Nerve Tissue** – forms the brain, spinal cord, and nerves. It is responsible for coordinating and controlling many body activities. It consists of **neurons** and support cells. **Neurons**, or nerve cells, is responsible for conducting action potentials.

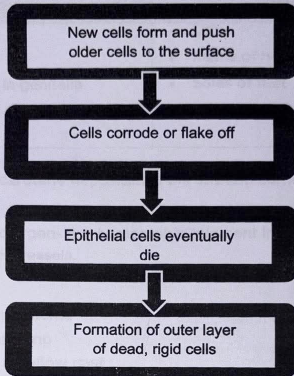
### Parts of a Neuron with Functions



-----END OF CHAPTER 2-----

## KERATINIZATION

A process in which new cells (with keratin) are pushing old cells to the surface. It takes 40-56 days for the new cells to reach the surface.



## Melanin

Group of pigments primarily responsible for skin, hair, and eye color.

## Melanocytes

- Irregularly shaped cells with many long processes that extend between the epithelial cells of the deep part of epidermis.
- Responsible to produce melanin.

## DETERMINANTS OF MELANIN PRODUCTION:

1. **Genetic Factors** - Responsible for melanin produced in different races.
2. **Albinism** - A recessive genetic trait that causes a deficiency or an absence of melanin (have fair skin, white hair, and unpigmented irises in eyes).
3. **Exposure to UV light** - stimulates melanocytes to increase melanin production to help protect the skin from the sun.
4. **Hormones** - certain hormones, such as estrogen and melanocytes-stimulating hormone, increases the melanin production during pregnancy.

## SKIN COLOR:

Three main factors contribute to skin color:

- The amount and kind of melanin in the epidermis.

| Areas with more Melanin                                                                                                                         | Areas with less Melanin                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"><li>• Freckles</li><li>• Moles</li><li>• Darkened areas in genitalia</li><li>• areola &amp; nipples</li></ul> | <ul style="list-style-type: none"><li>• Lips</li><li>• Palms of hands</li><li>• Soles of feet</li></ul> |

- The amount of carotene deposited in the stratum corneum and subcutaneous tissue.
- The amount of oxygen- rich hemoglobin (pigment in the red blood cells) in the dermal blood vessels.

## OTHER FACTORS

- ✓ Redness, or erythema
- ✓ Pallor, or blanching
- ✓ Jaundice or a yellow cast
- ✓ Bruises or black and blue marks

## TAKE NOTE!

- Melanin - pigment made in melanocytes.
- In Basale and Spinosum layers of Epidermis;
- Melanoblasts -> Melanocytes in Stratum basale;
- Darkness due to Melanin quantity (not due to the number of keratinocytes or other cells)

## DISORDER/S:

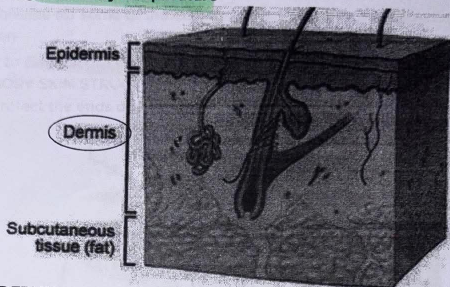
- Albinism - inability to produce Melanin
- Vitiligo - patchy loss of Melanocytes
- Freckles - patchy concentration of Melanocytes
- UV light causes: Tyrosine --> Melanin production

## DERMIS

- the 2nd major skin region; compose of dense collagenous connective tissue containing fibroblast, adipocytes, macrophages, nerves, hair follicles, smooth muscles, glands and lymphatic vessels.

### Functions of the Dermis:

- Supplies nutrients
- Removes waste products to the overlying epidermis
- Helps regulate body temperature

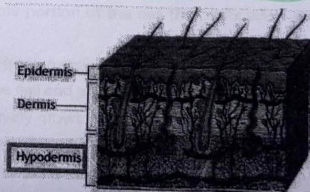


### LAYERS OF DERMIS:

1. **Papillary Layer** – thin connective tissue layer that contains blood vessels.
  - **Dermal Papillae** – It contains many blood vessels. Blood flow through these vessels to supply the overlying epidermis with nutrients, removes, and helps regulate body temperature.
  - **Meissner's corpuscles** - is responsible for transmitting the sensations of light touch and low-frequency vibrations from the periphery to the central nervous system.
2. **Reticular Layer** – the deepest layer of dermis; accounts for 80 % of dermis.

### HYPODERMIS

Also called the **subcutaneous layer** or **superficial fascia**. Thickness varies by body region and by individual (e.g., thicker in the abdomen and buttocks, thinner over the shins and eyelids), and varies with age, sex, and nutritional status.



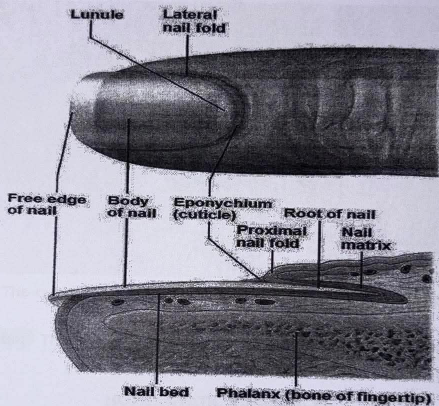
- Subcutaneous layer deep to the skin
- Composed of adipose and areolar connective tissue

Function:

1. Serves as padding and insulator
2. Responsible for some of the differences in appearance between men and women
3. Used to estimate total body fat

#### ACCESSORY SKIN STRUCTURES:

Nails - protect the ends of your fingers and toes.

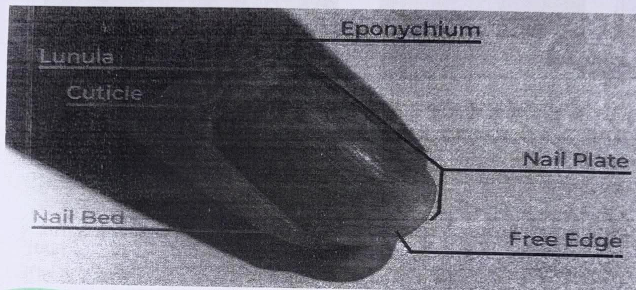


#### MAIN STRUCTURES OF THE NAIL:

- **Nail body/plate** - is the visible portion of the nail that rests upon and is attached to the nail bed.
  - The nail body extends from the root to the free edge.
- **Nail root** - is at the base of the nail and is embedded underneath the skin.
  - It is attached to an actively growing tissue known as the matrix.
- **Free edge**: is the end portion of the nail plate that extends from the tip of the finger or toe.

- It is the living portion of the skin upon which the nail body rests. It is pinkish in color
- **Matrix:** is the part of the nail bed that extends beneath the nail root and contains nerves, lymph, and blood vessels to nourish the nail.
- **Lunula:** or half-moon, is located at the base of the nail. The light whitish color of the lunula is caused by the reflection of light where the matrix and the connective tissue of the nail bed join.

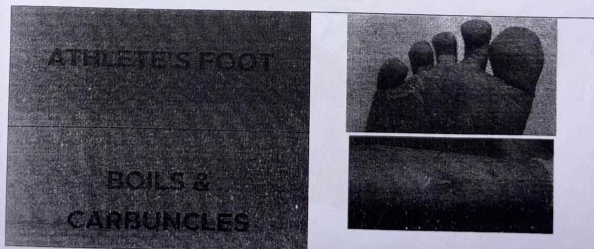
#### STRUCTURES SURROUNDING THE NAIL:



**Cuticle** - The cuticle is the dead; colorless tissue attached to the natural nail plate.

**Eponychium** - The eponychium is the living skin at the base of the nail.

#### HOMEOSTATIC IMBALANCES:



**COLD SORES**

**CONTACT  
DERMATITIS**

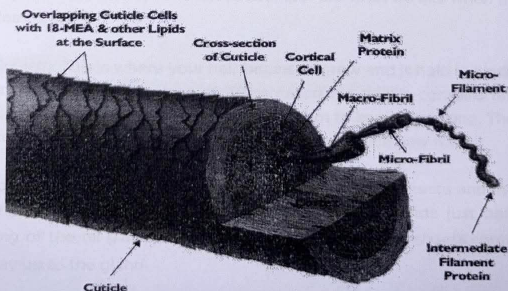
**IMPETIGO**

**PSORIASIS**

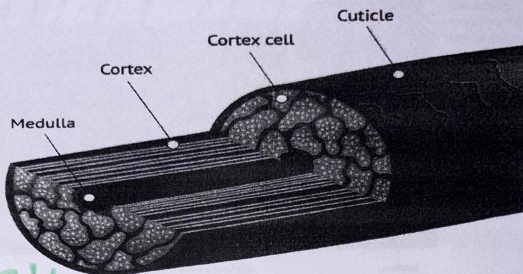


## HAIR

The hair does more than help us look nice. It may be called as our “crowning glory”, but it indeed is. It helps keep heat in your body since it can trap it by its million strands. It also serves as barrier from microorganisms as our eyelashes and eyebrows help protect your eyes.



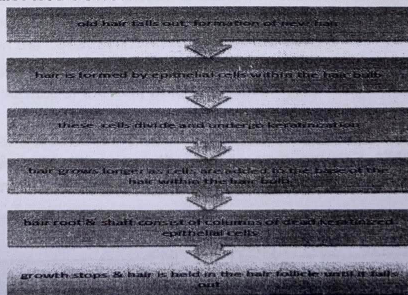
# HAIR STRUCTURE



**HAIR SHAFT** – It's made up of 3 layers of keratin, a hardening protein. These are;

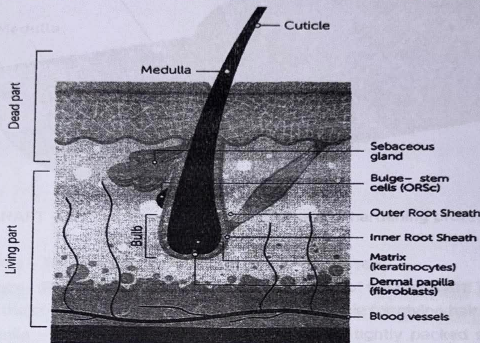
- **Cuticle** – The outer layer, the form of the hair we see.
- **Cortex** – The middle layer, which makes up most of the hair shaft. The medulla and the cortex contain pigmenting cells responsible for giving hair color.
- **Medulla** – The inner layer, which is formed by tightly packed scales in an overlapping structure that resembles roof shingles. Many hairs conditioning products are formulated to clean the cuticle by smoothing its structure.

## CYCLE OF HAIR PRODUCTION



Your hair is made of a protein called Keratin. The anatomy of the hair consists of:

- **Hair shaft:** The part of your hair you can see, touch and style.
- **Hair follicle:** The tube-like structure that keeps your hair in your skin
- **Hair bulb:** Located under your skin and responsible for hair growth.
- **Arrector pili:** A smooth muscle that causes the hair to rise from the skin.
- **Hair plexus:** Bundle of nerves that responds due to touch.

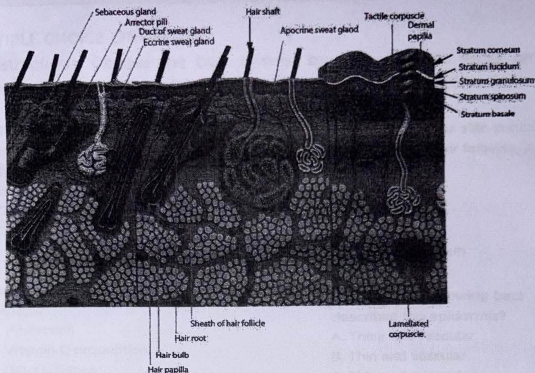


**Goosebumps** are caused by your integumentary system. We all have hair erector muscles connected to our hair follicles and skin. When it contracts, it makes your hair stand up. The "goosebumps" are what we see when these tiny muscles contract.

**Hair Follicle:** This is where your hair begins to grow and is held in place. At the bottom of the follicle, a piece of tissue called the **papilla** contains tiny blood vessels (**capillaries**). These nourish the hair root to keep it growing. The follicle also contains the **germinal matrix**, where cells produce new hairs.

The follicle is lined by an inner and outer sheath that protects and molds the growing hair. The inner sheath follows the hair and ends just before the opening of the oil gland, or **sebaceous gland**. The outer sheath continues all the way up to the gland.

## ACCESSORY STRUCTURE: GLANDS



Glands are found throughout your skin. They release materials like water, salt or oil from under your skin to the surface of your skin. Your integumentary system consists of the following glands:

**Sudoriferous glands** - These are the glands that secrete sweat through your skin. There are two types of sweat glands:

- **Apocrine glands** - active and functions on puberty because of the influence of sex hormones, found in the axilla (armpit) area, pubic area, and areole area. It gives that "body odor" due to the secretion that got mixed with bacteria.
- **Eccrine glands** - where sweat is being produced, a clear secretion that is primarily water plus some salts, vitamin C, traces of metabolic waste and lactic acid. When the sweat evaporates, it cools the body.

**Sebaceous glands** - These glands produce **sebum (oil)** which lubricates your face and the surface of the skin, which prevents drying and protects from some bacteria.

**Ceruminous glands** - These are the glands in your ear that secrete ear wax.

**Mammary glands** - These are the glands on a person's chest. In people assigned female at birth (AFAB), mammary glands produce milk after giving birth.

-----END OF TERM-----