

Medical Terminology

Medicine: is the science dealing mainly with the maintenance of health, and the prevention, alleviation or cure of diseases.

A term: is a word or expression that has a perfect meaning in some uses examples: medical terms ,legal terms, commercial terms, etc.

❖ **75% of scientific words are originated in Latin and Greek.**

Medical terminology can be divided into categories (ex . Numbers, colors, opposites , etc.)

A medical term may contain several elements:

Ex:

Pericarditis

PREFIX

ROOT

SUFFIX

Peri

cardi

itis

(around)

(heart)

(inflammation)

A medical term may contain all elements ex.: pericarditis , myocarditis or contain root only ex: cardiac muscle.

or Prefix + root : pericardium, myocardium

Root +suffix: Iritis

Prefixes and suffixes can be used with other roots. Like:

(nephritis, enteritis, hepatitis, stomatitis, ophthalmitis and gastritis).

Common Prefixes :

The Prefix is a word element attached to the beginning of a word or word root.

- Adding or changing a prefix changes the meaning of the word.
- The prefix usually indicates a number, time, position, direction, or negation.
- Many of the same prefixes used in medical terminology are also used in the English language.

Para : near , beside (ex: paranasal)

Trans: across (ex: Transrectal) (Transplacental).

Per : through (ex: percutaneous)

Supra : above: (ex: suprarenal gland) which is the adrenal gland , supraorbital swelling i.e. above the eye).

Peri : (around) : Ex : peritoneum ,pericardium, and the periosteum which are the sheaths around the abdominal viscera, heart and bone respectively).

Sub: under :(ex: subcutaneous : under the skin; submucosal :under the mucosa).

Dextro : right: (ex: dextrocardia : the state of heart on the right side).

Levo , sinistro : left (levorotation , sinistocardia : related to left side of heart).

Retro: behind (ex: retogastric).

Common Roots

Word root is the foundation of a medical term and contains its primary meaning. A root word delivers the essential meaning of the medical term and frequently indicates an organ or body part.

All medical terms have at least one word root. Most word roots are derived from Greek or Latin language. Thus, two different roots may have the same meaning. For example, the Greek word *dermatos* and the Latin word *cutane* both refer to the skin. As a general rule, Greek roots are used to build terms that describe a disease, condition, treatment, or diagnosis. Latin roots are used to build words that describe anatomical structures.

English Term	Greek or Latin Term*	Word Root
skin	dermatos (Gr)	dermat
	cutis (L)	cutane
kidney	nephros (Gr)	nephr
	renes (L)	ren
mouth	stomatos (Gr)	stomat
	oris (L)	or

Common Suffixes

Suffixes are attached at the end of words to change or add to the original meaning. In medical terminology, suffixes usually denote a medical condition, surgical procedure, diagnostic term, test information, disease.

Some Examples of suffixes words:

-**genic**: causing\forming – ex: Carcinogenic\ lipogenic

-**oma**: tumor or swelling - - ex: Myoma

-**osis**: normal\abnormal condition of the cell - ex: Leukocytosis, chlorosis, necrosis = dying cells

-**pathy**: disease - -ex: neuropathy = disease of the nervous system

-sarcoma : malignant tumor - - ex: Myosarcoma

-**ectomy**: excision / removal -- ex: nephrectomy = excision of a kidney, appendectomy

- **itis** : inflammation - - ex:

-**emia** : blood condition – ex : Anemia, Leukemia= cancer of blood cells

Basic used when deal with suffixes words:

* *Read* meaning from suffix, example: cardiology

Lec. 5

Dealing with Medical Terms

Medical terms is a special vocabulary used by health care professionals for effective and accurate communication. medical terms is consistent and uniform throughout the world.

Most medical terms can be divided into component parts—roots, prefixes, and suffixes—that maintain the same meaning whenever they appear. And some are formed of individual word part.

constructed terms : made up of multiple word parts that are combined to form a new term (derived from Latin and Greek), This types easy to deconstruct and easier to learn as each part has a meaning.

Non-constructed terms cannot be deconstructed into their individual word part so you must memorize them in their totality. They are words derived from other languages (particularly Latin or Greek), include the acronyms\ abbreviations (LASIK surgery). they also include eponyms i.e. medical terms named after the person who discovered the medical condition or procedure (Cesarean section) .

- **O** - the most common combining vowel. It is needed when the suffix begins with a consonant. The ‘o’, or any combining vowel, does not have a meaning, it is purely used to combine the two words and make them easier to pronounce.

Combining Form: A word root plus a combining vowel which allows two or more word roots to be joined together to form a medical term,

Ex: Thermometer

Dr. Mohammed A.

Basics used when deal with Word Roots:

1* *Drop* the combining vowel if another present at suffix, ex:

Gastrectomy

2* *Keep* the combining vowel between R & R, ex: gastroenterology.

Lec. 6

Terms of sciences

Biology – the science that study of living organisms.

Microbiology: the science that study of micro-organisms.

Bacteriology, Virology, mycology; parasitology.

Physiology: the science that study function of organs.

Pathology: the science that study of diseases

Pharmacology: the science that study of drugs

Toxicology: the science that study of toxins

Histology: the science that study of tissues

Cytology: the science that study of cells

Morphology- (Anatomy)

Some examples of root words:-

<i>Root</i>	<i>meaning</i>	<i>example</i>
CARCIN-	cancer	carcinogenic = cancer causing
CARDIO-	heart	cardiotoxicity = toxicity to the heart
CYTO-	cell	cytochemistry = study the chemistry of cell
DERMA-	skin	dermatitis = inflammation of the skin
HISTIO-	tissue	histology = study of tissue
HEPATI-	liver	hepatitis = inflammation of liver
NEPHRO-	kidney	nephrotoxic = harmful to the kidneys
NEURO-	nerves	neuroblast = an immature nerve cell
ONCO-	mass / tumor	oncology = the study of cancer
OSTEO-	bone / bony tissue	osteosarcoma = bone cancer
TOXO-	poison	toxicology = study of poisons
haeme(a)(o)- or haemato-	blood	haematology (the scientific study of blood, its formation and its diseases)

Some root words used with other words

- Hepatic:** related to the liver, Example : Hepatomegaly
Pulmonary: related to the lungs, Ex: Pulmonary infection
Gastric: related to the stomach, Ex: Gastrectomy
Cholecystic: related to gallbladder, Ex: Cholecystitis
Enteric : related to intestine, Ex Enteropathy
Cardiac : related to heart, Ex: Cardiology.

Medical term formation

The medical term constituted by using the word roots: A root is the basic element of any medical term. Roots often indicate a body part or system.

Some example of roots used to forms medical term	
brain	enceph = encephalectomy = encephalitis
eye	ophthalm, ocul
intestine (usually small)	inter

Head	
ear	ot,
eardrum	tympan, myring
face	faci
nose	rhin
skull	crani
tongue	lingu

tooth	odont, dent
Circulatory system	
aorta	aort
arteries	arteri
blood	hem, sangu
blood vessels	angi
heart	cardi
veins	ven, phleb
Bones and Muscles	
arm	brachi
back	dorsa
bones	oste
foot	pod, ped
muscles	myo
rib	cost
shoulder	scapul

THE IMPORTANCE OF SPELLING MEDICAL TERMS CORRECTLY

Misspelling a medical word, even by adding or leaving out one letter, can entirely change its meaning. For instance:

Abduction : carrying away from

Adduction : carrying toward

Arteritis : inflammation of any artery

Arthritis : inflammation of a joint

Ileum : lower part of small intestine

Ilium : hip bone.

Muscular System

The muscular system is comprised of the sum total muscles that allow movement of the skeleton.

Muscles types that comprise muscular system:

- 1. Skeletal muscle:** defined as voluntary and striated muscle that is usually attached to one or more bones.
 - It is called *voluntary* because we can decide when to contract a skeletal muscle.
 - It is called *striated* because it exhibits microscopic striations of light and dark bands.
- 2. Cardiac muscle** it's also striated, but it is involuntary—not under conscious control.
- 3. Smooth muscle** it's also involuntary, and unlike skeletal and cardiac muscle, it lacks striation so called *smooth*.
 - It's found in blood vessels, gastrointestinal tract, uterus... etc.

Examples for voluntary muscle movement such as walking, jumping, typing and talking.

Example for involuntary muscle movements such as the movement of materials through the body's organs, the beating of the heart.

Our bodies are equipped with about 600 skeletal muscles to not only put those 206 bones into motion, but also to:

- ~ generate as much as 85% of our body heat.
- ~ maintain our posture.
- ~ control the openings involved with the entrance and exit of materials.
- ~ express our emotions through movements of our facial muscles.

Three important structural terms to study of the muscular system and these are a muscle's **origin**, **insertion**, and **belly**.

Most muscles are attached to different bones at each end. When a muscle contracts, it causes movement where one bone remains relatively stationary and the other bone will move.

The end of the muscle attached to the stationary bone is called the origin, while the end of the muscle attached to the moving bone is called the insertion.

Also, many muscles are narrow at each end, and thick in the middle. This thicker middle region is called the belly.

There are other terms used in muscular system studying:

Agonist muscle. The muscle that is directly responsible for the movement at a joint

Antagonist muscle. The muscle that has an action opposite to that of the agonist and helps in the production of a coordinated movement.

HOW MUSCLES ARE NAMED

When you start studying the muscles of the body, many of the names seem difficult and foreign. The muscles of the body are named in accordance with one or more of the following features:

- **Location.** Many muscles are named as a result of location. Examples: the brachialis muscle (arm muscle) and pectoralis major abdominal part (chest muscle lower part).
- **Function.** The function of muscle is frequently a part of its name. example: the adductor muscle of the thigh, adduct or move the leg toward the midline of the body.

- **Shape.** Shape is a descriptive feature used for naming many muscles. Example: deltoid muscle (triangular muscle) that covering the shoulder.
- **Number of head or divisions.** The number of head or divisions may be used to name a muscle. The part *-cep* mean head. Biceps brachii is muscle having two heads located in the arm.
- **Points of attachment.** Origin and insertion points may be used to name a muscle. Example: the sternocleidomastoid muscle has its origin on the sternum and clavicle bone and inserts on the temporal bone.
- **Size.** The size can be used to name a muscle, especially if it is compared to the size of nearby muscles. Example: gluteus maximus is the largest muscle of the gluteal. Near by, there is small gluteal muscle, the gluteus minimus, and midsize gluteal muscle , the gluteus medius.
- **Direction of fibers.** Muscle may be name according to the orientation of their fibers. Example: Rectus abdominis muscles, fiber of these muscles are run straight up and down. Orbicularis oris muscle that form the lips, there fiber circular.

Anatomical explanation

For

Body Tissues

DEFINITION

A tissue is a grouping of similar cells working together to perform particular function.

TYPES OF TISSUES in human body:

There are several major types of tissues which include four types:-

- Epithelial Tissues
- Connective Tissues
- Muscle Tissues
- Nervous Tissues.

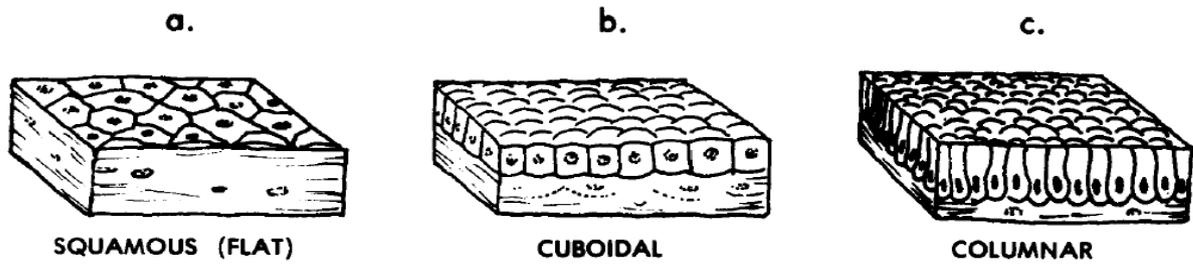
DEFINITION OF EPITHELIAL TISSUES

Epithelial tissue is the tissue that covers surfaces and lines cavities. Epithelial tissue covers the outer surface of the body. It lines the intestines, the lungs, and other hollow organs. It may have different functions.

TYPES OF EPITHELIAL CELLS (BY SHAPE)

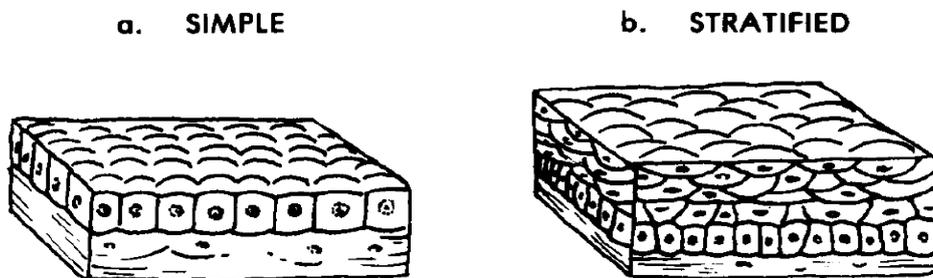
There are three basic types of epithelial cells include:

- Squamous (flat) cells
- Cuboidal (cubes) cells
- Columnar (columns) cells.



TYPES OF EPITHELIAL TISSUES

In epithelial tissues, the cells are in single or multiple layers. If there is only one layer, the tissue is called a simple epithelium. If there is more than one layer, the tissue is called a stratified epithelium.



Functions:-

Epithelial tissue has different functions, According to its location

In the skin, epithelial tissue protects the tissues beneath.

In the small intestines, the epithelial tissue absorption.

In the lungs, epithelial tissue is a membrane through which the gases pass easily.

In the glands, epithelial tissue secretion.

DEFINITION OF CONNECTIVE TISSUES

Connective tissue is tissue that supports other tissues, holds tissues together, or fills spaces

TYPES OF CONNECTIVE TISSUE

There are several types of connective tissue (C.T.). These include:-

A. Fibrous C.T (F.C.T.).

The fibrous connective tissue has main distinctive cells called fibroblasts. Fibroblasts are able to form elongated fibers. The fibers are either white or yellow.

(1) White fibers are made from a protein called collagen.

And this characterized by:

- A. tend to have a fixed length,
- B. not very easily stretched.

(2) Yellow fibers are made from a protein called elastin.

And this characterized by:

- A.They can be stretched (like a rubber band).
- B. its lengths are varying.

B. Cartilage CT.

C. Bone CT.

D. Fat CT.

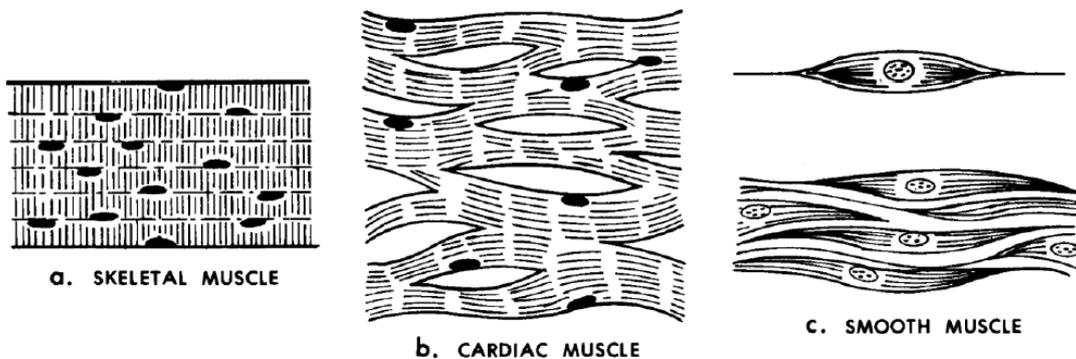
E. Blood is sometimes considered an additional type of CT.

DEFINITION OF MUSCULAR TISSUES

Muscular tissue is a specialized tissue in human which applies forces to different parts of the body by contraction. It is made up of thin and elongated cells called muscle fibers. It controls the movement of an organism.

TYPES OF MUSCLE TISSUES

- **Skeletal Muscle Tissue.**
- **Cardiac Muscle Tissue.**
- **Smooth Muscle Tissue.**



DEFINITION OF NERVOUS TISSUE

Nervous tissue is a collection of cells that respond to stimuli and transmit information.

NERVOUS TISSUE CELLS

1. The *nerve cell* (neuron): is the cell of the nervous tissue that actually picks up and transmits a signal from one part of the body to another.
2. The *neuroglia* (glia) is made up of the supporting cells of the nervous system.

Cardiovascular system

(*Circulatory system*)

The circulatory system consists of the heart, vessels and blood each of which is essential to the life of a multicellular organism.

BASIC COMPONENTS OF CIRCULATORY SYSTEM

The four basic components of any circulatory system are :

- a. **Blood.** Blood is the vehicle for oxygen, nutrients, and wastes.
- b. **Blood Vessels.** Blood vessels are the conduits, or tubes, through which the blood is moved.
- c. **Heart.** The heart is the pump which provides the primary motive force.
- d. **Capillaries.** The capillaries, are very small vessels, provide exchange areas. For example, in the capillaries of the lungs, oxygen is added and carbon dioxide is removed from the blood.

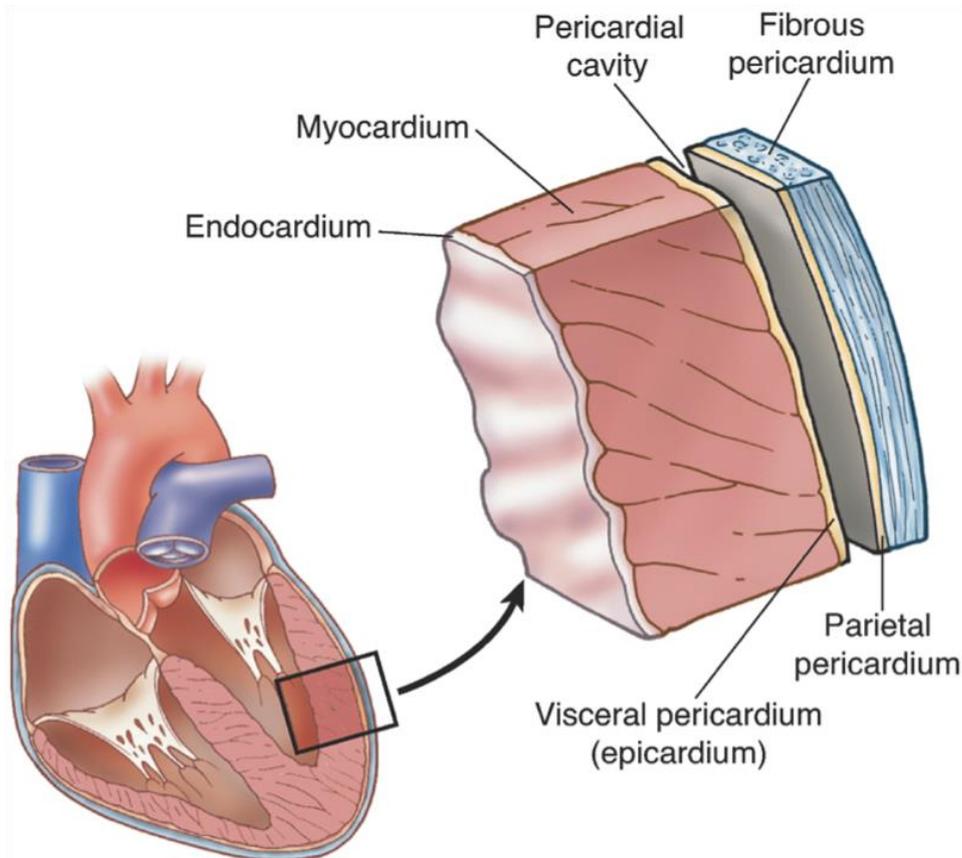
The Heart : is a muscular organ that pumps blood around the body by circulating it through the vascular system. It is found in the middle of thoracic cavity, wrapped in a two-layered serous sac called the pericardium.

Heart consists of three layers. They are-

1. Epicardium : is the outer layer of the heart wall. It is also known as visceral pericardium as it forms the inner layer of the pericardium. The epicardium functions to protect the inner heart layers and also assists in the production of pericardial fluid. Also this heart layer contain the coronary blood vessels.

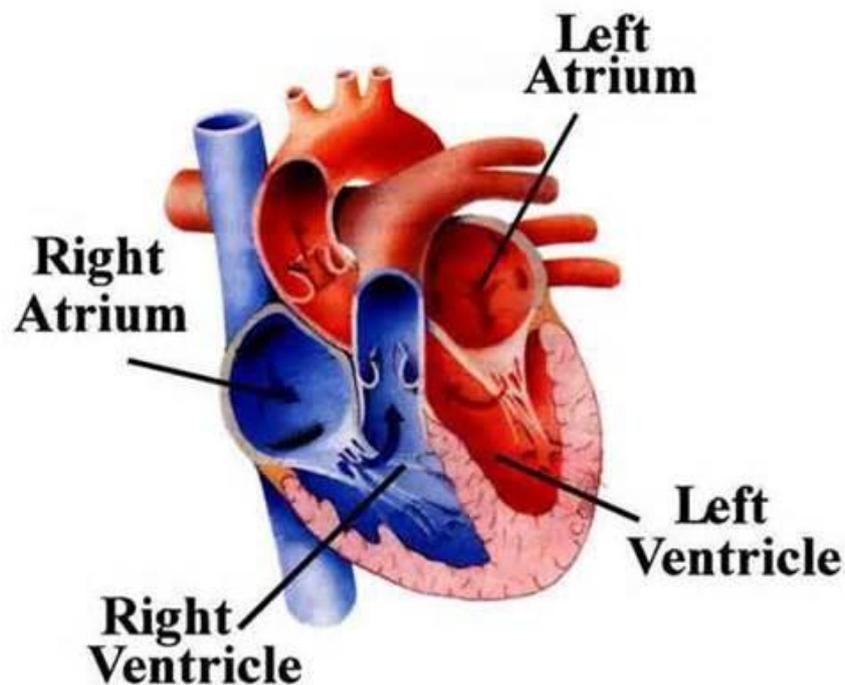
(2) Myocardium is the middle layer of the heart wall. It is composed of cardiac muscle fibers, which enable heart contractions. The myocardium is the thickest layer of the heart wall, with its thickness varying in different parts of the heart. The myocardium of the left ventricle is the thickest.

(3) Endocardium - is the thin inner layer of the heart wall. This layer lines the inner heart chambers, covers heart valves



Chambers of Heart

Heart has four chambers. Two of them are upper chambers called atria or auricles. Two lower chambers are called ventricles. The two atria are separated by interatrial septum. The two ventricles are separated by interventricular septum. Atria are filling chambers and ventricles are pumping chambers.

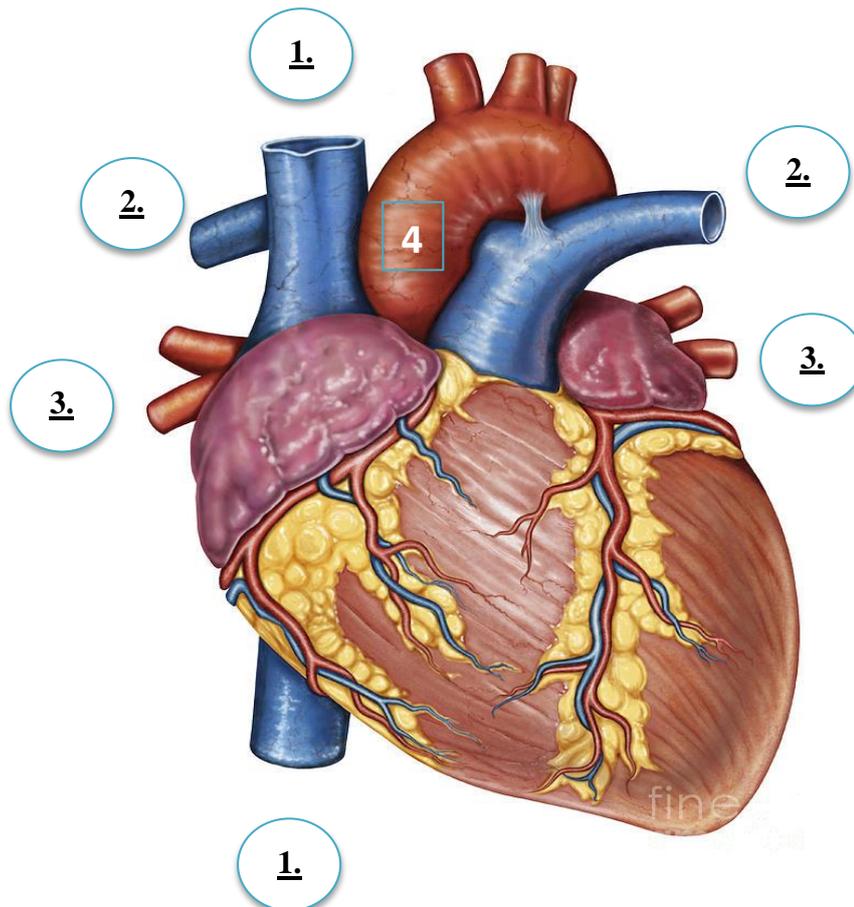


Blood Vessels attached to Heart

Blood vessels attached to heart are :-

1. *Superior and inferior venacavae* - carrying deoxygenated blood from parts of body to right atrium.
2. *Pulmonary artery* carrying venous blood to lungs from right ventricle.
3. *Pulmonary veins* carrying oxygenated blood from lungs to the left atrium of heart.
4. *Aorta* carrying oxygenated blood to all parts of body from left ventricle of heart.

Blood vessels supplying oxygenated blood to heart : Right and left coronary arteries arising from Aorta supply oxygenated blood to heart.
Blood vessels draining heart : Coronary veins bring deoxygenated blood of heart into coronary sinus, which opens directly into right atrium.



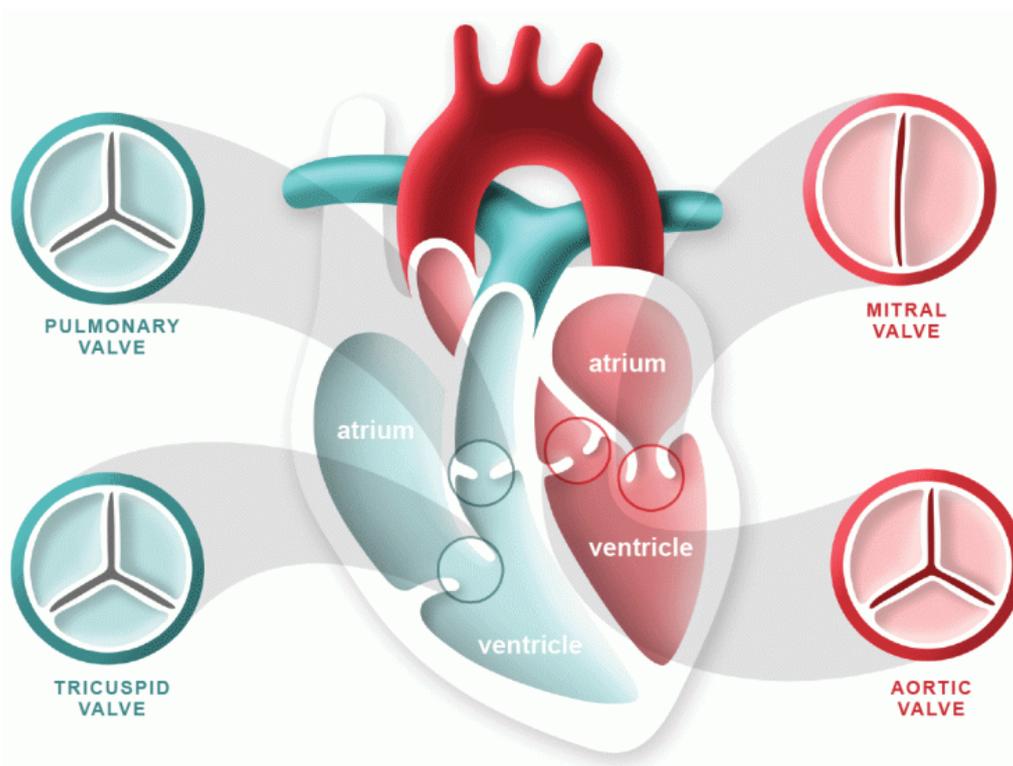
Valves of Heart

Opening between right atrium and right ventricle is guarded by tricuspid valve. It prevents back entry of blood into right atrium from right ventricle at the beginning of ventricular systole.

Opening between left atrium and left ventricle is guarded by bicuspid or mitral valve. It prevents back entry of blood into left atrium at the beginning of ventricular systole.

Pulmonary trunk is guarded by tricuspid semilunar valve which prevents back flow into right ventricle at the beginning of ventricular diastole.

Aorta has tricuspid semilunar valve which prevents back flow of blood into left ventricle at the beginning of ventricular diastole.



Vascular System

Blood vessels constitute vascular system. There are two types of blood vessels mainly. They are arteries and veins. Arteries subdivide into arterioles. Arterioles end in capillaries. Capillaries are single layered thin vessels. Capillaries unite to form venules. Venules unite to form veins. Arteries are the vessels carrying oxygenated blood to tissues (with one exception). Veins are the vessels carrying deoxygenated blood (with one exception).

Anatomical comparison between arteries and veins

Arteries	Veins
1. carry oxygenated blood, away from the heart except pulmonary artery	carry deoxygenated blood, towards the heart except pulmonary veins
2. mostly situated deeply in the body	superficial and deep in location
3. thick-walled, highly muscular	thin-walled
4. narrow lumen	wide lumen
5. Valves are absent	Valves are present which provide unidirectional flow of blood
6. reddish in color	bluish in color

The Pulmonary and Systemic Circuits

The cardiovascular system has two major divisions:

- A. Pulmonary circuit**, which carries blood to the lungs for gas exchange and returns it to the heart.
- B. Systemic circuit**, which supplies blood to every organ of the body, including other parts of the lungs and the wall of the heart itself.

Respiratory system

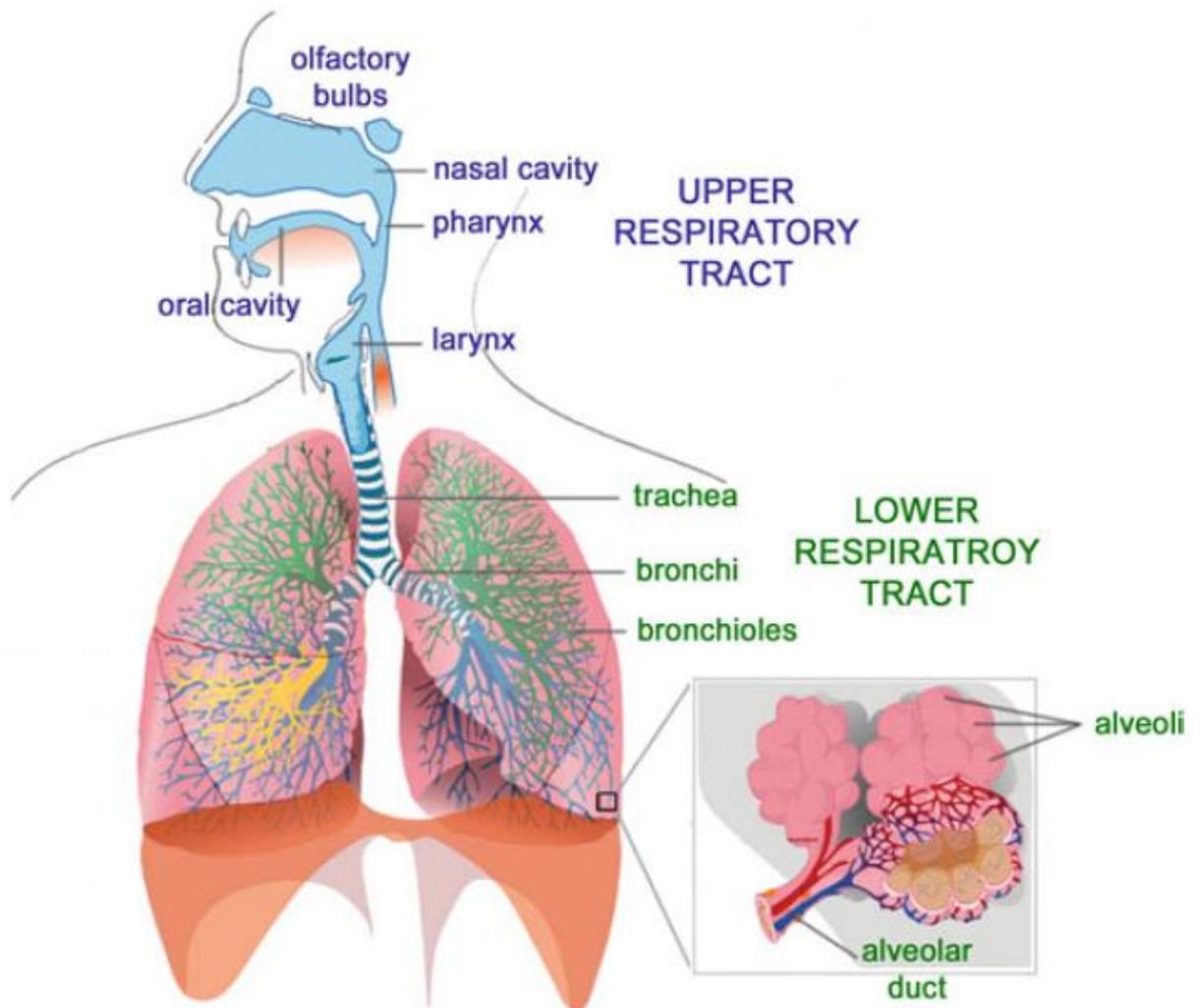
The respiratory system can be separated into regions based on function or anatomy.

Functionally there is :

The **conducting zone** (nose to bronchioles).

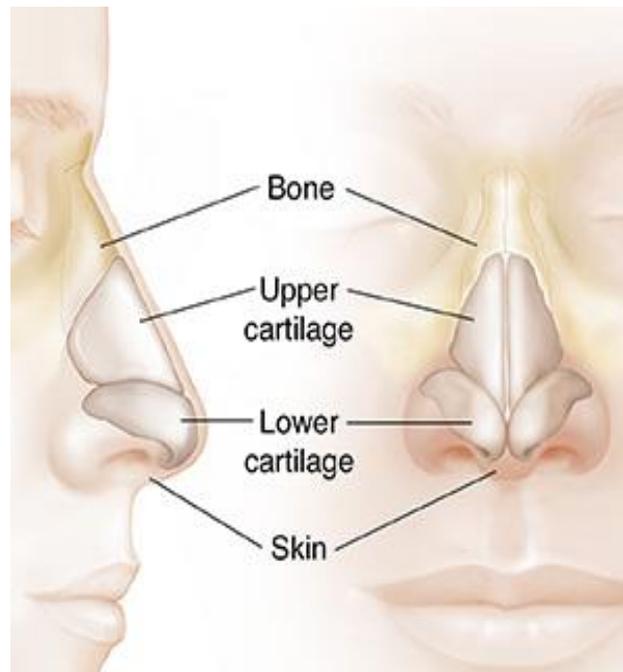
The **respiratory zone** (alveolar duct to alveoli).

Anatomically, the respiratory system can be divided into the **upper** and **lower** respiratory tract.



Nose and Nasal Cavity

The nose and its internal nasal cavity provide a passage for air to pass through reaching the lungs. Its role include: warms, moistens, filters and cleans the inhaled air from any foreign particles. The nasal cavity lined by stratified squamous epithelium.



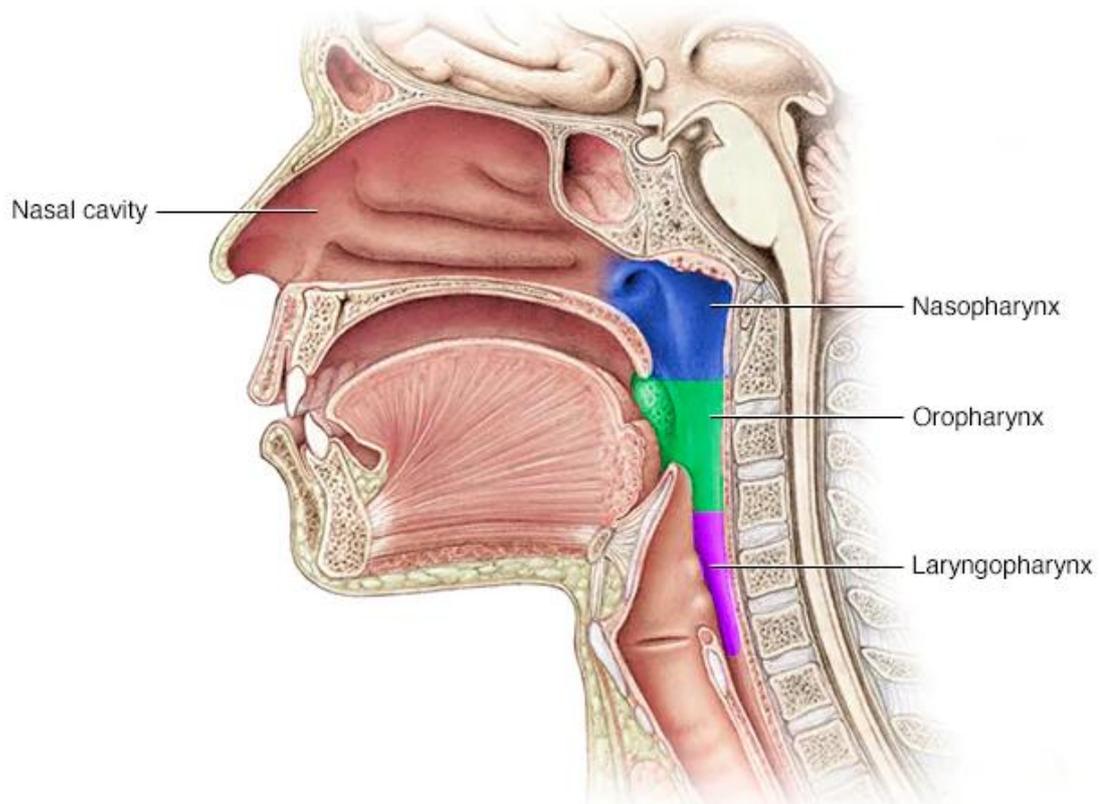
The nose is the only visible part of the respiratory system, protruding from the face, and lying in between the forehead and the upper lip. It is made up of a bony section and a cartilaginous section.

The nasal cavity The nasal cavity is the most superior part of the respiratory tract. It communicates with the external environment via the anterior openings, nares, and the nasopharynx via the posterior apertures, turbinate. This cavity is divided into two separate cavities by the septum. Within each cavity are three regions; nasal vestibule, respiratory region, and olfactory region.

Vestibule – the area surrounding the anterior external opening to the nasal cavity.

Respiratory region – lined by a ciliated psudeostratified epithelium, with mucus-secreting goblet cells.

Olfactory region – located at the apex of the nasal cavity. It is lined by olfactory cells.



The Pharynx

The pharynx (*throat*) is a tube-like structure about 12.5 cm long that connects the posterior nasal and oral cavities to the larynx and esophagus.

Structurally the pharynx can be divided into three anatomical parts according to its location , which are:

- 1- The **nasopharynx** (posterior to the nasal chambers)
- 2- The **oropharynx** (posterior to the mouth)

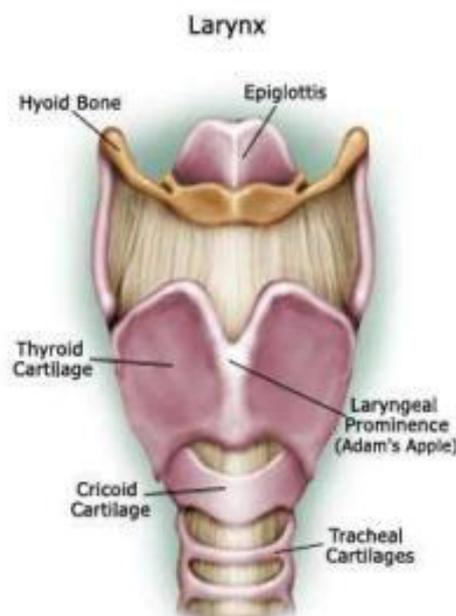
3- The **laryngopharynx** (posterior to the larynx).

The surface of the **nasopharynx** is covered by pseudo-stratified columnar epithelium. This is the same mechanism of nasal epithelium: - to filter, warm, and humidify the inhaled air .

In the **oropharynx** and **laryngopharynx**, the surface is lined with stratified squamous epithelium which is exposed to food moving through the passageway.

The Larynx

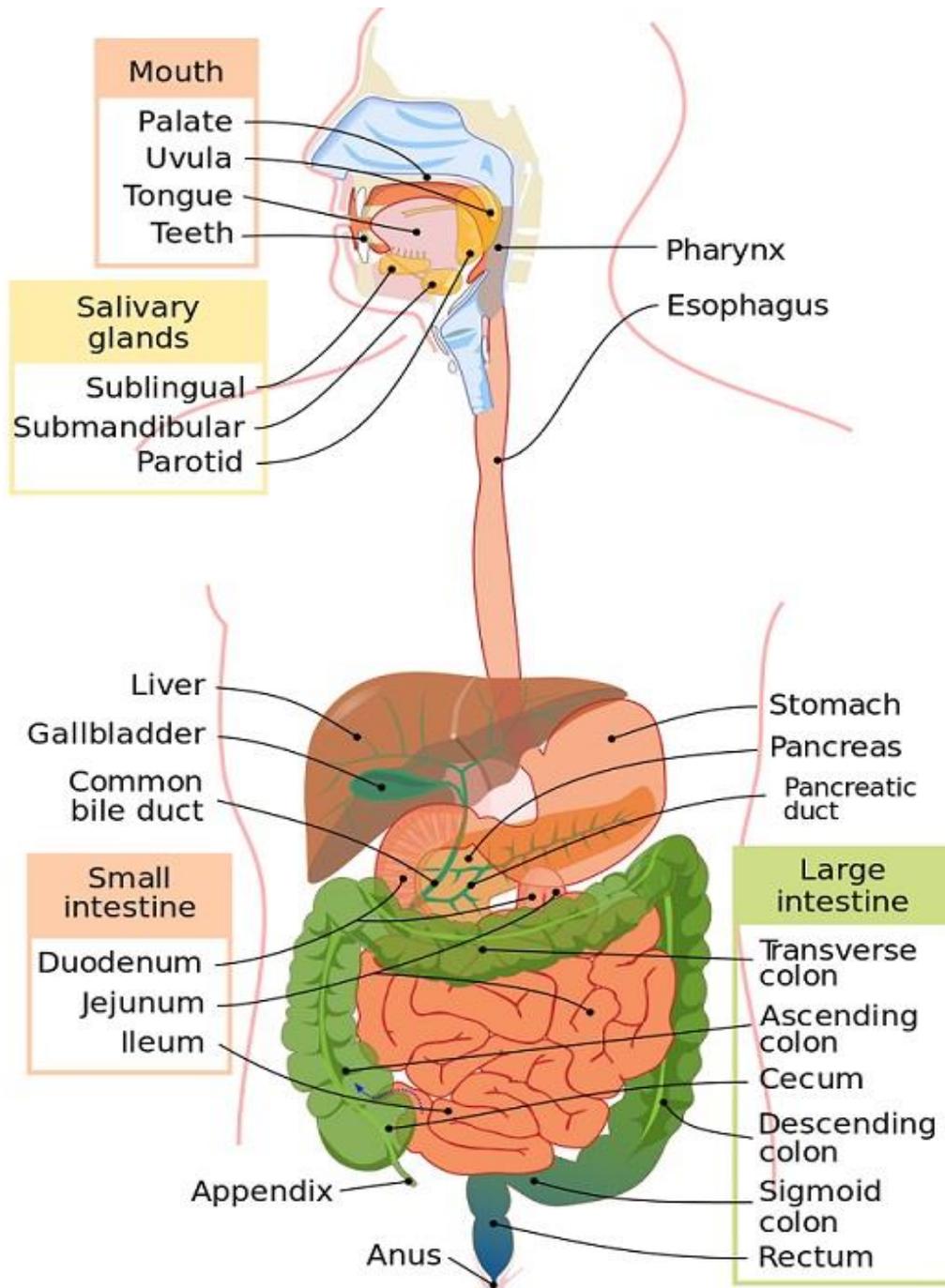
The **larynx** (voice box) is an organ located in the anterior neck. It is a component of the respiratory tract. The larynx is located in the **anterior compartment** of the neck, and extended between C3 and C6. It is continuous inferiorly with the **trachea**, and opens superiorly into the laryngeal part of the pharynx. larynx has several important functions, including : phonation, the cough reflex, and protection of the lower respiratory tract. The structure of the larynx is primarily cartilaginous.



The respiratory system does much different function, which include:-

1. **Gas exchange.**
2. **Communication.**
3. **Olfaction.**
4. **Blood pressure regulation.**
5. **Acid–base balance.**

Digestive System



General Anatomy of Digestive System

The digestive system is a group of organs working together to convert food into energy and basic nutrients to feed the entire body.

Food passes through a long tube inside the body known as the alimentary canal or the gastrointestinal tract (GI tract). The alimentary canal is made up of the oral cavity, pharynx, esophagus, stomach, small intestines, and large intestines.

In addition to the alimentary canal, there are several important accessory organs that help your body to digest food but do not have food pass through them. Accessory organs of the digestive system include the teeth, tongue, salivary glands, liver, gallbladder, and pancreas.

There are six functions take place in the digestive system:

1. **ingestion**, the selective intake of food;
2. **digestion**, the mechanical and chemical breakdown of food into a form usable by the body;
3. **absorption**, the uptake of nutrients into the blood.
4. **compaction**, absorbing water and consolidating the indigestible residue into feces.
5. **defecation**, the elimination of feces.

Mouth

Food begins its journey through the digestive system in the mouth, also known as the oral cavity. Its functions include:

1. ingestion (food intake)
2. taste
3. mastication (chewing)
4. chemical digestion
5. swallowing

in addition to other functions:

6. speech
7. respiration.

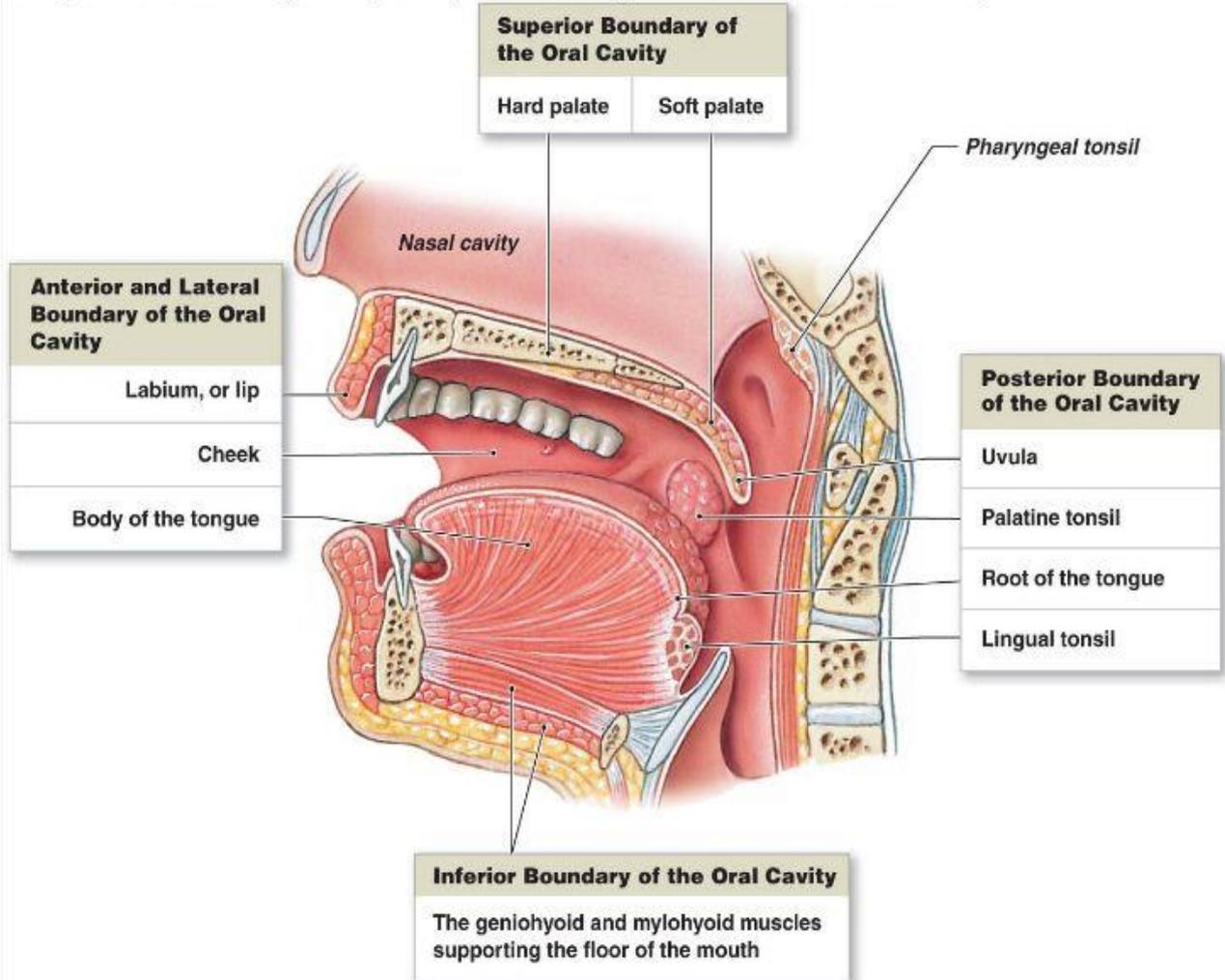
Inside the mouth there are many structures (organs) that aid in the digestion of food—the tongue, teeth, and salivary glands .

- *Teeth.* The **teeth** are 32 small, hard organs found along the anterior and lateral edges of the mouth. The teeth function are cutting and grinding food into smaller pieces.
- *Tongue.* The **tongue** is **located** on the inferior portion of the mouth just posterior and medial to the teeth.

It is a small organ made up of **muscles**. The outside of the tongue contains many taste buds on its the surface.

The **tongue also** helps to push food toward the posterior part of the mouth for swallowing.

A sagittal section showing the major components forming the boundaries of the oral cavity



Pharynx

The pharynx, or throat, is a funnel-shaped tube connected to the posterior end of oral cavity to the esophagus; it is a point where the digestive and respiratory tracts intersect.

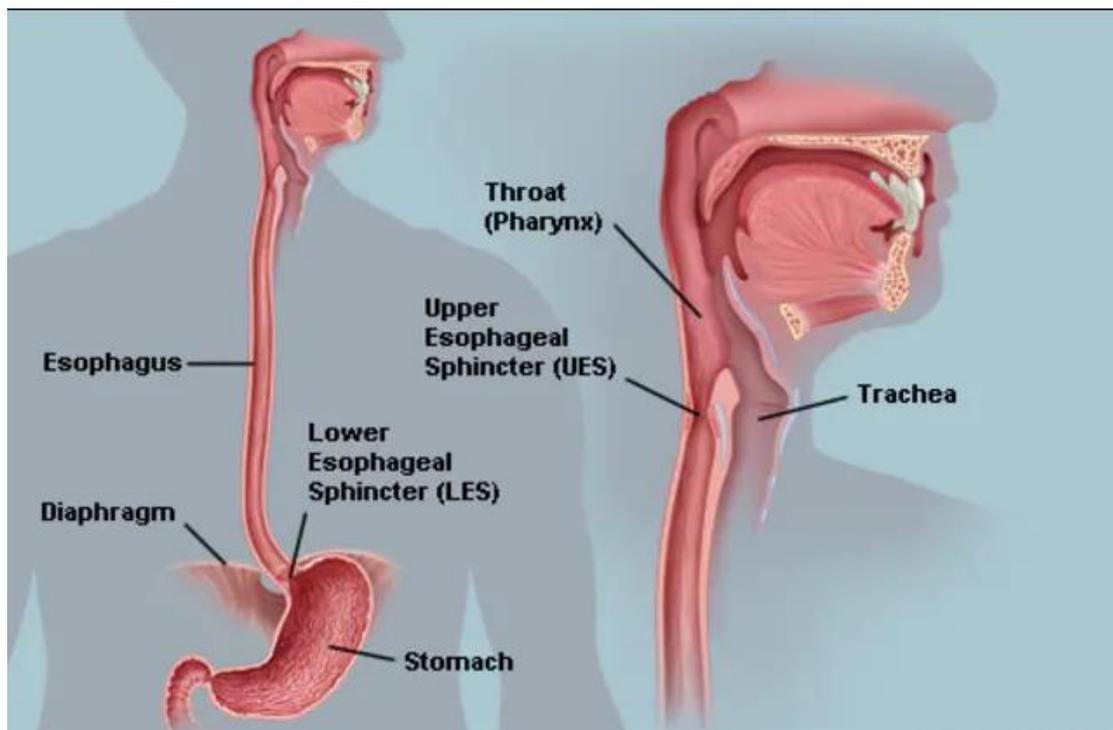
The pharynx is responsible for the passing the masses of chewed food from the mouth to the esophagus.

Esophagus

The **esophagus** is a muscular tube 25 to 30 cm long, posterior to the trachea, connecting the pharynx to the stomach that is part of the **upper gastrointestinal tract**.

The esophagus penetrates the diaphragm at an opening called the **esophageal hiatus**, continues another 3 to 4 cm, then meets the stomach.

At the inferior end of the esophagus is a muscular ring called the lower esophageal sphincter or cardiac sphincter. Its role is prevents stomach contents from rehearsing into the esophagus, thus protecting the esophageal mucosa from the erosive effect of the stomach acid.



Stomach

The **stomach** is a muscular sac that is located on the left side of the abdominal cavity, just inferior to the **diaphragm**.

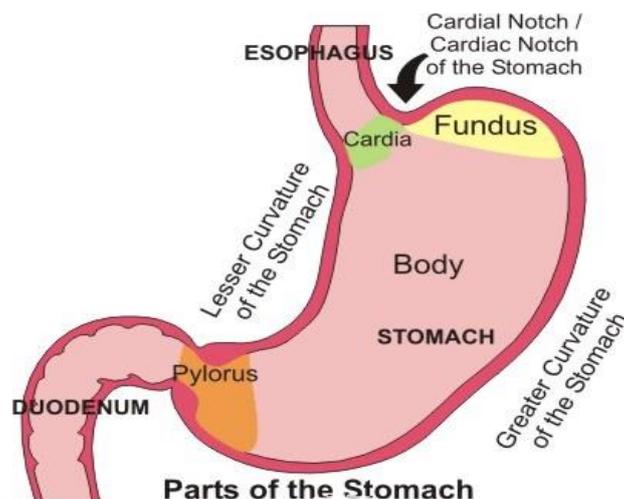
The superomedial margin, facing the liver, and is called the *lesser curvature*. The inferolateral margin is called the *greater curvature*. Because it represent long border in stomach (about 40 cm) .

The stomach is divided into four regions:

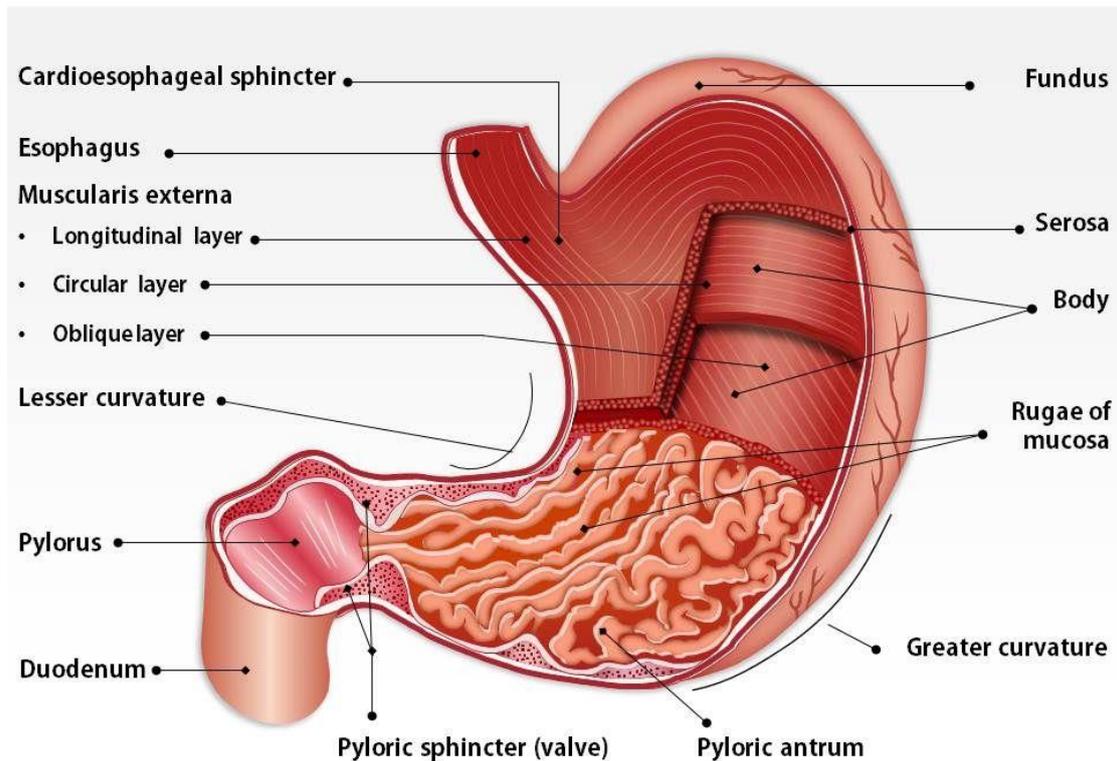
- (1) The **cardiac region (cardia)** is the small area within about 3 cm of the cardiac orifice.
- (2) The **fundic region (fundus)** is the domelike roof superior to the esophageal attachment.
- (3) The **body (corpus)** makes up most of the stomach distal to the cardiac orifice.
- (4) The **pyloric region** is a slightly narrower pouch at the distal end.

It functions breaks up food particles mechanically, liquefies the food, and begins the partial chemical digestion of proteins and fat.

This produces a soupy or pasty mixture of semidigested food called **chime**.



Stomach Anatomy



Small Intestine

The [small intestine](#) is a long, thin tube about 1 inch in diameter and about 6.5 ~ 9.5 meter in long. This is part of the [lower gastrointestinal tract](#).

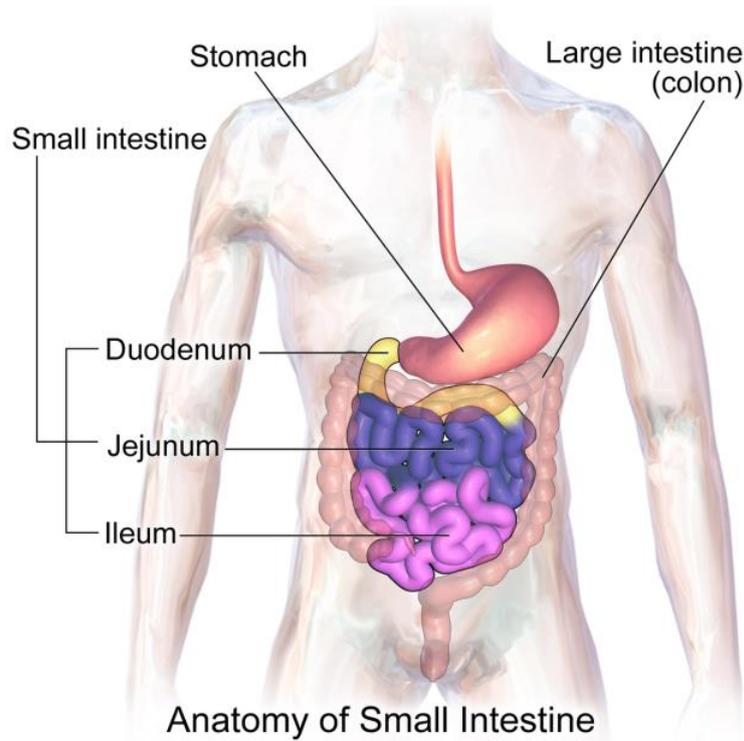
It is located just inferior to the stomach and takes up most of the space in the abdominal cavity.

Nearly all chemical digestion and nutrient absorption occur here. The small intestine has a large surface area exposed to the chyme. The surface area is increased by extensive folding of the mucosa, which supports the length of the small intestine.

By the time food leaves the small intestine, around 90% of all nutrients have been extracted from the food that entered it.

Small intestine is divided into three regions:

1. The duodenum
2. The jejunum
3. The ileum.



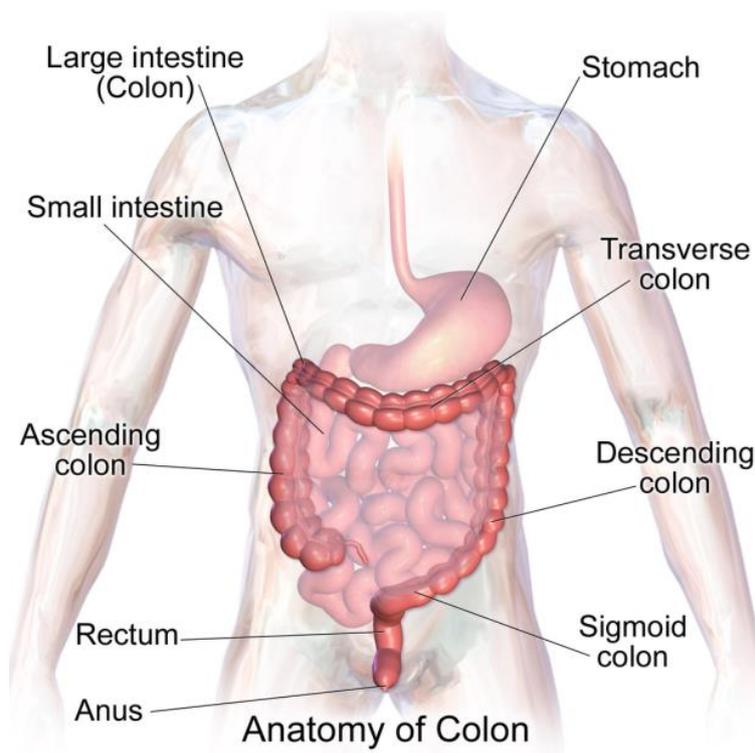
Large Intestine

The large intestine is a long, thick tube about 2.5 inches in diameter and about 1.5 meter long.

It is located just inferior to the stomach and wraps around the superior and lateral border of the small intestine.

The large intestine absorbs water and contains many symbiotic bacteria that aid in the breaking down of wastes to extract some small amounts of nutrients.

The large intestine consists of many regions: the cecum, Ascending colon, transverse colon, descending colon, sigmoid colon, rectum, and anal canal, in addition to Appendix.



Urinary System

The **Urinary System** is a group of organs in the body concerned with filtering the excess fluid and other substances such as excess minerals or vitamins as well as blood cells from the bloodstream. The substances are filtered out from the body in the form of **urine**. Urine is a liquid produced by the kidneys, collected in the bladder and excreted through the urethra.. The Urinary organs include the kidneys, ureters, bladder, and urethra.

Functions of the Urinary system

1. **Excretion** – removal of waste from the blood and excreted in the urine .
2. **Elimination** – removal of waste from other organ systems.
3. **Water balance** - kidney tubules regulate water amount .
4. **Regulation of pH** .
5. **Production of some hormones** like erythropoietin: and renin for blood pressure regulation .

Organs of the Urinary System:

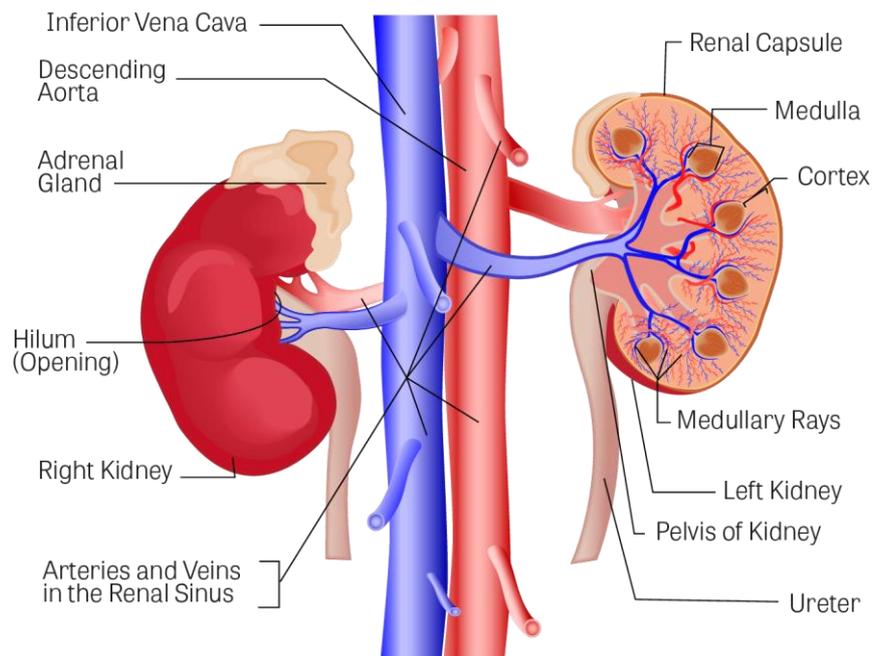
Kidneys

The **kidneys** are a pair of bean shaped, reddish brown organs about the size of your fist. It measures 10-12 cm long. They are covered by the renal capsule, which is a tough capsule of fibrous connective tissue.

Adhering to the surface of each kidney is two layers of fat to help cushion them.

The kidneys lie at the posterior abdominal wall at the level of vertebrae T12 to L3. The right kidney is slightly lower than the left because of the space occupied by the large right lobe of the liver above it.

There are three major regions of the kidney, **renal cortex**, **renal medulla** and the **renal pelvis**.

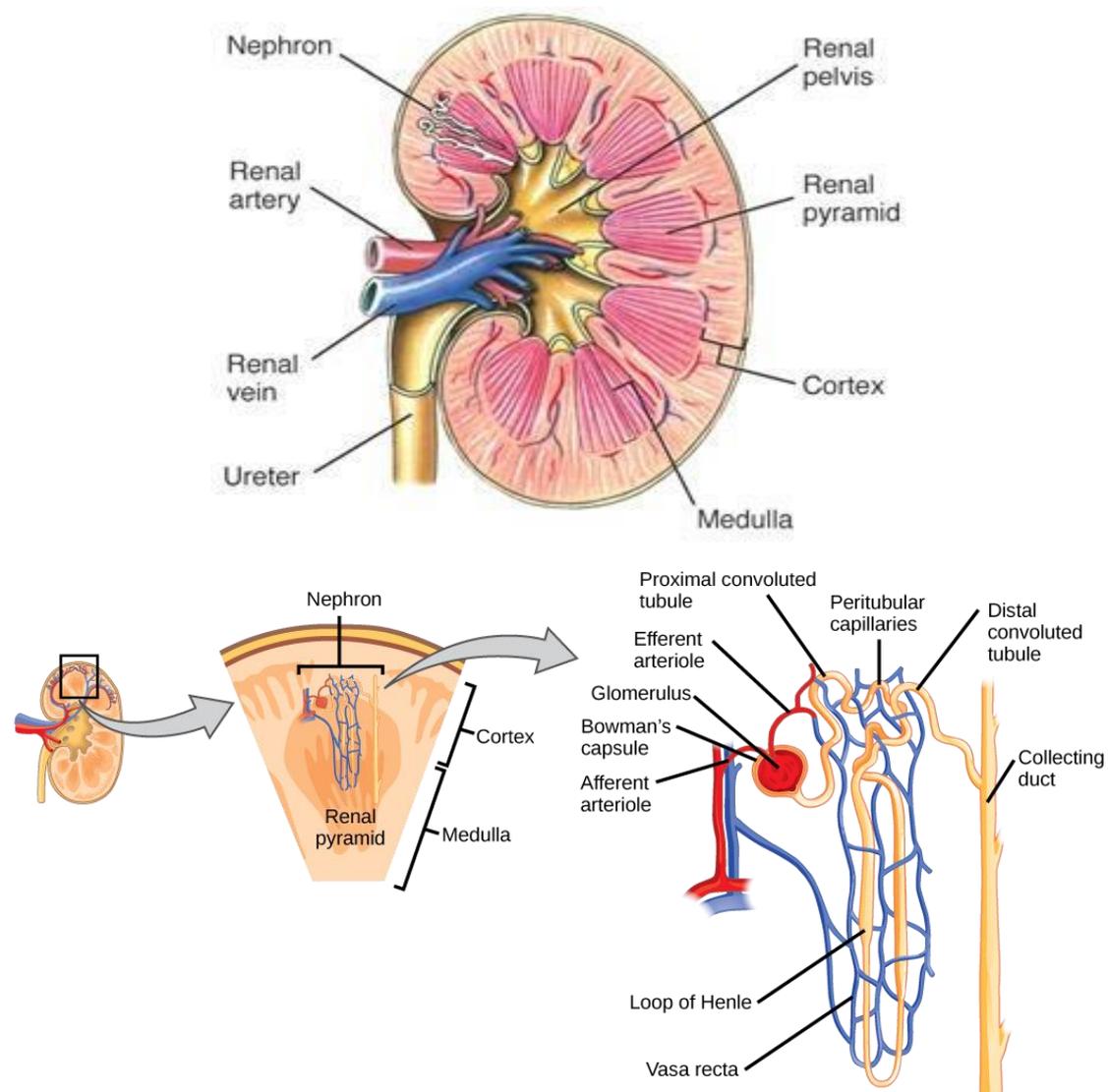


Nephrons

A nephron is the basic structural and functional unit of the kidney. Its chief function is filtering the blood, reabsorbing what is needed and excreting the residual as urine.

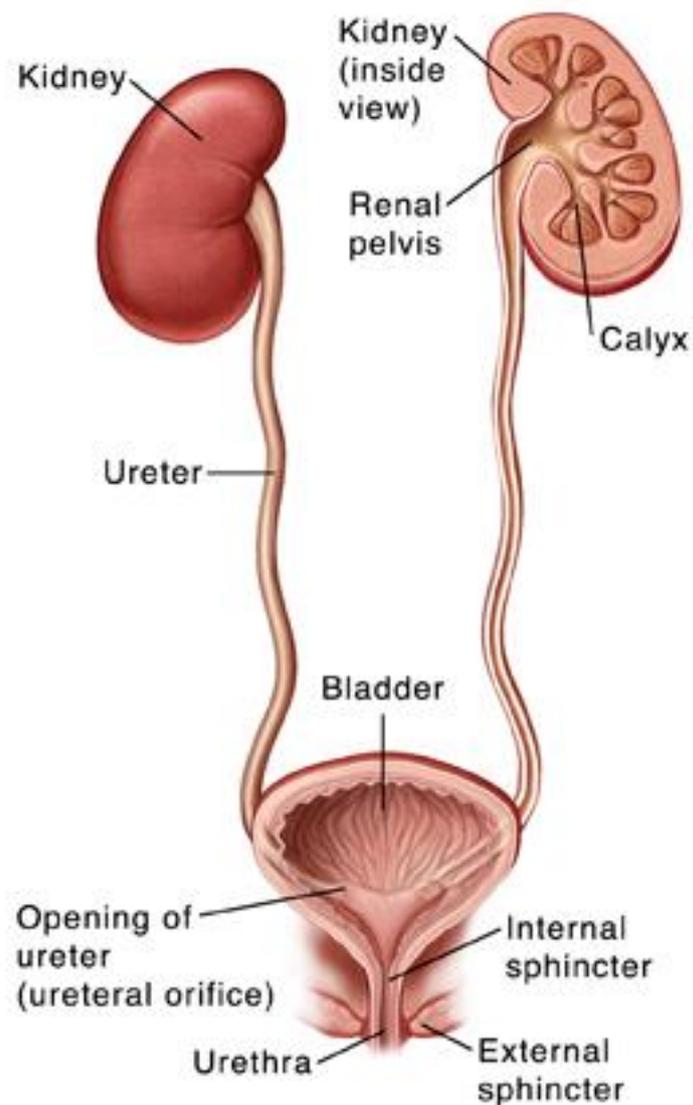
Nephrons eliminate wastes from the body, regulate blood volume and pressure, control levels of electrolytes and metabolites, and regulate blood pH. Its functions are regulated by hormones such as antidiuretic hormone and aldosterone.

Each nephron is composed of an initial filtering component (the renal corpuscle) and a tubule specialized for reabsorption and secretion (the renal tubule).



Ureters

The **ureters** are two tubes that drain urine from the kidneys to the bladder. Each ureter is a muscular tube about 10 inches (25 cm) long. Muscles in the walls of the ureters send the urine in small spurts into the bladder.

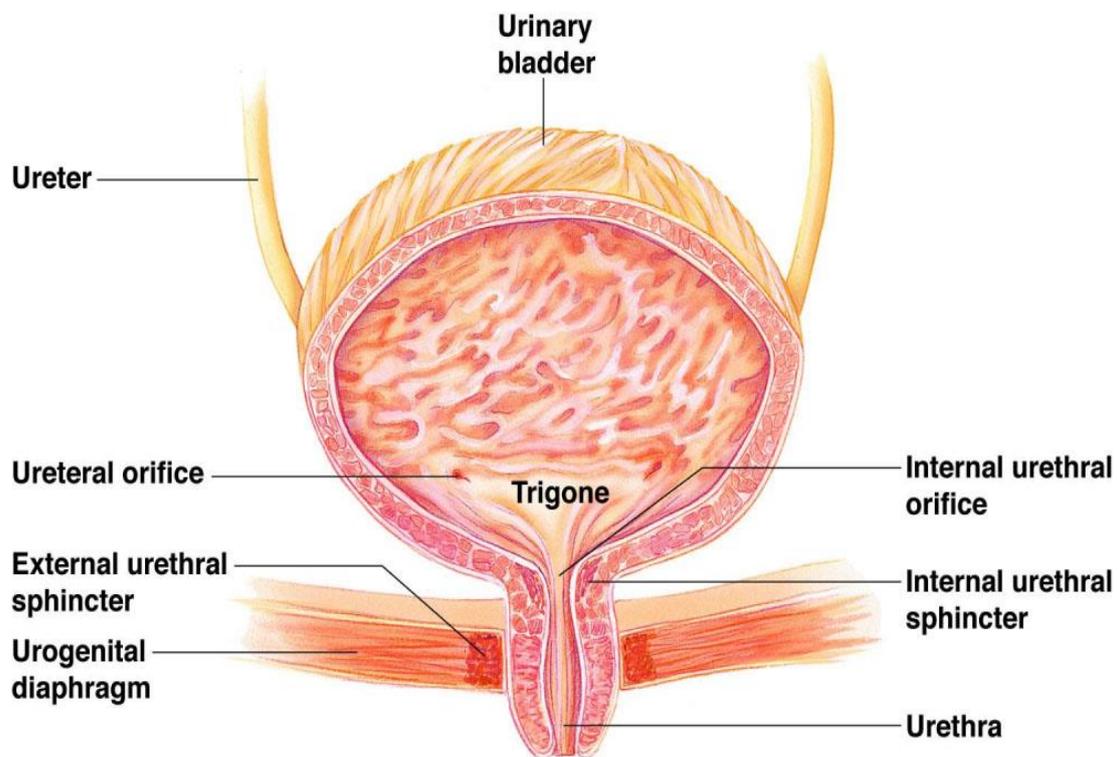


Urinary Bladder

The **urinary bladder** is a hollow, muscular and distensible or elastic organ that sits on the pelvic floor. On its anterior border lies the pubic symphysis and, on its posterior border, the vagina (in females) and rectum (in males).

The urinary bladder can hold approximately (500 to 530 ml) of urine, however the desire to micturate is usually done when it contains about 150 to 200 ml.

The **ureters** enter the bladder diagonally from its posteriolateral floor in triangular shaped area called the trigone.

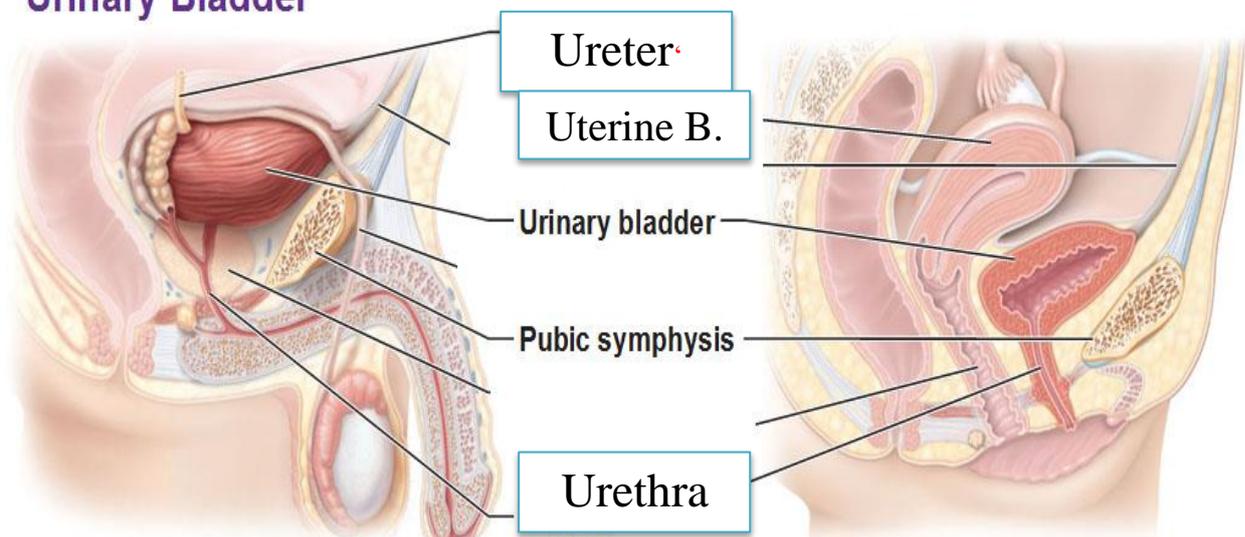


Urethra

The **urethra** is a muscular tube that connects the bladder with the outside of the body. The function of the urethra is to remove urine from the body. It measures about 1.5 inches (3.8 cm) in a woman but up to 8 inches (20 cm) in a man.

The **urethral sphincter** is a collective name for the muscles used to control the flow of urine from the urinary bladder. These muscles surround the urethra, so that when they contract, the urethra is closed.

Urinary Bladder



(a) Sagittal section through male pelvis, urinary bladder shown in lateral view

(b) Sagittal section through female pelvis