

# Resume of 206 anatomy

## Anatomy of cardiovascular system

### CVS is formed of

- the heart is the pump
- blood vessels which formed of arteries, veins, and capillaries.

### Heart

#### Location

- A person closed hand
- Lies in the middle of the chest cavity
- Posteriorly it lies against 5-8th thoracic vertebrae

### The cardiac wall is formed of 3 layers

- Epicardium : is the outer layer
- Myocardium : is a thick, muscular, contract automatically and it doesnot fatigue.
- Endocardium: is lining of the myocardial wall.

### Chambers of the heart

- There are 4 chambers
- 2 above called atria
- 2 below called ventricles.

### Atria

- Are left and right.
- Separated by a septum
- Receiving blood from the big veins
- Atrial wall not thick

### Ventricles

- Pumping chambers right and left
- Their wall is thicker than the atrial wall
- left ventricle pumps blood to every part of the body, so its wall is the thicker one.

### Cardiac valves

- permit blood flow only in one direction.

### A.atrioventricular (AV) : two valves

- Tricusped valve:is right AV valve, has 3 flaps
- Mitral valves: is left AV valve, has 2 flaps.

**Semilunar valve (SL): Two valve**

- aortic valve: presents between left ventricle and aorta.
- pulmonary valve: presents between right ventricle and pulmonary artery.

**Blood flow through the heart:**

- Blood will be collected by superior and inferior vena cavae to right atrium
- then it flows through tricuspid valve into right ventricle,
- then through pulmonary valve to pulmonary artery to the lung ,
- here the blood will be oxygenated,
- then it flows back through 4 pulmonary veins to the left atrium,
- and pass through mitral valve into left ventricle to pass through aortic valve to the aorta.

**Blood supply of heart tissue**

- Right and left coronary arteries supply myocardial cells with blood.

Nerve supply of the heart:

- Sympathetic fibers: 3 branches, increase cardiac activity
- Parasympathetic: part of vagus nerve, depress cardiac activity

**Blood vessels**

Types of blood vessels

Artery:

- carries blood from heart to periphery
- conducts oxygenated blood, except the pulmonary artery.

Vein:

- carries blood from periphery to the heart.
- conduct nonoxygenated blood, except 4 pulmonary veins.

Capillary:

- Carries blood from arteriole to venule

**Function of blood vessels**

The main function is blood transport.

**• Arteries**

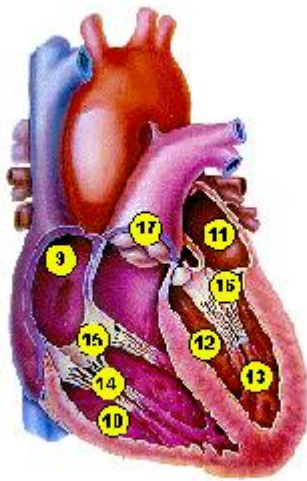
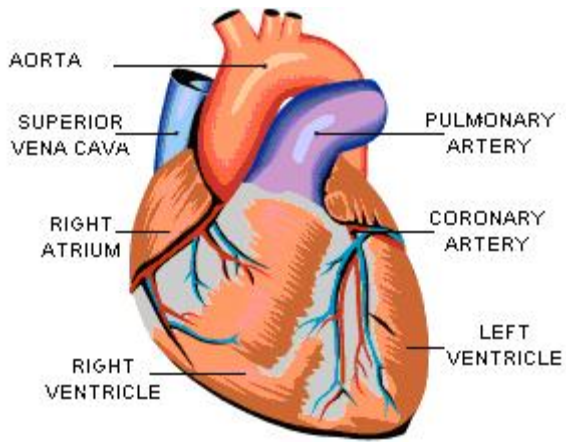
- o distribution of blood
- o keep blood pressure proper to its function.

**• Veins**

- o collect the blood , their wall-----distend

- Capillary

- o it decrease the blood pressure.
- o it makes the blood flow is slow.



- 9. Right Atrium
- 10. Right Ventricle
- 11. Left Atrium
- 12. Left Ventricle
- 13. Papillary Muscles
- 14. Chordae Tendineae
- 15. Tricuspid Valve
- 16. Mitral Valve

## Chapter(2)

### Physiology of the cardiovascular System(CVS)

Physiology of cardiovascular system

The role of CVS depending on 2 factors

- Pumping of heart
- Peripheral resistance

Conducting system of the heart is formed of

- SA node
- AV bundle
- Purkinje fibres
- AV node

It begins in SA node (pacemaker) to make rhythmic activity without any stimulation from CNS, each impulse travels to both atria, reaching AV node, this allows full contraction of both atria, the velocity of impulse will increase through AV bundle and Purkinje fibers to ventricular muscle to contract at the same time.

Electrocardiogram (ECG waves)

- Record the electrical activity
- It does not record heart contraction.

P wave: depolarization of both atria.

QRS: -ventricles depolarization  
-atria repolarization

T wave: ventricles repolarization



Cardiac cycle (pumping cycle)

- It means complete heart beat .
- Consists of:
- Contraction (systole)
  - Relaxation (diastole)

Atrial systole

- It is push the blood from both atria into ventricles through AV valve.

Ventricular systole

- The ventricles contract and push the blood through aorta and pulmonary arteries (QRS wave)

### **Natural blood pressure**

1. In systemic circulation (120/80)

- Systole(120):ventricles contractions.
- Diastol(80): ventricles relaxations.

2. In pulmonary circulation (25/8)

- Systole(25):ventricles contractions.
- Diastol(8): ventricles relaxations.

### **Heart Sounds**

- The heart makes sounds during cardiac cycle(dob,lop)

First sound:

- Caused by contraction of ventricles and closure AV valve (systole)

Second sound:

- Cause by closure of semilunar valve (SL)

Factors affecting blood pressure

- Cardiac output
- Perphral resistance.

Pulse

- Expantion and recoil of artery

Depends in 2 factors:

1. Cardiac pumping.
2. Elasticity of arteriolar wall.

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## **Chapter(3)**

### **The blood**

Blood:

- One of the body fluid compartment
- Forms 6-8% of total body weight

Function of blood

- Transport medium (oxygen, hormones& enzymes)
- Heat regulation system
- Water balance

Blood volume

- Young male about 5-6 liters
- Young female about 4-5 liters

## Two elements of blood

### 1. Plasma

- fluid part of blood represents 55%.
- 90% water & 10% solutes.

### 2. Formed elements

- Red blood cells (RBC)  
One third of the cell formed hemoglobin (HB) ♣  
In man RBC number 5.5 million/mm<sup>3</sup> ♣  
In woman 4.8 million/mm<sup>3</sup> ♣

The function of RBC transport of O<sub>2</sub> ♣ & CO<sub>2</sub>  
Average life RBC 105-120 days. ♣

### Note:-

each 100ml of blood in male contains 14-16 grams of HB ♣  
while in woman each 100ml contains 12-14 grams of HB ♣

### Anemia:-

means each 100ml of the blood contains less than 10gr HB ♣

### • White blood cell (WBC)

5000-11000/mm<sup>3</sup> ♣

5 types of RBC according to the presence of the cytoplasmic granules ♣

### I- Granulocytes:-

- a. Neutrophil
- b. Basophil
- c. Eosinophil.

### II- Agranulocytes:-

- a. Lymphocyte
- b. Monocytes

The main function of WBC is immunity. ♣

### Notes:-

Leukopenia:- The total count of WBC is less than ♣  
5000/mm<sup>3</sup>

Leukocytosis:- The total count of WBC is more than 11000/mm<sup>3</sup> ♣

### • Platelets

Count 150,000- 350,000/mm<sup>3</sup> ♣

The main function of platelets is blood clotting. ♣

Average life 7 days. ♣

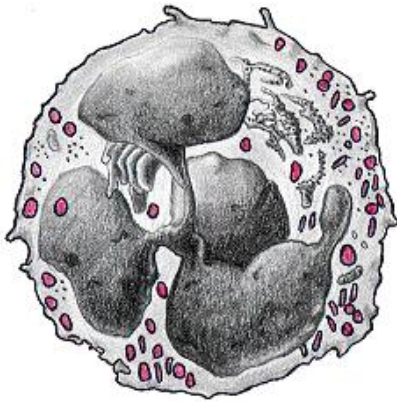


Fig. 8 - Neutrophil

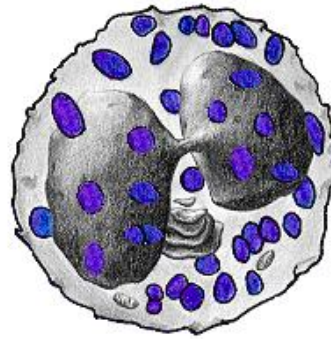


fig. 10 - Basophil

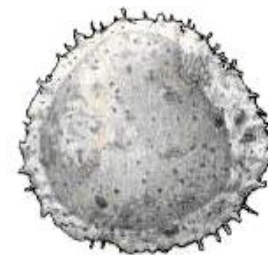
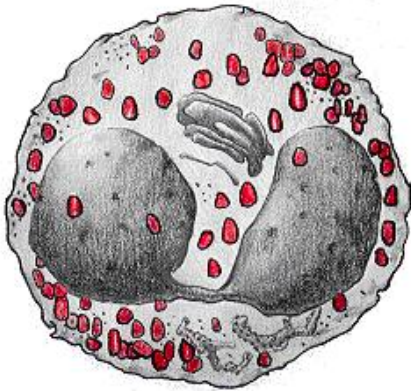


Fig. 11 - Lymphocyte

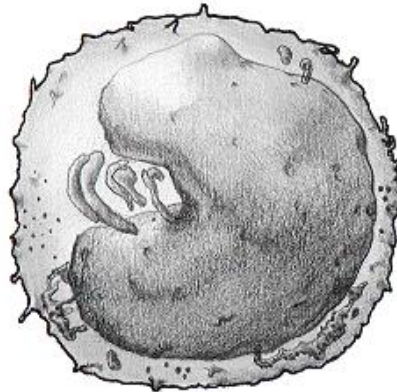


Fig. 12 - Monocyte

### Blood group

Blood group means the type of antigens present in RBC membrane, in other hand there are antibodies in plasma that react in specific group antigen.

### ABO system

Blood types are named according to the antigens present on RBC membranes.

Group types }  
Type A:-♣

- RBC contains antigen A
- Plasma contains anti B antibodies

Type B:-♣

- RBC contains antigen B
- plasma contains anti A antibodies

Type AB:-♣

- RBC contains antigen AB
- Plasma contains no antibodies

Type O:-♣

- RBC contains no antigen

RH system

RH positive :- RBC contains antigen on its membranes⊗

RH negative:- RBC has no antigen on its membranes⊗

Blood Donor Table		
Blood Type	Can Donate To	Can Receive From
A	A, AB	A, O
B	B, AB	B, O
AB	AB	A, B, O
O	A, B, AB, O	O

Notes:-

O -ve :- universal donor⊗

AB +ve:-universal recipient⊗

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### Chapter(4)

#### Lymphatic system

Lymphatic system



Lymphatic system is formed of 3 elements

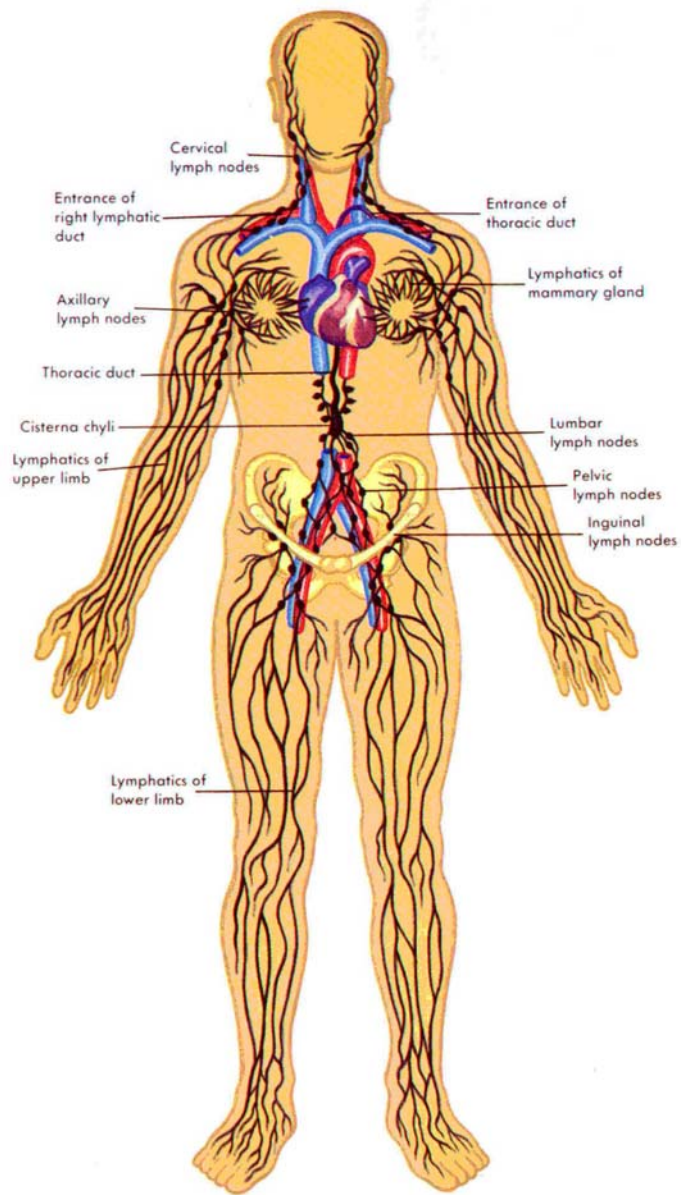
- Lymph vessels
- Lymph
- Lymph nodes

Functions of the lymphatic system

- Immunity
- Fluid balance

Lymph and interstitial fluid

- Lymph is clear watery fluid found in the lymphatic vessels



LYMPHATIC SYSTEM

## **Chapter(5)**

### **Anatomy of respiratory System(RS)**

Anatomy of respiratory system (RS)

Structure:- two tracts

Upper respiratory tract(present outside chest cavity)∞

- a. Nose
- b. Pharynx
- c. Larynx

Lower respiratory tract( present in chest cavity)∞

- a. Trachea
- b. Bronchial
- c. Lungs

Functions of the respiratory system

- a. Air distribution.
- b. Gas exchanges
- c. Filtration, warming & humidification
- d. Sense of smell
- e. Influencing sound production

Upper respiratory tract:-∞

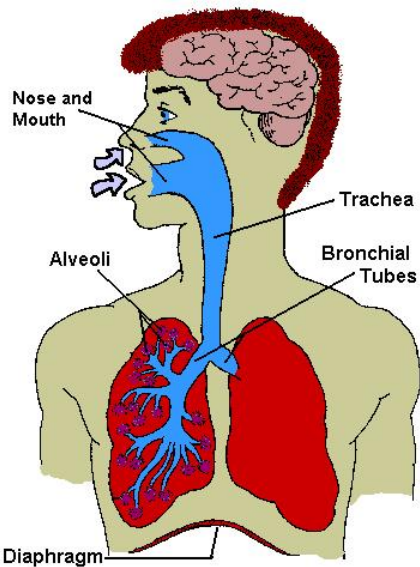
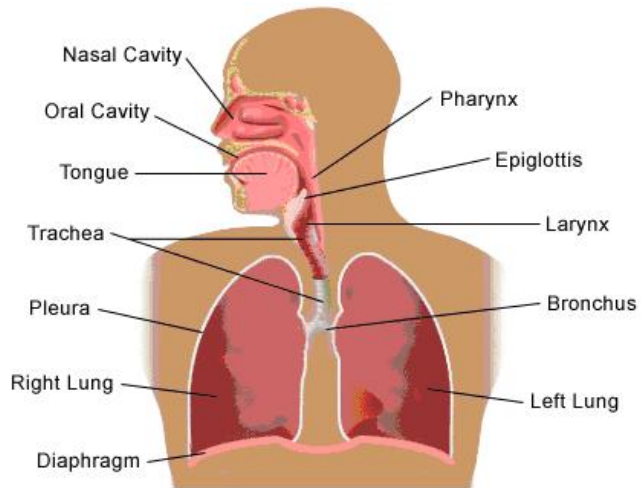
A. Nose

Two portions:-

- external nose
- internal nose(nasal cavity)

functions of the nose

- a. air passage
- b. filtration
- c. warming
- d. smelling
- e. chemical examination



Para nasal sinuses:-

contains air spaces, that open or drain into nasal cavity.

Types of sinuses

- a. frontal sinus
- b. maxillary sinuses
- c. ethmoid sinuses
- d. sphenoid sinuses

Sinusitis:-

Infection of the Para nasal sinuses.

## B. pharynx

functions of pharynx

- a. pathway for respiratory & digestive tracts
- b. change of the phonation

## C. Larynx( voice box)

Its triangular shape formed of cartilages.

Cartilages of the larynx

- a. Thyroid cartilage (Adams apple), it's the largest larynx cartilage
- b. Epiglottis, behind the tongue
- c. Cricoid, posterior wall of larynx

Functions of larynx

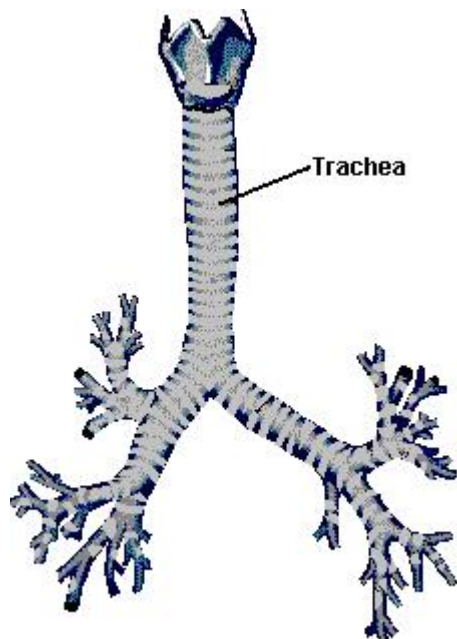
- a. Vital airway of the lungs
- b. Voice production
- c. Humidification & warming of the air

Lower respiratory tract:-

### A. Trachea:-

- tube like 11cm long
- diameter, 2.5cm
- extends from larynx to the primary bronchi

Function of trachea is air passage



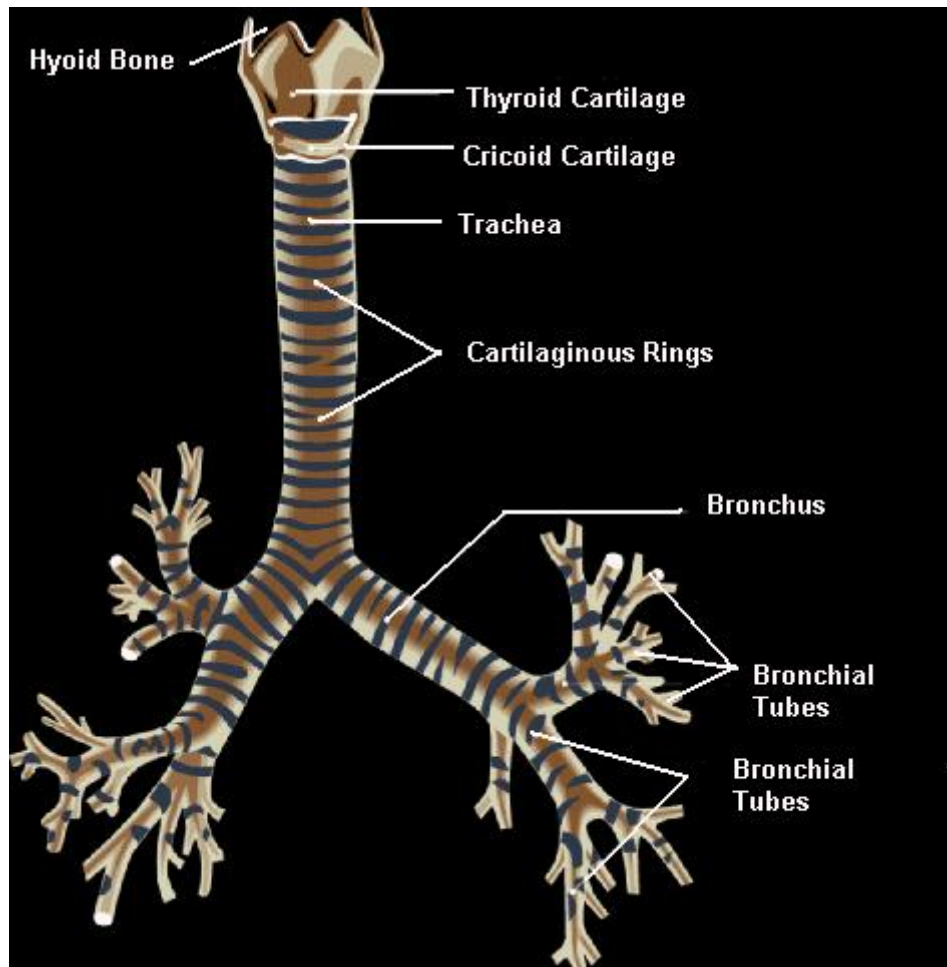
Bronchi:-

The trachea divides into two primary bronchi

RT bronchus:- larger  
-divides into three secondary bronchi

LT bronchus:- smaller  
- divides into two secondary bronchi

Notes:- bronchi divides to many bronchioles to be lastly small tube ended as alveoli

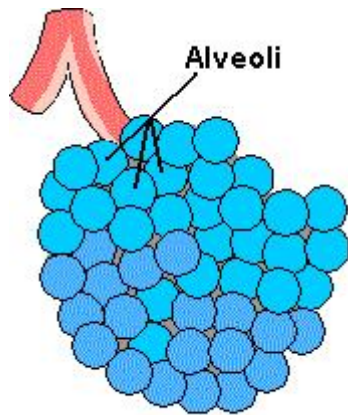


Alveoli:-  
These are the primary gas exchanges.

Functions of alveoli:  
Gas exchanges  
Distribution of the air  
Cleaning of the air  
Warming of the air

♣

♣



Lungs:-

Each lung has three surfaces

Costal surface:- direct contact with the chest wall♣

Medial surface:- the room of mediastinal structure♣

Inferior surface:- diaphragmatic♣

Rt lung:- is divided into three lobes, upper, middle & lower lobes.

Lt lung:- is divided into upper & lower lobes.

Functions of lungs:-

Gas exchange, getting O<sub>2</sub> and giving CO<sub>2</sub>

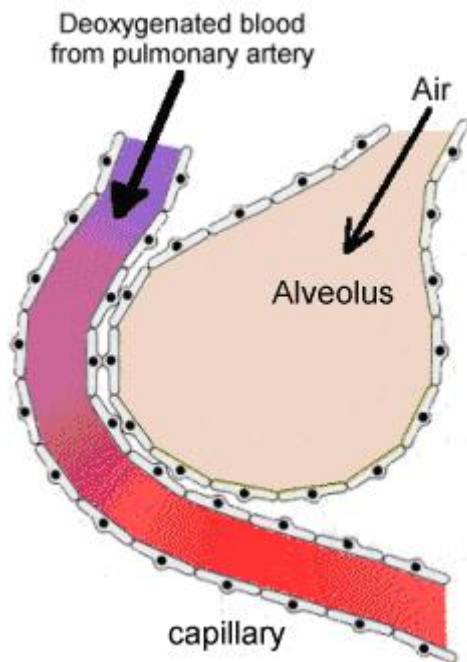
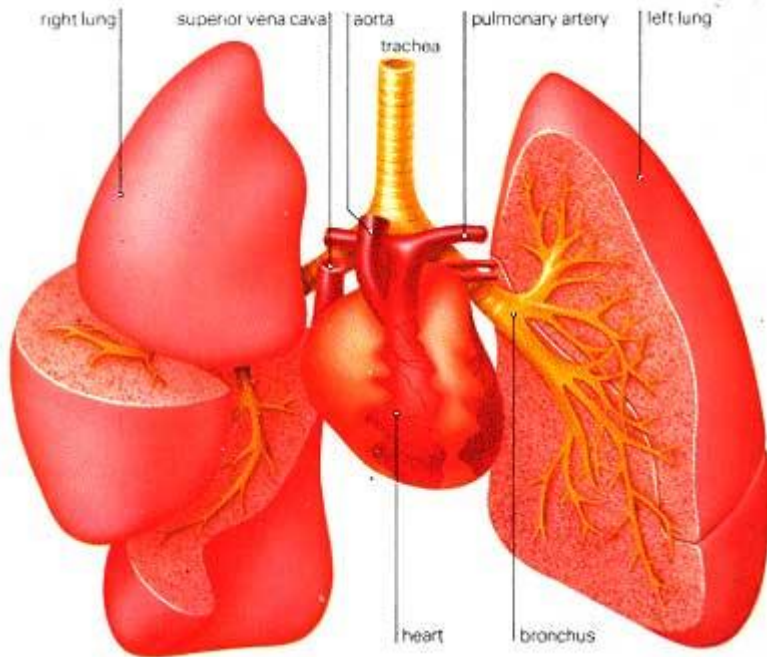
Thorax cavity:-

Chest cavity is lined by serious membrane called pleura.

The pleura:-

Parietal pleura♣

Visceral pleura♣



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## Chapter(6)

### Physiology of respiratory system

Physiology of the respiratory system  
Process of respiratory system

Breathing (pulmonary ventilation)♣  
Gas exchanges♣  
Gas transport by blood.♣

Breathing:- }  
Two phase  
a. inspiration  
b. expiration

a. Inspiration:-

During inspiration the air will rush from atmosphere to the lung according to the pressure gradient.

b. Expiration:-

During the expiration the air will rush out the chest cavity according to passive process

Gas exchange }

a. exchange of gases in the lung:-

occur between the alveolar air and the blood capillaries for oxygenation of the blood.

b. transportation of gases by blood

O<sub>2</sub> is carried in two forms:-

- dissolved O<sub>2</sub> in plasma, its only 0.3ml per 100ml of blood.
- Oxyhemoglobin, each each gram of heamoglobin can unite with 1.34ml of O<sub>2</sub>

CO<sub>2</sub> is carried by:-

- Dissolved CO<sub>2</sub> in the plasma = 10%
- Carbainine compound 20-25 with NH<sub>3</sub> (amine).
- Bicarbonate, more than 66% of CO<sub>2</sub> is carried by form HCO<sub>3</sub> and some of CO<sub>2</sub> by form H<sub>2</sub>CO<sub>3</sub>.

Regulation of brathing

Regulation centers:-

- Rhythmic center(in medulla oblongata)

a. Inspiration :-by inspiratory centre.

b. Expiration :- by expiratory centre.

- Apneustic centre( in the pons)

This centre stimulates the inspiratory centre in the medulla to increase the length and depth of inspiration.

- Pneumotaxic centre(in the pons)

This centre inhibits both apenustic and inspiratory centres, to prevent over inflation of the lung.

common problems &diseases in RS

Pneumonia

Inflammation in the lung

Sleep Apnea

Sleep Apnea is the intermittent absence of breathing during sleep

COPD

Chronic (continual, permanent, incurable)

Obstructive (blocks)

Pulmonary (pertaining to the lungs)



Disease (condition with signs and symptoms)

COPD or chronic obstructive pulmonary disease has no single definition.

Chronic bronchitis

Inflammation in the bronchus

occurs when the airways in your lungs have become narrow and partly clogged with mucus.

Emphysema

Emphysema is an enlargement and destruction of the alveoli (air sacs) in the lungs. This causes the surrounding airways to collapse.

Asthma

Asthma is a chronic lung condition characterized by: one or a combination of the following breathing problems: cough, wheeze, shortness of breath, or chest tightness.

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## Chapter(7)

### Anatomy of the digestive system

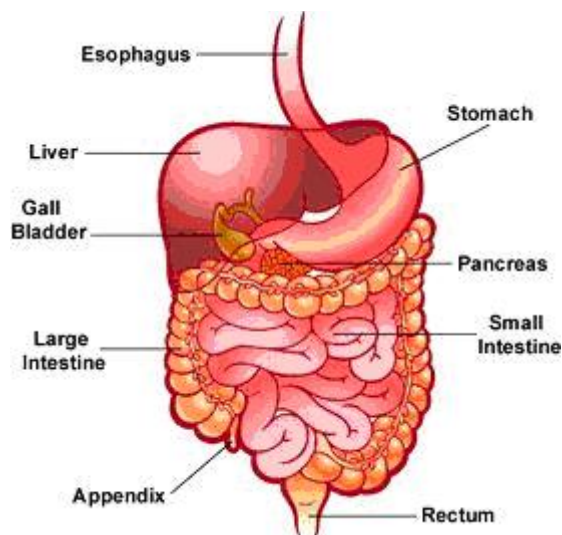
Anatomy of the digestive system

Structure:-

- GIT, Gastrointestinal tract
- Digestive glands

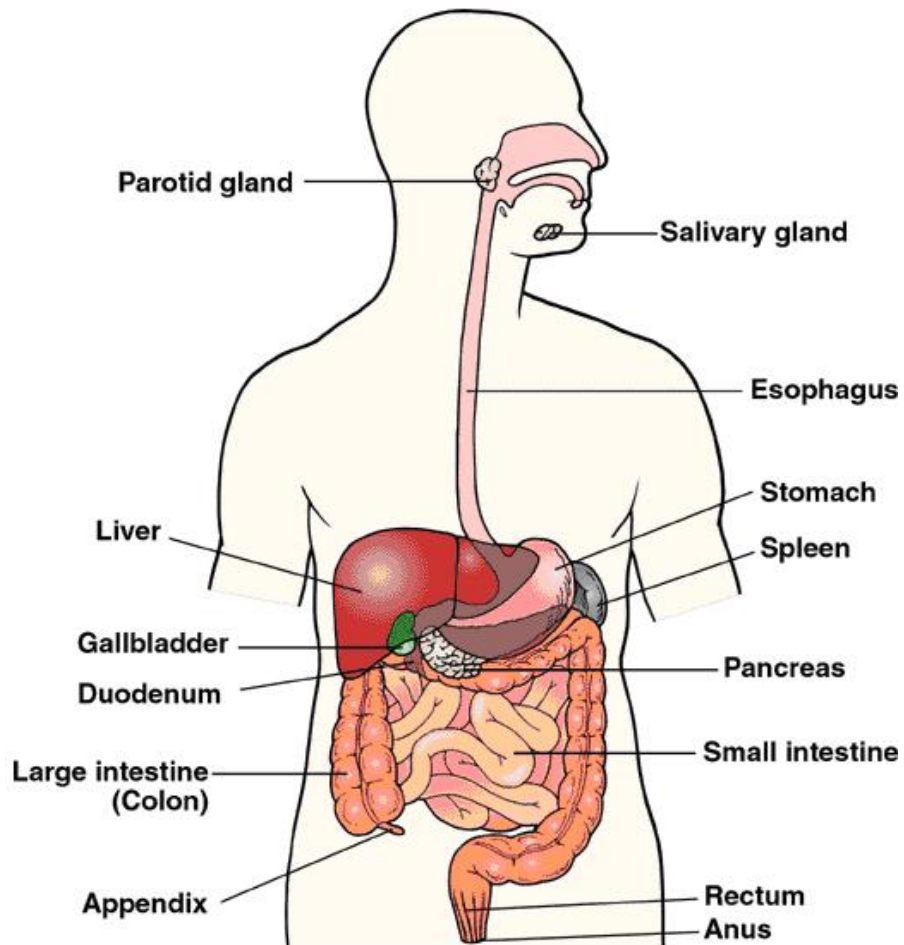
Digestive system is the system of:-

- Alteration of the physical and chemical composition of the food.
- Digestion
- Elimination through defecation



- GIT structure:-
- Mouth
  - Pharynx
  - Esophagus
  - Stomach
  - Small intestine
  - Large intestine

## Digestive System



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- 1) Mouth:-  
Structure of oral cavity
- Lips
  - Cheeks
  - Tongue
  - Palate

## Teeth

Teeth are organ of chewing

### Types of teeth

- Deciduous teeth:-
  - 20 teeth
  - Appears at age 6 months & completed at age 2 years
- Permanent teeth:-
  - 32 teeth
  - Appear at age 6 years

## 2) pharynx

- pathway for respiratory & digestive tracts
- change of the phonation

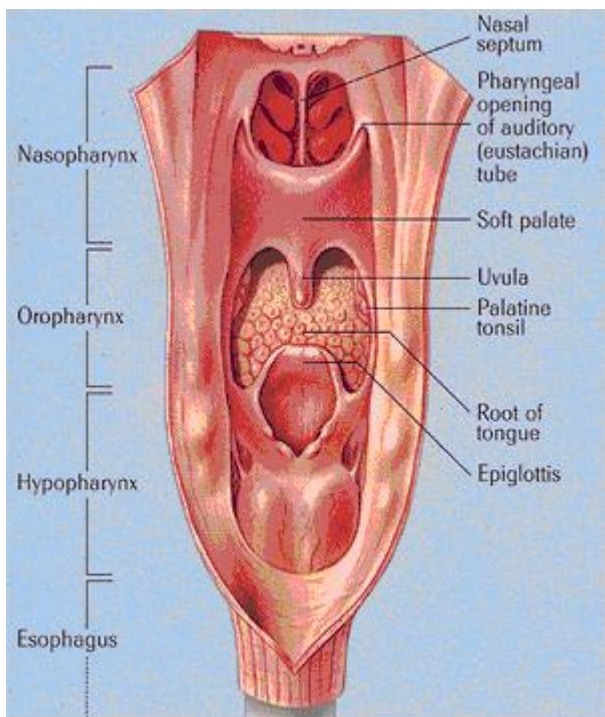


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## 3) esophagus

- 25 cm long
- Extends from the pharynx to the stomach
- Presents posterior to the trachea and the heart

## 4) Stomach

- Collapsible pouch
- Tube like
- Hold a volume 1-5 liter.
  - Position:- it lies in the epigastrium and left hypochondrium.
  - It has 3 parts:-
- Fundus

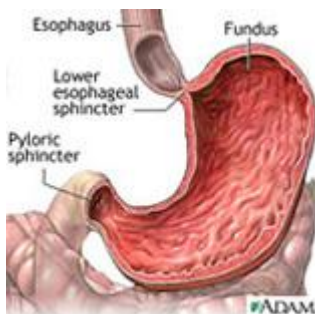
- Body
- Pylorus

#### Sphincters

- Lower esophageal
- Pyloric

#### Functions of stomach:-

- Reservoir for food till it can be partially digested
- Secretion of gastric juice enzymes & acid
- Secretes gastrin hormone, that regulating digestive function.
- Anti microbial function



#### 5) Small intestine

Its a tube 2.5cm wide and 6 meter long

Formed of 3 parts:-

- Duodenum
- Jejunum
- Ileum

#### Small intestine wall

- Mucosa
- Sub mucosa
- Muscular
- Serosa

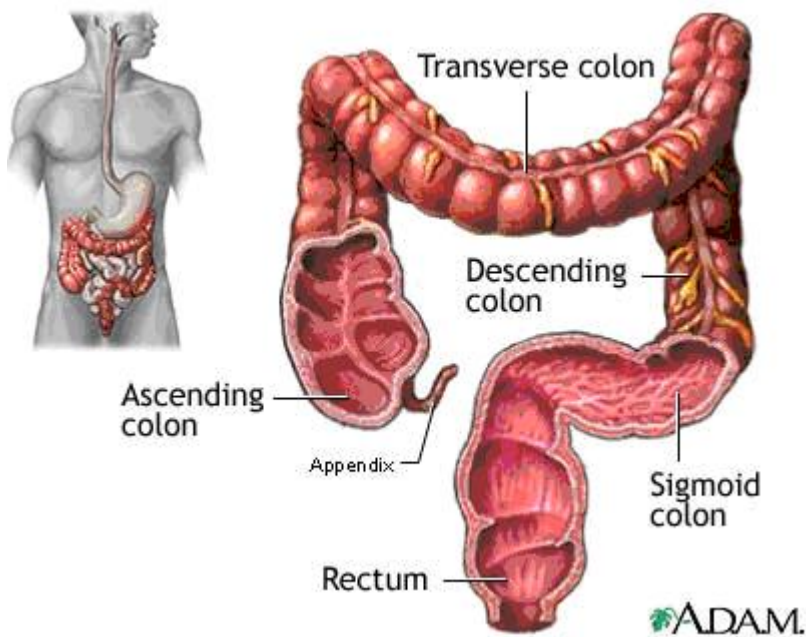


**Large intestine**

- It's a tube like 6cm wide and 1.5- 1.8 meter long

Formed of three parts

- Cecum, in the Rt iliac fossa
- Colon, 4 parts
  - Asceanding colon♣
  - Transverse colon♣
  - Descending colon♣
  - Sigmoid colon♣
- Rectum, the last part of the GIT



**Anal canal**

It's the last 2.5 cm of the rectum

Anus

The opening of the anal canal.

Hemorrhoid (pils)

Are the varicose of anal veins( of the anal canal)

Apendix

- Atube like 8-10 cm long
- Presents at the Rt iliac fossa
- Just behind the cecum

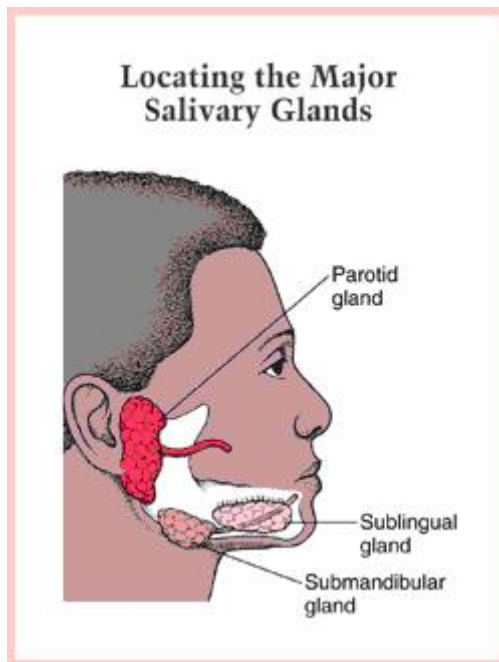
Fuction

- Defense mechanism
- Medium for intestinal bacterial growth

Digestive glands

1) Salivary glands

- Paroted:- between the skin and underlying masseter muscle below externalear.
- Submandibular:- located below the mandibular angle
- Sublingual



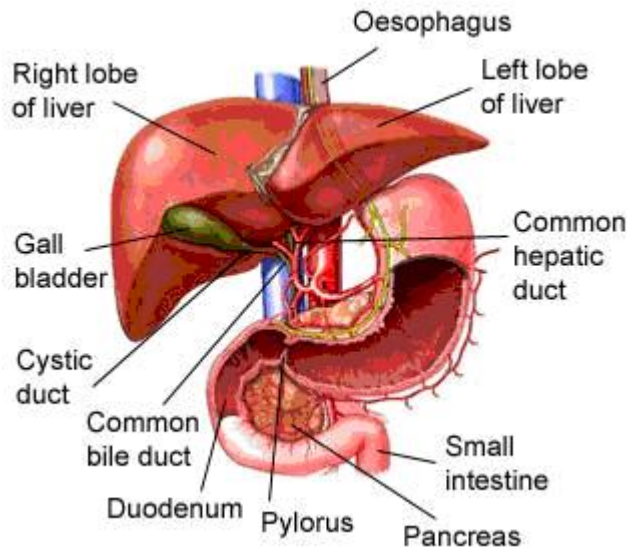
2) Liver:-

- Largest gland in the body
- Lies under the diaphragm

Functions of liver

- Detoxification of various substances e.g Alcohol

- Secretion of bile salts and bile pigments
- Secretion of plasma proteins
- Blood cell formation
- Storage of several substances e.g iron, vitamin A, B12 and D



#### Gall bladder

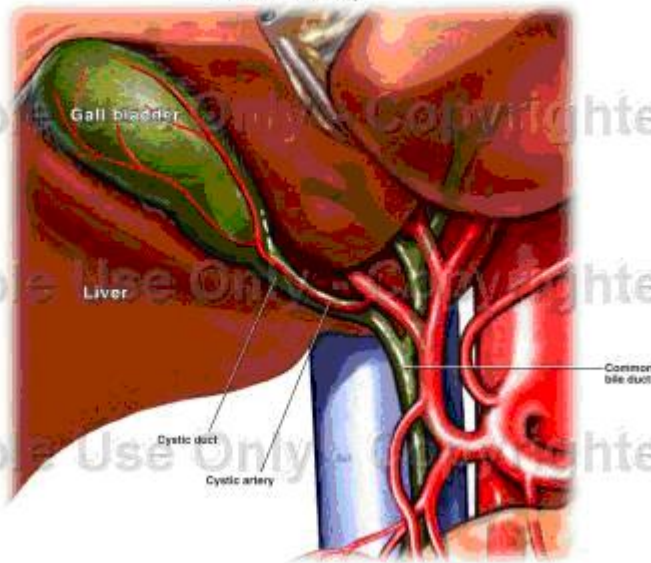
- Lies under the surface of liver
- 7-10 cm long
- Can hold 30- 50 ml of bile

#### Functions

- Storage of bile till the time of evacuation
- Concentration of bile

## Surgical Removal of the Gall Bladder with Damage to the Common Bile Duct

### Normal Anatomy



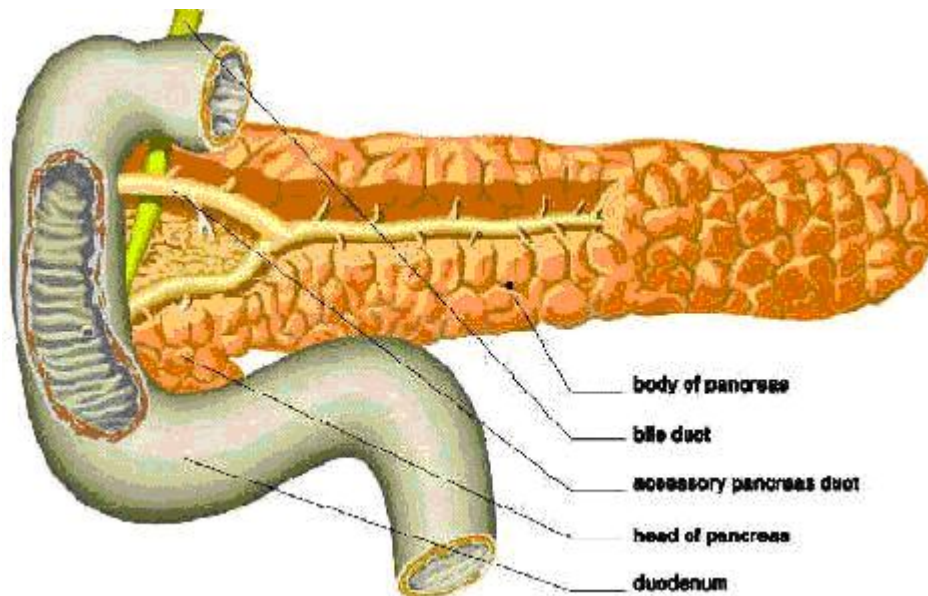
Enlargement of gall bladder, bile ducts and arteries

## Pancreas

### Parts of pancreas

- The head:- lies between the duodenum
- The body:- lies behind stomach
- The tail:- touch the spleen in the left side

Size:- 12-15cm long



### Structures of pancreas

Pancreas formed of two glandular tissue

- Exocrine gland:- represents the majority of pancreas,  
- the tissue is acinar



- Endocrine gland:-between the exocrine gland.
- pancreas islets ( alpha& beta cells)

functions of pancreas

- the acinar units:- secrete the digestive enzymes in the pancreatic juice
- beta cells:- secrete insulin (hypoglycemic hormone)
- alpha cells:- secrete glucagons( hyperglycemic hormone)

## **Chapter(8)**

### **Physiology of digestive system**

Physiology of digestive system

The primary function of digestive system is to make the essential nutrients available for every cell in the body .

Digestion

Includes tow process

- 1) Mechanical digestion
- 2) Chemical digestion

1) Mechanical digestion

Includes the mastication, mixing with digestive juice, till the elimination

A- Mastication

- Oral stage:- voluntary
  - tongue will press the bolus, pushing it backward to the oropharynx
- pharyngeal & esophageal stages:- involuntary
  - will push the bolus to the ---
  - stomach

During this stage three opening will be closed: -

- the mouth:- by the tongue
- the oropharynx:- by the soft palate
- larynx:- by the epiglottis

B- Motility:-

- Peristalsis:- wave like
  - step by step
  - contraction & relaxation
- Segmentation:-forward& backward
  - movements occur within a single region(segments)

## Regulation of motility

- a. Gastric motility
- b. Hormonal
- c. Nervous
- d. Intestinal motility

## 2) Chemical digestion

Means changes in food composition through the GIT

- Protein digestion:- by proteases (enzymes) that hydrolyze proteins  
- proteases are, pepsin(gastri)& trypsin(pancreatic)
- Fat digestion:- Emulsification, change fat to very small droplets  
- Pancreatic lipase--- fat digesting enzyme.

### Secretion:-

The digestive secretion includes the release of saliva, gastric, pancreatic, And intestinal juices.

### Absorption

The passage of ingested food, water, salts and vitamins through the intestinal mucosa to the blood.

### Vomiting

Expulsion of food through mouth.

### Defecation:-

Is the process of expulsion the waste product of food

### Constipation

Occurs when the lower colon content move slower than normal so the water will be absorbed

### Diarrhea

Occurs when the movements through the small intestine too quickly

### Epigastric pain

Pain in the stomach

### Peptic ulcer

Ulceration in the stomach

### Duodenum ulcer

Ulceration in the duodenum

### Hepatitis

Inflammation in the liver

### Cholecystitis

Inflammation in Gall bladder

### Appendicitis

Inflammation of appendix

## Chapter(9)

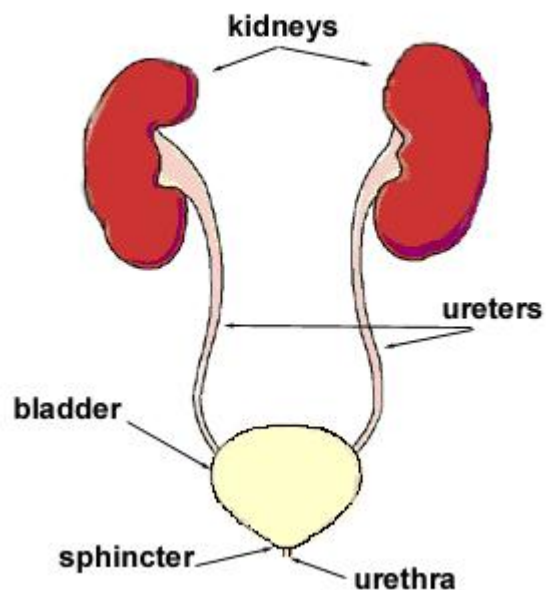
### Anatomy of urinary system

The urinary system

Structure:-

- 1) Kidney:- the principle organ of the urinary system
- 2) Ureters
- 3) Urinary bladder
- 4) Urethra

### Front View of Urinary Tract

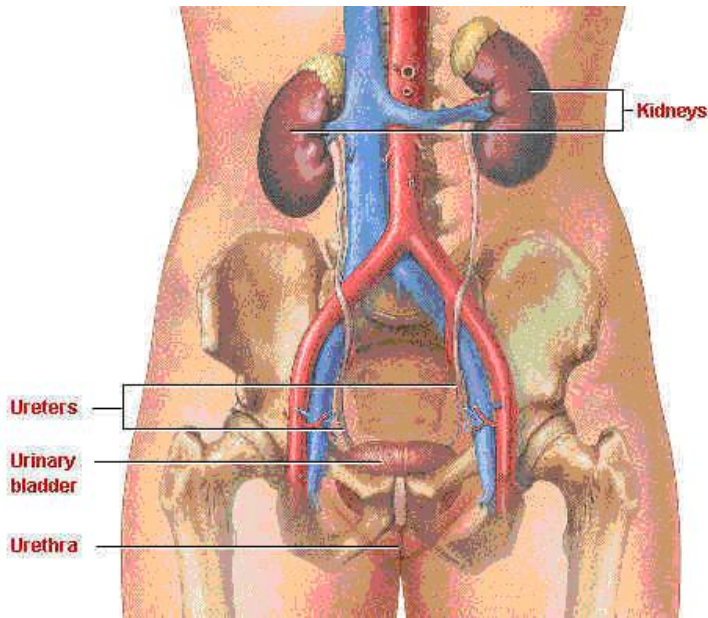


Kidney

Size:- 11 cm by 7 cm by 3 cm

Site:- along the sides of the vertebral column, extend from the level of T12 to the level of L3.

The right kidney:- is slightly lower because of the liver.



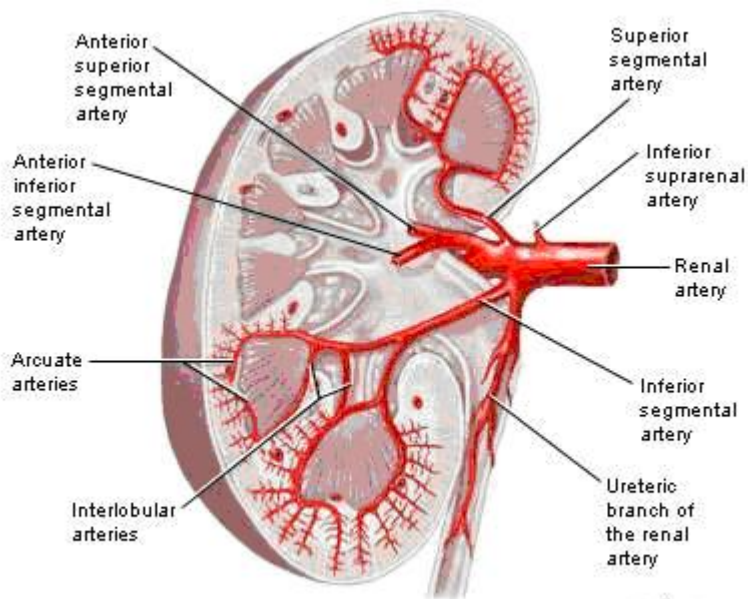
Kidney tissue:-

Each kidney is formed of:-

- a. Cortex:- the outer region
- b. Medulla:- the inner region

Renal blood vessels:-

- a. Renal artery
- b. Renal vein
- c. Interlobar arteries
- d. Interlobar vein



Ureter:-

- It's a tube about 25cm long
- Its formed 3 layers: -Mucosa
  - smooth muscle layer
  - Fibrous layer

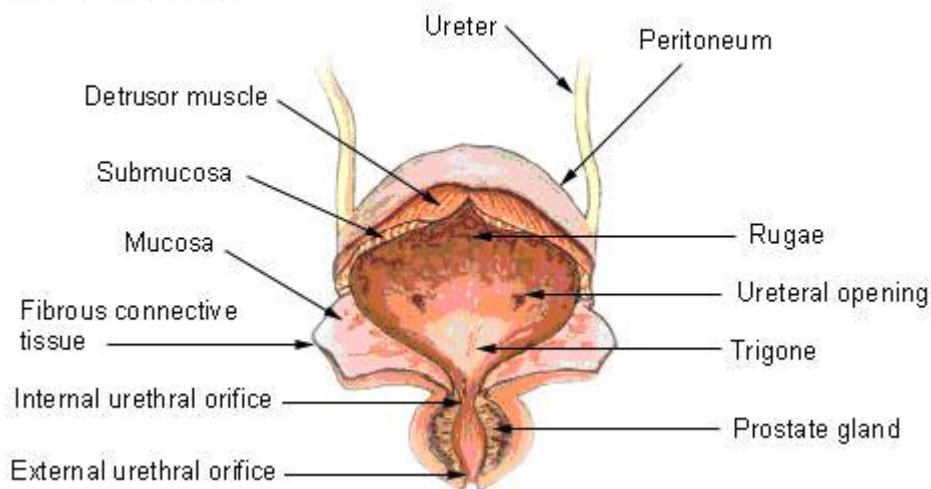
Urinary bladder:-

- It's a collapsible bage
- Present just behind the symphysis pubis
- Have 3 opening

Function

- Reservoir for urine, average volume is about 250cc
- Expels urine from the body.

### Urinary Bladder



Urethra:-

- Its a short tube
- Extends from trigone to the bladder exterior
- Its length in female is 3cm & in male 20 cm

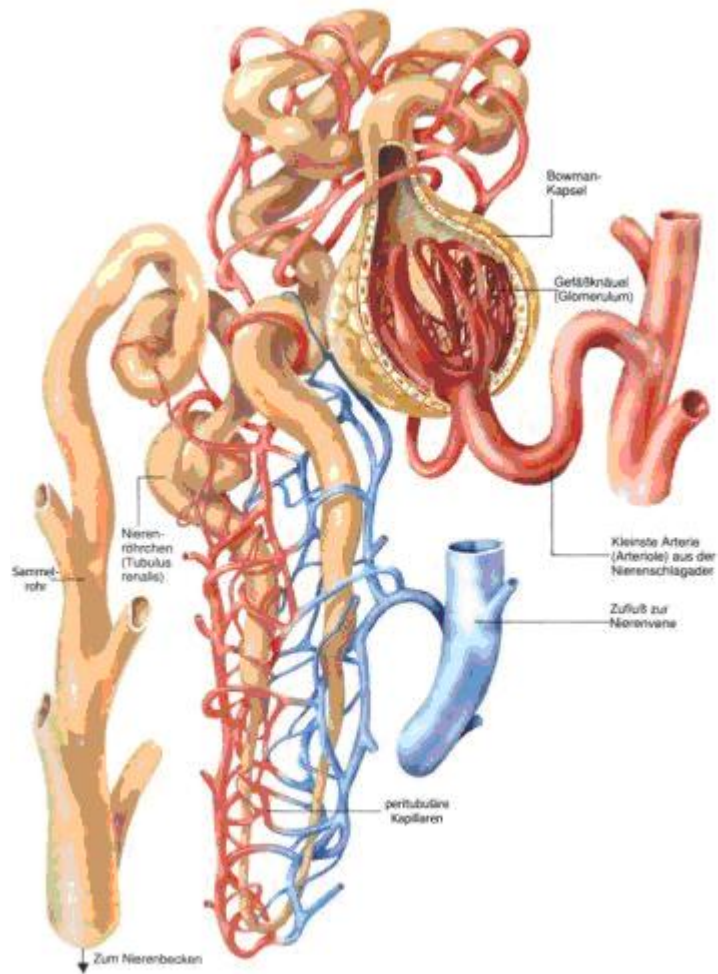
Micturation(voiding):- starts by

- Voluntary relaxation of the external sphincter of the bladder
- Bladder muscle contraction, internal sphincter relaxation.

Incontinence:- means involuntary urination

Nephron:-

Is the structural unit of the kidney, there are 1.25 million per kidney



## Chapter(10)

### Physiology of urinary system

Physiology of the urinary system

Functions of the kidney:-

- plasma homeostasis
- keeping fluid electrolyte and acid base
- influence the rate of secretion of antidiuretic hormone(ADH) and aldosterone.
- The synthesis of active form of vit D

Kidneys perform their function through 3 processes

- Filtration
- Reabsorption
- Tubular secretion

1) Filtration:-

- Is a physical process occurs in renal corpuscles.

- Water and small solutes filter out of blood into bowmans capsules.
- the only blood cells and most plasma proteins that don't move out.

## 2) Reabsorption:-

- Reabsorption of Na through active transport
- Glucose and aminoacid passively absorbed in accompanying with Na.
- Water, passage of Na and Cl from tubules to the blood will create osmotic pressure, drives water out the tubules to the blood
- Urea, will be reabsorped passively

## 3) Secretion:-

is the movement of substances out of blood into tubular fluid

## Urine composition:-

- Electrolytes e.g Na, K, CL
- Toxins, during disease, bacteria
- Pigments
- Hormones
- Urea, uric acid, creatinin, ammonia
- Abnormal conditions, blood, stones, glucose, albumin.

