# Pharmacology

## Al-Furat al-Awast Technical University

## Technical Institute of Babylon

## Department of Nursing technologies

**Second class**


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Ph.D. Pharmacology & Toxicology


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# References

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## Objective:-

General: the student must know.

1- Basic science of pharmacology.

2- The activity of drugs.

3-Absorption and excretion of drug.

4- Dose and dosage form.

5- Toxicology, toxins, poisoning with metals.

## Specific:

1- Routes of drug administration.
2- Effect of drug on the body.
3- Injection routes of drug administration.
4- Toxicity with drugs and metals.

# General definitions

1

قسم التمريض الدراسة
الصباحية و المسائية

The Liver and Its Functions. The liver is the largest solid organ in the body. It removes toxins from the body's blood supply, maintains healthy blood sugar levels, regulates blood clotting, and performs hundreds of other vital functions. It is located beneath the rib cage in the right upper abdomen.

The spleen is a small organ inside your left rib cage, just above the stomach. It's part of the lymphatic system (which is part of the immune system). The spleen stores and filters blood and makes white blood cells that protect you from infection.

**Pharmacology:** -It is science that deals with the action of drugs on the living body and it is study of the preparation, qualities, and uses of drugs.

**Pharmacy**:-It is a place for preparing and dispensing drugs.

**Pharmacist** :- It is a person whose job is preparing medicines according to a doctor's prescription

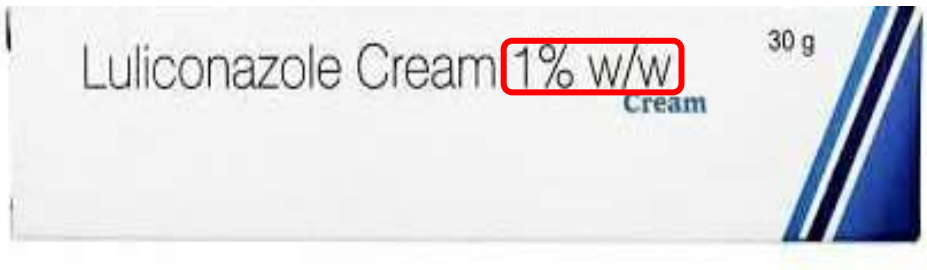
**Drug**:-It is any substance that affects living processes.

**Dose:** -It is amount of drug the required to produce the pharmacological action.

**Concentration**:- It is refers to the amount of a substance per defined space.

## Types of concentration

Weight /Weight (w/w)
Weight/Volume (w/v)
Volume /Volume (v/v)


**Toxicology**:-It is poisoning of therapeutic agents administered in excess and the substances having only a toxic action.

**Toxin**: -It is a poisonous substance, that is produced by living cells or organisms and is capable of causing disease when introduced into the body tissues.

**Therapeutics**:-It is the branch of medicine concerned with the treatment of disease.

## Types of doses

### 1- Therapeutic dose (Effective dose):-

Amount of drug that produces a therapeutic response or desired pharmacological effect.

**Therapeutic dose is divided into :-**

A-Minimum therapeutic dose :- It is a lowest therapeutic dose produce the desired pharmacological effect.

B-Maximum therapeutic dose :- It is a highest therapeutic dose produce the desired pharmacological effect.

**Example**

Minimum therapeutic dose of Amoxicillin = 125 mg

Maximum therapeutic dose of Amoxicillin = 500 mg


**2-Toxic dose :-**Minimal dose required to produce adverse effects.

**3-Lethal dose** :-

**the dose** of a **substance that results** in **the death** of **cells, ti ssues,** or **the organism.**

**Example:-**

Paracetamol

Therapeutic dose of **Paracetamol**
Minimum Therapeutic dose
125 mg , 250 mg

Maximum therapeutic dose of **Paracetamol**
1000 mg

Toxic dose of **Paracetamol=** 10000 mg
Lethal dose of **Paracetamol=** 140000 mg

**Side effects** are unwanted **(Mild)** symptoms caused by medical treatment.
Example nausea , vomiting , headache and diarrhea .

**Adverse effect** is an undesired **harmful** effect resulting from a medication .Example Hepatotoxicity , Renal failure , cytotoxic , Nephrotoxicity.

**Chapter one Questions**

**Q1:- Select the doses and concentrations in the table below.**

| Quantity | Answer |
|---|---|
| 5 ml | |
| 20 ml/100ml | |
| 30mg/ml | |
| 10 cc | |
| 0.5gm/100gm | |
| 30cc | |
| 0.001mg/ml | |

**Q2:- Which of the followin g medicines is a dose or concentration?**





**Q3:-Any of the medicinal effects below are side effects or adverse effects.**

| Drug effects | Type of effect |
| --- | --- |
| Itching | |
| Ototoxicity | |
| Heart failure | |
| Blindness | |
| Hairless | |
| Tooth pigmentation | |

# Pharmacological doses

2

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**Dose:** -It is amount of drug the required to produce the pharmacological action.

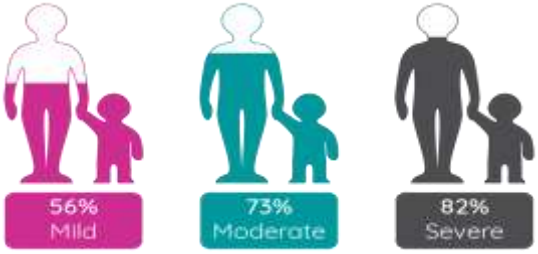
## Factors affecting the dose of drug

1- Age :- Children require smaller doses than adults. Example Child dose of Paracetamol = 125 mg and 250 mg , While adult dose of Paracetamol = 500 mg and 1000 mg.

2- **Sex:-** Female adults generally require smaller doses than males due to the presence of more body fat.

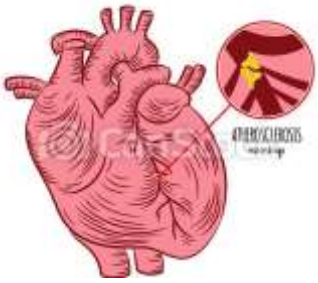
3- **Body weight** :-Increased body weight leads to increased dosage.

4- **Severity of disease**:- Sometimes the dose depends on the severity of the disease example :- Simple headache may be relieved by a single tablet of Paracetamol (250mg or 500mg) whereas severe headache (**Migraine**) may necessitate administration of (1000mg) of the same drug.



5- **Health and nutrition** :- Debilitated and anemic patients are, in general, more sensitive to the toxic effects of drugs and hence they are given smaller doses.


6- **Pathological state**:-In the case of chronic diseases, the dose should be monitored.



7- **Tolerance** :- reduced reaction to a *drug* following its repeated use.


8- **Give more than one drug at a time**.

9- Time and frequency of drug administration.

10- Route of administration of drugs.

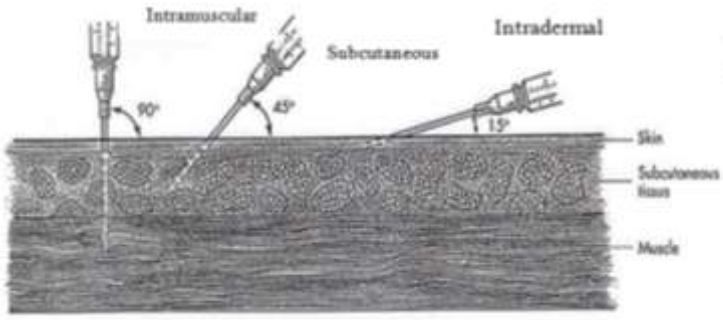
**Routes of administration of the drugs**

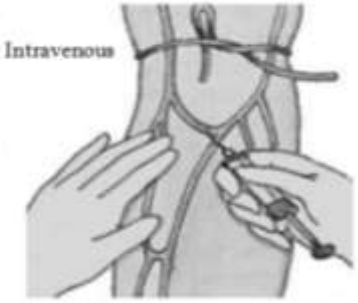
**1-Parenteral route**

a-Intravenous (IV) b-Intramuscular (IM)

c-Subcutaneous (SC)

d-Intradermal (ID) d-Intraperitonal (IP)

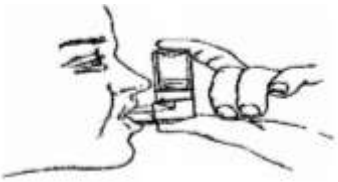



**2-Inhalation route**

a-Gases

b-Aerosol



**3-External routes**

**I-Topical application route (skin and eyes)**

a-Ointments b-Drops c-Cream d-Lotions e-Gel

**II-Rectal route**

a-Suppositories b-Enema

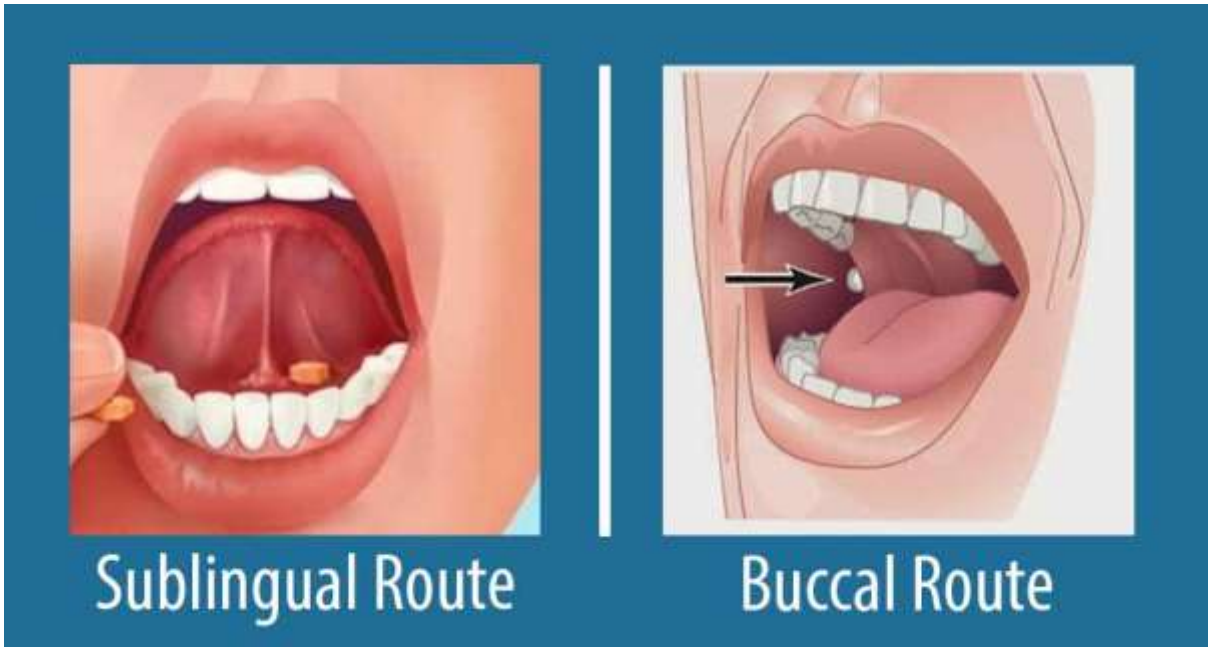
**III-Vaginal route**

**4-Oral route**

a-Powder b-Capsules c-Tablets

d-Syrup e-Pills

**5-Sublingual and Buccal route.**

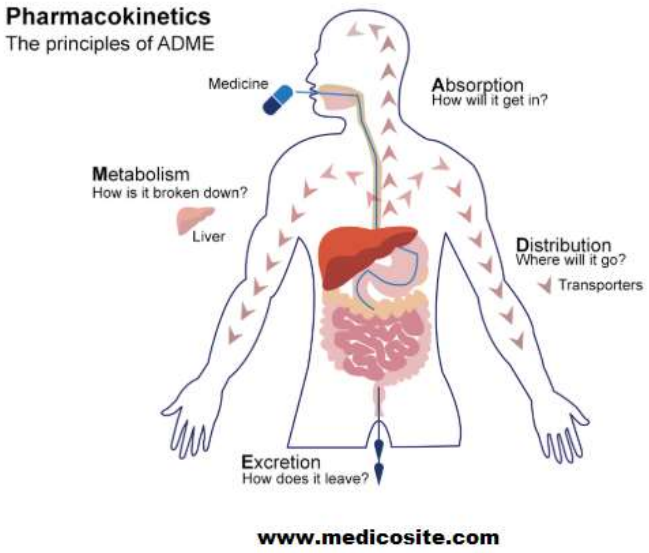



**Pharmacokinetic:-**It is the branch of pharmacology concerned with the action of Body on the drugs.

**Pharmacokinetic of drugs**

Include four steps:-

1-Absorption 2- Metabolism 3-Distribution 4- Elimination (Excretion)

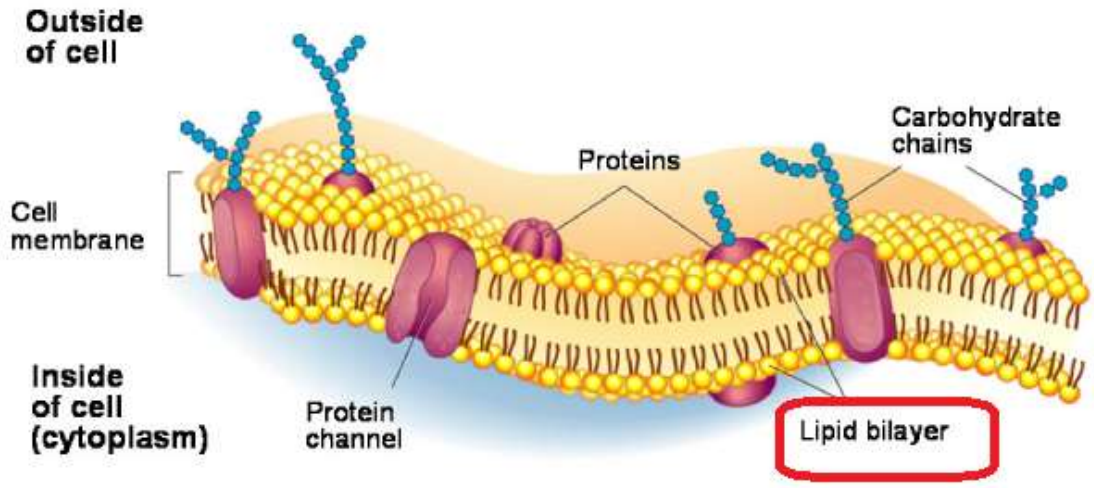


## Absorption of drug

**Absorption of drug**:-It is passage of drug from the site of administration into blood stream.

**Factors affecting the absorption of drugs**

1-Water soluble **(Polar)** of drug or lipid **(non-Polar)** soluble of drugs.




**Example:- Drug (A) are polar soluble drug , Drug (B) are non- Polar soluble drug.**

1- Which of the above drugs highly distribution in the blood? Why?

**Drug (B) Because of the ability of fat-soluble drugs to cross cellular membranes, and therefore their period of stay in the body will be for long periods.**

2- Which of the above drugs highly excretion from the body? Why?

**Drug (A):- Due to the inability of water-soluble drugs to spread rapidly across cell membranes and their high ability to dissolve in body fluids, thus their excretion will be rapid through the excretory organs.**

2-Concentration of dose. The higher the concentration of the drug, the greater the absorption of the drug.

3-Route of administration of drugs. Example Parenteral routes are high absorption than oral routes.

4-Physical properties of drugs. Cream drug are high absorption than ointment and lotion.

5-Chemical properties of drugs

A:- **Ionize Drugs and Unionize drugs. Ionized molecules are usually unable to penetrate lipid cell membranes because they are hydrophilic and poorly lipid soluble. Unionized molecules are usually lipid soluble and can diffuse across cell membranes**.

**Example:- Drug (A) are Ionize soluble drug ,Drug (B) are Un-ionize soluble drug.**

1- Which of the above drugs highly distribution in the blood? Why?

Drug (B) : Because **Unionized molecules are usually lipid soluble and can diffuse across cell membranes.**

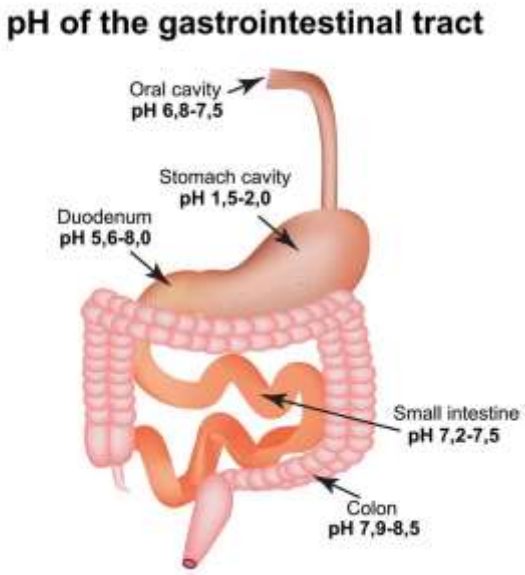
2- Which of the above drugs highly excretion from the body? Why?

Drug (A): **Ionized molecules are usually unable to penetrate lipid cell membranes because they are hydrophilic and poorly lipid soluble.**

**B:- Weakly acidic or base drugs**

Weakly acidic drugs (eg, aspirin) are more readily absorbed from an acid medium (stomach) than are weakly basic drugs (eg, quinidine). Weakly base drugs (eg, quinidine) are more readily absorbed from an base medium (intestine) than are weakly basic drugs (eg, Aspirin).

However, whether a drug is acidic or basic, most absorption occurs in the small intestine because the surface area is larger and membranes are more permeable.




**Example:- Drug (A) are weak acid ,Drug (B) are weak base.**

1- Which of the above drugs highly absorption in the stomach?

Drug (A) because weakly acidic drugs are more readily absorbed from an acid medium (stomach).

2- Which of the above drugs highly absorption from the intestine?

Drug (B) because weakly base drugs are more readily absorbed from an base medium (intestine).

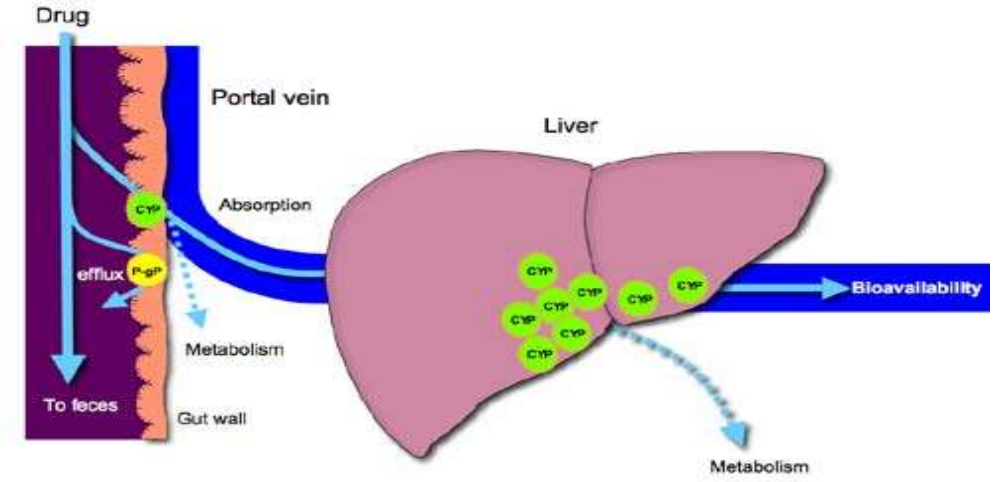
5-Amount of connective tissue and capillary in site of administration of drug.

## Metabolism of drugs

Drug metabolism:It is the process by which the body breaks down and converts medication into active chemical substances.

Most drug metabolism occurs in the:-

1- Liver 2-Gut wall 3-Lungs 4- Blood plasma.




## Distribution of drug

**Distribution of drug:** It is transport of drug molecules by blood stream to all body tissues or to target tissue.

**Factors affecting the distribution of drugs**

1-Protein binding: - the drugs physically binding by plasma proteins .

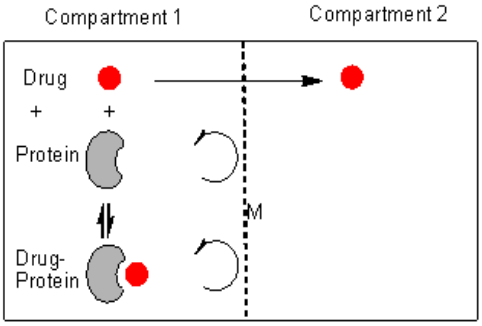
Important plasma protein which binding with drugs.

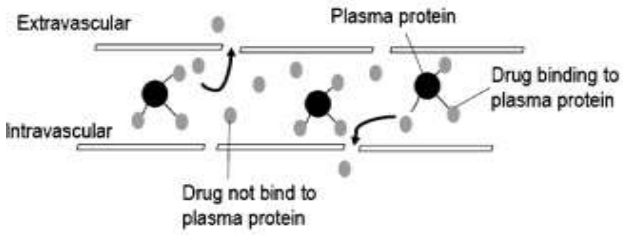
1-Albumin 2-Lipoprotein 3-$\alpha_1$-acid glycoprotein

**NOTE:** -When the drug enter to blood circulation divided into:-

a-Drug binding – (with protein) ----Ineffective.

b-Free drug – (Not binding with protein)-effective.




Example:- Drug (A) are binding with protein at a ratio 12% , Drug (B) are binding with protein 60%, Answer the following questions:-

1- Which drug is excreted from the body faster than the other?
2- Which of the drugs stays in the body faster than the other?

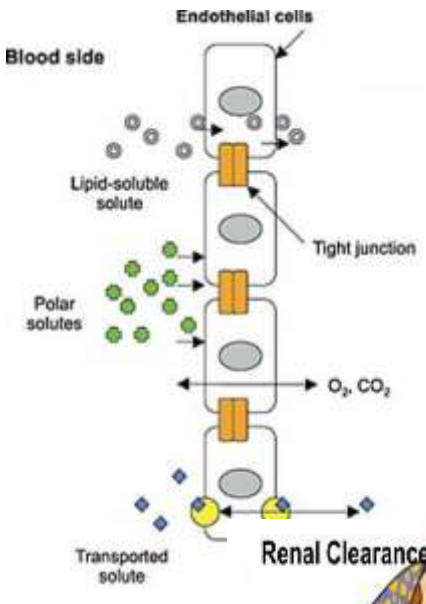
2-Accumulation and storage.

1-Some drugs accumulation in site of action example chlorpromazine.
2-Pb accumulation in bone.
3-Toxic materials –accumulation in the lipid tissues.

3-Dilulation of drugs

4-Present special barriers in the body example:-

**I**-Blood Brain Barrier
**II**-Placenta Barrier
**III**-Testis Barrier
**IV**-Cornea Barrier




## Elimination of drug (Excretion of drugs)

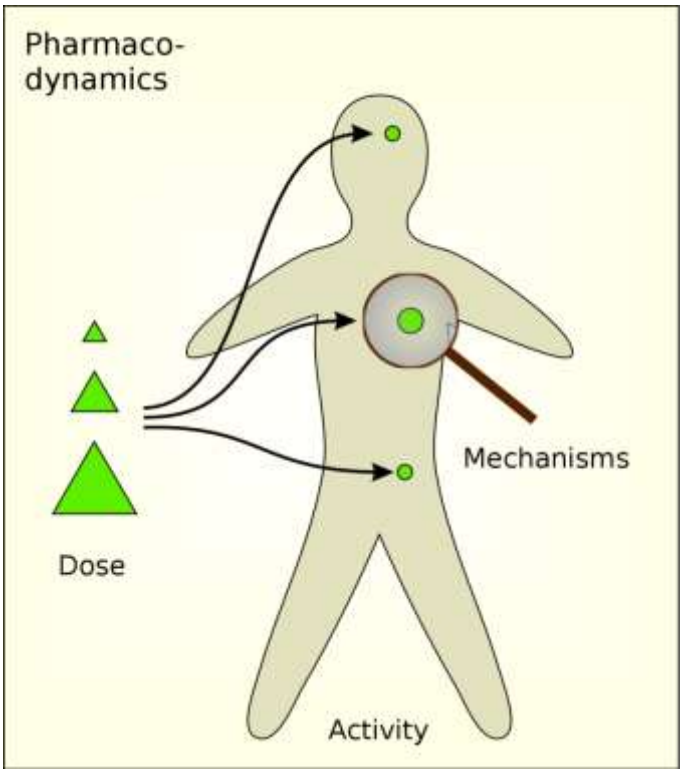
**Elimination of drug:** -It is exit the drugs molecules from body tissues to external environment.

**Routes of drug excretion**

- 
- Urine

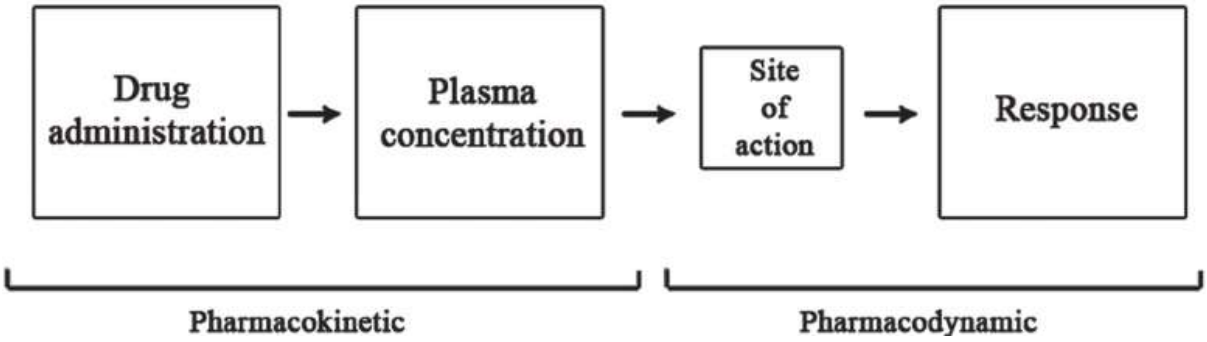
- Breath
- Saliva
- Perspiration
- Feces
- Milk
- Bile
- Hair

**Pharmacodynamics:-** is the branch of pharmacology concerned with the action of drugs on the body .




**Example :-**

Effect of Atenolol on the Heart -------lead to ------ decrease heart rate by blocking the Beta 1 (β1) receptors.




## Chapter Two Questions

Q1:- Drug (A) are binding with protein at a ratio 22% , Drug (B) are binding with protein 90%, Drug (C) are binding with protein 5%Answer the following questions:-

1- Which drug is excreted from the body faster than the other?
2- Which of the drugs stays in the body faster than the other?

**Example:- Drug (A) are water soluble drug , Drug (B) are lipid soluble drug.**

1- Which of the above drugs highly distribution in the blood?
2- Which of the above drugs highly excretion from the body?

Q2:- Put a check mark(✔) in front of the correct statement and a false mark(X) in front of the incorrect statement , **and correct the error, if any.** **Note :- Do not change the underlined phrases or Words.**

1- The age of the patient does **not** affect the amount of the administered dose.
2- It **is** recommended to take more than one medicine at one time.
3- Giving the drug intravenously is **faster** for the drug to spread in the body than the way the drug is given orally.
4- When drug molecules bind with protein (albumin), its excretion through the body is **faster**.
5- The most important organ for drug metabolism in the body is the **spleen**.

# Nonsteroidal Anti-inflammatory Drugs (NSAIDs)

**3**

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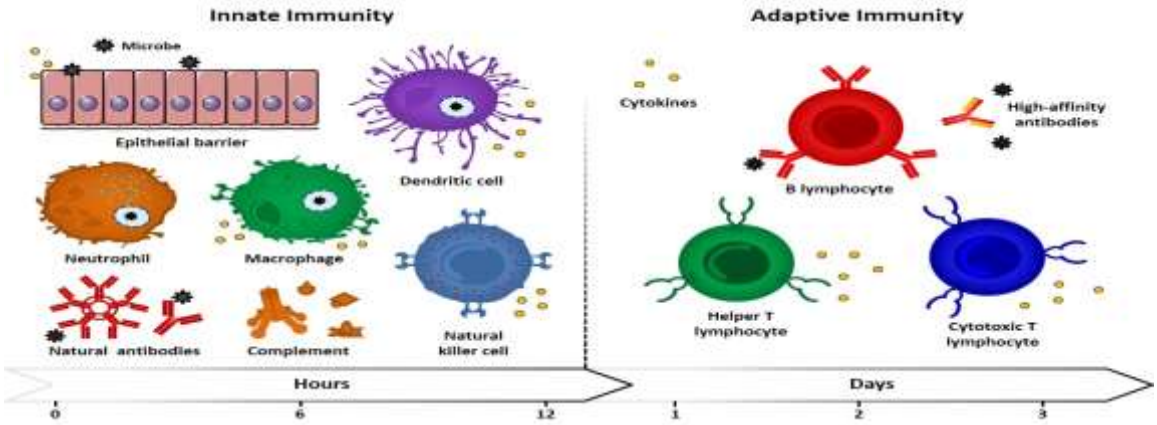
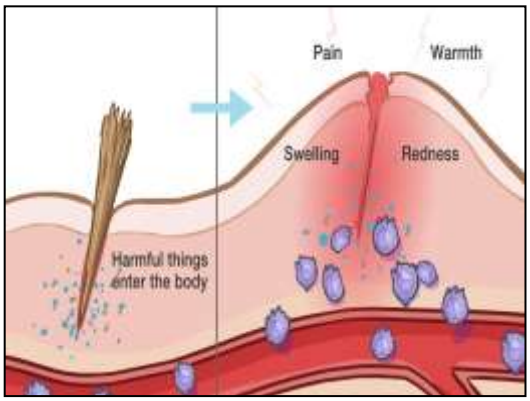
## Inflammation

**Inflammation:-**It is non-specific defense mechanism of the body against to all forms injury and lead to increase of white blood cells (Inflammatory cells).




## Signs of inflammation

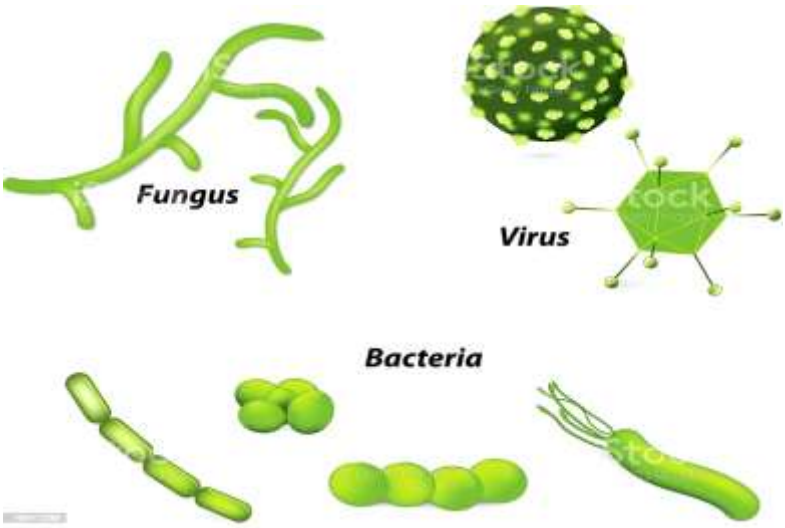
1-Swelling 2- Pain 3-Redness 4-Heat (Fever or Warmth)



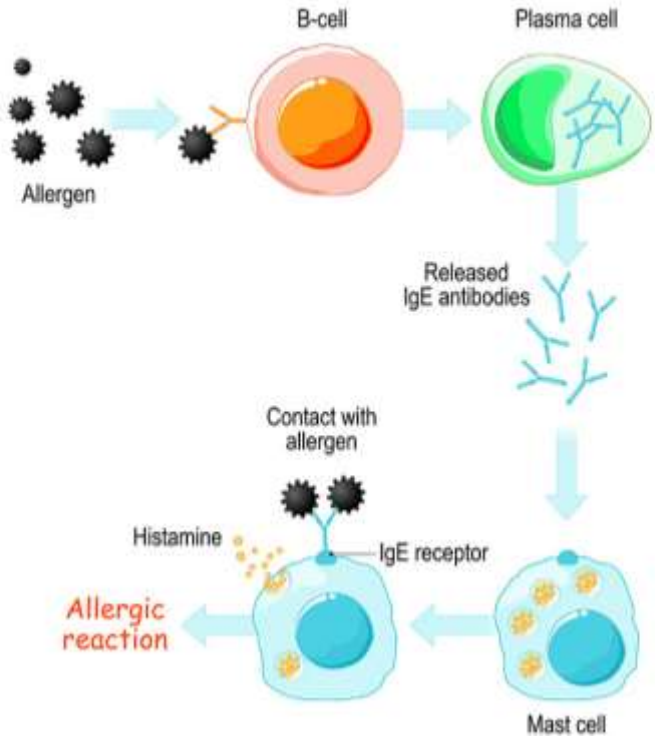

## Causes of inflammation

**1-Physicals causes**: -**a**-Trauma **b**-Heat or cold materials **c**-Radiation

**2-Chemical causes**: -**a**-Strong acid **b**-Strong base **c**-Organic materials
**3-Living microorganisms causes**: -**a**-Bacteria b-Viruses **c**-Fungus d-Parasites




**4-Immunological causes**: -**a**-Antigen-Antibody complex **b**-Cells mediator (Histamine , Leukotriene , Cytokines) مضاف للسنة القادمة , Interleukin and Prostaglandins).



## Treatment the inflammation

Pain Muscles pain , Joints pain, Bones pain , Fever , toothache etc.

Immunological reaction Respiratory system (Asthma) , Skin (Allergy) , synovial membrane (Arthritis)… etc.

Microbes infection (Bacterial ,Viral and Fungal infection)

Treatment

NSAIDs

Treatment

Corticosteroids

Treatment

Antibacterial , Antiviral and antifungal

**Nonsteroidal Anti-inflammatory Drugs (NSAIDs):**-They are a class of drugs that provide analgesic and antipyretic (fever-reducing) effects, and, in higher doses act as anti-inflammatory effects.

**Nonsteroidal Antiinflammatory Drugs (NSAIDs)**

1-Aspirin 2- Ibuprofen 3- Indomethacin
4- Celecoxib 5- Diclofenac 6- Mefenamic Acid
7-Paracetamol (Acetaminophen) 8- Meloxicam

9- Naproxen 10- Piroxicam

**Prostaglandins** are substances produced naturally by the body. They are derived from fatty acids, such as arachidonic acid.

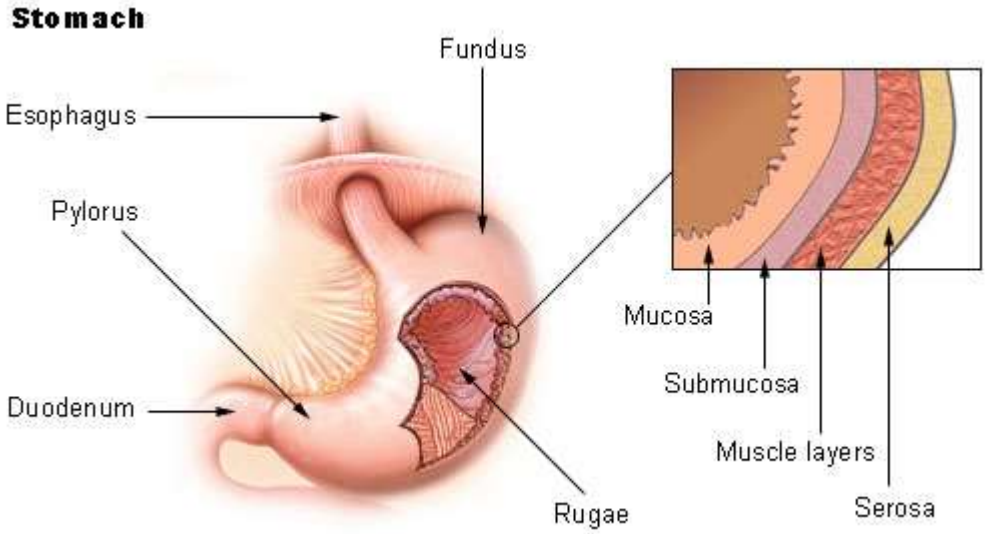
**Functions of Prostaglandins.**

1-It promote on the inflammation.

2- It promote on pain and fever.

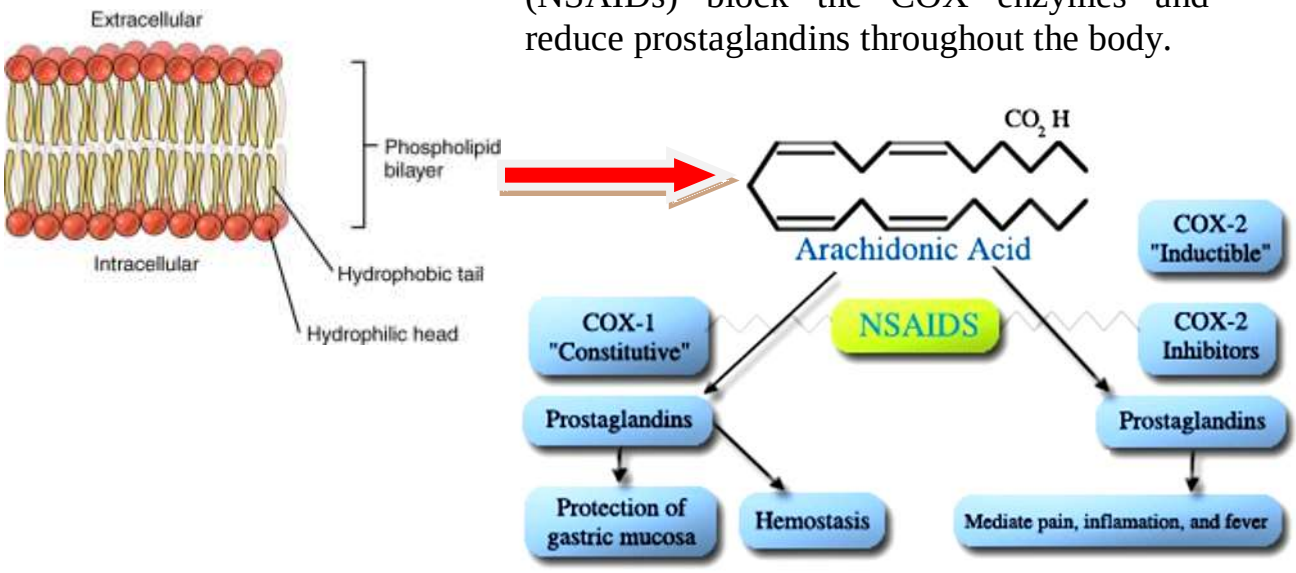
3-Support the blood clotting functions of platelets.

4-Protect the lining of the stomach from the damaging effects of acid.




**Mechanism of Action of NSAIDs**

Prostaglandins are produced within the body's cells by the enzyme cyclooxygenase (COX). There are two COX enzymes, COX-1 and COX-2. Both enzymes produce prostaglandins that promote inflammation, pain, and fever and gastric mucosa. Nonsteroidal anti-inflammatory drugs (NSAIDs) block the COX enzymes and reduce prostaglandins throughout the body.



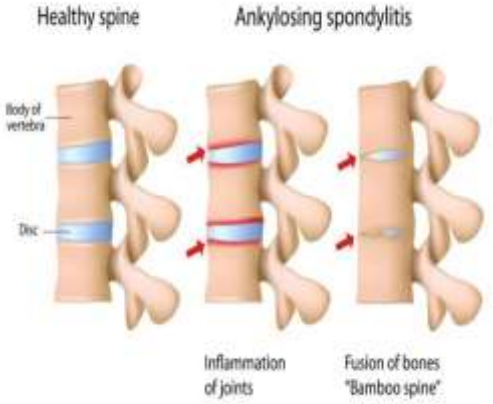

**Mechanism of action of NSAIDs (This fee is required).**

## Medical uses of NSAIDs

1-Rheumatoid arthritis


2-Osteoarthritis

3-Inflammatory arthropathies (e.g.ankylosing spondylitis, psoriatic arthritis , Reiter's syndrome).






4-Gout

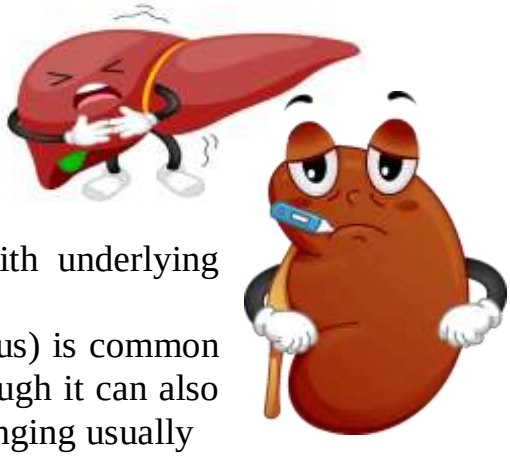
5-Dysmenorrhoea (menstrual pain) example Mefenamic Acid.
6-Metastatic bone pain 7-Headache and migraine
8-Postoperative pain
9-Mild-to-moderate pain due to inflammation and tissue injury.
10-Muscle stiffness and pain due to Parkinson's disease

11-Pyrexia (fever) 12-Renal colic 13-Antiplatelet aggregation example Aspirin.
12- Polycythemia (مضافة للسنة القادمة)

**Side effects of NSAIDs**

**1-Cardiovascular system** — Blood pressure may rise with use of NSAIDs.

**2-Gastrointestinal system** — Short-term use of NSAIDs can cause stomach upset (dyspepsia). Long-term use of NSAIDs, especially at high doses, can lead to peptic ulcer disease and bleeding from the stomach.



**3-Liver toxicity** — Long-term use of NSAIDs, especially at high doses, can rarely harm the liver.

**4-Kidney toxicity** — Use of NSAIDs, even for a short period of time, can harm the kidneys. This is especially true in people with underlying kidney disease.

**5-Ringing in the ears** — ringing in the ears (tinnitus) is common in people who take high doses of aspirin, although it can also occur in people who take other NSAIDs. The ringing usually resolves when the dose is decreased.

# Corticosteroids Drugs

4

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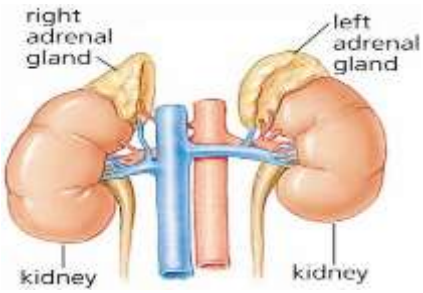
## Corticosteroids drugs

**Corticosteroids** are a class of chemicals that includes the steroid hormones that are produced in the adrenal cortex of vertebrates as well as the synthetic analogues of these hormones.

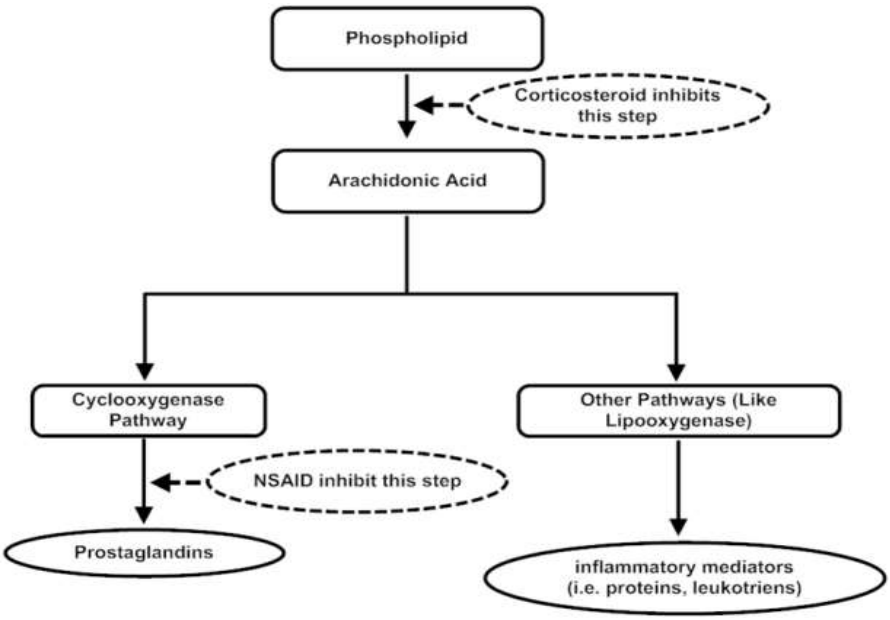



**Normal position of adrenal gland (This fee for information only).**

## Physiological functions of Corticosteroids

1-Stress response.
2-Immune response.
3-Regulation of inflammation.
4-Carbohydrate metabolism.
5-Protein catabolism.
6-Blood electrolyte levels.
7-Behavior.

**Mechanism of action of corticosteroids.**




**Mechanism of action of corticosteroids (This fee is required).**

## Classification of Corticosteroids drugs

### 1-short-acting glucocorticoids

Cortisone acetate
Hydrocortisone

### 2-Intermediate-acting glucocorticoids

Methylprednisolone
Prednisolone
Prednisone
Triamcinolone

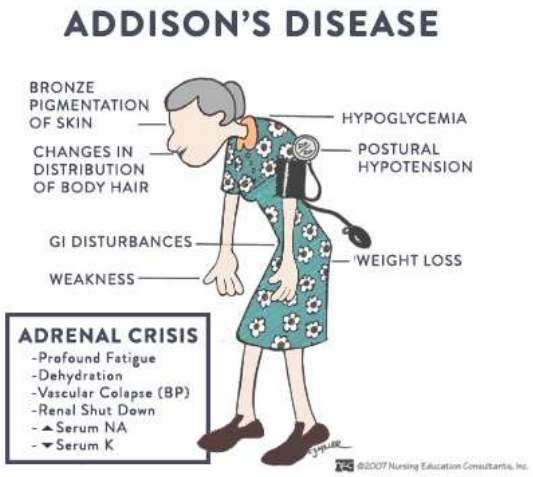
### 3-long-acting glucocorticoids

Betamethasone
Dexamethasone
Mineralocorticoid

## Corticosteroid medication or indication

Corticosteroid medications are used to treat:-

1-Rheumatoid arthritis
2-Lupus erythematosis
3-Asthma`
4-Allergies
5-Addison's disease, in which the adrenal glands don't produce enough steroids.
6-Help prevent organ rejection in transplant recipients.




## Routes of administration of corticosteroid drugs

**1-Orally route**

Tablets, capsules or syrups help treat the inflammation and pain associated with certain chronic conditions, such as rheumatoid arthritis and lupus.

Note: - Systemic corticosteroids refer to corticosteroids that are given orally or by injection and distribute throughout the body.

**2-Inhalation and intranasal spray route**. These forms help control inflammation associated with asthma and nasal allergies.

Inhalation and intranasal route of corticosteroid (This fee for information

**3-Injection route** . This form is used to treat such signs and symptoms as the pain and inflammation of tendinitis.

**Corticosteroids side effects**

1-Elevated pressure in the eyes (glaucoma).


2-Increased blood pressure.

3-Mood swings .

4-Immunosupression

4-When taking oral corticosteroids longer term may be result:-

I-Clouding of the lens in one or both eyes (cataracts)

II-High blood sugar, which can trigger or worsen diabetes

III-Increased risk of infections

IV-Thinning bones (osteoporosis) and fractures.

V-Suppressed adrenal gland hormone production.

VI-Thin skin, easy bruising and slower wound healing

5- Side effects of inhaled corticosteroids

I-Fungal infection in the mouth (oral thrush)

II-Hoarseness

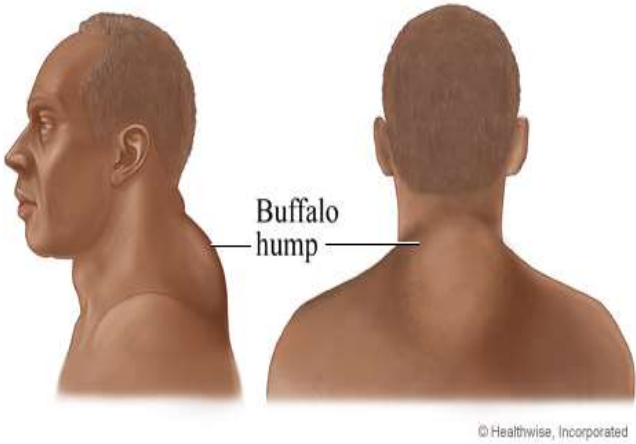

**6-Cushing's syndrome** describes the signs and symptoms associated with prolonged exposure to inappropriately high levels of the hormone cortisol. This can be caused by taking glucocorticoid drugs, or diseases that result in excess cortisol.

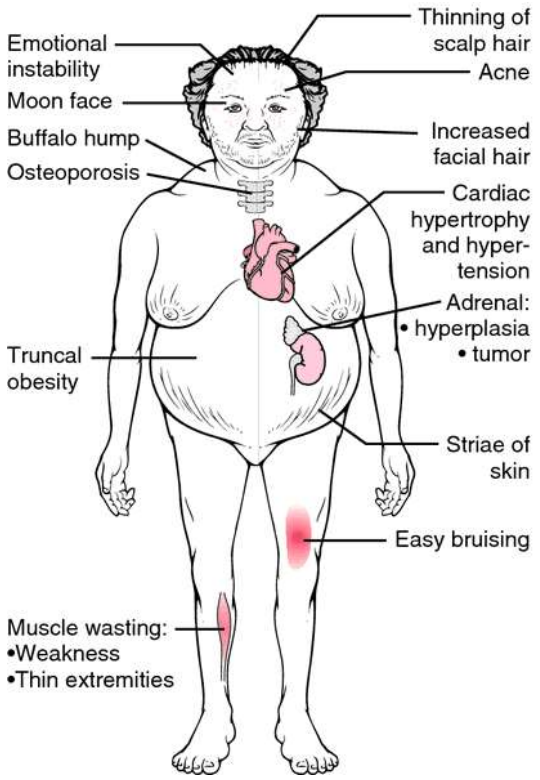
**Symptoms of Cushing's syndrome**

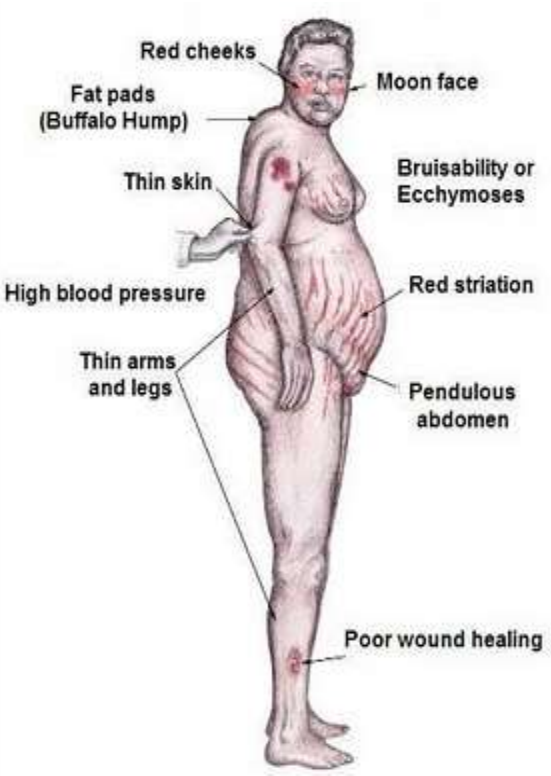
1- Weight gain around the abdomen, and obesity

2- Wasting of the limbs.

3- A 'buffalo' hump of fat high on the back.





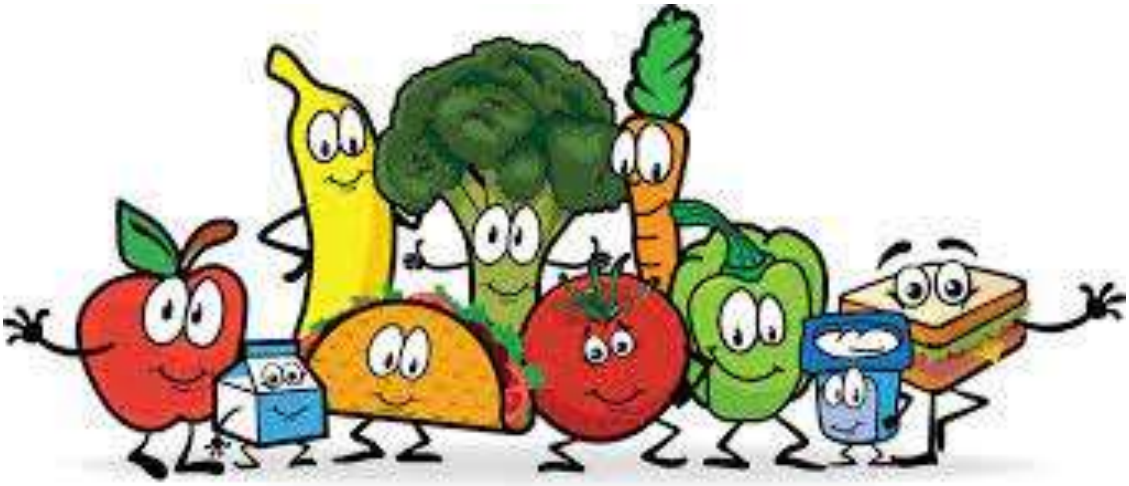




4- Moon face.
5- Weight gain.
6- Eye Problems steroids can sometimes cause cataracts or glaucoma.
7- Atherosclerosis
8- Elevated Blood Sugar.

# Nutrition

6

قسم التمريض الدراسة
الصباحية و المسائية



# Nutrition

**Include:-**

1-Vitamins
2-Parenteral nutrition
3-Electrolytes
4-Intravenous fluids

## 1-Vitamins

**Vitamins:**-They are an organic compound that is required in the diet in small amounts for the maintenance of normal metabolic processes.

**Vitamins functions**

1-Vitamins essential to immune system.
2-Vitamins essential to normal growth and development.
3-Vitamins essential to regulation the metabolic processes.
4-Vitamins essential to blood clotting.

## Vitamins are divided into:-

**1-Fat-soluble vitamins which include:-**

**1**-Vitamin A (**Retinol**)
**2**-Vitamin E (**Tocopherol**)
**3**-Vitamin D (**Calciferol**)
**4**-Vitamin K (**Phylloquinone**)

## Medical uses of Fat-soluble vitamins which include

### 1-Vitamin A (Retinol)

**Vitamin A (Retinol) benefits**

1-Promotes healthy bone growth
2-Vision
3-Reproduction
4-Cell division
5-Helps regulate the immune system.

### 2-Vitamin E (Tocopherol)

**Vitamin E (Tocopherol) benefits**

1-Antioxidants.
2-Inhance immune system function.

3-DNA repair.
4-Inhance the fertility.

## 3-Vitamin D (Calciferol)

**Vitamin D (Calciferol) benefits**

**1-** It is regulating cell growth**.**
**2-** It is maintaining a healthy immune system.
3-It is regulating the bone and teeth growth.

## 4-Vitamin K (Phylloquinone)

**Vitamin K (Phylloquinone) benefits**

**1-**It is help to blood coagulation.

## 2-Water-soluble vitamins which include:-

**1-**Thiamine (B1) **2-**Riboflavin (B2) **3-** Pyridoxine (B6)
**4-** Niacin (B3) **5-**Folic acid (B9) **6-**Pantothenic acid (B5)
**7-**Cyanocobalamin (B12) **8-**Biotin (B7) **9-**Cholin **10-** Inositol
**11-**Ascorbic acid (Vitamin C).

## Medical uses of Water-soluble vitamins

## 1-Thiamine (B1)

**Vitamin B1 (Thiamine) benefits**

1-It is helping supports the normal function of the nervous system , muscles and heart**.**
2-It is promotes normal growth and development.
3-It is helping regulate appetite.

## 2-Riboflavin (B2)

**Riboflavin (B2) benefits**

1- It is supports energy production, is necessary for red blood cells and antibody production, respiration and regulating human growth and reproduction.

2- It is essential for healthy skin, nails and hair growth, thyroid activity, healing of wounds and general good health.

## 3-Niacin (B3)

**Niacin (B3) benefits**

1- It is regulates circulation, hormone production, the digestive and nervous systems, promotes healthy skin.

## 4- Pyridoxine (B6)

### Pyridoxine (B6) benefits

1- It is necessary to balance the hormonal changes in women, assists in the growth of new cells and the functioning of the immune system,

2- It is used to red blood cell production.

3- Medically Vitamin B6 are used for nausea treatment (Especially in the pregnant).

## 5-Cyanocobalamin (B12)

### Cyanocobalamin (B12) benefits

1-The primary functions are to maintain a healthy nervous system.

2- To produce red blood cells.

## 6- Ascorbic acid (Vitamin C)

### Ascorbic acid (Vitamin C) benefits

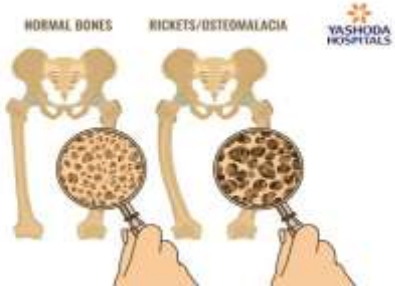
1-It is important in forming collagen that gives structure to bones, cartilage, muscle and blood vessels and in maintaining bones and teeth, and in the absorption of iron.

## Vitamins deficiency diseases.

1-Vitamin A deficiency it causes Night-blindness, Hyperkeratosis and Keratomalacia.

2-Vitamin D deficiency it causes Rickets and Osteomalacia

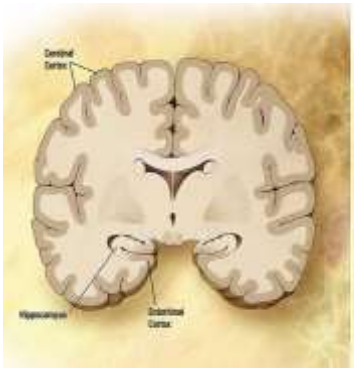


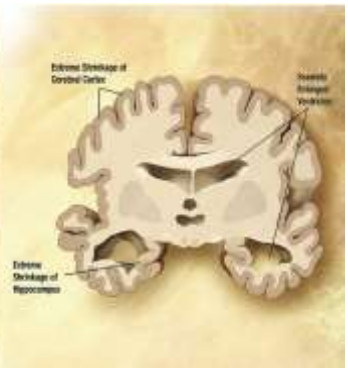


4- **Vitamin E Deficiency** causes Deficiency is very rare and mild hemolytic anemia in newborn infants and infertility in Males and females .

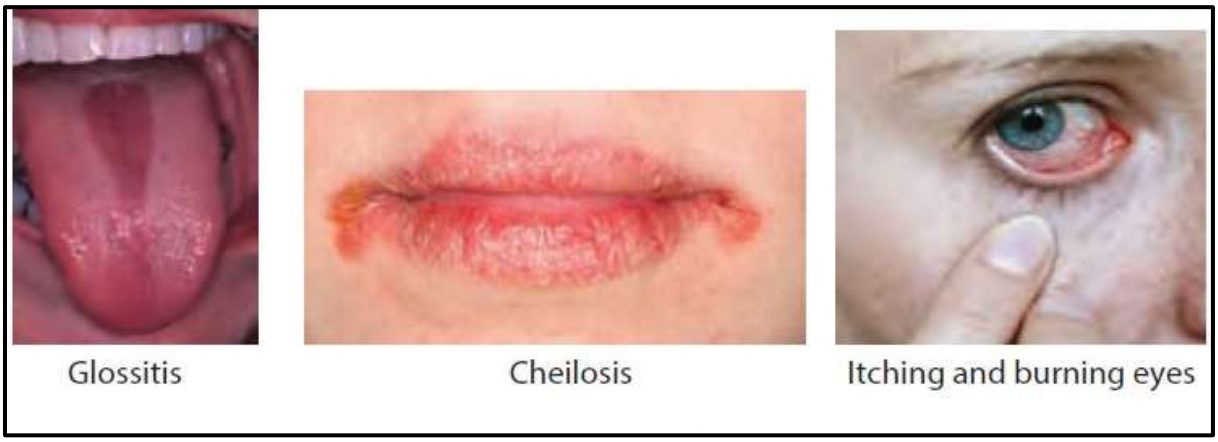
5- Vitamin K Deficiency it causes Bleeding diathesis.

**6-** Vitamin B1 Deficiency it causes Berberi and Wernicke-Korsakoff syndrome





**7-** Vitamin B2 Deficiency it causes Ariboflavinosis

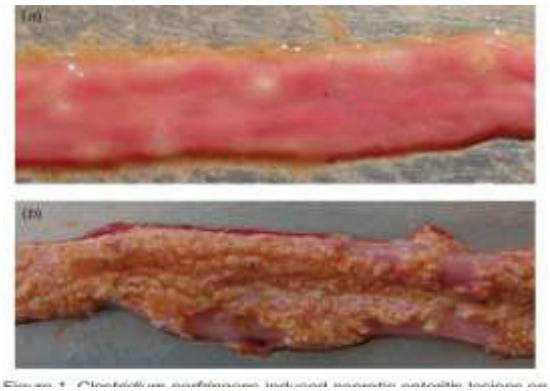


**7-**Vitamin B3 Deficiency it causes Pellagra.

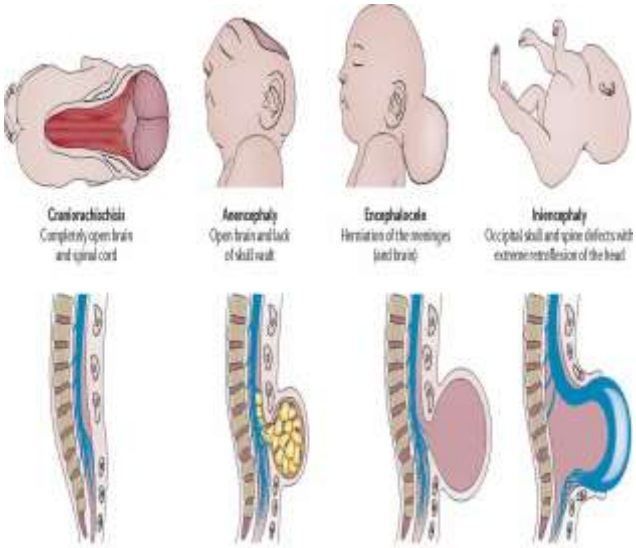

**8-**Vitamin B5 Deficiency it causes Paresthesia.

**9-**Vitamin B6 Deficiency it causes Anemia and peripheral neuropathy.

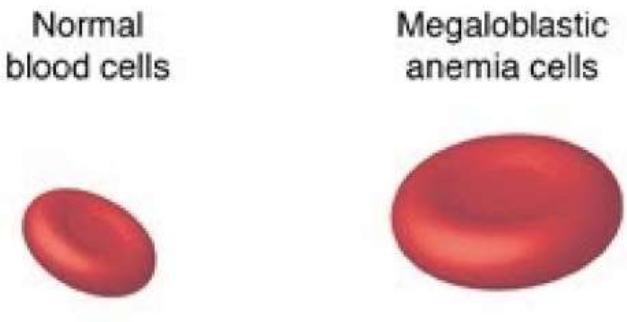
10-Vitamin B7 Deficiency it causes Dermatitis, enteritis.



**11-** Vitamin B9 (Folic acid) Deficiency it causes during pregnancy neural tube defects.




**12-** Vitamin B12 Deficiency it causes Megaloblastic anemia.




**13-** Vitamin C Deficiency it causes Scurvy disease

## 2-Electrolytes

**Electrolyte:** A substance that dissociates into ions in solution and acquires the capacity to conduct electricity.

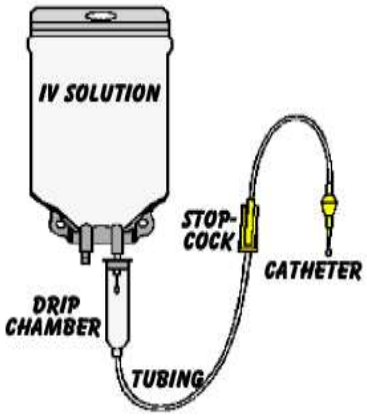
Include:- Sodium , Potassium , Calcium , Magnesium , Phosphate ,Copper , Chromium , Iodine , Manganese , Molybdenum , Selenium , Zinc.

**Oral Rehydration Salts (ORS) which composed from:-**

**1**-Sodium chloride 3.5 g/l
**2**-Potassium chloride 1.5 g/l
**3**-Sodium citrate 2.9g/l
**4**-Anhydrous glucose 20 g/l


## 3-Intravenous fluids

**Intravenous fluid: -** It is the giving of liquid substances directly into a vein.




Administer system **(This fee for information only).**

## Uses of intravenous therapy

**1-**Dehydration **2-**Electrolytic imbalance **3-**Blood transfusion **4-**In surgical operation

## Types of the intravenous fluid

1-Crystalloid solutions are aqueous solutions of mineral salts or other water –soluble molecules and include:-

## Types of crystalloid solutions

| S | Solution | Other Name |
|---|---|---|
| 1 | Dextrose 5%<br>in water | 5% Dextrose |
| 2 | 2/3Dextrose and<br>1/3 Saline | 3.3% Dextrose /<br>0.3% saline |
| 3 | Half-normal saline | 0.45% NaCl |
| 4 | Normal saline | 0.9% NaCl |
| 5 | Ringer's lactate | Lactated<br>Ringer |





- Lactated Ringer's is composed of sodium chloride 6 g/L, sodium lactate 3.1 g/L, potassium chloride 0.3 g/L, and calcium chloride 0.2 g/L.

2-Colloids solutions which contain larger insoluble molecules such as plasma and blood.



**Risks of intravenous therapy**

1-Infection in site of administration.
2-Phlebitis result from irritation of vein by I/V catheter.
3-Fluid overloads which causes hypertension or heart failure or pulmonary edema.

4-Electrolyte imbalance result from too dilute or too concentration solution.

5-Embolism result from blood clot or solid mass or air bubble.

6-Extravasation is the accidental administration of I/V infused medicinal drugs into the surrounding tissue.


Vein embolism

**(This fee for information only).**

Extravasation

**(This fee for information only).**

# Lipid lowering agents

7

قسم التمريض الدراسة
الصباحية و المسائية


**Cholesterol** is a waxy substance found in blood and it is **fat-like substance made in the liver**. Body needs cholesterol to build healthy cells, but high levels of cholesterol can increase risk of Cardiovascular disease.

**Triglycerides** are a type of fat (lipid) found in your blood. When eat, body converts any calories it doesn't need to use right away into triglycerides.

## Functions of Cholesterol

1- Cholesterol is an essential lipid constituent of cell membranes.

2- Cholesterol is a precursor of steroid hormones and of bile acids.

3- Cholesterol is an essential to vitamin D synthesis.

## Cholesterol Transport


1-HDL (High Density Lipoprotein)

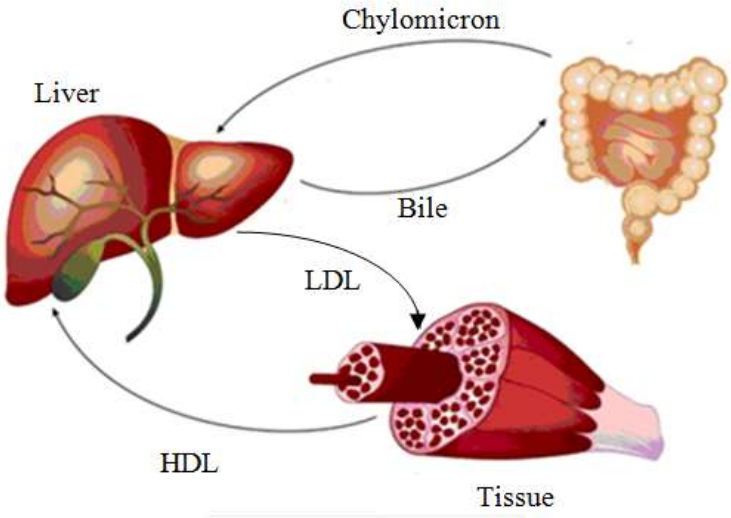
(Good) It brings back cholesterol to the liver.

2-LDL (Bad) (Low Density Lipoprotein)

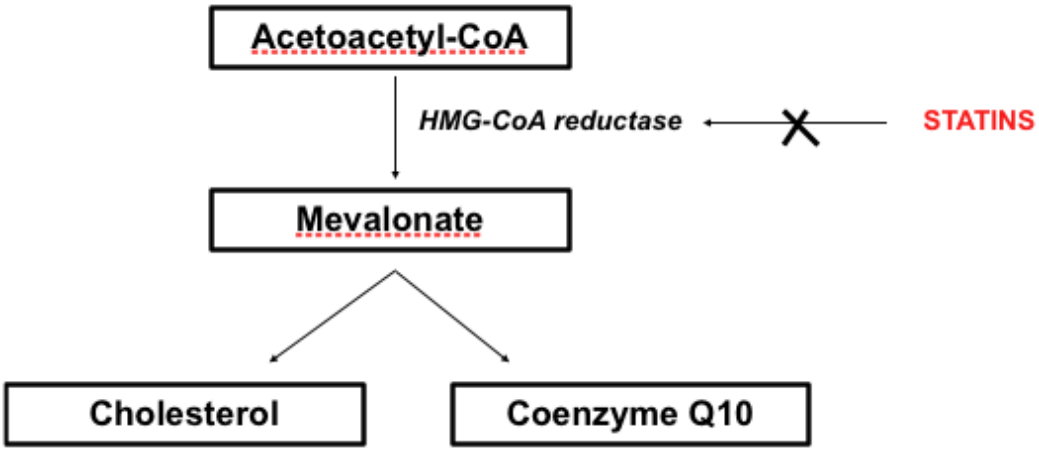
Its over-accumulation and deposition lead to serious ailments.

3-VLDL (Very Low Density Lipoprotein)

Converted into LDL by endothelial cell-associated lipases.




**Cholesterol transport (This fee for information only).**




## Mechanism of action of Lipid lowering agent (This fee is required).

**Lipid profile** or **lipid panel** is a panel of blood tests used to find abnormalities in lipids, such as cholesterol and triglycerides.

Normal value (mg/dl) of :-

| Element | Optimal | Borderline | High risk |
|---|---|---|---|
| LDL C | <100 | 130–159 | 160+ |
| HDL C | >60 | 35–45 | <35 |
| Triglycerides | <150 | 150–199 | >200 |
| Total Choles. | <200 | 200–239 | >240 |

## Lipid lowering agents

| | | |
|---|---|---|
| Atorva**statin** | Simva**statin** | Rosuva**statin** |
| Fluva**statin** | Lova**statin** | Prava**statin** |

## Medical uses of Lipid lowering agent

**Lipid lowering agent** are usually used to lower blood cholesterol levels and reduce risk for illnesses related to atherosclerosis.

## Side effects of Lipid lowering agent

1. Headache
2. Dizziness
3. Gastric problems
4. Low platelet count
5. Nausea and vomiting
6. Muscle pain: Skeletal muscle toxicity such as rhabdomyolysis.
7. Sleep problems

# Cardiovascular system Drugs

# 9

قسم التمريض الدراسة الصباحية و المسائية

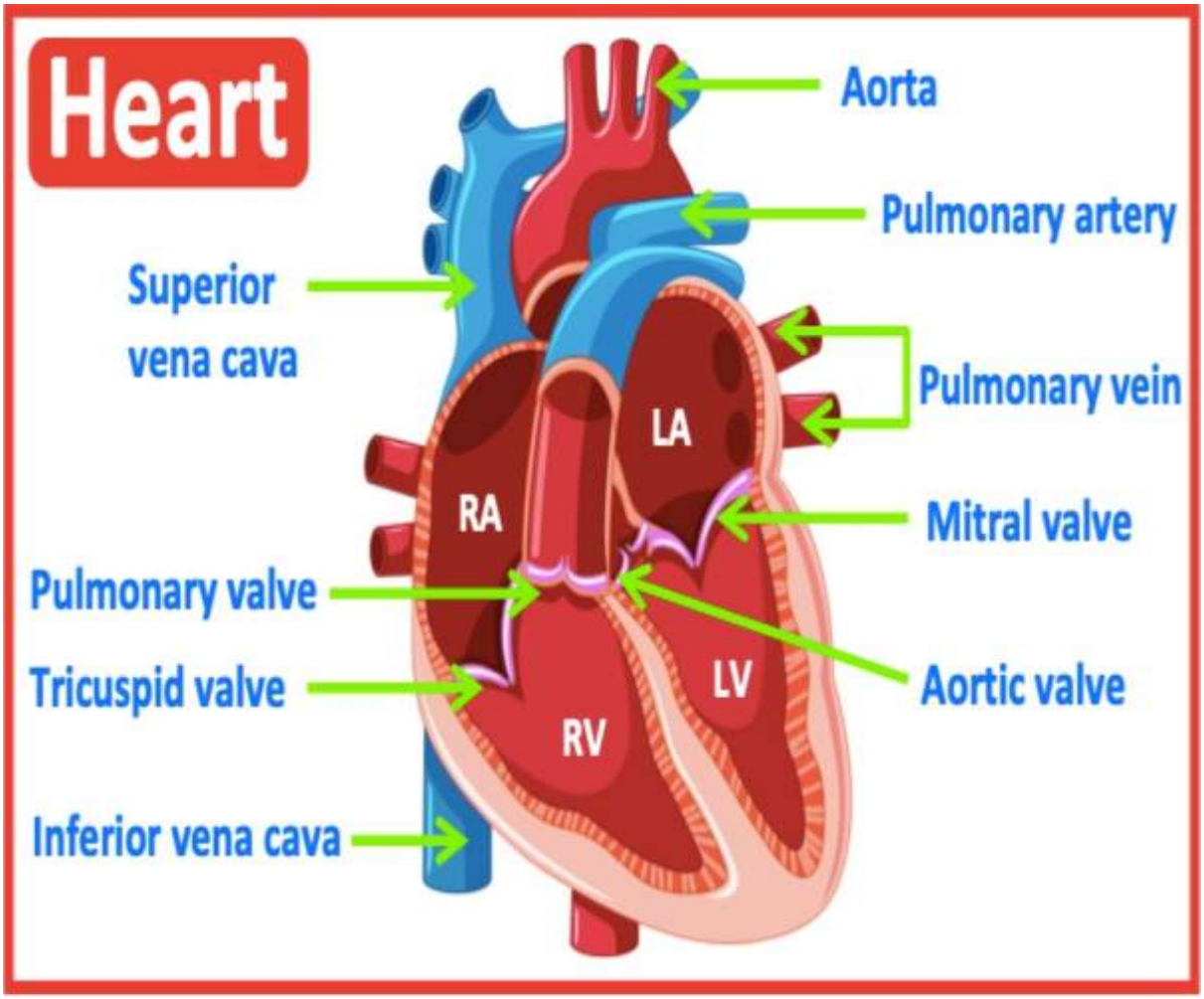
# Cardiovascular Diseases (CVS)

**Cardiovascular diseases**

1-Heart failure
2-Cardiac infarction
3-Cardiac arrhythmic
4- Heart Infection (Endocarditis , Pericarditis and Myocarditis )
5-Atherosclerosis
6-Angina

**Cardiovascular diseases drugs**

1-Diuretics drugs
2- Digitalis and cardiac glycosides drugs
3- β-adrenoreceptors blocking drugs
4-Antiarrythmic drugs
5- Vasodilators drugs
6- Antihypertensive drugs
7- Sympathomimetic drugs
8- Sclerosing agents



# 1-Diureitics

**Diuretics**:-It is any substance which increases urine flow or outflow.

## Uses of diuretics drugs or indication of diuretics drugs

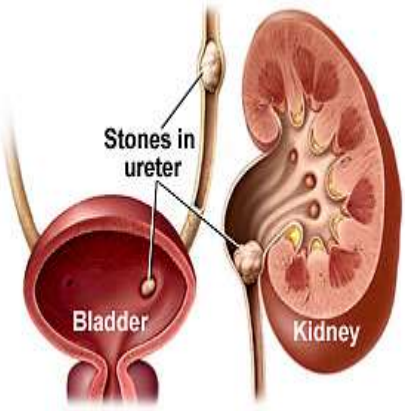
1-Oedema states example:-

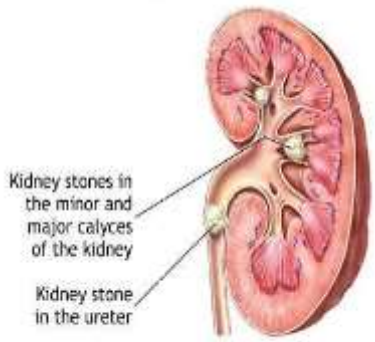
a-Congestive heart failure oedema (edema). b-Acute pulmonary oedema .

2-Hypertension:-by excretion the salts.

3-Renal stone:-to expulsion the stone to outside.

4-Nephrogenic diabetes.




Renal stone .

+

**Abdominal U/S :-** **Aug -7th -2006**

- Both **kidneys are normal** site , size , cortical echogencity & thickness **, with two mid & lower Lt. calyceal stones (10 & 7 mm) respectively but without hydronephrosis.**
- **UB** is partially full , no stone , no mass lesion .
- Normal **A/V uterus** , thin endomterium ,empty cavity .
- **Free adnexa.**
- Smooth **liver** outline , normal size , homogenous parenchymal texture **, no focal lesion.**
- **GB is thin wall , no gall stone & non dilated CBD &** intra-hepatic biliary tree.
- Normal **spleen & pancreas** in size , parenchymal echogenic texture , **no focal lesion.**
- No **para-aortic LAP , no ascites** .

**Classification of diuretics according to efficacy**

1-High efficacy diuretics which include Frusmide (Furosemide) and Bumetanide.

2-Moderate efficacy diuretics which include Thiazides and Metolazone .

3-Low efficacy diuretics which include Spironolactone , Amiloride and Triamterene.

**Side effects of diuretics**

**1**-Loss electrolytes from the body.

**2**-Dehydration

**3**-Hyperuricaemia (increase uric acid) example Thiazides.

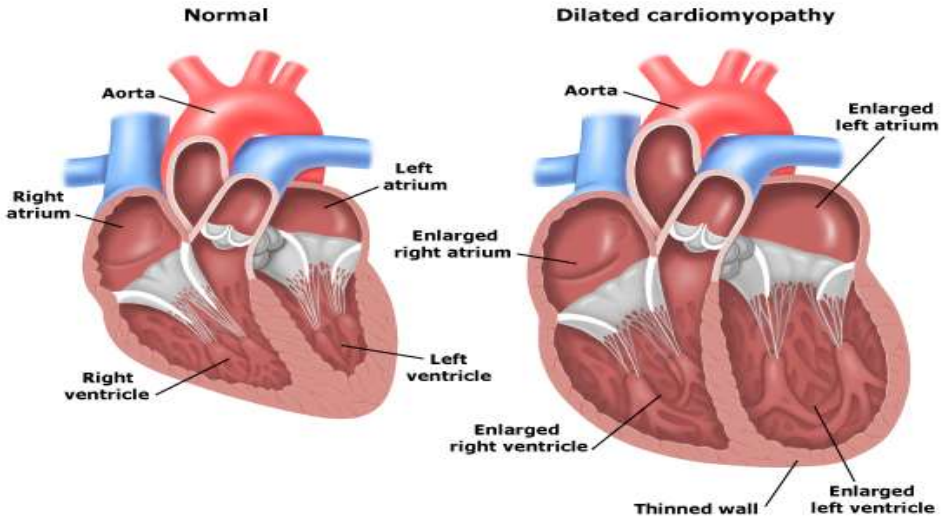
**4**-Nausea, deafness and diarrhea.

**5**-Sensitive reaction (allergy).

## 2-Digitalis and cardiac Glycosides

**Heart failure**:-It is impaired cardiac pump function.

**Or** Heart can't pump enough blood to meet body's needs.



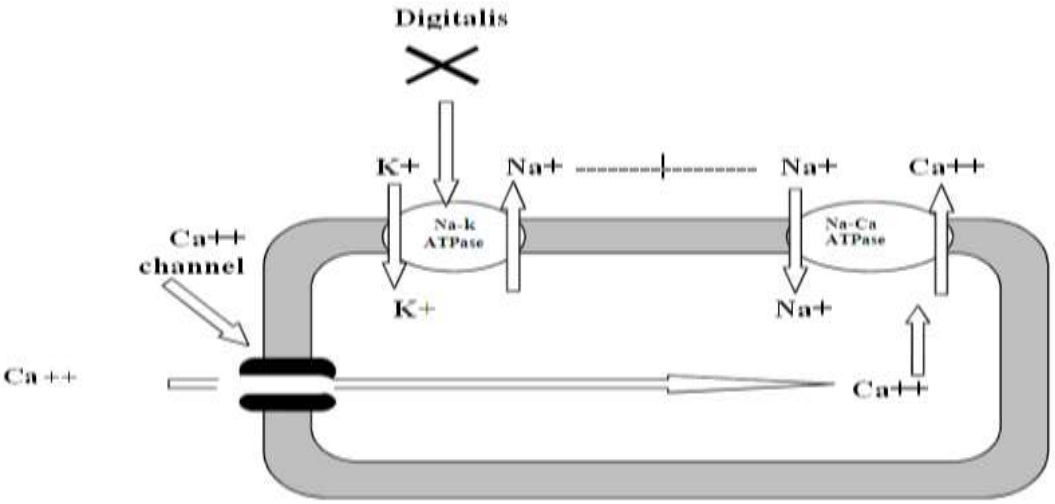

Heart failure **(This fee for information only).**

**Digitalis**:-It is a drug which preparation from foxglove plant and used for atrial fibrillation, atrial flutter and sometimes heart failure that cannot be controlled by other medication.

Figure (63):- Digitalis plant

## Mechanism of action

1-Direct effect by inhibit Na- K+ ATPase.
2-Indirect effect by enhance vagal nerve activity.




Mechanism of action of Digilalis **(This fee is required)**.

## Digitalis drugs

1-Digoxin 2-Digitoxin

## Indication of digitalis drugs

**1-Heat failure** (Digitalis is increase the force of ventricular contraction and thereby increase Cardiac output.

**2-Atrial fibrillation** (by stimulation of Vagal nerve which lead to decrease conduction of Sano-Atrial Node (SA Node).

## Side effects of digitalis

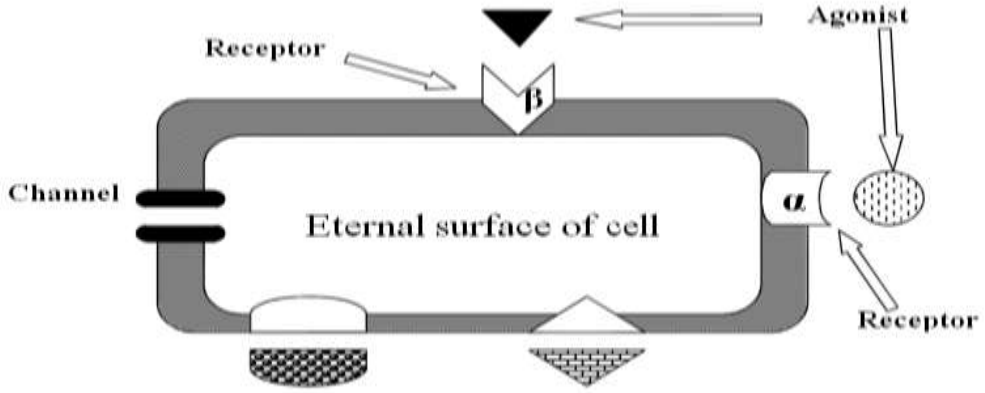
1-Gastrointestinal disturbances 3-Enlargment of breast in the woman.

2-Disturbances of colour vision 4-Toxic effect (t 1/2 about 36 hours).

5- Irregular heartbeat.

## Nervous system receptors

**Receptors:-**It is a protein structures are present in the cell membrane.




Cells receptors **(This fee is required).**

## Types of cells receptors

### 1-Sympathatic receptors :-( Adrenaline agonist)

1-β- Receptors are divided into:-

$\beta_1$-Receptors are present in the heart, intestinal smooth muscles.

$\beta_2$-Receptors are present in the bronchi, vascular and uterine smooth muscles.

2-α receptors are divided into two subunits ($\alpha_1$ and $\alpha_2$ receptors) these receptors are present in most body cells.

### 2-Parasympathatic Receptors [Acetylcholine (Ach) agonist].

1-Muscarinic Receptors are divided into:-

$M_1$-receptors are present in the brain and gastric Parietal cells.

$M_2$-receptors are present in the heart.

$M_3$-receptors are present in the smooth muscles and glands and bronchi

2-Necotnic receptors are present in the skeletal muscle cells.

## Histamine receptors

Histamine receptors are divided into:-

$H_1$ is present in bronchi

$H_2$ is present in stomach

## 3-Antihypertensive drugs

**1- β-adreno - receptors blocking drugs.**

A-Propranolol

B-Atenolol

**2-Angiotensin Converting Enzyme inhibitors (ACEI).**

Example Captopril

**3-Angiotensin II receptor antagonist**

Example Valsartan

**4-Calcium channel blockers.**

Example

Dilti
aze
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mil

**5-α-Blockers drugs** ------- example Parzosin and Doxazosin.

**6-Vasodilators drugs**

**Nitrates**

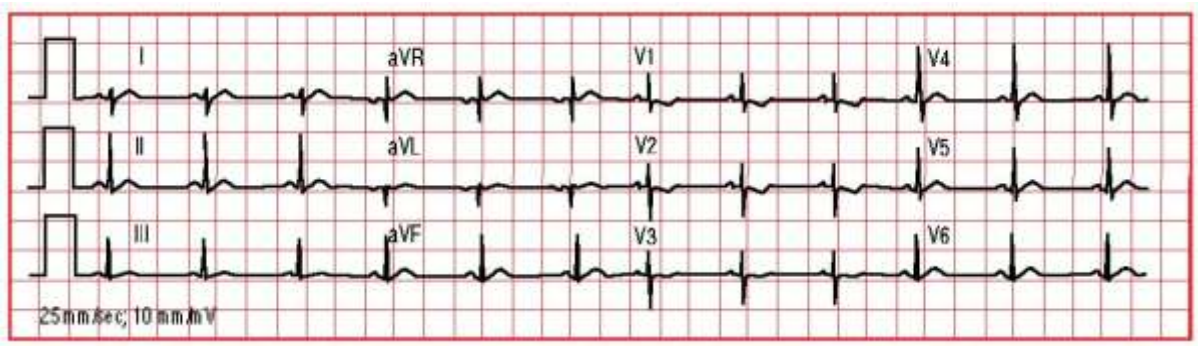
**a-Short-acting nitrates** (Glyceryl trinitrate) sublingual tablet .It is act for about 30 minutes.

**b-Long acting nitrates** (Isosorbide dinitrate) oral tablet. It is act for several hours.

## 4-Antiarrhythmic drugs

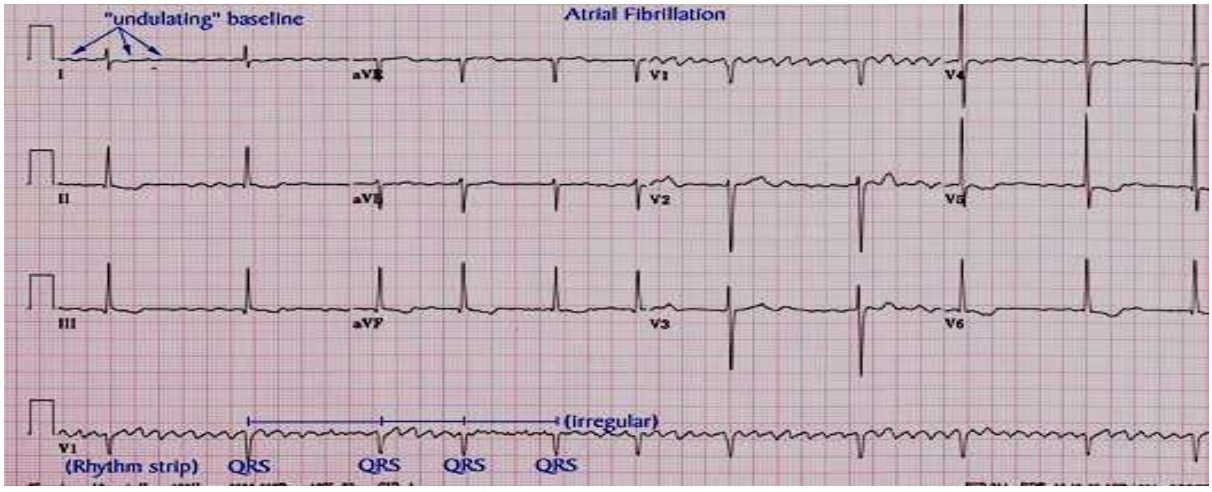
Are a group of pharmaceuticals that are used to suppress abnormal rhythms of the heart (cardiac arrhythmias), such as atrial fibrillation , atrial flutter, ventricular tachycardia, and ventricular fibrillation.

**Cardiac arrhythmic (Cardiac dysrythmic):-** It is defect of the cardiac electricity which result abnormal cardiac action.




Normal ECG **(This fee for information only)**.

**Auricular flutter (Atrial fibrillation)**:-is an irregular and often very fast heart rate.




Atrial fibrillation **(This fee for information only).**

**Classification of antiarrythmic drugs**

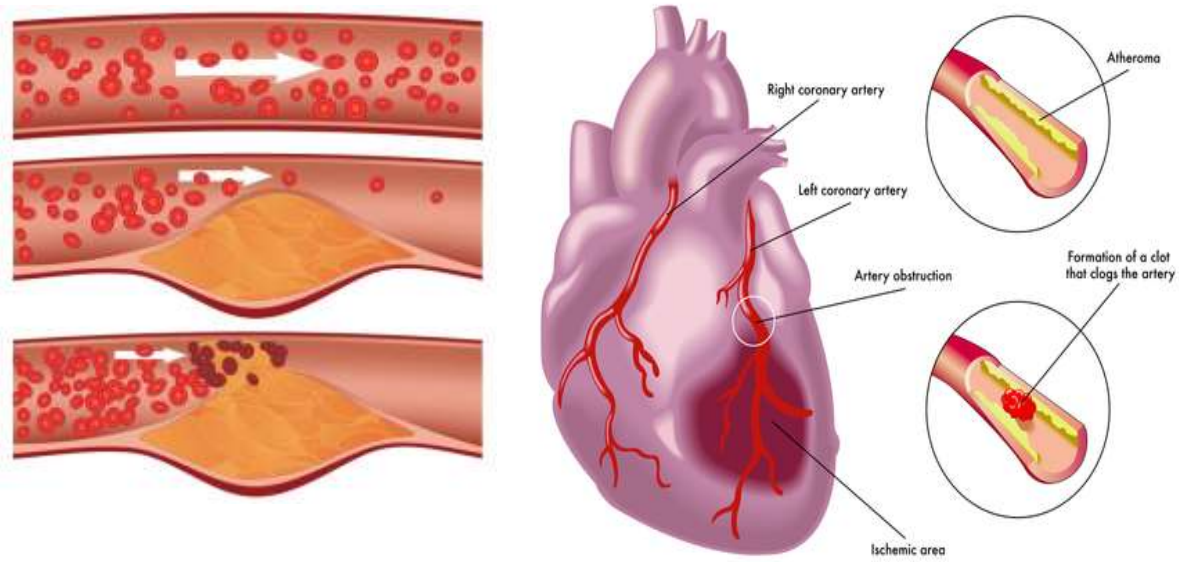
Example:-Quinidine , Propranolol , Azimilide , Vrapamil.

## 5-Sclerosing agents

**Atherosclerosis: -** is the hardening and narrowing of the arteries.

**The most important factors leading to the occurrence of atherosclerosis**.

**1**-Age and gender
**2**-Family history
**3**-Smoking
**4**-Hypertension
**5**-Hypercholesterolaemia
**6**-Diabetes mellitus
**7**-Haemostatic factors
**8**-Obesity
**9**-Alcohol
**10**-Abnormal endothelial cells function



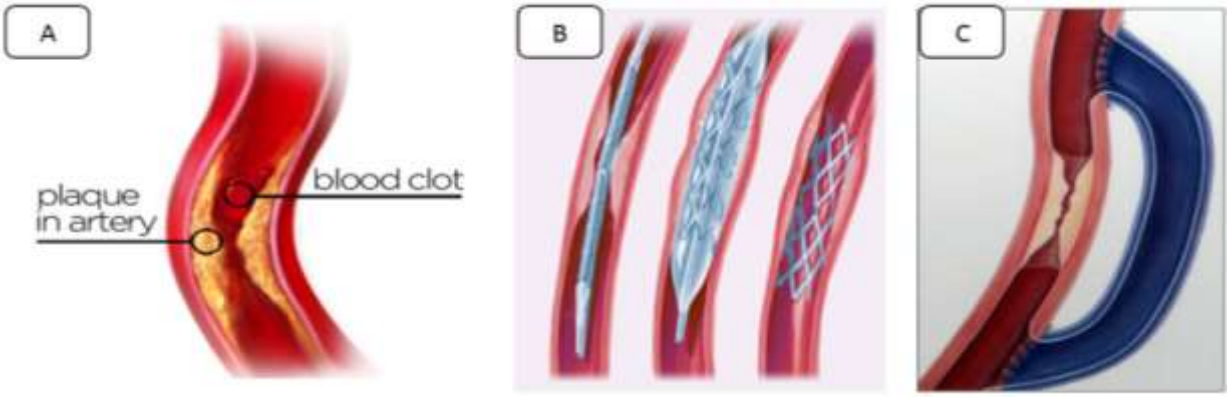

Atherosclerosis **(This fee for information only)**.

### Treatment of atherosclerosis

**1**-Medical treatment by

1-Antiplatelet therapy by aspirin ……..ect.
2-Anti-anginal drug treatment by Nitrates…….. ect.
3-Anti-hypertension drug treatment by Propranolol and Atenolol…….ect.

**2**-Surgical treatment (open chest) by replace of defect coronary artery.

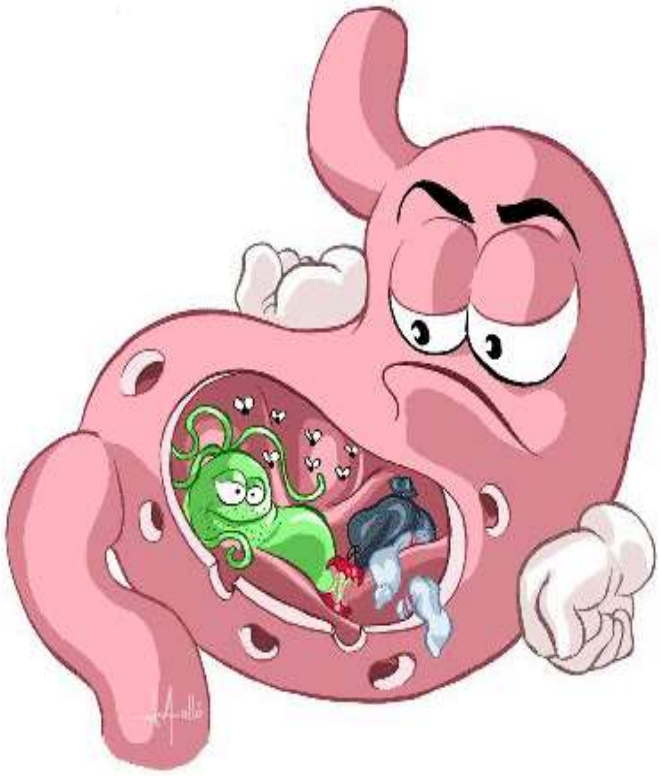



Surgical treatment of Atherosclerosis **(This fee for information only)**.
**A:** Atherosclerotic artery.
**B:-**Angioplasty with stents.
**C:-**Bypass surgery (Open chest).

# Gastrointestinal tract Drugs

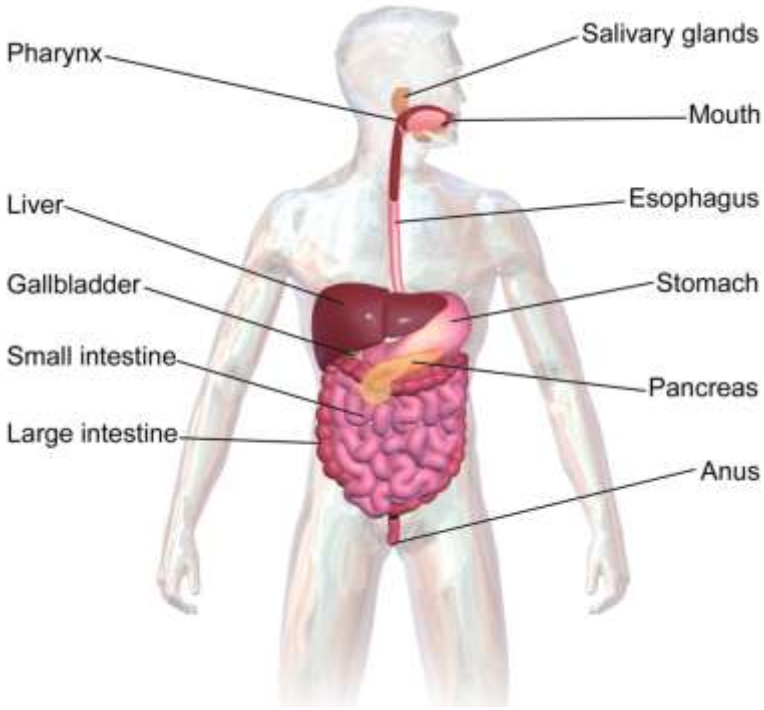
10

قسم التمريض الدراسة
الصباحية و المسائية



## Gastrointestinal tract drugs

1-Antacids drugs
2-Antispasmodics drugs
3-Heeling peptic and duodenal ulcer drugs
4-Antidiarrhoeal drugs
5-Laxatives
6-Rectal and colonic drugs
7-Drug act on intestinal secretions

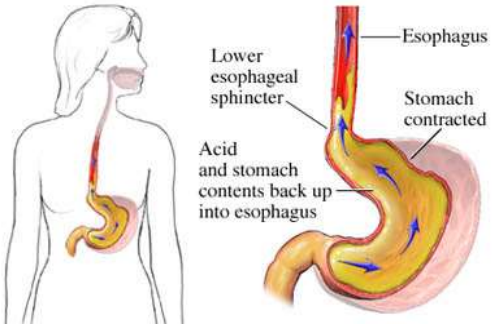



Digestive system **(This fee for information only).**

**1-Antacid** It is drugs that use to neutralize the acidity of stomach.

### Uses of antacid drugs

1-Heartburn is an irritation of the esophagus that is caused by stomach acid.
2-Gastritis
3-Gastroesophageal reflux disease (GERD).
4- Peptic and duodenal ulcer.




Gastroesophageal reflux disease (GERD).

### Classification of antacid drugs

1-Antacid drugs are effecting on the stomach medium:-

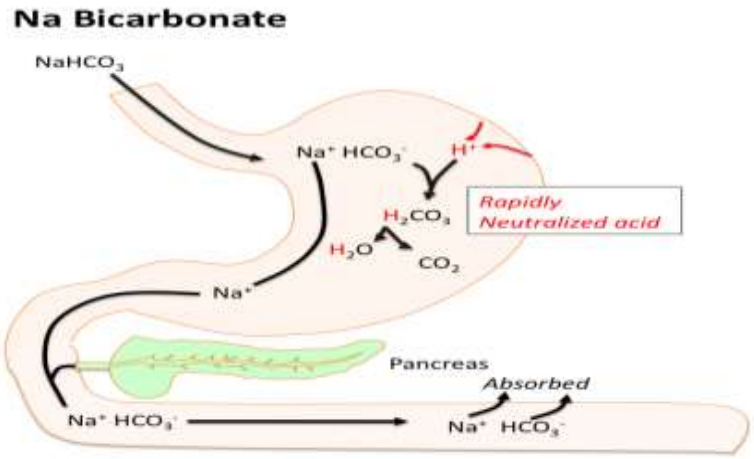
I-Sodium bicarbonate [$NaHCo_3$]
II-Magnesium hydroxide [$Mg(OH)_2$]
III-Aluminium hydroxide [$Al(OH)_2$]

$$Al(OH)_3 + 3HCl \xrightarrow{\text{Slow}} AlCl3 + 3H_2O$$

$$Mg(OH)\ 2 + 2HCL \xrightarrow{\text{Slow / moderate}} MgCL_2 + 2H2O$$

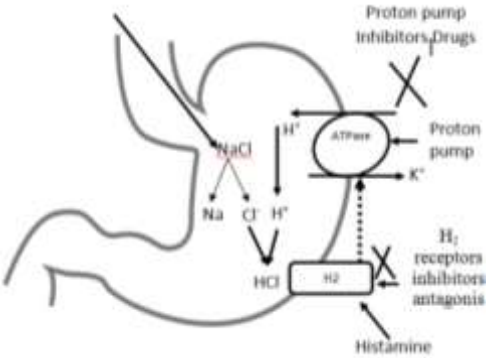
$$CaCO3 + 2HCL \xrightarrow{\text{Fast}} CaCl_2 + H_2O + CO_2$$

$$NaHCO3 + HCl \xrightarrow{\text{Fast}} NaCl + H2O + CO2$$




Mechanism of action of $NaHCO_3$ **(This fee is required)**.

2-Antacid drugs act as proton pump inhibitor (PPI).
I-Omeprazole II- Lansoprazole III- Rabeprazole
3-Antacid drugs act as $H_2$ receptors inhibitors antagonist .
I-Cimetidine II-Ranitidine III- Famotidine




Mechanism of action of antacid this
**(fee is required).**

Notes:-

## Histamine

It is chemical mediators found in most body tissues in an inactive form and it is release as response to stimuli such as Antigen, physical trauma, snake venoms and allergy.
Secreted the histamine from specific cells are called mast cells.

### Histamine receptors

**1**-$H_1$ receptors are present in the respiratory system.
**2**-$H_2$ receptors are present in the stomach.

### Action of the Histamine

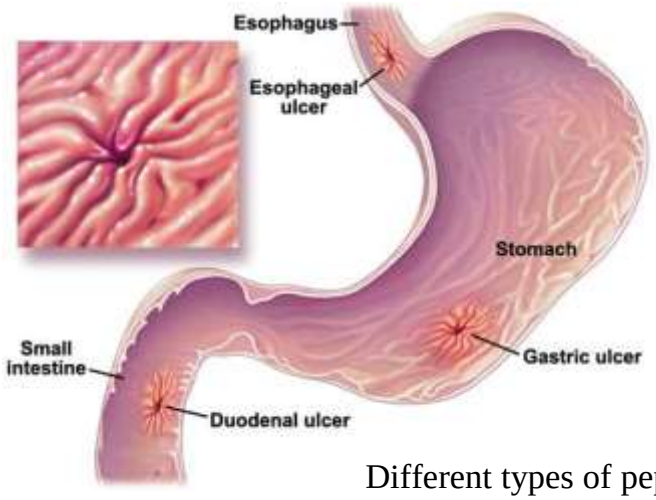
1-On the smooth muscle lead to contraction (excepting arterioles).
2-Blood vessels lead to dilated.
3-Gastric secretion leads to increase gastric acid.
4- Bronchi lead to bronchocontraction.

### Side effects of Antacid drugs

**1**-Constipation **2**-Headache **3**-Loss of appetite **4**-Nausea or vomiting
**5**-Restlessness **6**-Unpleasant taste

### 2-Ulcer (Gastric and duodenal ulcer):-

**Peptic ulcers**: - are open sores that develop on the inside lining of your esophagus, stomach and the upper portion of your small intestine.



Different types of peptic ulcer (**This fee for information only)**.

**Gastric ulcer**: - It is erosion in the lining of the stomach.
**Duodenal ulcer**: - it is erosion in the lining of the duodenum.
**Esophageal ulcer**: - it is erosion in the lining of the esophagus.

**Note**:-

Peptic ulcers that occur on the inside of the stomach are called gastric ulcers. Peptic ulcers that occur inside the hollow tube (esophagus) where food travels from your throat to your stomach are called esophageal ulcers. Peptic ulcers that affect the inside of the upper portion of your small intestine (duodenum) are called duodenal ulcers.

## Predisposing factors of peptic ulcers

1-Bactreial causes example *Hylicobacter pylori* .

2-Acidic drugs example aspirin

3-Acidic fluids 4-Smoking 5-Gastric acid 6-Drugs example aspirin

## Treatment of ulcer

1-Antibiotic treatment

Standard triple therapy (Bismuth, Metronidazole and Amoxicillin) for 2 weeks.

2-$H_2$ receptors antagonists' example Cimetidine and Ranitidine.

3-Proton pump inhibitor example Omprazole, Lansoprazole and Rabeprazole

4-Antiacid drugs

I-Sodium bicarbonate [$NaHCO_3$] II-Magnesium hydroxide [$Mg(OH)_2$]

III-Aluminum hydroxide [$Al(OH)_2$]

## 3-Antispasmodics drugs

It is drugs which use to treatment of spasm Example:-

**1**-Atropine

**2**-Propantheline

3-Hyoscyamine

4- Scopolamine

5- Phenobarbital

## Side effects of antisposmatics drugs

1-Constipation

2-Dry mouth

3- Problems with urination

4-Agitation

5- Confusion, or severe memory problems.

6-fast or Confusion pounding heartbeats

7- Blurred vision with eye pain, or seeing halos around lights

# 4-Rectal and colonic drugs

These drugs given by two routes:-

**I-Suppositories**

## Uses of suppositories

1-To stimulant the gut to defaecation.

2-To analgesic effect example paracetamol and voltaren.

**II-Enemas**:-It produce defaecation by softening faeces and distending the bowel.

**Different types of enema** (**This fee for information only**).

**Uses of the enemas**

**1**-In the elderly constipation.
**2**-Befor the endoscope.
**3**-To preparation to surgery.

**The enemas are containing on the fluids which composed from:-**

**1**-Sodium phosphate which is poorly absorbed and so retains water in the gut.
**2**-Arachis oil uses to soften impacted faeces.
**3**-Glycerol
\

## 5-Laxative or cathartics or purgatives

They are drugs used to increase the motility of the gut and increase defaecation.

**Uses of laxative drugs (indication)**

**1**-In case constipation especially in elderlies.
**2**-In toxic materials (to expulse the toxic materials with stool).
**3**-Empty of the bowel prior to surgery.
**4**-In case ileostomy and colostomy.
**5**-Obaining a fresh stool sample for diagnosis.

**Laxative drugs**

**1**-Bisacodyl **2**-$MgSo_4$ **3**-Lactulose **4**-Carbacol

**Side effects of laxative drugs**

**1**-Vomiting
**2**-Dizziness

**3**-Passing blood out with stools
**4**-Fainting

## 6-Antidiarrhreal drugs

These drugs which prevent diarrhea.

### Antidiarrhreal drugs

**1**-Codeine **2**-Diphenoxylate
**3**-Kaolin **4**-Loperamide

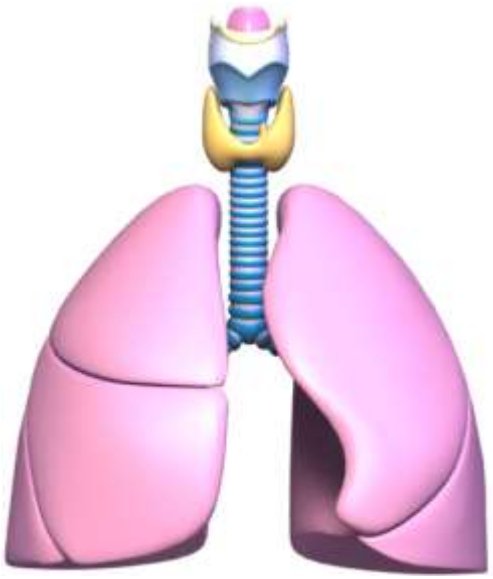
### Side effects of Antidiarrhreal drugs

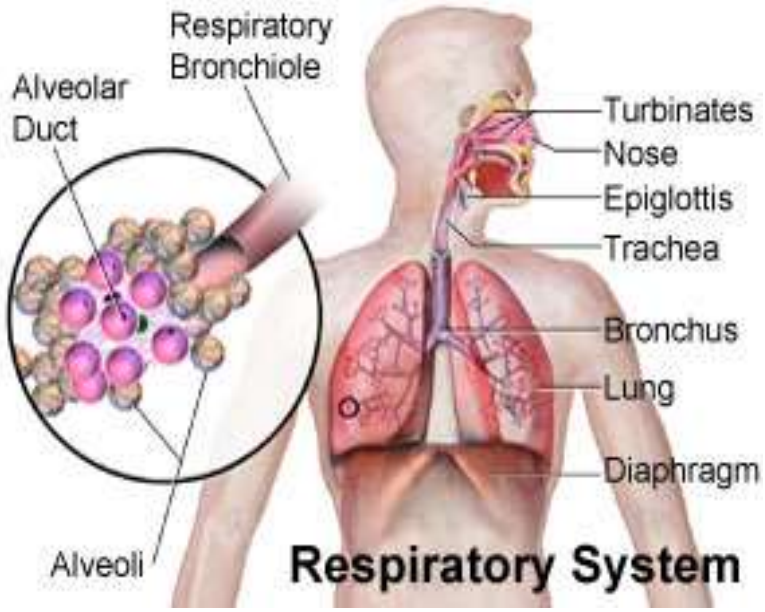
**1**-Constipation, bloating, and fullness.
**2**-Skin rash
**3**-Drowsiness
**4**-Dizziness
**5**-Dry mouth

# Respiratory system Drugs

# 11

قسم التمريض الدراسة
الصباحية و المسائية






Respiratory system **(This fee for information only)**.

**Respiratory system drugs**

1-Bronchodilators drugs
2-Corticosteroides drugs
3-Allergic disorders drugs
4-Respiratory stimulants drugs
5-Mucolyticsdrugs
6-Antitussive drugs
7-Expectorant drugs
8-Nasal decongestants drugs

## 1-Bronchodilators drugs

They are drugs which causes bronchodilator example.

1-Salbutamol act by β2 receptors.
2-Theophyline act by relaxing smooth muscles of the bronchi.

Inhalation route of asthma treatment **(This fee for information only)**

## 2-Corticosteroides drugs

Uses these drugs to increase the airway caliber (Diameter) in asthma by reducing bronchial inflammatory reaction (edema, mucus hypersecretion).

Note:

The mechanism of action of steroid drugs (corticosteroids) act invert the mechanism of action of histamine by:-

**1**-Corticosteroids drugs have a bronchodilator effect by:-

1-Decreased synthesis and release of inflammatory mediators (Histamine).

2-Decreased infiltration and activity of inflammatory cells (leuckocytosis).

3-Decreased edema of the airway mucosa.

**2**-In the skin lead to vasoconstrictions in case allergy (increase of histamine)for that use to treatment of allergy reaction.

### Corticosteroids drugs

**1**-Cortisone **2**-Prednisolone **3**-Dexamethasone

### Sides effects of Corticosteroids drugs

1-Osteoporosis result from long time treatment by corticosteroid drugs.
2-Infection by suppressing human defenses (immune response).
3-$Na^+$ and water retention and $K^+$ loss.

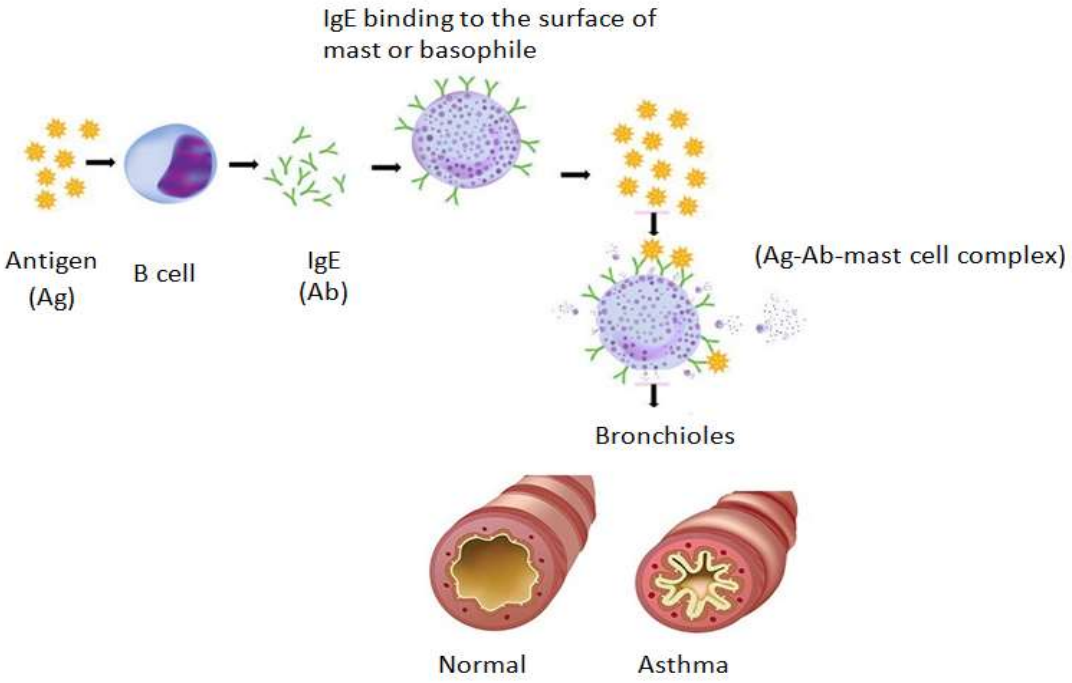
## 3-Asthma drugs

**Asthma**:-It is chronic inflammatory disorder of the airway that occurs in children and adult.

### Clinical sings of asthma

1-Breathlessness
2-Tightness in the chest
3-Wheezing
4-Dyspnea
5-Cough


Asthma disease **(This fee for information only)**.




mine

Mechanism of inflammatory reaction of asthma **(This fee is required)**.

## Asthmatics drugs

1-Glucocorticoides drugs (**Anti-inflammatory drugs**) example:- Triamcinolone and prednisolone

2-β2-adrenergic agonists

Albuterol and

Salbutamol

3-Methylxanthines act these drugs by relaxation of smooth muscle in the bronchioles example Theophyline

4-Anticholinergic drugs act these drugs by inhibition of the M3 receptors example Ipratropium.

5- Leukotriene receptor antagonist example Montelukast, is used as part of an asthma therapy.

**4- Allergic rhinitis**:- is swelling of the nasal passages caused by allergens.

**Allergic rhinitis treatment**

1- Nasal steroid sprays example dexamethasone.
2- Antihistamine example Loratadine and Disloratadine.
3- Decongestants example pseudoephedrine and phenylephrine.
4- Leukotriene inhibitors example Montelukast.

**5-Allergic bronchitis** is the inflammation of the bronchial tubes in the lungs caused by an allergic reaction.

**Allergic bronchitis treatment**

1- Bronchodilators example albuterol.
2- Steroids example Hydrocortisone (H.C).
3- Leukotriene receptor antagonist example Montelukast.

## 6-Respiratory stimulants drugs

These drugs uses (analeptics) are central nervous system stimulants and the therapeutic dose is close to that which causes convulsions their use therefore be carefully monitored. Example **1-Doxapram 2-Aminophylline**

**Respiratory stimulants drugs are use in:-**

1-Hypercapnia
2-Drowsiness
3-Apnoea in premature infants.

## 7-Mucolytics drugs

These drugs which reduce viscosity of mucus materials.
Or
The drugs that liquefy the viscosity of mucus which secreted from bronchioles. Example 1-Carbocisteine 2-Mecyteine

## 8-Antitussive drugs

It is drugs suppressing cough center in central nervous system.

**Antitussive drugs are divided into:-**

1-Narcotic antitussive (opioid antitussive) these drugs act by inhibition cough center in the medulla oblongata .

1-Codeine 2-Morphine

2-Non narcotic antitussive (Non-opioid antitussive)

Dextromethorphan act by inhibitor specific respecters in the brain and spinal cord.

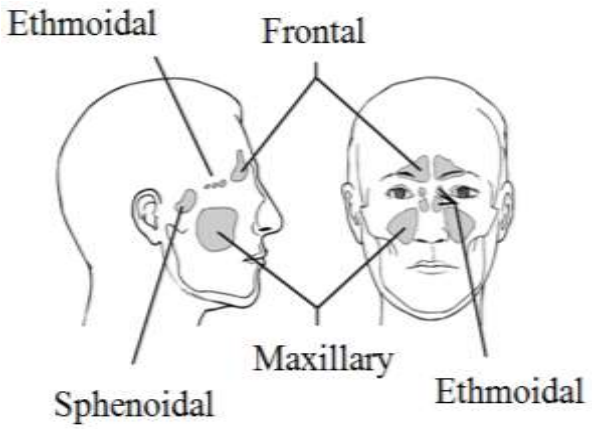
## 9-Expectorant drugs

It is encourage productive cough by increase the volume of bronchial secretion

Example squill ,Volatile oil

## 10-Nasal decongestants drugs

They are drugs which reduce the nasal congestion by stimulating the $\alpha_1$ receptors on nasal blood vessels which causes vasoconstriction




Human nasal signs**(This fee for information only)**.

### Uses of the nasal decongestants drugs

1-Allergic rhinitis 2-Colds 3-Coughs 4-Sinusitis 5-Otitis barotraumas

### Routes of administration of these drugs

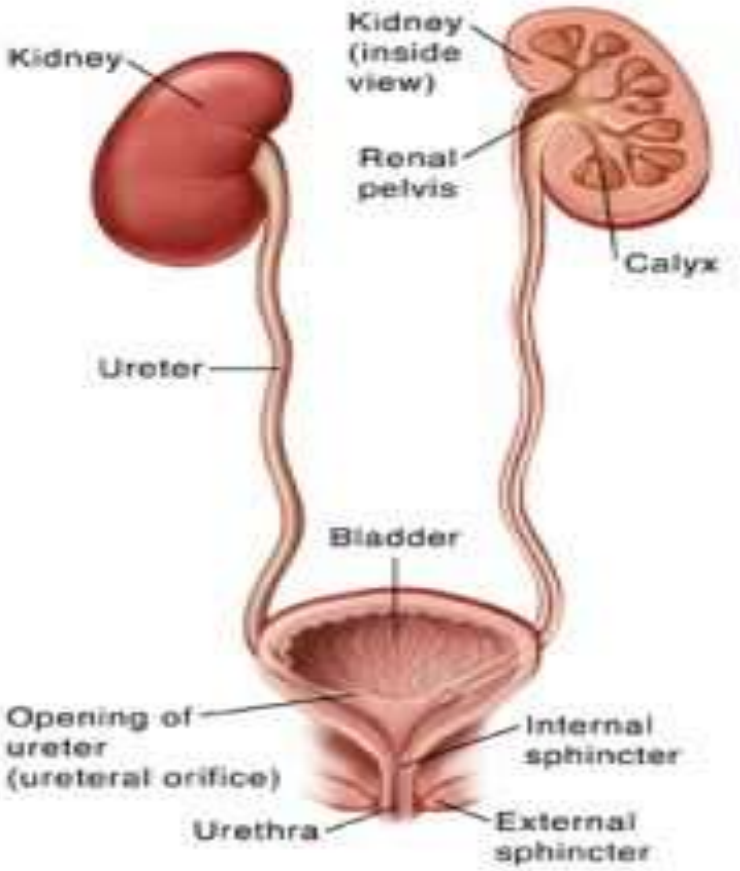
1-Nasal spray 2-Nasal drops 3-Ear drops

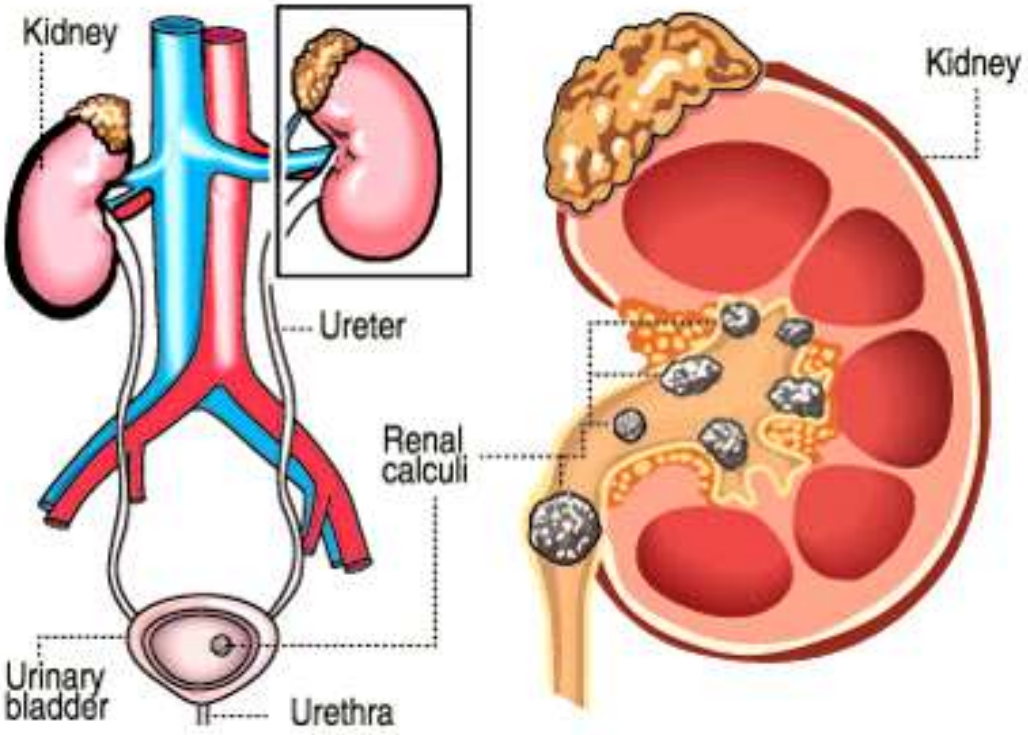
### Nasal decongestants drugs

1-Phenylephrine 2-Naphazoline 3-Adrenaline

# Urinary tract drugs

**12**


Kidney
Kidney (inside view)
Renal pelvis
Calyx
Ureter
Bladder
Opening of ureter (ureteral orifice)
Internal sphincter
Urethra
External sphincter




# Urogenital tract infections

## Types of urogenital tract infection

1-Bacterial infection example ***E.coli*** (which represent about 80-90% from

urogenital tract infections).
2-Viral infections example **herpes virus**
3-Fungal infections example **Candidiasis**

**Inflammation of urogenital tract**

1-Vulvitis:- It is inflammation of vulva.
2-Vaginitis:-It is inflammation of vagina.
3-Endometritis :-It is inflammation of endometrium layer of uterus .
4-Urethritis :-It is inflammation of urethra.
5-Cysitis :-It is inflammation of urinary bladder.
6-Ureteritis:-It is inflammation of ureter.
7-Nephritis (Pyelonephritis):-It is inflammation of renal (kidney).

## Treatment of urogenital tract infection (UTI)

**1-Bacterial infection treated by:-**
Antibiotics drugs which include:-
1- Cephalexin (Keflex)®
2-Cefotaxime (Claforan)®
3- Ceftriaxone
4-Erythromycin
5- Ciprofloxacin
6- Gentamicin

**2-Viral infection treated by** Antiviral drugs which include: - Aciclovir (acyclovir) tab.200 mg

**3-Fungal infection treated by** Antifungal drugs which include:-
Fluconazole is the drug of choice for most species of Candida, particularly C. albicans. The recommended dose is 200 to 400 mg daily, administered orally, for two weeks.

**Sources of urogenital tract infection**

1- Because near the female anus from external urogenital orifice the bacteria possible transport from anus to this orifice.
2-Sexaual intercourses help to urogenital tract infection.
3-Short urethra in the female help to infection.

**Renal stone** (Kidney stones, or renal calculi):- are solid masses made of crystals.

**Medication**

Pain relief may require narcotic medications. The presence of infection requires treatment with antibiotics. Other medications include:

1- Antibiotics (Cephalexin , Cefotaxime, Ceftriaxone, Erythromycin, Erythromycin, Ciprofloxacin, Gentamicin).
2- Allopurinol for uric acid stones dissolved .
3- Thiazide diuretics to prevent calcium stones from forming.
4- Sodium bicarbonate or sodium citrate to make the urine less acidic.
5- Phosphorus solutions to prevent calcium stones from forming.
6- NSAIDs example Ibuprofen , Acetaminophen ,Naproxen sodium for pain.

## Anti-spasmodic drugs

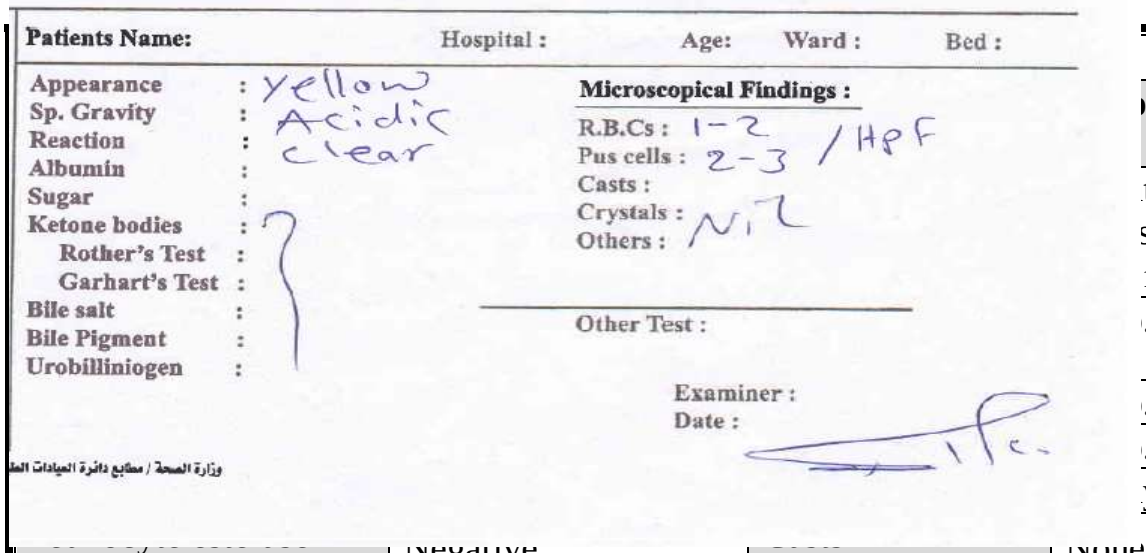
**Renal colic** is a type of pain you get when urinary stones block part of your urinary tract.

**Antispasmodic drugs** relax the smooth muscles of the urinary bladder.

**Treatment of renal colic of spasm**

1- NSAIDs such as Diclofenac or Ibuprofen.
2- Antispasmodics like Butylscopolamine .
3- In severe pain used Morphine , Pethidine.

# Normal General Urine Exam (GUE)



Patients Name: Hospital : Age: Ward : Bed :

Appearance : yellow
Sp. Gravity : Acidic
Reaction : clear
Albumin :
Sugar :
Ketone bodies :
Rother's Test :
Garhart's Test :
Bile salt :
Bile Pigment :
Urobilliniogen :

Microscopical Findings :
R.B.Cs : 1-2 /HPF
Pus cells : 2-3
Casts :
Crystals :
Others : Nil

Other Test :

Examiner :
Date :

وزارة الصحة / مطابع دائرة العيادات الط

| | | | |
|---|---|---|---|
| | Negative | | None |
| Protein | Negative or traces (< 30 mg/dl) | Germs- fungi | No abnormal crystals present |
| Glucose | Negative | Crystals | A few |
| Ketones | Negative | Amorphous salts | No, some |
| Lipid droplets | Negative | Mucus | None |

**NIL:- Non- infection lesion**
**HPF:-** High Power Field

**Table 1: Urinalysis results of four urine samples.**

| TEST | NORMAL | URINE SAMPLE A | URINE SAMPLE B | URINE SAMPLE C |
|---|---|---|---|---|
| **LEUKOCYTES** | Negative | | | |
| **NITRITE** | Negative | | | |
| **UROBILINOGEN** | 3.2 µmol/L | | | |
| **PROTEIN** | <10 mg/dl | | High | High |
| **pH** | 4.5-8.0 | | | High |
| **BLOOD** | Negative | | | |
| **SPECIFIC GRAVITY** | 1.010-1.025 | | | High |
| **KETONE** | <6 mg/dl | | | |
| **BILIRUBIN** | 0.2-1.2 mg/dl | | | |
| **GLUCOSE** | <130 mg/dl | High | | High |

| | Unknown #1 | | | Unknown #2 | | |
|---|---|---|---|---|---|---|
| **Urine Characteristics** | **Unknown #1** | **Normal or abnormal** | **Reason for abnormality** | **Unknown #2** | **Normal or abnormal** | **Reason for abnormality** |
| Color | yellow | | | orange | | |
| Transparency | clear | | | cloudy | | |
| Specific Gravity | 1.014 | | | 1.038 | | |
| pH | 6 | | | 8 | | |
| Glucose | ++++ | | | - | | |
| Ketones | ++ | | | - | | |
| Protein | - | | | ++++ | | |
| Nitrite | ++ | | | - | | |
| Bilirubin | - | | | - | | |
| Urobilinogen | - | | | - | | |
| Occult Blood | - | | | +++ | | |
| Leukocytes | ++ | | | - | | |

**U/S of abdomen :** **2015-03-11**

Normal size both kid.
Moderate dilatation PCS and ureter of left kid. to 9 mm upper ureteric stone, parenchymal thickness partly at lower pole about 8 – 10 mm, otherwise: normal parenchymal thickness.
No rt. renal stone, non dilated PCS, normal parenchymal thickness.
No supra renal masses.

Normal wall thickness UB, no stones, no mass.
Normal uterus, no mass.
No adnexial cyst.

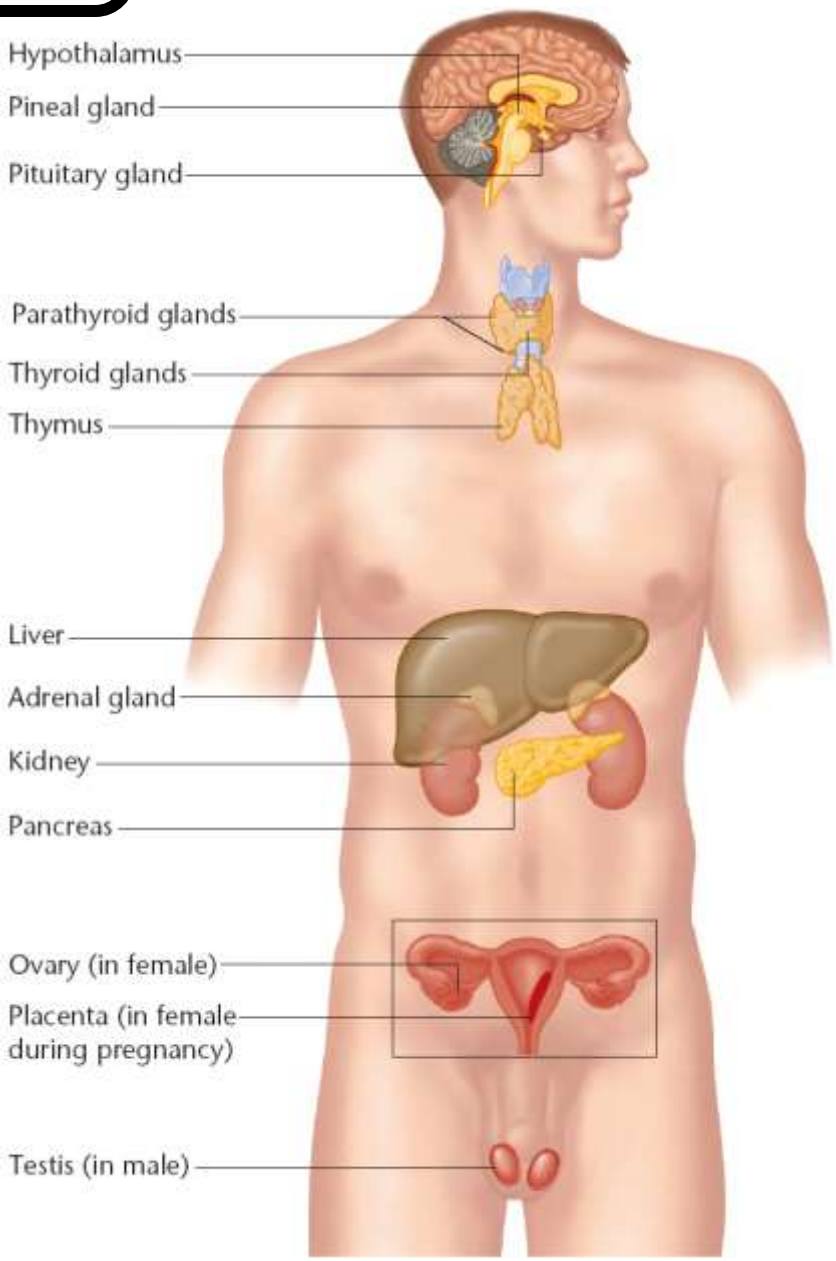
Normal size liver, normal echogenicity.
No mass seen.
Normal intra hepatic biliary tree.
Non dilated hepatic veins.
Normal caliper portal vein.

Normal wall thickness GB, no gall stones.
Normal CBD.
Normal size spleen, no focal lesion.
No obv. pancreatic mass.
No free intra peritoneal fluid.

**Conclusion**: there is 9 mm left ureteric stone about 49 mm from PUJ cause moderate hydronephrosis and hydroureter in parts with chronic obst. changes.

# Endocrinological drugs

# 13



**Endocrine:-**
Drug used in diabetes and hypoglycemia
Pituitary hormones
Thyroid and anti-thyroid drugs
Corticosteroids
Female sex hormones
Male sex hormone
Anti-androgens
Anabolic steroid
Hyperglycemia drugs
Other endocrine hyperlipidemic drugs.

## Drug used in diabetes and hypoglycemia

**1-Antidiabetus drugs:-**It is drugs were used to treatment of diabetes mellitus**.**

**Diabetes** is a condition in which the body does not make enough insulin or the body cells cannot use insulin properly.

**Insulin**: - It is a protein hormone and secreted from Beta cells in the pancreas gland and has a play role in the regulation of glucose in the blood.

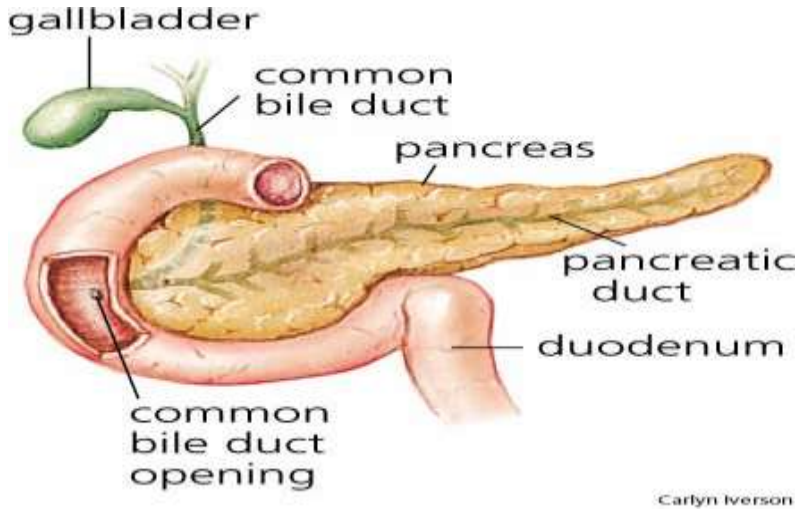



**Figure (103):-**Pancreatic gland (This fee for information only).

### Antidiabetic drugs (Antihyperglycemic drugs)

Divided into:-
1-Hormonal drugs which include insulin and divided into:-

### Sources of insulin

1-Animal source (Insulin was originally derived from the pancreases of

cows and pigs. Animal-sourced insulin is made from preparations of beef or pork pancreases).

2-Biosynthetic human insulin, its analogues and derivatives, are produced via gene technologies.

## Types of insulin

**Rapid-acting** insulin's **(Clear)** they work quickly, they are used most often at the start of a meal. They quickly drop the blood sugar level and work for a short time.

**Short-acting** insulin's **(Clear)** is often used 30 minutes before a meal so that it has time to work. These liquid insulins are clear and do not settle out when the bottle (vial) sits for a while.

**Intermediate-acting** insulin's **(Cloudy)** contain added substances (buffers) that make them work over a long time and that may make them look cloudy.

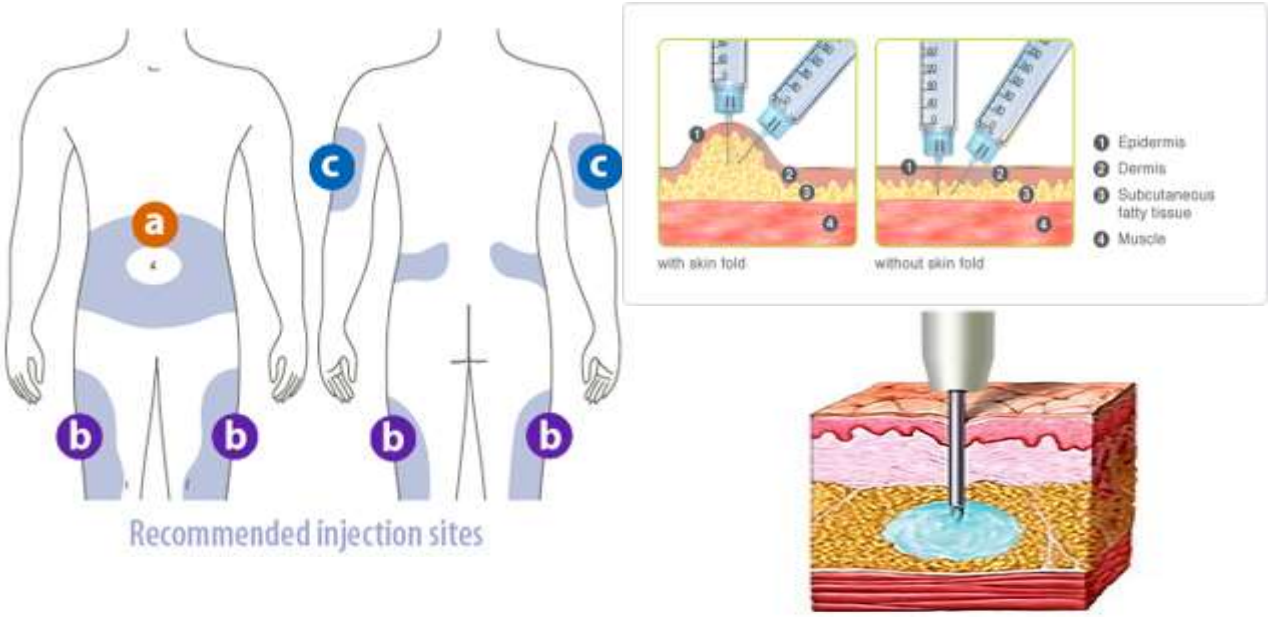
**Long-acting** insulins **(Clear)** work for a longer time to lower blood sugar levels throughout the day and night.

**Ultra Long-acting insulin's (Clear)** have no peak and last for 24 hours or more.

**Mixtures of insulin** can sometimes be combined in the same syringe, for example, intermediate-acting and rapid- or short-acting insulin. Not all insulins can be mixed together.

**There are different types of insulin include:-**

| Type of Insulin | Duration |
|---|---|
| Rapid-acting | 3 to 5 hours |
| Short-acting | 5 to 8 hours |
| Intermediate-acting | 12 to 16 hours |
| Long-acting | 20 to 26 hours |




**Sites of insulin injection (This fee for information only).**

## 2-Oral antidiabetic drugs include.

1-Glibenclamide 2-Metformin 3- Sitagliptin.

## Side effects (Adverse effects) of the antidiabetic drugs

1-Hypoglycaemia
2-Coma may be occurring by longer acting drugs.
3-Insulin antibodies (Autoimmune)
4-Gastrointestinal disorders

**Hyperglycemia drugs:**-They are drugs which causes increase the glucose blood example:-

1-β -adrenoceptors drugs 2-Diazoxide 3-Thiazide

**Hypoglycemia**:-It is decrease glucose in the blood.

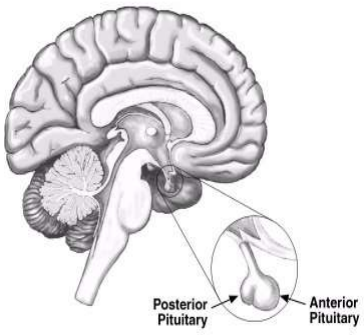
## Causes of hypoglycemia

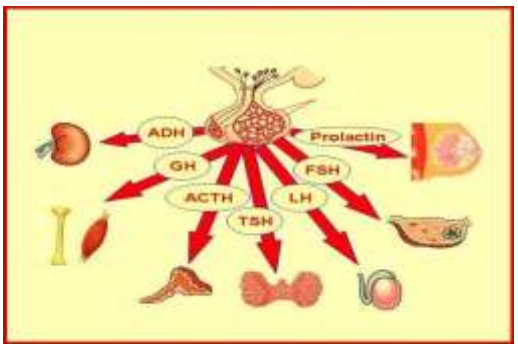
1-Overdose of insulin during treatment or overdose of oral antidiabetic drugs
2-Sever starvation

## Treatment of hypoglycemia

1-I/V Dextrose
2- Sugar consumption.

## Pituitary hormones




Pituitary gland and their hormones **(This fee for information only)**.

### Pituitary gland hormones

This gland is divided into 2 lobes

**1-Anterior lobe**: - which secreted

**A-Follicle Stimulating Hormone (FSH).**

**FSH Function**

It stimulates the ovaries to develop follicles.

**B-Luteinizing Hormone (LH)**

**LH Function**

It is stimulate ovulation

**C-Thyroid Stimulating Hormone (TSH)**

**TSH function**

It is stimulating thyroid hormone secretion.

**D-Prolactin hormone**

**Prolactin hormone function**

It is stimulating the breast to produce milk.

**E-Growth hormone (GH)**

**2-Posterior lobe:-**which secreted

A-Oxytocin hormone

**Oxytocin hormone functions**

1- It is stimulating milk.

2- It is to prepare a pregnant woman for childbirth.

**B-Antidiuretic hormone (ADH)**

**Antidiuretic hormone function**

It is preventing of urination

## Thyroid drugs

**Thyroid hormone**: - It is a protein hormone secreted from thyroid gland.

### Types of thyroid gland

1-Mono-iodotyrosine (3-mono-iodotyronsine)(T1)
2-Di-iodotyrosine (3, 3'-diiodotyrosine)(T2)
3-Tri-iodotyrosine (3, 5, 3'-triiodotyrosine)(T3)
4-Tertra-iodotyrosie (3, 5, 3', 5'-tetraiodotyrosine) (T4) (Thyroxine)

**Hypothyroidism is divided into:-**

1-In the children are called *cretinism* which characterized by:-

1- Face edema 2- Tongue appear
3-Abdominal bulging 4-Arched of the limbs 5-Mental retardation



Hypothyroidism in child (cretinism) **(This fee for information only).**

2-In the adults are called **Myxedema** which characterized by:-

1-Thicking of skin 2-Edema in the face, lips and eyelids

**Treatment of hypothyroidism:-**

1-In the children should by early treated by thyroxine . 2-In the adult treated by




thyroxin

.

Hypothyroidism in adult man (Myxedema) **(This fee for information only)**.

**Hyperthyroidism**:-It is increase the thyroxin hormone in the blood.


Hyperthyroidism in adult (Exophthalmic goiter) **(This fee for information only**).

**Goiter:-**It is enlargement of thyroid gland.


Goiter disease **(This fee for information only).**

**Antithyroid drugs (antihyperthyroidism drugs)**

1-They are drugs which use to treatment of hyperthyroidism
Include:-
1-Thionamides which block synthesis of thyroid hormone.
2-Radioiodine which destroys the cells making thyroid hormone.

**3-Gonads hormone**

Include:-

**1-Overy:** - these glands secreted many hormones:-
a-Progestrone or called pregnancy hormone.
b-Estrogens hormone.

**2-Placenta hormone**s:-secreted progesterone hormone

**3-Testis hormone**:-secreted testosterone hormone.

## 4-Pituitary gland

This gland is divided into 2 lobes.

**1-Anterior lobe**: - which secreted

**A**-Follicle Stimulating Hormone (FSH).

**B**-Luteinizing Hormone (LH)

**C**-Thyroid Stimulating Hormone (TSH)

**D**-Prolactin hormone

**E**-Growth hormone (GH)

**2-Posterior lobe:**-which secreted

**A**-Oxytocin hormone

**B**-Antidiuretic hormone (ADH)

**5-Androgens:**-Androgens are a group of chemically related sex steroid hormones.

**or**

Androgen it is meaning testosterone which secreted by the interstitial cells of the testis.

## Functions of testosterone hormone

1-Spermatogensis

2-Male Secondary sex characteristics.

3-Increase anabolic protein especially in the muscles.

4-Increase growth of bones.

5- Increased production of red blood cells.

## Androgen drugs

1-Testostarone gives orally

2-Mesterolone also gives orally

## Indication androgen therapy (Uses)

**1**-Testicular failure

**2**-Uses in the decease libido and of secondary sex characteristics can be greatly improved.

**3**-Male contraception androgen

**4**-Anaemia which lead to increase RBCs production.

## Adverse effects

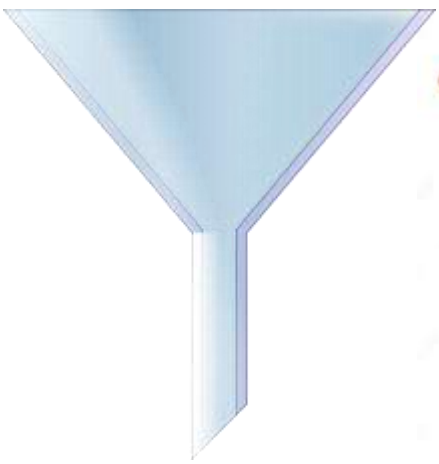
1-Liver injury

2-Hypothalamic - pituitary suppression

3-Salt and water retaining

## Contraindication

1-In the pregnant women (effect on



the female embryo sex organs)
2-In sport man led to decrease testicular function of sperm and the body appear funnel-like shape.
3-In the adult women lead to increase the hair in the body and enlargement the chest especial the muscles and masculine like voice.

## 6-Antiandrogens drugs

They are drugs which use to against to the androgen hormone

## Antiandrogen drugs

1-Cyproterone
2-Flutamide
3-Ketoconazole

## Uses of antiandrogen drugs

1-Prostatic cancer
2-Sever female hirsutism
3-Sever acne in woman
4-Male-oral- contraceptive

## 7-Anabolic steroids

They are drugs which increase body activity.

## Uses of Anabolic steroid drugs

1-Osteoporosis( the anabolic steroid prevent calcium and nitrogen loss in the urine)
2-Relieve chronic biliary obstruction
3-Aplastic anaemia
4-Debilitating diseases

## Endocrine hyperlipidemia drugs

They are drugs which increase the lipid in the blood.

## Hyperlipidemic drugs

1-Coticosteroid drugs
2-Androgen drugs
3-Anabolic drugs

# Central nervous system drugs

14

# Central nervous systems drugs

Narcotics
Hypnotics
Analgesics (mild, moderate, sever pain)
Sedative
Axiolytics
Antipsychotics
Antidepressants
CNS stimulants
Antiemetics
Migraine
Antiepileptics
Parkinsonism
Drugs used in chorea and tics
Trigeminal neuralgia

## Narcotic

**Narcotic**: - Drugs that act on the brain and block the sensation of pain.

### Narcotic drugs

1-Cocaine
2-Morphine
3-Heroin
4-Crack
5-Opium
6-Methadone
7-Codeine

### Side effects of narcotic drugs

1-Watery eyes
2-Itching
3-Breathing difficulties
4-Nausea
5-Vomiting
6-Constricted pupils


### Long-term Effects of narcotic drugs

1-Slow and shallow breathing
2-Flushing
3-Clammy skin
4-Decreased body temperature
5-Spasticity
6-Hypertension

7-Increased chance of hepatitis
8-Convulsions
9-Coma
10-Death

**Sedative (Tranquilizer or tranquilliser):-** It is a substance that induces sedation by reducing irritability or excitement .

**Sedative drugs**
1-Benzodiazepines
2-Alcohol

**Note**

In overdose of sedative drugs or if combined with another sedative drug, many of these drugs can cause unconsciousness (hypnotic) and even death.

## Hypnotic

**Hypnotics: -** They are drugs that depress central nervous system function and relieve anxiety in low doses and induce sleep in higher doses.

**Uses of hypnotics**
1-Anxiety
2-Insomnia


**Side effects of hypnotics**
1-Respiratory depression
2-Addiction

**Hypnotics drugs**
1-Diazepam ( Valium)™
2-Lorazepan (Ativan)®

## Analgesics

**Analgesics**: - They are drugs that relieve pain due to multiple causes.
Or
They are drugs that relieve pain without causing loss of consciousness.

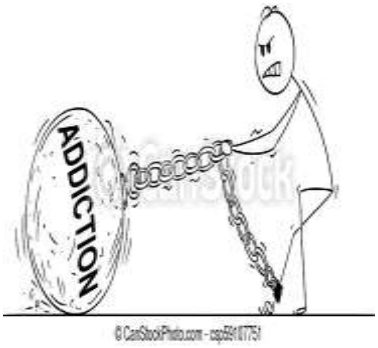
**Uses of analgesics**
1-To relieve pain (mild, moderate and sever pain)
2-Before surgical operation

3-In some cases example migraine and insomnia
4-In headache cases
5-In especial phenomena dysmenorrheal that occur in the woman.

**Types of analgesics treatment**

1-Non-narcotic analgesics example paracetamol ,ibuprofen,diclofenac
2-Narcotic analgesics e.g. codeine
3-Combined analgesics therapy of NSAIDs
4-Opioids e.g. morphine

**Addiction:** - Is a complex disorder characterized by compulsive drug use.




## Pain

**Pain:** - It is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.

**Classification of Pain**

**1-Nociceptive**: represents the normal response to noxious insult or injury of tissues such as skin, muscles, visceral organs, joints, tendons, or bones.

**2-Neuropathic**: pain initiated or caused by a primary lesion or disease in the somatosensory nervous system example diabetic neuropathy.

**3-Inflammatory**: a result of activation and sensitization of the nociceptive pain pathway by a variety of mediators released at a site of tissue inflammation.

**Pain Intensity**

1-Mild
2-Moderate
3-Severe

**Time course:** Pain duration

**1-Acute pain**: pain of less than 3 to 6 months duration.

**2-Chronic pain**: pain lasting for more than 3-6 months, or persisting.

## Treatment of pain

By use the analgesics drugs (analgesics: - it is relieving pain)

1- Mild pain (Non-narcotic analgesics or NSAIDs example paracetamol , ibuprofen and diclofenac.

2-Moderate pain

A-Narcotic analgesics e.g. codeine

B-Combined therapy of NSAIDs

3-Sever pain opioids e.g. morphine

## Antiemitics

**Vomiting (Emesis):-** It is a protective mechanism for eliminating irritant or harmful substances from the upper gastrointestinal tract.

**Antiemetics:**-They are drugs that prevention of vomiting.

**Antiemetics drugs**

1-Metoclopramide

2-Hyoscine

3-Scoplamine

## Migraine drugs

**Migraine:** -It is a neurovascular disorder that involves dilation and inflammation of intracranial blood vessels.


**Migraine the characterized by:-**

1- Unilateral

2-Throbbing head pain of moderate to severe intensity.

**Causes of migraine**

The cause the migraine related to the vasodilatation and inflammation that occur due to increase:-

1-Calcitonin gene-related peptide

2-Increase serotonin (5-HT)

**Treatment of migraine**

1-Treatment of acute migraine

1-Aspirin 600 mg

2- Paracetamol

3- Ibuprofen

4-Naproxen

## Central nervous system stimulant

**Central nervous system stimulants:** - They are drugs that increase the activity of CNS neurons.

### Uses of CNS stimulants drugs

1-Obesity by loss appetite
2- Neurotoxicity
3-Treatment myasthenia gravis

### Contraindication of CNS stimulant drugs

1-Epilepsy cases
2-Cardiac diseases
3-Psychotic cases

### CNS stimulants drugs

1-Amphetamine
2-Methylphenidate
3-Methylxanthines that include:-
1-Coffe 2-Tea 3-Soda (Coca-cola, Pepsi-cola)
4-Ice cream and Yogurt 5-Cocoa

## Antidepressent drugs

**Antidepressants:**-They are drugs that used to relieve symptoms of depression.

### Uses of antidepressants drugs

1-Anxiety disorders
2-Psychotic disorders
3-Mania (a person become sad and unhappy).

### Antidepressants drugs

1-Tricyclic antidepressants example impramine.
2-Monoamine oxidase inhibitors example phenelzine .
3-Selective serotonin reuptake inhibitors example fluoxetine

### Antipsychotic drugs

**Antipsychotics:-** They are drugs that use to treatment broad spectrum of psychotic disorders.

## Uses antipsychotics

1-Schizophrenia
2-Delusional
3-Acute mania 4-Depressive psychoses

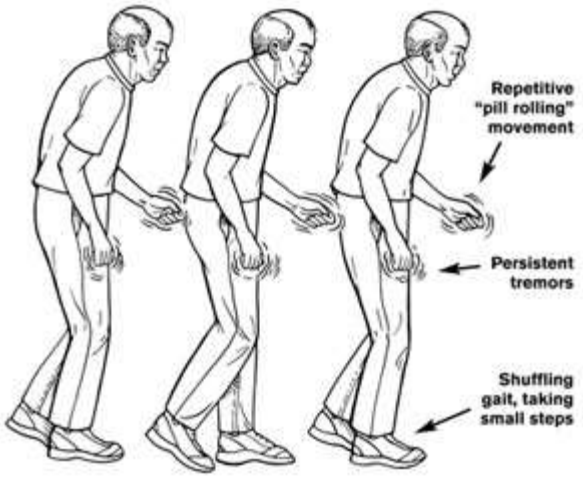
## Antipsychotics drugs

1-Chlorpromazine 2-Fluphenazine

## Neurological diseases

## I-Parkinson's diseases

**Parkinson's disease**:-It is neurodegenerative disorders appear in middle age and progress relentlessly.




## Causes of Parkinson's disease

1-Unknown causes
2- Genetic causes (believe)

## Parkinson's disease symptoms

1-Dementia 2-Depression
3-Impaired memory 4-Tremor

## Pathophysiology of Parkinson's disease

Parkinson's disease occurs due to imbalances between two neurotransmitters:
Dopamine (inhibitory transmitter) and Ach (Excitatory transmitter).

## In normal state:

* The dopamine inhibit neurons that release Gamma-amino-butyric acid (GABA)
**The Acetylcholine (Ach) excites the neurons that release GABA.

## In Parkinson's disease

Loss the neurons that responsible on dopamine release in same time GABA that stimulate by Ach for that increase GABA and result contributes to the movement disorders.

## Treatment of Parkinson's disease

## Livodopa

These drug act by promoting synthesis of dopamine in the brain and helps restore a proper balance between dopamine and Ach.

## II-Epilepy disease

Epilepsy:-it is refer to a group of disorder characterized by excessive excitability of neurons within the central nervous system.



**Antipileptics:-** It is the drugs that inhibit the neuronal discharge.
Or It is the drugs that use to treatment of epilepsy disease.

## Causes of epilepsy

1-Genetic causes
2-Cerebral birth injury
3-Trauma
4-Brain inflammation

## Treatment of Epilepsy

1-Suppression of sodium influx example Phenytoin
2-Suppression of calcium influx example Valproic acid
3-Potentiation of GABA example Benzodiazepines and barbiturates.

## III-Trigeminal neuralgia

It is a severe pain that occurs along the course of a nerve.

## Pathogenesis

This disease occurs due to compression of the trigeminal nerve rootlets at their entry to the brain stem by aberrant loops of the cerebella arteries.

## Treatment of the trigeminal neuralgia

1-Carbamazepine
2-Phenytoin
3-Gabapentin

## IV-Chorea

Chorea (the Greek for "dance"):-it is non-rhythmic involuntary movements result from excessive activity in the striatum (site synthesis dopamine) due to dopaminergic drugs used to treat Parkinson's disease. **(treatment)**

## V-Tics

Tics:-they are repetitive semi-purposeful movements such as blinking, winking, grinning or screwing up of the eye.

**Blinking** is a semi-autonomic rapid closing of the eyelid.

## Anxielytics

Anxielytics:- they are drugs that relieve the anxiety example benzodiazepines.

## Mechanism of action of CNS drugs

**Drugs which act on the CNS are divided into:-**

1-Cholinergic drugs (cholinomimtics drugs) or called Drugs – like Acetylcholine effect

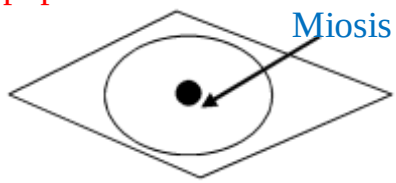
2-Adrenergic drugs (Adrenermimtics drugs or Symathomimtics drugs ) or called Drugs –like Adrenaline effect (Amphetamine).

1-Cholinergic drugs (cholinomimtics drugs) or called Drugs – like Acetylcholine effect Include:-

I-Pilocarpine and effect on the eye pupil

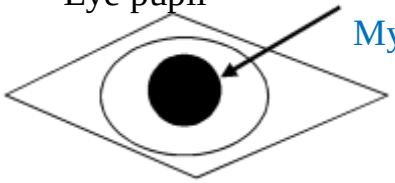
Pilocarpine causes miosis (contraction of eye pupil).

Eye pupil




Atropine act against the Plocarpine(Against the Ach act)

Eye pupil




II-Carbacol these drug causes increase the intestinal movement for that uses in the postoperative ileum surgery.

2-Adrenergic drugs (Adrenermimtics drugs or Symathomimtics drugs) or called Drugs-like Adrenaline effect (Amphetamine).

**Effect adrenaline on the:-**

**1- Heart rate:** - increase of heart rate by stimulating the β1 receptors which presenting the heart cells which lead to:-

1- Increase heart rate

2-Increase blood pressure

**2-Respiratory system**

Effect on the bronchi:-

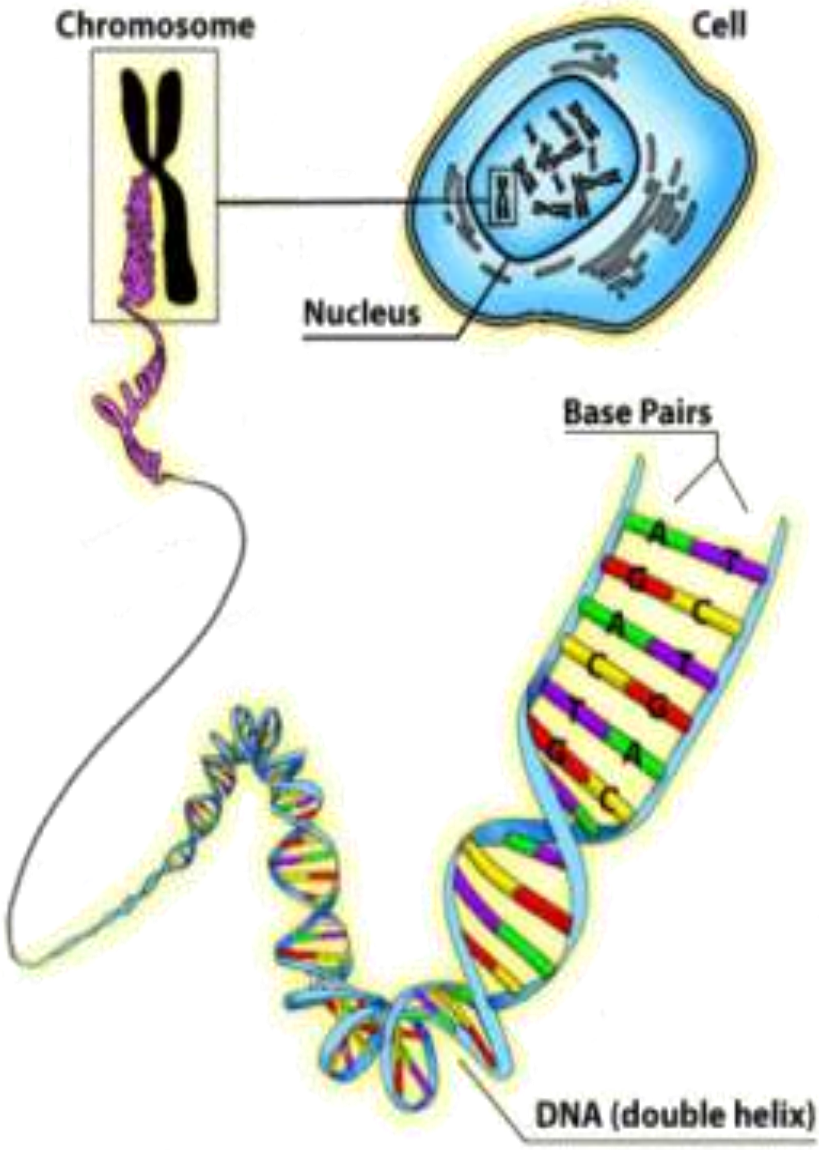
The adrenaline causes bronchodilator by stimulating the β2 which presenting the bronchi cells (smooth muscle cells).

**3-Blood vessels**

Adrenaline causes vasoconstriction by acting on **α receptors**.

# Chemotherapy and Immuno suppressants drugs

**15**



## Chemotherapy and immune-suppressants:

Alkylatings anticancer drugs

Antimetabolites anticancer drugs

Enzymes anticancer drugs

Hormones anticancer drugs

Drug alters immune responses anticancer drugs

**Neoplasm(Tumor)-** An abnormal new growth of tissue that grows more rapidly than normal cells and will continue to grow if not treated. These growths will compete with normal cells for nutrients. This is a non-specific term that can refer to benign or malignant growths.

**Cancer: -** A malignant tumor (a malignant neoplasm).

## Types of tumor

**1-**Benign tumor: - It is usually localized, rarely spreads to other parts of the body and responds well to treatment. However, if left untreated, benign tumors can lead to serious disease.

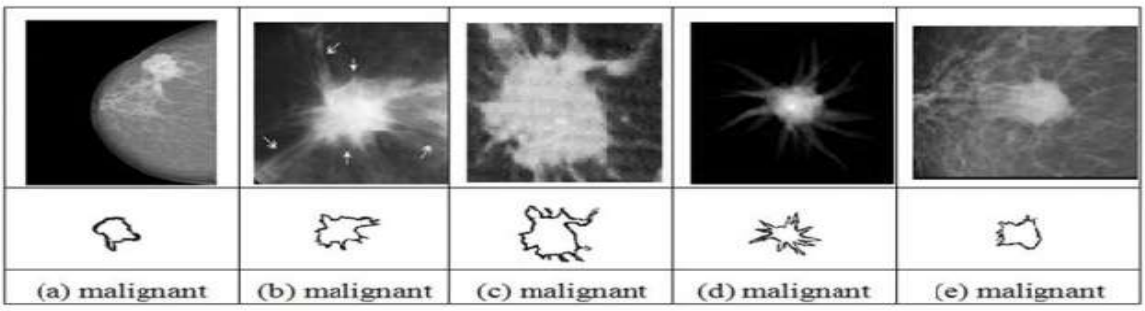
**2-**Malignan tumor: -A malignant tumor is resistant to treatment, may spread to other parts of the body and often recurs after removal.

Normal mammogram

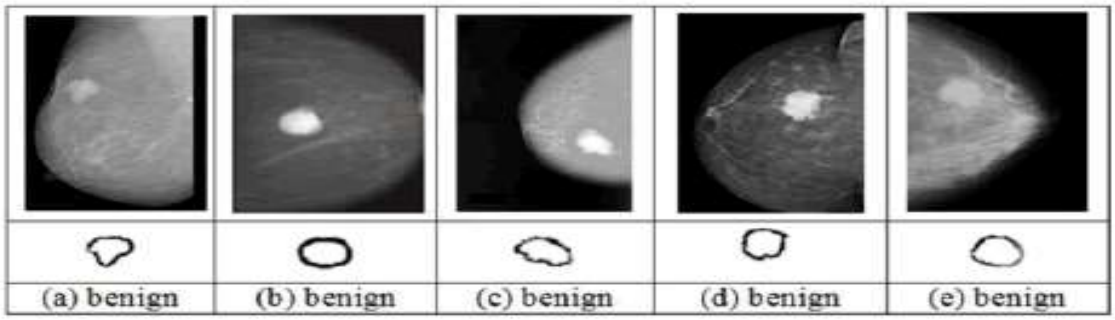
Benign cyst (not cancer)

Breast calcifications

Breast cancer




**e 6:** Samples of malignant breast tumor.



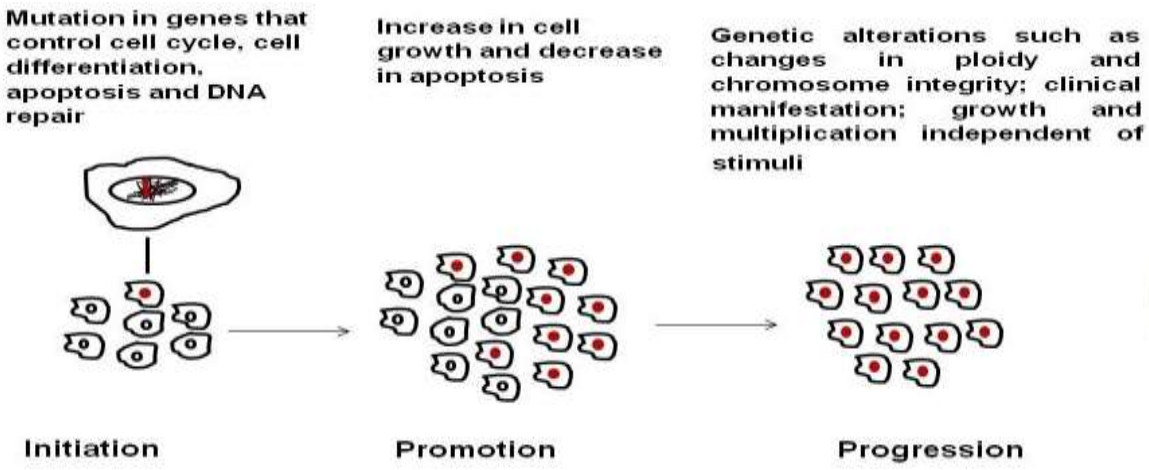

**e 5:** Samples of benign breast tumor.

**Tumor is characterized by**

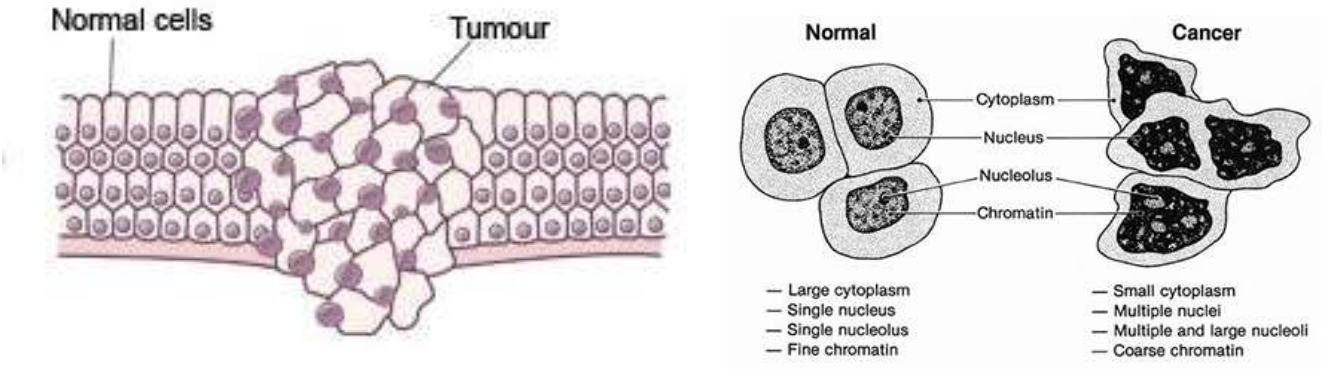
**1-** The abnormal cellular proliferation sometimes produces tissue very similar to normal in appearance.

**2-**Not useful (no physiological function)

**3-** Have no order structure arrangement.




**Steps of tumor formation.**




**Normal and Cancer cells.**

## Causes of tumor

1-Groswing older
2-Tobacco
3-Sunlight
4- U.V light, X-ray, radioactive substance example $U^{338}$.
5-Certain chemicals and other substances
6-Some viruses and bacteria
7- Hormones treated
8-Family history of cancer
9-Alcohol
10-Poor diet, lack of physical activity, or being overweight
11-Chronic irritation.
12-Carcinogenic agents or substances example I.

**Note**

*When the tumor characterized by slow growth, Non-invasive and harmless (some time) is consider ***Benign*** and end mostly by ***oma*****.**

**When the tumor characterized by rapid growth, invasive and very

harm is consider ***Malignant*** and end mostly by ***sarcoma***.

**Types of cancer tissues.**

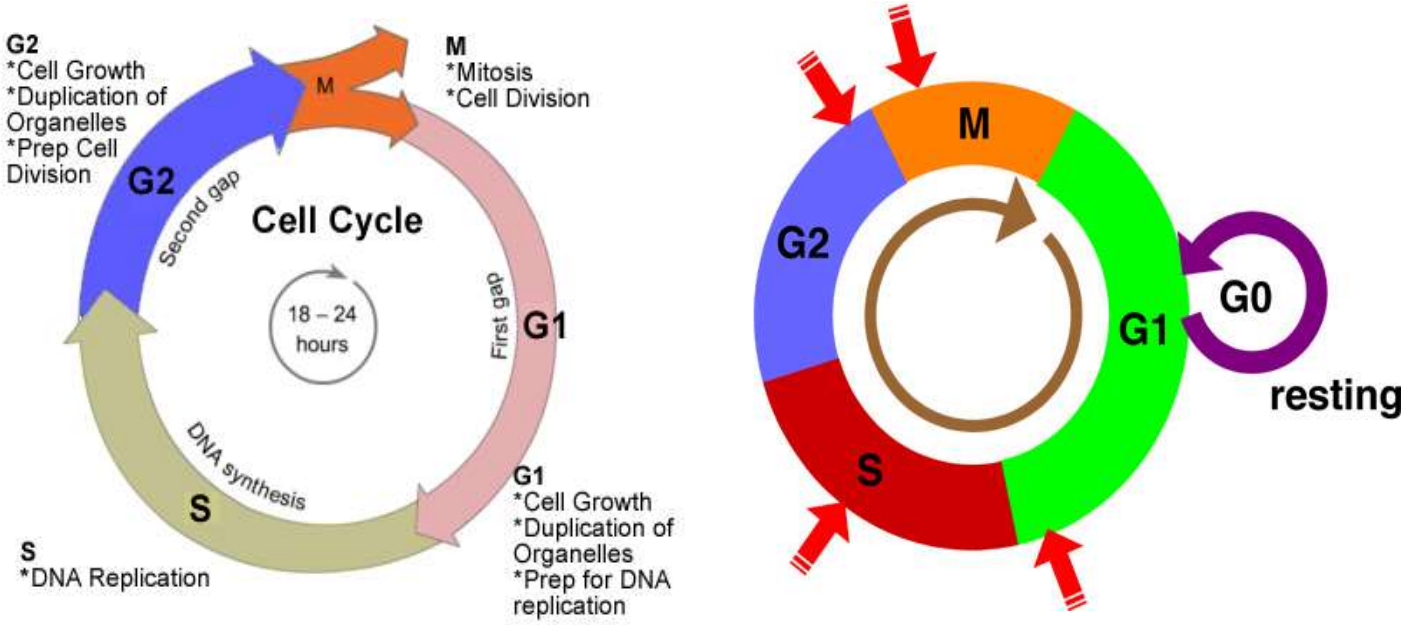
| Tissue | Benign | Malignant |
|---|---|---|
| Bone | Osteoma | Osteosarcoma |
| Cartilage | Chondroma | Chondrosarcoma |
| Fat | Lipoma | Liposarcoma |
| Smooth muscle | Leiomyoma | Lieomyosarcoma |
| Striated muscle | Rhabdomyoma | Rhabdomyosacoma |
| Liver | Benign hepatoma | Malignant hepatoma |
| Bone marrow | Non recognized | Leukemia |
| Squamous epithelium | Papilloma | Squamous cell carcinoma |
| Blood vessels | Hemangioma | Hemangiosarcoma |
| Nerve cell | Ganglioneuroma | Neuroblastoma |
| Fibrous tissue | Myxoma | Myxosarcoma |

**Treatment of tumor**

1-Surgery

2- Radiotherapy

3-Chemotherapy (Cytogenic agents).They are drugs that kill cancer cells directly and inhibition cell proliferation.




**Normal cell cycle.**

**Classification of chemotherapy cytotoxic anticancer drugs:-**

**1-According to cell-cycle phase**

**1-Cell-cycle phase specificity drugs: -** these anticancer agents are effective Only during a specific phase of the cell cycle .example Vincristine acts by causes mitotic arrest.

**2-Cell-cycle phase non-specificity drugs:-**These anticancer agents are affect cells during any phase of the cell cycle include G0 example streptozocin and mitomycin.

**2-Chemotherapy drugs**

A-Alkylation agents: - are interact with DNA by forming a covalent bond with a specific nitrogen atom in guanine.

**Alkylation agents**

1-Streptozocin 2-Cyclophosphamide

**B-Platinum compounds:-**

1-Similar to alkylating agents

2- It is conceder cell-cycle phase non-specificity

Platiunm drugs

1-Cisplatin 2-Carboplatin

**C-Antimetabolites :-**

These cytotoxic anticancer drugs are structural analogs of important natural metabolites and inhibit enzymes that synthesis essential cellular constituents.

**Classification of antimetabolites anticancer drugs.**

I-Folic acid analogs: - These drugs block the conversion of folic acid to its active form.

**Folic acid analogs drugs**

Methotrexate

**II- Pyrimidine analogs: - act by:-**

1-They can inhibit biosynthesis of pyrimidines.

2-They can inhibit biosynthesis DNA and RNA.

3-They can undergo incorporation into DNA and RNA.

**Pyrimidine analogs drugs**

1-Fluorouracil 2-Cytarabine

**III-Purine analogs**

1-They can inhibit biosynthesis of purine

2-They can inhibit biosynthesis DNA and RNA

3-They can undergo incorporation into DNA and RNA

**Purine analogs drugs**

Mercaptopurine

**D-Endocrine therapy**

The important characterized of hormones and hormone antagonists anticancer drugs.

1- These drugs act on target tissue by act on the specific receptors on target tissue.

2-Least toxic of all anticancer drugs

**Endocrine anticancer drugs**

1-Glucocorticoids example prednisone

2-Antiestrogens these drugs block estrogen receptors example Tamoxifen uses to the breast cancer.

3-Androgen receptor blockers example Flutamide.

**E-Immunotherapy**

The purpose from immunotherapy it is stimulate the hosts own immune system to kill cancer cells.

**Immunotherapy anticancer drugs example:-**

BCG (Bacille Calmette – Guerin) Vaccine this vaccine use to the urinary bladder cancer.

**Side effects of anticancer drugs**

1-Low blood counts causes an increased possibility of developing infection or anemia

2-Tiredness

3-Mouth soreness

4-Nausea, vomiting

5-Loss of appetite

6-Constipation or diarrhea

7-Hair loss

8-Skin changes or reactions

9-Pain or nerve changes

10-Changes in fertility and sexuality

# Toxicity

16

**Toxicology** is the study of the adverse effects of chemical, physical, or biological agents on living organisms and the ecosystem, including the prevention and amelioration of such adverse effects.

**Toxic substances** that are produced by biological systems such as plants, animals, fungi, or bacteria.

**Lethal dose**
the dose of a substance that results in the death of cells, tissues, or t he organism.

**Toxicant** is toxic substances that are produced by or are a by-product of human activities.

**Toxicity periods**

1- **Acute Toxicity**: Daily examination of the animals and tabulation of the number of animals that die in a 14-day period after a single dosage occurs.
2- **Sub-acute Toxicity**: performed to obtain information on the toxicity of a chemical after repeated administration for typically 14 days.
3- **Subchronic Toxicity**: exposure usually lasts for 90 days.
4- **Chronic Toxicity**: Long-term or chronic exposure studies are performed similarly to sub-chronic studies except that the period of exposure is usually for 6 months to 2 years.

**Routes of Exposure is a Determinant of Toxicity**

1- Inhalation exposure- Gases, vapors, airborne powders, and aerosolized liquids are inhalation risks
2- Dermal exposure - Chemicals in contact with the skin can cause local effect but may also enter the systemic circulation and cause effects at distant sites from the entry route.
3- Ingestion exposure .
4- Injection exposure.
5- Eye exposure

**Treatment of Poisoning**

1- Supportive care
2- Activated charcoal for serious oral poisonings.
3- Occasional use of specific antidotes or dialysis.
4- Only rare use of gastric emptying.

**Alcohol (chemistry)**, an organic compound in which a hydroxyl group is bound to a carbon atom.

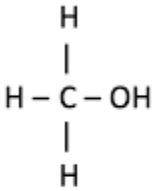

water an alcohol

## Types of Alcohol

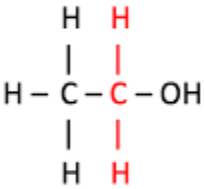
1- Ethanol alcohol:- (also called **ethyl alcohol**, **grain alcohol**, **drinking alcohol**, or simply **alcohol**) is an organic chemical compound. It is a simple alcohol with the chemical formula $C_2H_6O$.

2- Methanol Alcohol: also known as **methyl alcohol and wood alcohol** because it was once produced chiefly by the destructive distillation of wood., amongst other names, is a chemical and the simplest alcohol, with the formula $CH_3OH$

Methanol



Ethanol



# Effects of alcohol on the body

## Brain

Alcohol interferes with the brain's communication pathways, and can affect the way the brain looks and works. These disruptions can change mood and behavior, and make it harder to think clearly and move with coordination.

## Heart

Drinking a lot over a long time or too much on a single occasion can damage the heart, causing problems including:

- Cardiomyopathy – Stretching and drooping of heart muscle.
- Arrhythmias – Irregular heart beat.
- Stroke.
- High blood pressure .

## Liver

Heavy drinking takes a toll on the liver, and can lead to a variety of problems and liver inflammations including:

- Steatosis, or fatty liver
- Alcoholic hepatitis
- Fibrosis
- Cirrhosis

## Pancreas

Alcohol causes the pancreas to produce toxic substances that can eventually lead to pancreatitis, a dangerous inflammation and swelling of the blood vessels in the pancreas that prevents proper digestion.

## Cancer

According to the National Cancer Institute: "There is a strong scientific consensus that alcohol drinking can cause several types of cancer.

- Head and neck cancer, including oral cavity, pharynx, and larynx cancers.
- Esophageal cancer, particularly esophageal squamous cell carcinoma.
- Liver cancer.
- Breast cancer:
- Colorectal cancer.

# Eyes

Ingesting as little as 10 ml of pure methanol can cause permanent blindness by destruction of the optic nerve. 30 ml is potentially fatal

# Toxicity with antibiotics , Penicillin , Cephalosporin .

1- Neurotoxic side effects of β-lactam antibiotics are well-known conditions for decades. β-lactam antibiotics can trigger epilepsy or seizures because of their chemical structures of β-lactams that make them capable of binding to the gamma-aminobutyric acid (GABA) receptors in the brain. Some of the β-lactams are GABA receptor antagonists.

2- Genotoxic effects of some β-lactams have been shown in some studies done *in vitro*. Ceftazidime is toxic to bone marrow cells.

3- β-lactam antibiotics have toxic effects on the urogenital system.