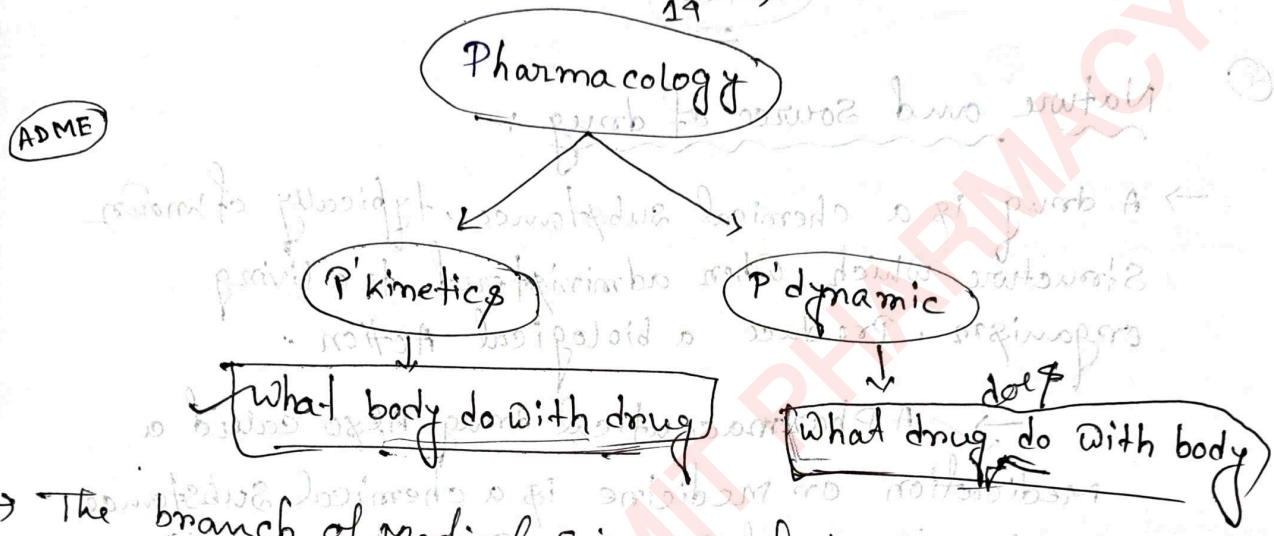
General Pharmacology Unit-1

5×1 = 5 } Must know
2×1 = 2 }
5×1 = 5 } Desirable to know
2×1 = 2 }
19 -19 Marks



→ The branch of Medical Science in which study about the characteristics of drug in which the body and drug responce is called Pharmacology.

→ It is two types →
a) Pharmacokinetics;
b) Pharmacodynamics

① Pharmacokinetics :→

"What body do with drug"

→ It is following four types

A → Absorption
B → Distribution
M → Metabolism
E → Excreation / Elimination

ADME

(*) Pharmacodynamics :-

"What drug do with body"

Action

(*) Nature and source of drug :-

→ A drug is a chemical substance, typically of known structure which, when administered to a living organism, produce a biological Action.

→ A Pharmaceutical drug also called a medication or medicine is a chemical substance used to ~~tea~~ treat, cure, Prevent or ~~dig~~ diagnose a disease.

(*) Nature of drug :-

1. Symptomatic drug
2. Preventing drug
3. Diagnostic drug
4. curative drug
5. Health Maintance drug
6. contraceptive drug

→ contraceptive Drug

(1) Symptomatic drug :-

→ Those drugs which are given to treate the symptom of any disease is called symptomatic drug.

(II) Preventing drug :-

→ Thog drug which are Prevent the causes of the disease this is called Preventing drug.

eg :- Antibiotics.

(III) Diagnostic drug :- → Amoxicillin - 625 tab

→ Those drug which are use to determine the reason or cause of any disease this is called diagnostic drug.

(IV) curative drug :-

→ curative drugs are those drugs which is basicaly are suplim ment which are given to Patient for the treatment of any disease or Prevention of Any disease.

(V) Health Maintance drug :-

→ Those drugs which are use to health maintance our body or maintain immuno system this is called Health maintance drug.

(VI) contraceptive drug :-

→ Basically contraceptive drugs are use to made on Female to resist the ovum sperm fertilization.

eg :- Estrogen, Pogesteron.

⊛ Source of drug :-

a) Plant
b) Animal
c) Mineral
d) Synthetic
e) Micro organism
f) Genetic engineering.

a) Plant :-

Those drugs which are get's from Plant this is called Plant source drug.

eg:- Atropin, Digoxin.

b) Animal :- Those drugs which are get's form animal this is called Animal source drug

eg:- Enzyme, Hormones ⇄ Insulin, Thyroxin

c) Mineral :- Those drugs which are obtained form rock, stone this is called Mineral source drugs.

eg:- $CuSO_4$, $MgSO_4$, Zink, Salts.

d) Synthetic :- Those drugs which are Prepared in lab this is called synthetic drugs.

eg:- Paracetamol, Ibuprofen

e) Micro organism :-

→ Those drugs which are gets form the micro organism like bacteria, virus, fungi etc. This is called Micro organism source drug.

Eg:- Antibiotics

f) Genetic engineering :-

→ Those drugs which are prepare by the help of genetic engineering technique is called Genetic engineering source drug.

Route of Drug Administration

Enternal
- → Oral
- → Sublingual
- → Buccal
- → Dental cones
- → Rectal.

Here Bioavailibility decrease

Parenteral
- → Intervernous (IV)
- → Intermuscular (IM)
- → Subcutaneous (Sc)
- → Intra Arfear (IA)
- → Intra cardiac (Ic)
- → Intradermal (ID)

→ Bioavailibility ↑ 100%.

Topical
- ⊗ on skin
- ⊗ on cavities

Ingestion of Food
↓
Tongue & soft Palate
↓
Pharynx
↓
Esophagus
↓
Stomach
↳ Small intestine

⊛ Enteral Route of Administration :-

→ Enteral Means GIT When any drugs is Pass through GIT and Reach into the blood is called Route of Administration.

⊛ Oral :-

→ When any drug is given through mouth and Pass through GIT is called oral drugs.

→ Types of oral drugs

- Tablet
- capsule
- Solution (syrup)
- Suspension
- Powder.

→ Advantage :-

- Easily taken by mouth
- It is easily available.
- No Expert is required for his administration.
- No extra Precautions is required for storage.

→ Disadvantage :-

- Bioavailability is very less.
- Drug is first Pass metabolic.
- very slow responce.
- unconceas Patient can't take the drug.

Sublingual Route of Administration:-

→ Where the dosage form is Placed under the tongue.

→ Rapidly ~~absorbed~~ Absorve by sublingual mucosa.

Advantage:-

- Drug Absorption is quick.
- quick termination.
- Economical.

Dis-Advantage:-

- unplatable and bitter drug.
- Few drugs are absorbed.
- Large quantities drugs not given.

Buccal Route of Administration:-

→ Where the dosage form is placed b/w gums and inner lining of the check absorbed by buccal mucosa.

→ Advantage:-

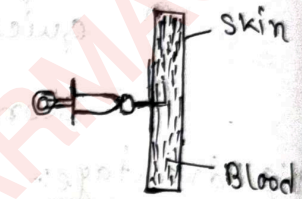
- Avoid first Pass limit.
- Rapid Absorption
- Drug Stability.

Disadvantage:-

- Small dose limit.

⊛ Parentral Route of Administration :→

→ The term Parentral Means out side form the intestinal Route it means when drug is not Passing through the gastro intestinal Roulte Parentral Administration is given by injection inside the body.



Parentral

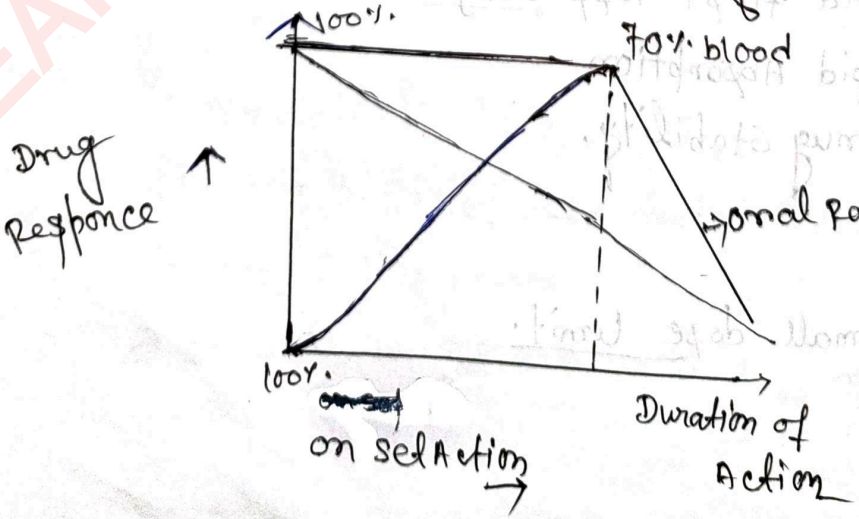
Para → out side the body

enternal → Intestinal Route

⊛ Intravenous Route :- (IV)

→ Intravenous drug is directly incertain into veins by injection. The Bioavailabity of 'IV' Routs is 100 % and there is no loss of drug by first Pass metabolism.

• There on set Action is very quick.



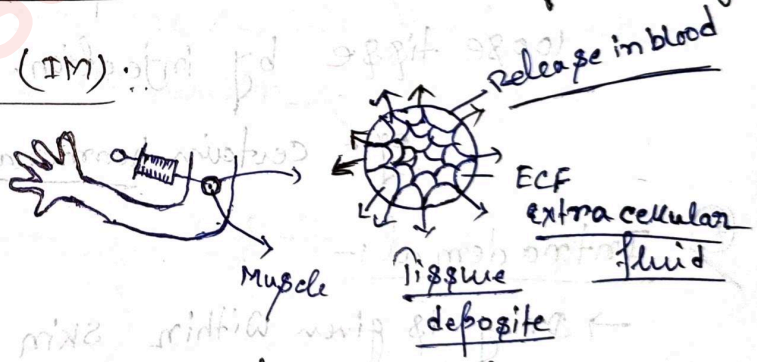
Advantage:-

- quick onset of Action
- 100% bioavailability.
- No first Pass metabolism.
- you can give unconceous patient.
- Less amount of drug is required drug is not Pass through GIT, so no drug wasted.

disadvantage:-

- It is very costly.
- It create Pain during injection.
- For IV Administration expert is required.
- cell necrosis can occure at the site of Injection.
- If drug toxic then it can't be remove by vomating.

Intra Muscular Route (IM).



→ Intramuscular drug is not directly injected into the blood it is given into muscle and then it relase into the blood.

→ Those drugs whose Particle size is bigger it is given by IM Route.

→ When drug is incersion into muscle than create a tissue deposite after metabolic Process the drug Release into blood.

* Advantage :-
  - Rapid onset of Action.
  - Gastric factors can be avoided.
  - Absorption.
* Disadvantage :-
  - Expensive
  - only upto 10 ml drug given.
  - Nerve Damage.

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* Subcutaneous :-

→ ~~injection~~ Injected under the skin, Absorption is slow so action is Prolonged.

IMPLANT :→ A Tablet or capsule is incertain into the loose tissue by injection.

eg:- certain hormonal drugs.

* Intradermal :-

→ Drug is given within skin layers (dermis)

→ Painful.

→ Mainly used for testing sensitivity of drug.

eg:- Penicilin, ATS (Anti-tetanus syrum)

- Inoculation :- Administration of vacine (like Small pox vaccine)

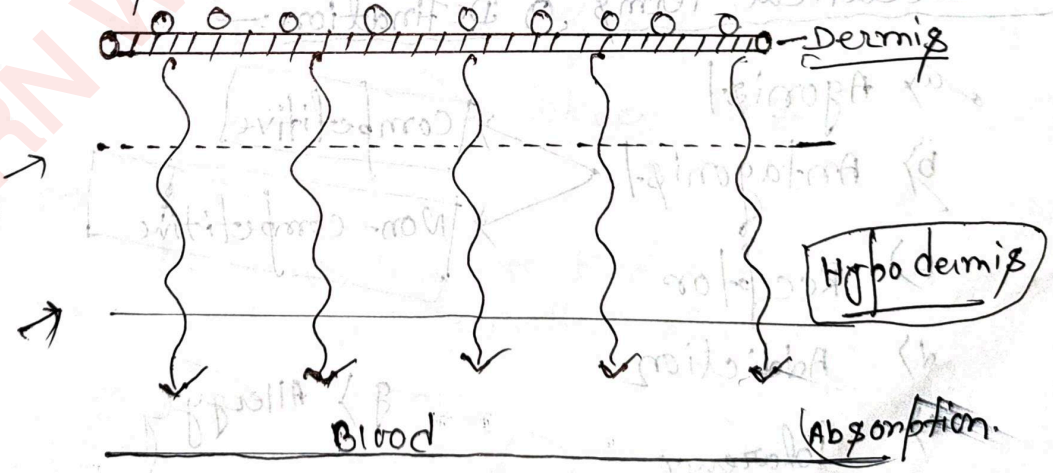
Intra-Articular :-

- Injections of Antibiotics and corticosteroids are administration.
- Inflammed Joined cavities by expert.

eg :- hydrocortisone in rheumatoid Arthritis.

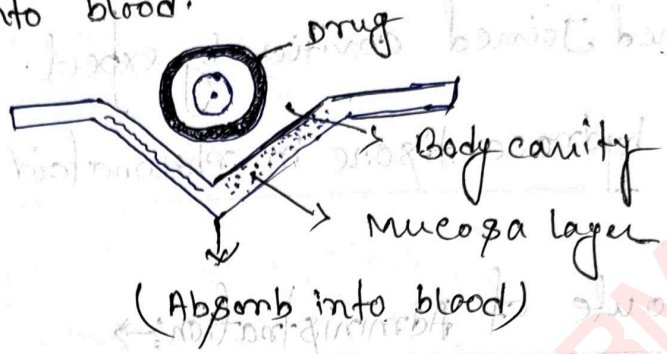
Topical Route of Administration :-

- When drug is apply externaly without blood. Then it is called topical route drug Administration.
- Topical drug apply on the skin Surface and different external body cavities.
- When topical drug Apply are the skin then it reach into the systemic circulation by Adsorption Mechanism.



- Topical drug is also inserted into body cavities like – eye, Ear, Nose, Rectal, urethral.

⊙ The inner lining of body cavity is made by mucosa layer and drug is absorb through layer and Reach into blood.



Advantage:-

⊙ It is apply for local Action.
⊙ Here is less chance of side effects.
⊙ easy to remove if drug is wrong.

Disadvantage:-

⊙ It gives late Action
⊙ Lotion and suppository is irritating for Patient.

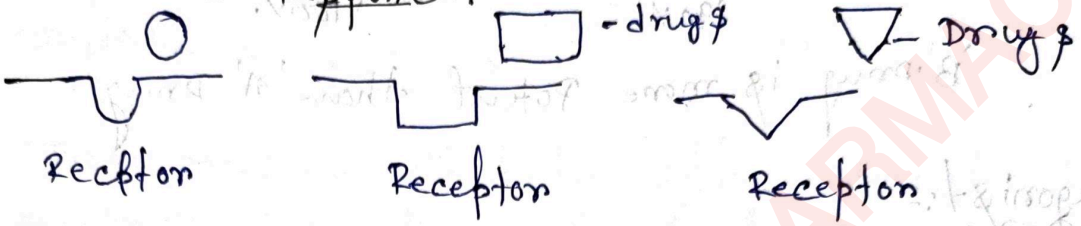
⊛Pharmaceutical Terms & Defination:-

→

a) Agonist
b) Antagonist → Competitive, Non-competitive
c) Receptor
d) Addiction
e) Tolarence
f) Allergy
g) Dependance
h) Tachphylexic
i) Idosyncrasis

⊛ Receptor :-

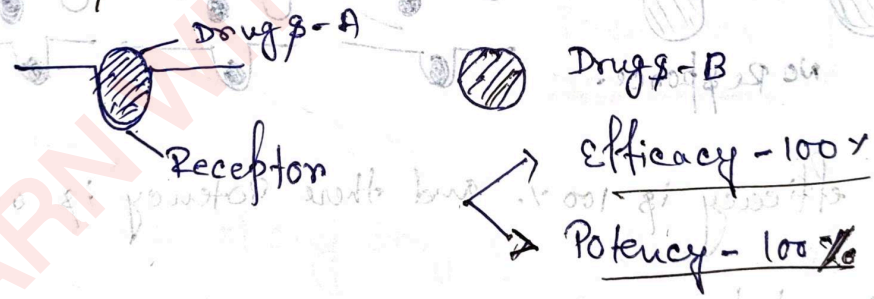
→ Receptor are the proteinous structure are behave like a active site they are present of any organ. on the Receptor when drug bind they gives Pharmalogical Action and Responce.



⊛ Agonist :-

→ Agonist are those chemical molecule which bind with the receptor and give 100% same Responce like the natural drug.

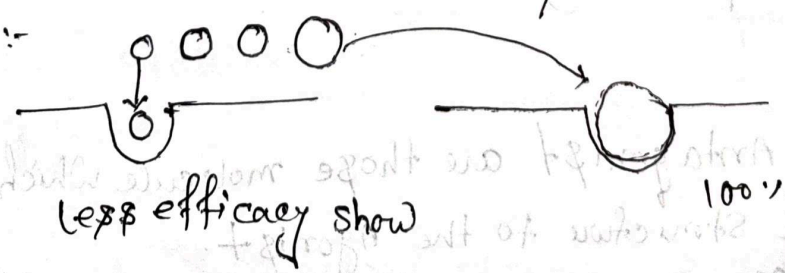
① The Agonist have they 100% efficacy & Potency is also 100%.



Efficacy :→

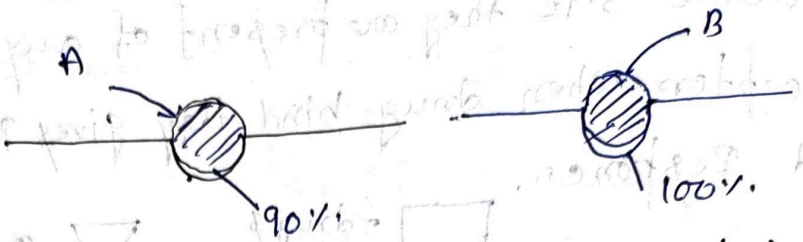
Effinity of drug to bind with the receptor is called efficacy.

Eg:-



* **Potency :-** The effect of Any drug Produce after binding with the receptor.

eg:

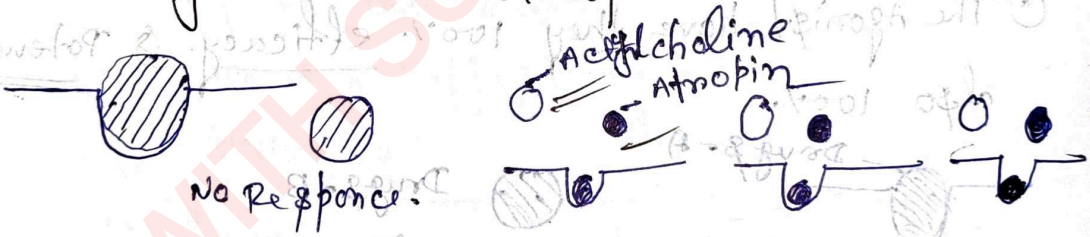


'B' Drug is more Potent than 'A' Drug

* **Antagonist :-**

→ Antagonist are those molecule which have Similar Structure like agonist but they don't give Pharmacological responce.

→ The Antagonise give opposite Action of Agonist and they blocked the Receptor.



⊙ There efficacy is 100% and there Potency is 0%.

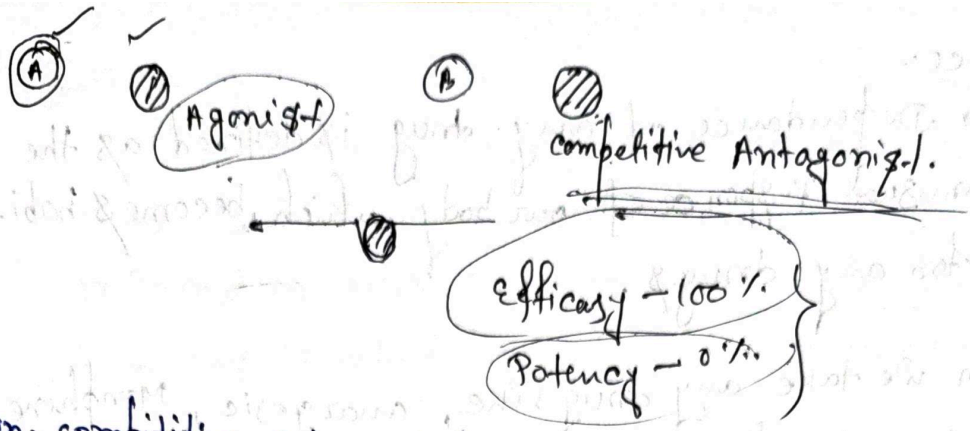
→ It is two type -

① competitive
② Non-competitive }

① **competitive :-**

→ competitive Antagonist are those molecule which have similar Structure to the Agonist.

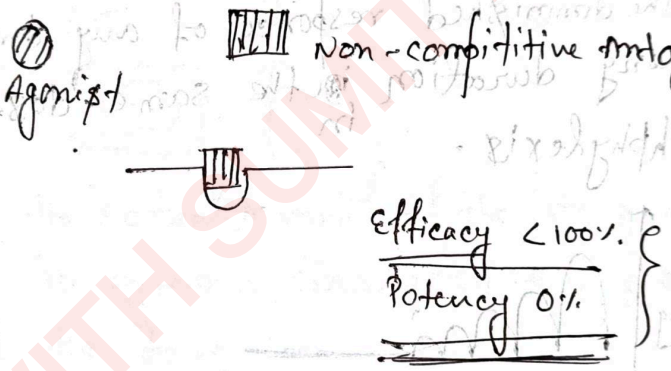
⊙ There efficacy is 100% and there Potency is 0%.



(*) Non-competitive Antagonist:→

→ Those compound which have different structure than Agonist they block the receptor for less time.

→ and there efficacy is less than 100 %. and Potency is 0%.



(*) same Addiction:→

→ Addiction of any drug is a drug Abuse this is basically when we take any drug for long duration then after that time our body shows some unusual Physical behaviour or some unusual Phsical changes in our body called Addiction.

(*) Tolerance:→

→ The diminished response of any drug for given of long duration in the same dose.

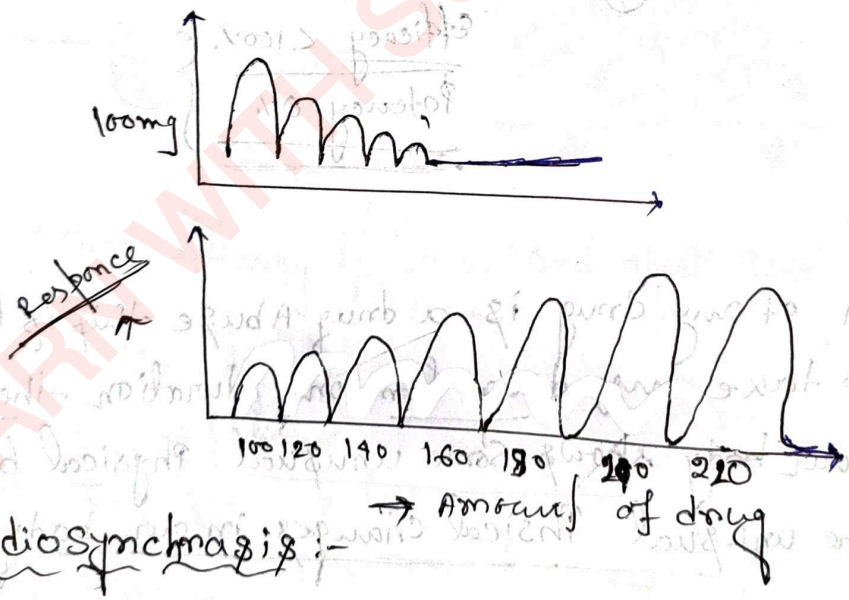
① Dependance:-

→ Dependance of any drug is defined as the any unusual responce of our body which becomes habitual for any druggs.

→ When we take any drug like, anargesic, Morphine for long duration than our bodyes make dependance for ~~those~~ these druggs and which don't receive drug in a particular time then it may cause different Headache,

② Tachyphylexis :→

→ The diminished responce of any drug for uping long duration in the same dose is called ~~t~~achphylexis.



③ Idiosynchrasis :-

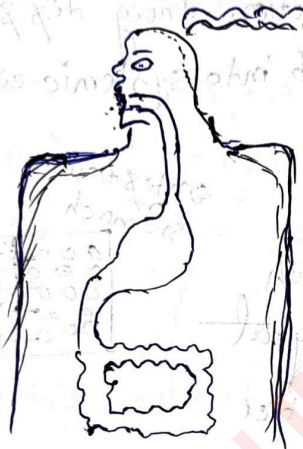
⇒ The Idiosynchrasis of any drug is unusual and different behaviour of same drug in different body this is called 'Idiosynchrasis.

Allergy :-

→ It is the inflamatory response of any particular Sub's which is non-self for our body it produce inflamation like, Redness, heat, colored, swelling, Pain this is called 'inflamation' or 'Allergy'.

Bioavilibility

→



ADME

500 mg → 200 mg Metabolises
300 mg (Bioavailibility)

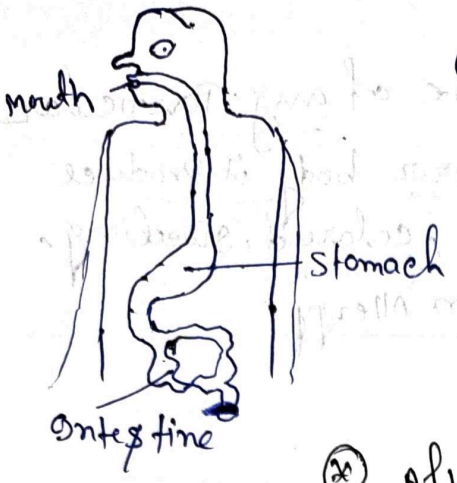
→ It is the Actual Amount of the drug which reach into the sytemic circulation this is called bioavailibility of the drug.

⊙ Those drug whose bio availibity is high the rate of Absorption is also high..

Absorption

through oral route

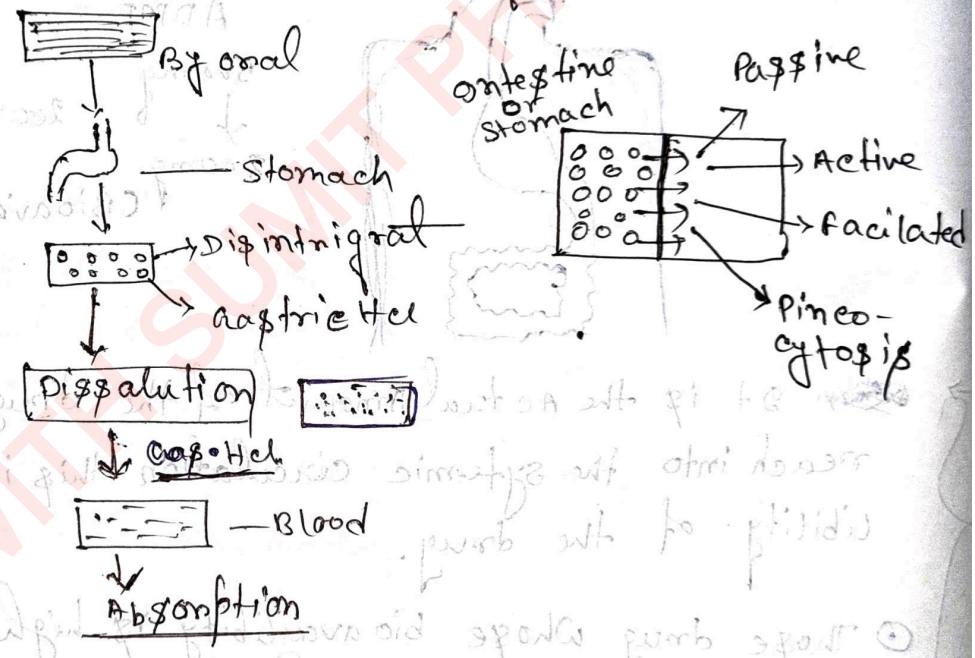
→ When we take any drug, then is goes into the stomach and after dig. infrigration & dissolution it absorb into blood.



(*) Absorption is the first step of Pharmacokinetics.

(*) In disintrigration step drug break into small Particle in the Presence of gastric Hcl

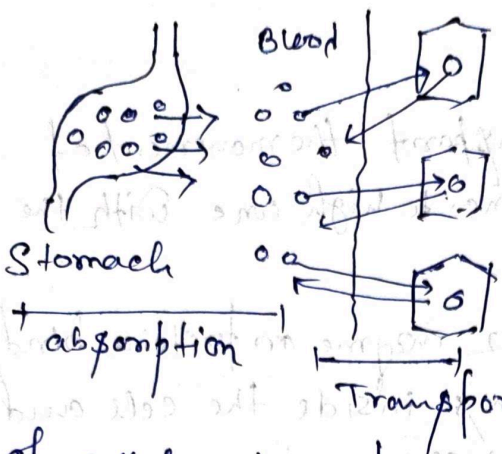
(*) After disintrigration drug dissolve into gastric Hcl and Absorb into systemic circulation

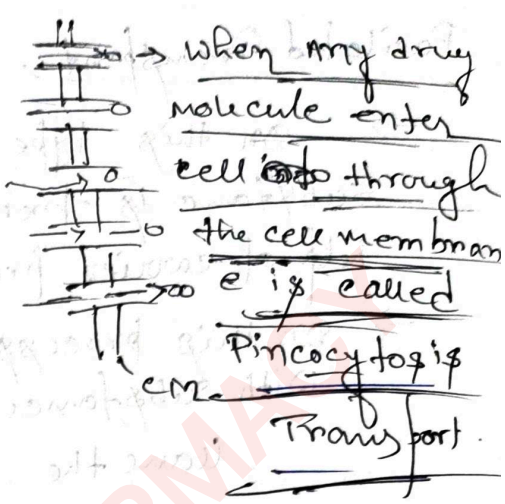


(*) **Cellular Transport :-**

→ The movement of food particle from blood to cells form cell to blood is called cellular Transport.

→ By the use of cellular Transport the chemical substance which is absorbed in blood is moves into cell and waste substance moves form cell to blood.





⊛ Types of cellular transport :-

- Active Transport → Need energy
- Passive Transport → Natural Process
- Facilated Transport → Need carier protein
- Pincocytosis "

⊛ Active Transport :-

→ In this type of Transport the movement of Subs is form low conc to higher conc with the help of energy.

(*) In this type of Transport ATP is used for movement.

⊛ Passive Transport :-

→ In this type of transport the movement of Subs is high conc. to low concentration.

(*) It is two types —

(A) By Diffusion (No semipermeable membrane is used)

(B) By osmosis (Semi permeable membrane is used)

high to low movement — of any particle.

Facilated Transport :-

→ In this type of transport the movement of substance is from low conc. to high conc. With the help of carrier protein.

→ In this process carrier enzyme or protein bind with substance and moves inside the cell and leave the substance.

⊛ Factors affecting Drug Absorption :-

→ Drug absorption is depends upon following factors-

(a) Physiochemical Properties of drug
(b) Physiological factors
(c) Nature of dosage form.
(d) Route of drug Administration.
(e) ~~Biavai~~ Bioavailibity

→ Tab, capsule, Suspension, Syrup, Emulsion, injection et c.

Physiochemical Properties of Drugs

- Particle size
- Nature of Powder from of drug
- Solubility / Dissolution
- Salt from of drug
- Ionization Rate

(A) Particle Size :→

→ The absorption of drug is inversely Proportional to the Particle Size.

→ As well as the Particle size of drug is increase the rate of absorption is decrease.

→ And when the Particle size is decrease then the Rate of absorption is high.

(B) Nature of Powder from of drug :-

→ The nature of any Powder is of two types Amorphus or crystaline.

(*) The Amorphus Powder is dissolve very easily because it takes less energy

(*) And in crystaline form they require high energy for dissolution because, they have crystal latic structure.

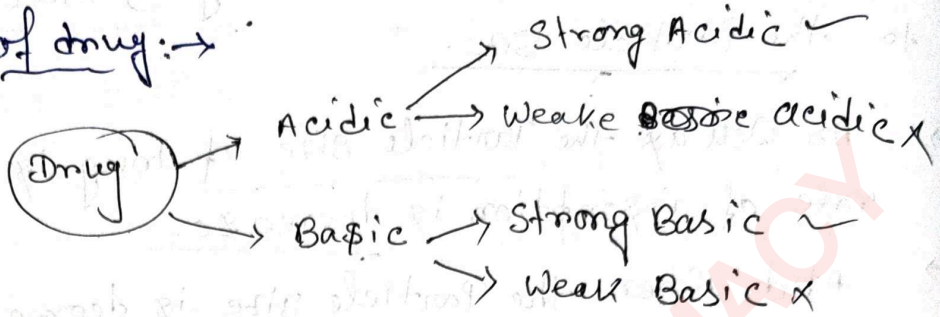
→ So the Rate of Absorption is the high for Amporphus Powder and the rate of Absorption is very low for crystaline Powder.

(C) Solubility / Dissolution :→

→ The rate of absorption of any drug is also depends on the Solubility factor because our gastric is hydrophilic in nature so hydrophilic drug more easily can dissolve into the gastric Hd than lipophilic drug. so, the rate of

absorption is high for hydrophilic drug and the rate of of absorption is low for lipophilic drug.

⑤ Salt form of drug :→



→ The Strong Acidic or Strong Basic drug can easily dissociate into the solvent.

→ So their dissolution rate and absorption rate is very high but in the case of weak acidic and weak basic drug their dissociation rate is slow so the absorb very slowly.

→ But when it convert the weak acidic and weak Basic drug into salt form them their rate of dissociation is increase and their rate of absorption is also increase.

Ionization Rate :-

→ Those drug which are in ionic form they can be dissolve eassily but they can't cross the cell membrane.

→ But in the case of non-ionic form of Drug the can't dissociate easily but thier rate of absorption is high.

→ So we make any drug in such a way at the time of dissolution they are in ionic form and at the time of absorption they should be in non-ionic form.

(*) Physiological factor:-

- Membrane Transport
- Gastric emptying time
- Drug stability and pH of GIT
- Surface Area.
- Blood flow
- Effect of food.
- First Pass Metabolism.

(A) Membrane transport:-

① Active Transport (low → high)
② Passive Transport (high → low)
③ Facilated Transport (low —Protein→ high)

(B) Gastric emptying Time:-

→ The absorption of drug is also depends upon the gastric emptying time.

→ The drug whose gastric emptying time is less their Rate of absorption is high.

(C) Drug stability and pH of GIT:-

→ There ~~are~~ are lots of drugs which are soluble in acid or stable in gastric Acid. They can be easily dissolution and their rate of absorption is high.

→ But is certain case many drugs which do not Dissolve into gastric acid and which becomes disintrigeted or becomes deactivated in (gastric media)

acidic mediam. So they are uses in certain Polymer form and they diggolve indo the intestine and their rate of absorption is increase.

Surface area :-

→ Surface area of any body is directely Proportional to rate of Absorption.

→ If the surface area is increase then the more no of drug will be absorb Proper Way.

Blood flow :-

→ The Rate of drug absorption is directly Proportional to the blood flow.

→ When the blood flow in body is increase then the rate of drug absorption is also be increase.

Effect of food :-

→ The rate of drug absorption is also depends upon the food which is present in the stomach.

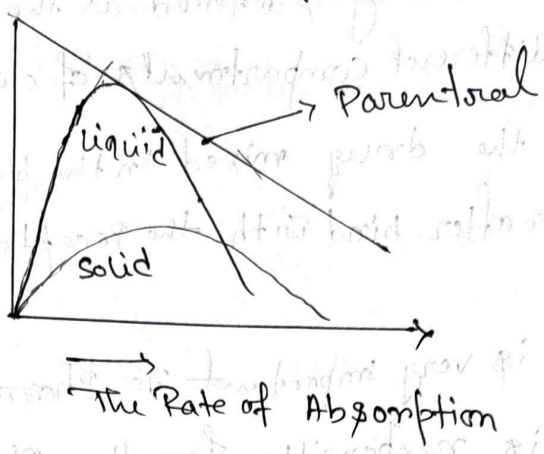
→ If the food is Present in stomach then it dilute the drug and rate of absorption will decrease.

First Pass metabolism :-

→ When the drug directly goes into the liver without reaching into the receptors and systemic circulation

→ this is called first Pass metabolism.

Nature of Dosage form



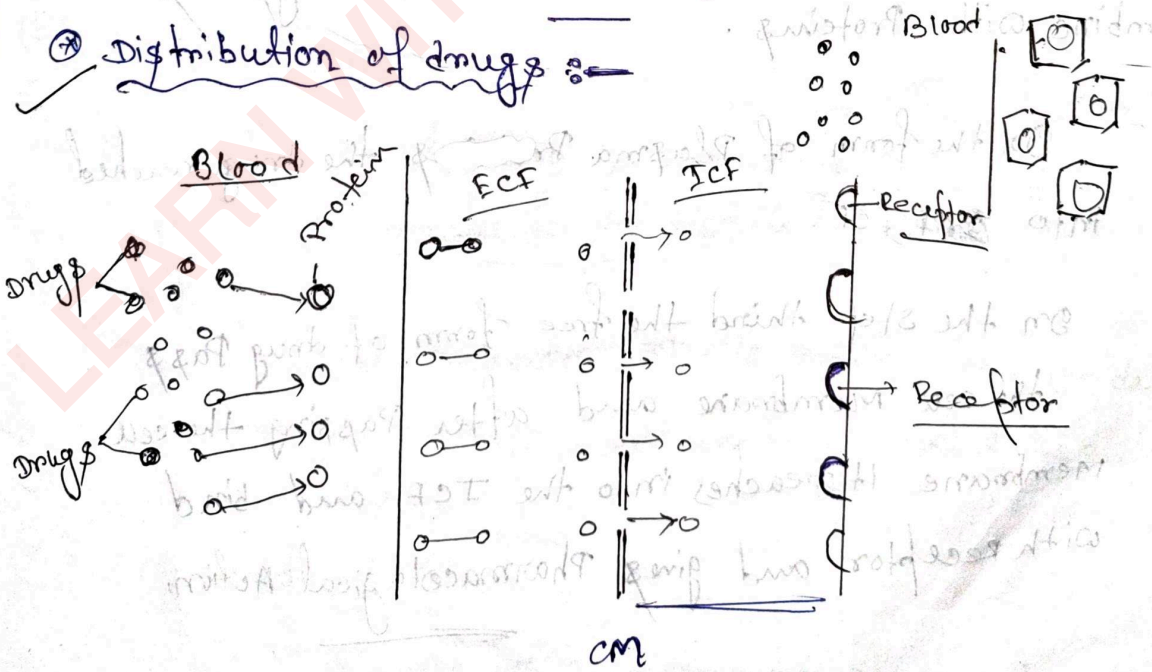
→ The Rate of drug Absorption is also depends upon the nature of dosage form.

→ If the drug is taken in orally the some Part of drug is metabolised to their rate of absorption is Slow.

→ But When the drug is given Parentarly their bioavaibility is 100% and route of absorption is 100%.

→ In the case of oral, the absorption of liquid dosage form is greater than solid dosage form.

⊛ Distribution of drugs :—



→ The Distribution of drug is defined as the movement of drug into different compartments of our body.

→ First of all the drug mixed in the blood and goes ECF and then after bind with the Receptor and ~~pharmacologic~~ Pharmacologic al Action.

⊛ Distribution is very important to Pharmacological Action, Because it is responsible for the Pharmcological Action of any drug when the drug can't bind with Receptor they can't give Pharmacological Response.

⊛ **Steps of Distribution:-**

→ Steps of Distribution is of following three types —

Steps-1 ⊛ Step first after the absorption they is comes into the blood and some part of drugs is combine with Proteins.

Step-2:- On the form of Plasma Proteins the drug reached into ~~ICF~~ ICF.

Step-3:- On the step third the free form of drug Pass the cell membrane and after Passing the cell membrane it reaches into the ICF and bind with Receptor and gives Pharmacological Action.

Factor Affecting Distribution:-

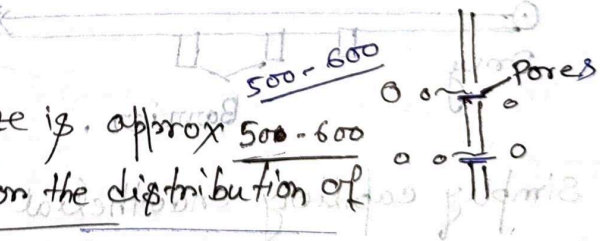
→ These are the following factor of affecting distribution.

1. Physiological Barrier
2. Plasma protein binding
3. Tissue Permeability
   - Physiochemical Properties
     - Molecule size
     - Degree of ionization
     - Partition coefficient.

a) Physiochemical Properties:-

→ The distribution of drug is also depends upon the Physiochemical Property of drug like, it pKa value, P^H value, its Particle size, Acidic nature, basic nature etc.

b) Molecular size:-



→ The molecular size is approx 500-600 Dalton is Permeable for the distribution of the drug.

⇒ If the molecular size is greater than 600 dalton then it can't Pass cell membrane and the distribution is not Possible.

c) Degree of ionization:-

→ for the better distribution of drug degree of ionization of the drug should be low.

Partition co-efficient :-

→ Drugs are generally Hydrophilic or Lipophilic in nature.

→ If drugs are lypophilic in nature they can cross the cell membrane simply because our cell membrane is made up from 'phospholipid' and 'cellulose'.

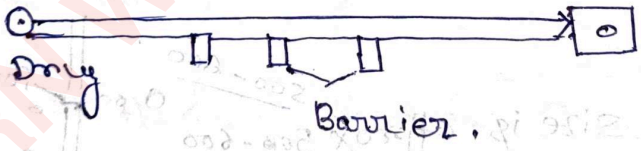
→ If the drugs hydrophilic in nature they can't cross the cell membrane simply.

⊛ Physiological Barrier :→

→ Physiological Barrier are those Barrier which inhibit the free movement of drug into organ directly.

→ It decrease the rate of absorption and Distribution.

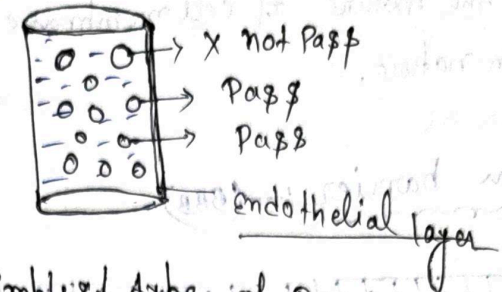
→ The nature of physiological barrier is different in different organ.



different organ.

(a) Simply capillery endothelial barrier (SCEB)
(b) Simple cell membrane Barrier (SCMB)
(c) Blood Brain Barrier (BBB)
(d) Blood Placenta Barrier (BPB)
(e) Blood testes Barrier (BTB)

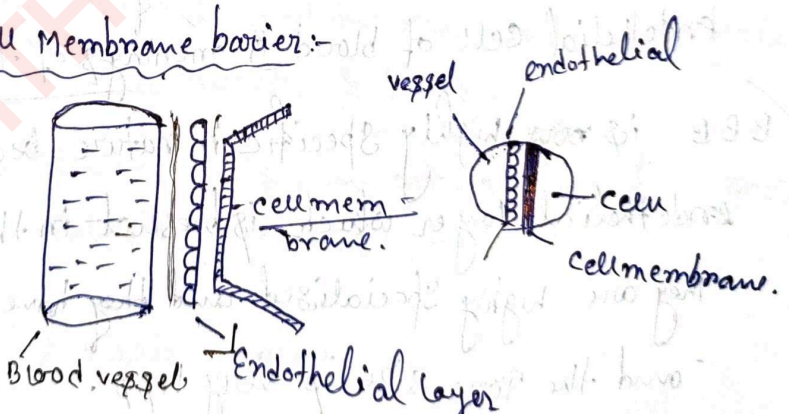
(A) Simple capillary endothelial Barrier :⇒



→ This is the simplest type of Barrier because in the blood vessel inner wall is made up of endothelial and in blood vessels small pores are present and drug can pass only those pores and can't pass other than pores.

⊙ If the Particle size of Molecule is more than 600 dalton, then Particle size can't pass those spaces and they can't ~~distribution~~ distribution from blood to any organ.

(B) Simple cell Membrane barier :-

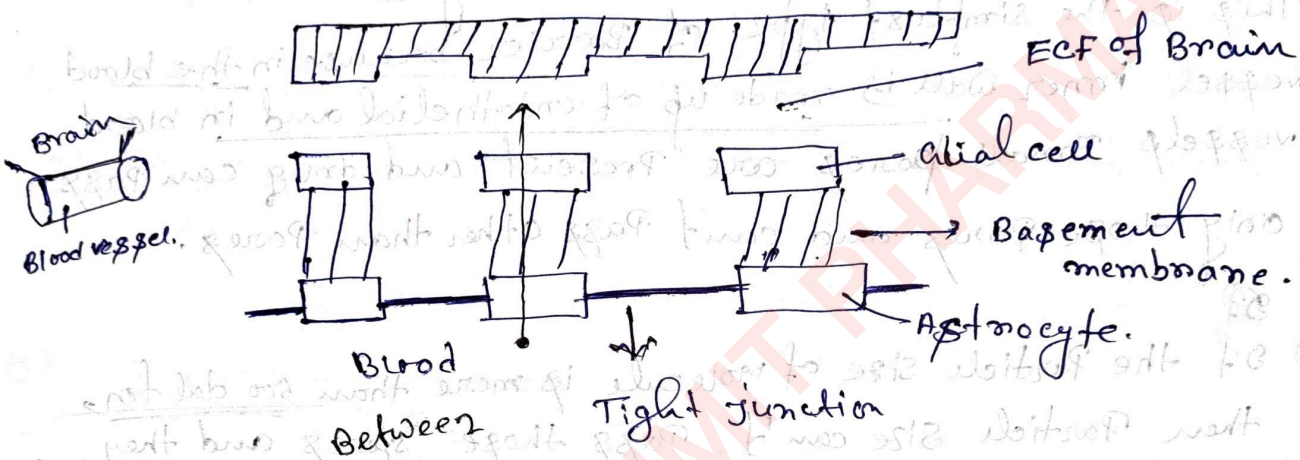


→ The simple cellmembrane barrier is present b/w the endothelial layer of blood vessel & the cell membrane of any cell.

→ In this Barrier only the drug Particle size 50-600 Dalton can Pass and the larger Particle can't Pass.

① In this type of Barrier only lipophilic drug can Pass because the nature of cell membrane Because it is lipophilic in nature.

② Blood Brain barrier :— (BBB)



→ The Barrier, Blood vessels and Brain is called Blood Brain Barrier.

→ The Blood Brain Barrier basically combination of endothelial cell of blood & menings of the Brain.

→ BBB is highly Specific in nature Because the endothelial layer which is present in the blood vessel. They are highly Specialised and they have tight junctions and the Pore Size is very less.

→ In the layer of Brain Basement membrane, Glial cell and Astrocyte cell are present which are highly lipophilic in nature so only high lipophilic drug can Pass the blood Brain Barrier.

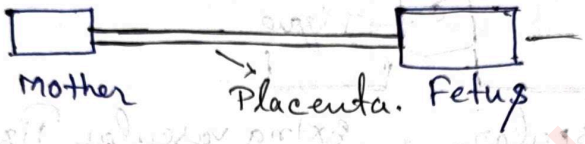
Approach :-

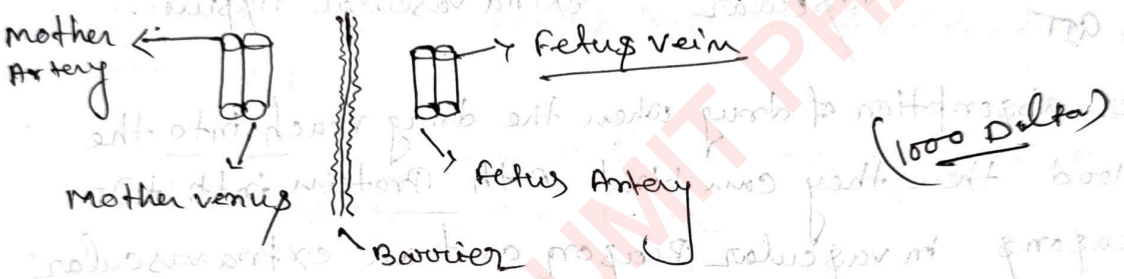
(a) Permeation enhance → Dimethyl sulfoxid

(b) Prodrug Approach → Dopamine, ~~Levodopa~~ Levodopa.

(c) carrier system → Active Transport.

(d) Blood Placenta Barrier (BPB)

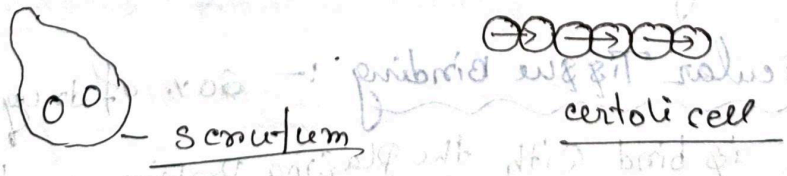




→ A semipermeable membrane made us of Placenta tissues. and limiting the kind and the ammount of material exchanged between Mother & fetus.

→ on a structural basis, the barrier effected is groun-ded By the Syncytiotrophoblast continuity.

(e) Blood Testes Barrier (BTB)

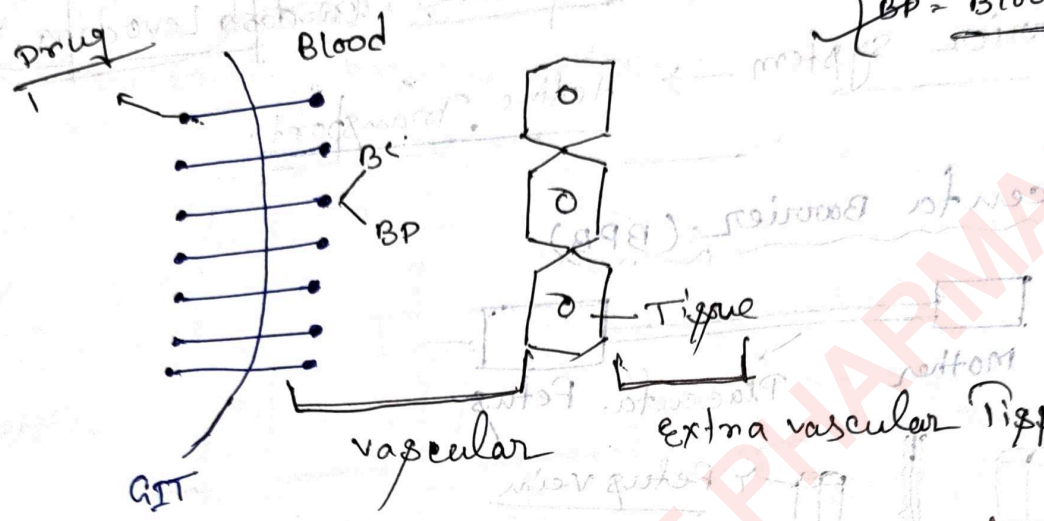


→ In blood testes barrier there are low such endothe-lial barrier is present ~~bfw~~ only the drug is pass through the ~~cert cell~~

certolie cell by diffusion / osmosis process.

Protein binding

BC = Blood cell
BP = Blood Plasma



→ After absorption of drug when the drug reach into the blood then they can bind with Protein into two reasons in vascular Reason and an extra vascular Reason:

① The Protein binding can be classified into two catagory —

① vascular Protein binding :- In this binding the Protein which is Present inside the blood and blood cells are responsible for the binding.

② Extra vascular Tissue Binding :- 60% of drug is bind with the Plasma Protein and all the rest all 40% (Proteins) drugs can cross the cell membrane barrier and they bind directly with the organs.

Mechanism

Reversible | Irreversible

(*) Reversible → on the basis of chemical reaction of drug with Protein the Protein binding mechanism is two type —

(I) Reversible Protein binding :-

→ On this type of protein binding the drug is bind with Protein with very weak force like, hydrogen bond, vander valve force of attraction. so, they can easily release the drugs, becomes free and it bind with the Receptor.

⊙ Reversible Protein binding is Responsible for Pharacological Action.

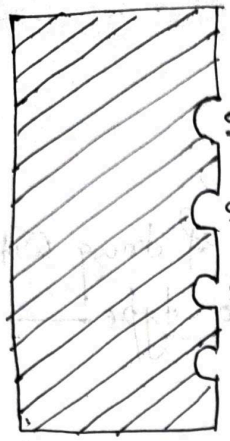
(II) Irreversible Protein binding :-

→ On this type of protein binding the drug bind with the Protein with strong bond like ionic bond, or covallent bond.

→ On this type of binding drugs after binding with protein can't release and drugs don't becomes free, so they can't Produce Pharmacological Action.

(*) Blood / Plasma Protein binding :-

protein
1) Albumin (59%) Albubumin Present ↑ 650,000 Drug Proteins
2) α-Alycoprotein
3) Lipoprotein
4) Alobuline



Side-I Warfarin binding site
Side-II Diazepam binding site
Side-III Digitoxicn binding site
Side-IV Tamoxifen binding site

① This is the largest protein which is present in blood Plasma

⊙ And about 5g % conc of this protein in present in Blood Plasma.

⊙ An about 65,000 thousand of drug receptors are present in this protein.

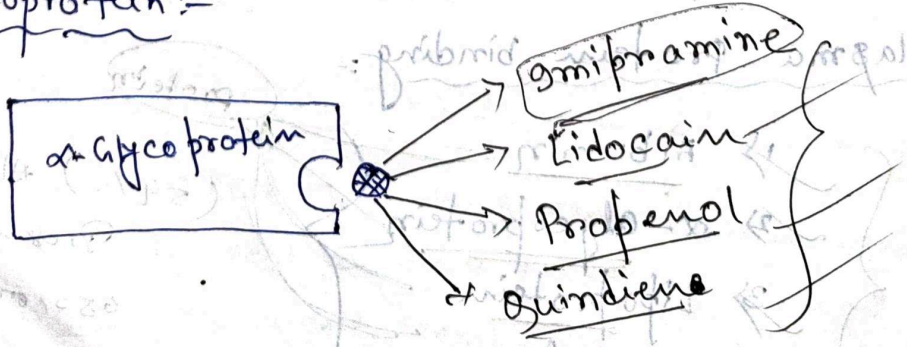
⊙ And so many kinds of drug bind with this Receptor.

⊙ In the albumin basically four type of side are Present

Side-I, Side-II, Side-III, Side-IV

Side-I → Warfarin Binding side
Side-II → Diazepam binding side
Side-III → Digitoxicn " "
Side-IV → Tamoxifen " "

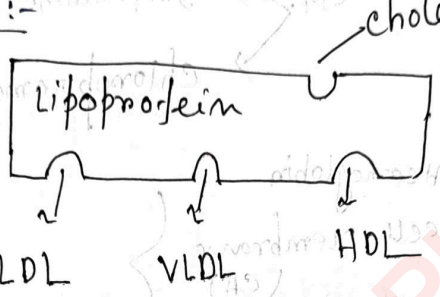
② α-Glycoprotein :-



→ α- Alycoprotein is the second largest protein of blood Plasma and in this protein basically Proteinous nature or glucose nature molecule are bind.

→ They are basically the drug, Imipramine, Lidocain, Propanol, Quindine.

(3) Lipoprotein :-



→ Lipoproteins are amphiphilic in nature. It contains combination of lipid & appoproteins. The lipophilic lipid consist of triglycerides & cholesteryl esters and hydrophilic appoprotein consists of free cholesterol & Proteins.

(4) Globuline :-

globuline

- α_1
- α_2
- β_1
- β_2

→ It mainly binds to endogenous Substance.

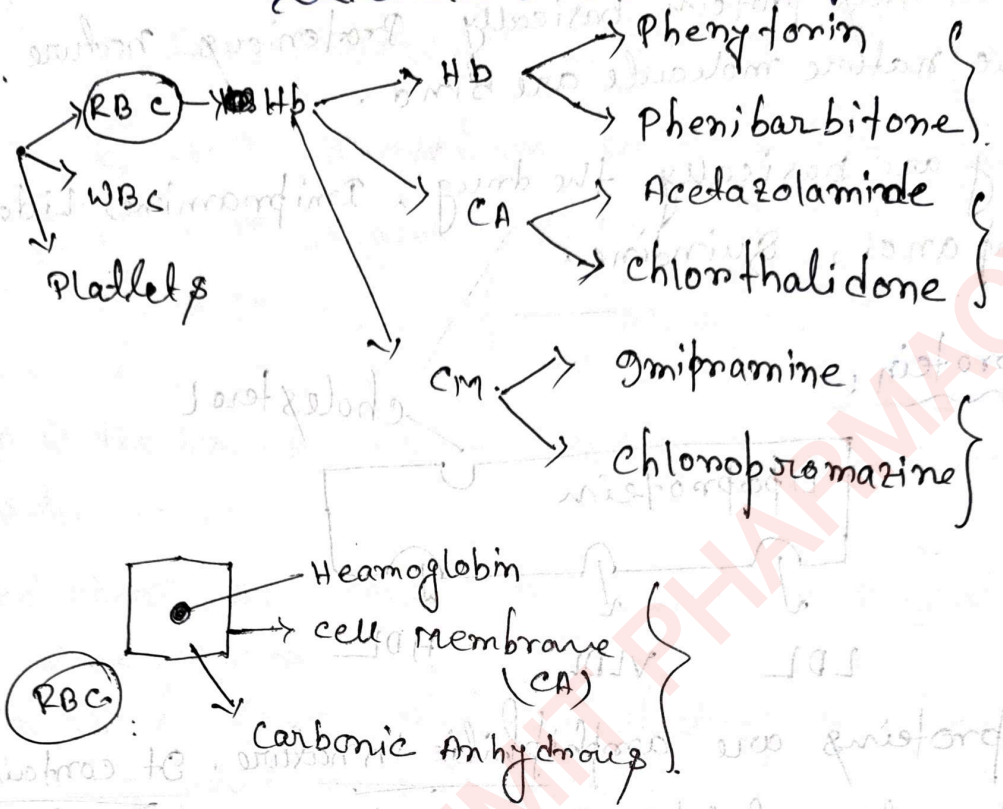
α_1 → corticosteroid binding globuln.

α_2 :- it binds vita-A, D, E, K & cuprie ions

β_1 :- it bind to ferrous ions

β_2 → catoinoids

Blood cell Protein Binding



→ Some of the drugs when enter into cell then blood cell.

→ There are basically three types of blood cells are Present RBC, WBC, Platelets. On which 90% Part of the RBC Play in the Protein binding.

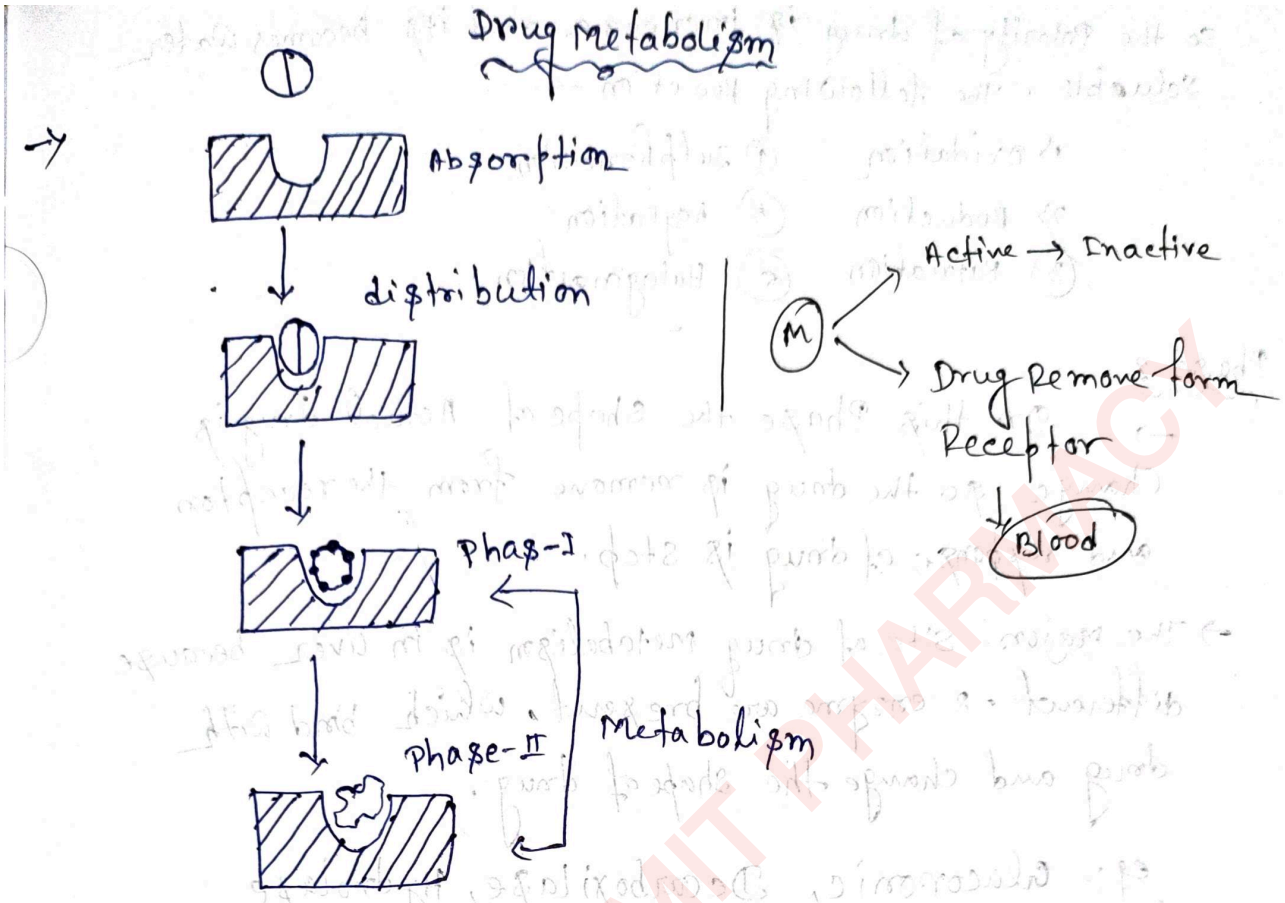
→ Basically in Blood cells are three Parts where protein can bind, this is heamoglobin, Carbonic Anhydrous enzymes and cell membrane.

→ On the heamglobin Part basically Phenytoin, Phenibarbitone

→ On carbonic anhydrous enzyme Acetazolamide, Chlorthalidone,

→ And in cell membrane → Imipramine, Chloropromazine,

Drug Metabolism



→ ~~this Phase~~ Drug metabolism is also known as bio transformation. On metabolism process the Active drug is convert into inactive drug. and Polarity of drug is increase so it remove form Receptor.

→ Drug Metabolism is two type

① Phase-1 Metabolism
② Phase-2 Metabolism

Phase-1 :- On this Phase main target of Metabolism is to increase the Polarity of the drug convert it active form to inactive form.

→ On this Phase different chemical reaction is perform with drug.

So the Polarity of drug is increase and its becomes Water Soluable. The following Reaction —

1) Oxidation
2) Reduction
3) Nitration
4) Sulphonation
5) Acylation
6) Halogination

Phase-2

→ On this Phase the shape of Actual drug is Change so the drug is remove from the receptor and response of drug is stop.

→ The Major site of drug metabolism is in liver because different-2 enzyme are present, which bind with drug and change the shape of drug.

eg:- Glucoronic, Decarboxilase, Hydrolase, Deaminase, Transamines

Drug Elimination

→ Elimination or excretion is the last step of the Pharmacokinetics of the drugs.

→ On this step after the metabolism inactive form of drug is Present in the blood.

→ Aided by elimination Process inactive form of drug is removed out side the body.

Elimination organ :- kidney, bile, Sweat, Milk, lungs

kidney → urine
bile → Primary liver
Sweat → Skin
lungs → CO_2

Types of elimination :-

- Renal elimination
- Enterohepatic elimination
- Pulmonary Elimination
- Sweat or Saliva Elimination

Renal elimination :-

→ This the most abundent type of elimination and about 80% drug eliminated through kidney by this Renal elimination Process.

→ This is Three Step.

a) Tubular filteration (TF)
b) Tubular Secreation (TS)
c) Tubular Reabsorption (TR)

Enterohepatic Elimination :-

→ When the some drugs are eliminated through the liver this is called Enterohepatic elimination.

→ And those drug which have the Smallest molecular size they can easily cropped liver and reach into the bile acid, and they released from the body in the form of bilirubin, biliverdin.

Pulmonary elimination :-

→ Some drugs are smaller size, so they can easy remone in the form of CO_2 by help of air

⑧ Sweat and Saliva Elimination:-

→ When the drug is remove in the form of sweat and saliva, this is called Saliva elimination.

Clearence:

clearence is defined as the total amount of drug which is eliminated through kidney in minute is called clearence.