There is no god but Allah

Types of agonist and antagonist

Objective

Define pharmacodynamics.

Describe receptors.

Define orphan, serpentine &spare receptors,

Describe up regulation and down regulation of receptors .

Classify agonist and antagonist .

Pharmacodynamics .

It is the study of mechanism of action, pharmacological action & adverse effects of drugs.

What the drug dose to the body .

Drug receptors

Drugs produce their effects by interacting with specific cell molecule called receptors.

Most of the receptors are protein in nature.

Receptors location

In the cell membrane

In cytoplasm

In the nucleus

In the cell membrane

Enzyme receptors

Cytokine receptors

Ligand gated channels

2. G protein coupled receptors.

Receptors located in cytoplasm

Nitric oxide receptors

Corticosteriod receptors

Thyroid receptors

Vitamin D receptors.

These drugs bind with receptors

Complex binds with heat-shock protein 90 & form dimer

Dimer enters in nucleus & binds with specefic site on DNA

Receptors located in nucleus

Receptors of anticancer drugs

Cyclophosphamide, Azathioprine etc

Drugs acting outside the cell

Antacids bicarbonate, magnisium oxide.

Chelating agents penicillinamine is used for mercury poisoning .

Types of drug receptors.

1. Ligand gated ions channels.

2. G protein coupled receptors.

3. Enzyme linked receptors.

4. Intracellular receptors.

Orphan receptors,

Receptors for which the endogenous ligands are presently unknown.

An receptor with no known ligand.

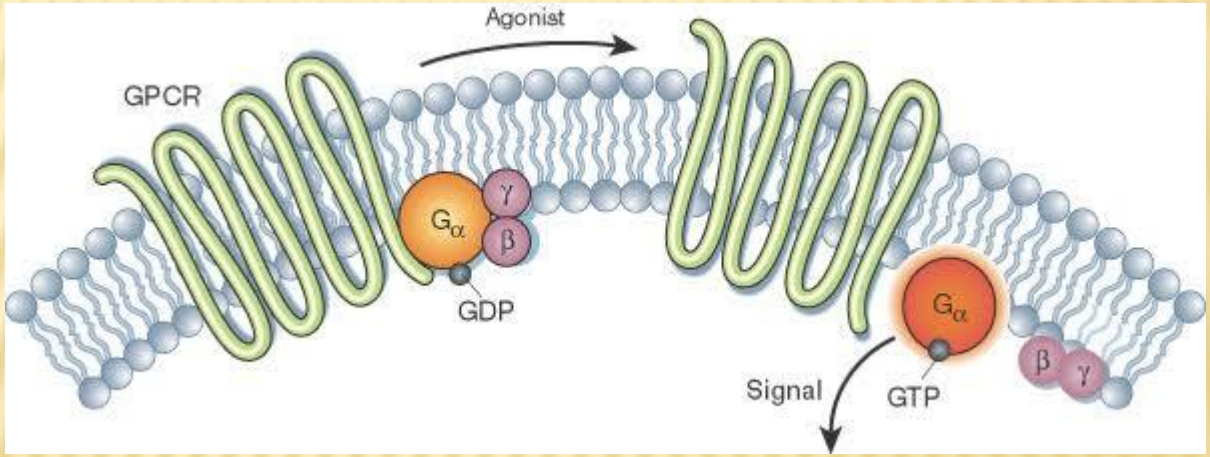
For example G protein coupled receptors and nuclear receptors.

If the ligand is discovered later on, the receptor is referred to as adopted orphan.

PPAR (peroxisome proliferator activated receptor) fibrates,
RXR (retinoid X receptor) retinoic acid.

Serpentine receptors.

Latin serpens ,snake; G protein coupled receptors which cross the plasma membrane seven times , appearing like snake.



Down-regulation of receptors,

Decrease in the number of receptors after prolonged exposure to an agonist.

The prolonged exposure to agonist , endocytosis and subsequent degradation of receptors are occurred .

For example chronic use of salbutamol down regulates β_2 receptor.

which may be responsible for ↓ed effect of salbutamol in asthmatics .

Up-regulation of receptors,

Increase in the number of receptors after prolonged exposure to an antagonist.

For example propranolol is stopped after prolong use .

Some patient experience anxiety ,tachycardia etc .

This is due to super sensitivity of β-receptor to catecholamines.

Affinity

The ability of a drug to bind to a receptor.

The affinity gives us an idea how well a drug and a receptor recognise each other

Intrinsic activity

A drug binds to the receptor & produces pharmacological action is known as intrinsic activity of drug.

Antagonist

A drug binds to the receptor & prevents binding of agonist to its receptor.

It does not activate the receptor; it has affinity but no intrinsic activity.

Agonist

A drug which binds to the receptor & activates it & produce maximum rsponse .

Agonist has affinity + intrinsic activity.

Types of Agonist

Full Agonist

Partial Agonist

Inverse Agonist

Full Agonist

Full Agonist when binds with receptor it produces maximum Response.

Full Agonist has high affinity + high intrinsic activity .

Acetylcholine acts as full agonist at cholinergic receptors.

Adrenaline acts as full agonist at adrenergic receptors.

Partial Agonist

When a partial agonist binds with its receptor to maximum level produces decreased response as compared to full agonist.

Partial Agonist may also be defined as an agonist that produced a submximum response at full receptor occupancy.

Agonist has affinity + less intrinsic activity .

Partial Agonist in the absence of full agonist acts as agonist & in the presence agonist it acts antagonist.

Pindolol acts both as antagonist & agonist at β receptors .

Inverse Agonist

When a inverse agonist binds with receptor produces a response opposite full agonist.

Inverse agonist has affinity + depressed (-ve)intrinsic activity.

Beta carbolines are a group of compound which bind with benzodiazepine receptors and produce anxiety ,fear and tremors.

These effects are just opposite to that of benzodiazepine when they bind on these receptors.

Types of Antagonist

Competitive / reversible Antagonist

Non-Competitive / irreversible Antagonist

Chemical Antagonist

Physiological Antagonist

Competitive / reversible Antagonist

When an antagonist competes agonist for the same receptor site

A competitive antagonist reversibly binds to the same site as agonist & blocks the agonist action this phenomena is known as competitive antagonism.

Atropine acts as competitive antagonist at cholinergic receptors

acetylcholine acts as agonist at cholinergic receptors .

Non-Competitive / irreversible Antagonist

When an antagonist competes agonist for different receptor site and binds with receptor by forming a covalent bound with it.

A non-competitive antagonist irreversibly binds to site on receptor other than the agonist binding site & blocks the agonist action this phenomena is known as non-competitive antagonism.

In type of antagonistic effects cannot be overcome by ↑ing the Conc. of agonist .

Non Competitive antagonism

Phenoxybenzamine act as non-competitive antagonist at α-receptor

In this case α-receptor are permanently occupied by pnenoxybenz – amine.

The activity of α-receptors is only restored when new receptors are synthesised

Chemical antagonism

The opposing effect of the two drugs is due to their chemical property.

Dimercaprol is used for metal poising

Antacid is used to neutralise the gastric acid

Protamine sulphate is used as antidote for heparin.

physiological - antagonism

In this type of antagonism, a drug produces an effect opposite to that produced by

another drug by acting on different receptor or on the same receptor.

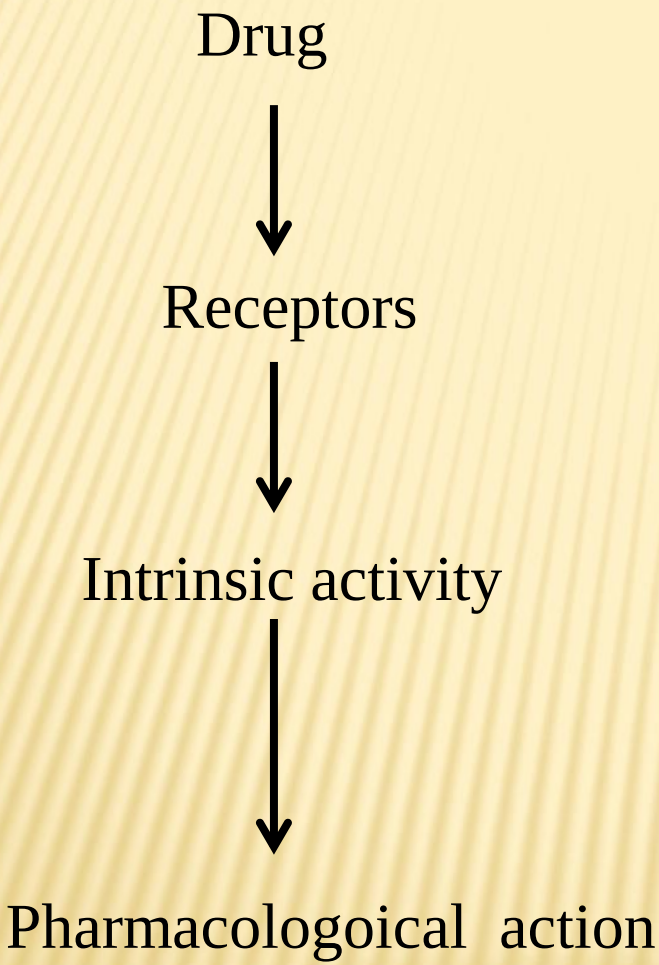
Pharmacokinetic antagonism

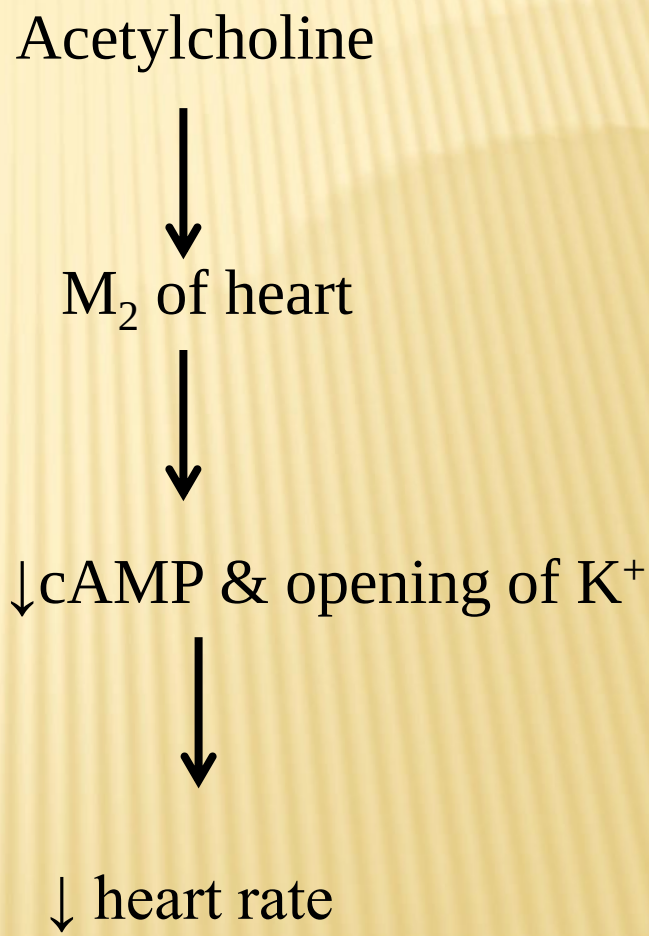
Any drug altering the absorption, distribution, metabolism or excretion of another drug can alter the concentration of the drug at its receptor site.

$NaHCO_3$ increases the excretion of aspirin and thus decreases its concentration.

Spare receptors.

Spare receptors are receptors that remain unbound when an agonist is producing its maximal biologic response.


Drug
Receptors
Intrinsic activity
Pharmacologoical action


Acetylcholine
M2 of heart
↓cAMP & opening of K+
↓ heart rate

The Expiation of Assembly
Kaffaratul-Majlis

سُبْحَانَكَ اللّٰهُمَّ
وَبِحَمْدِكَ اَشْهَدُ اَنْ لَّآ اِلٰهَ
اِلَّآ اَنْتَ اَسْتَغْفِرُكَ وَاَتُوْبُ اِلَيْكَ

Subhaanaka Allaahumma wa bihamdika, 'ash-hadu 'an laa 'ilaaha 'illaa 'Anta, 'astaghfiruka wa 'atoobu 'ilayka.

Glory is to You, O Allah, and praise is to You. I bear witness that there is none worthy of worship but You. I seek Your forgiveness and repent to You.

At-Tirmidhi 3433