Pharmacodynamics3

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ILOS

- Identify types of DRC
- Outline significance of DRC
- Enumerate types of antagonists

* Types of Ligands

Drugs are classified, according to the nature of their interaction with receptors, into:

- **Agonist:**

Drugs that have affinity, efficacy and rapid dissociation.

- **Partial agonist: Dualists:**

Drugs that initially stimulate then block receptors. So, they have affinity, weak efficacy and slow dissociation.

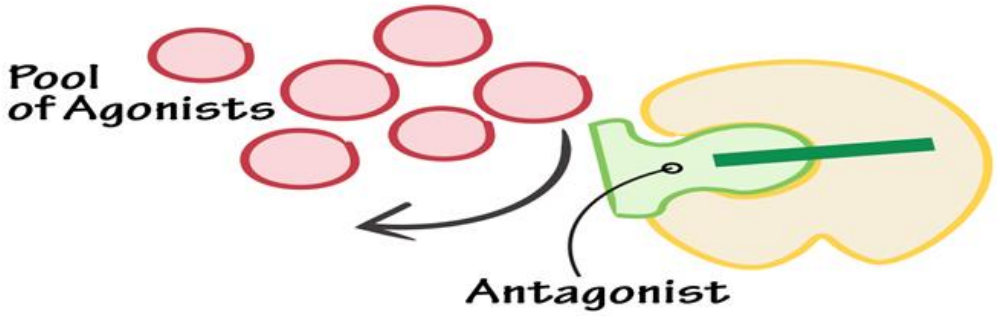
- **Antagonist:**

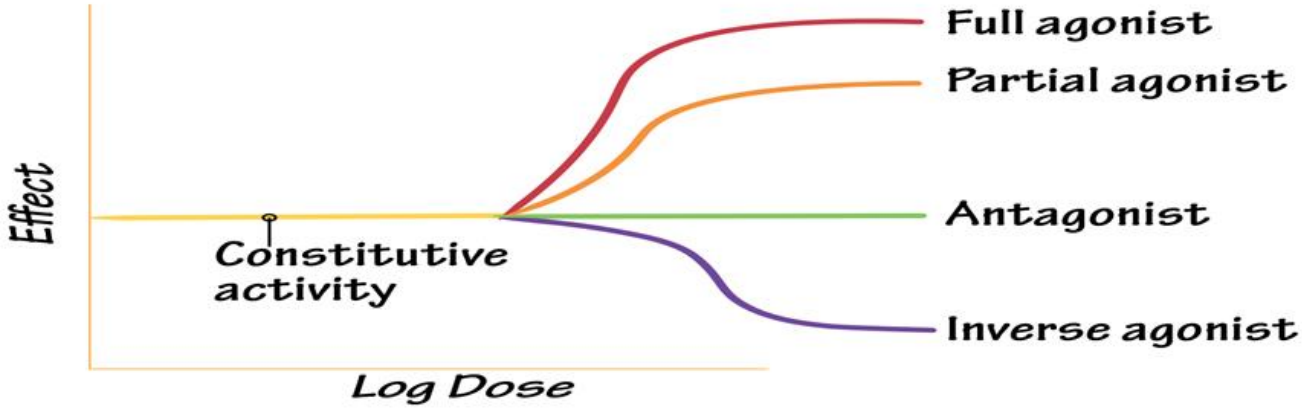
Drugs that block receptors. They have affinity, no efficacy and slow dissociation.

- **Inverse agonists:**

Drugs that produce opposite effects of the normal agonist

Pharmacologic Antagonists





* Types of Ligands

A) Stimulants = Agonists:

Examples: **Adrenaline (α & β), A.Ch. (M & N)**

B) Blockers:

Antagonists:

Examples: **Atropine.**

C) Partial Agonists = Dualists:

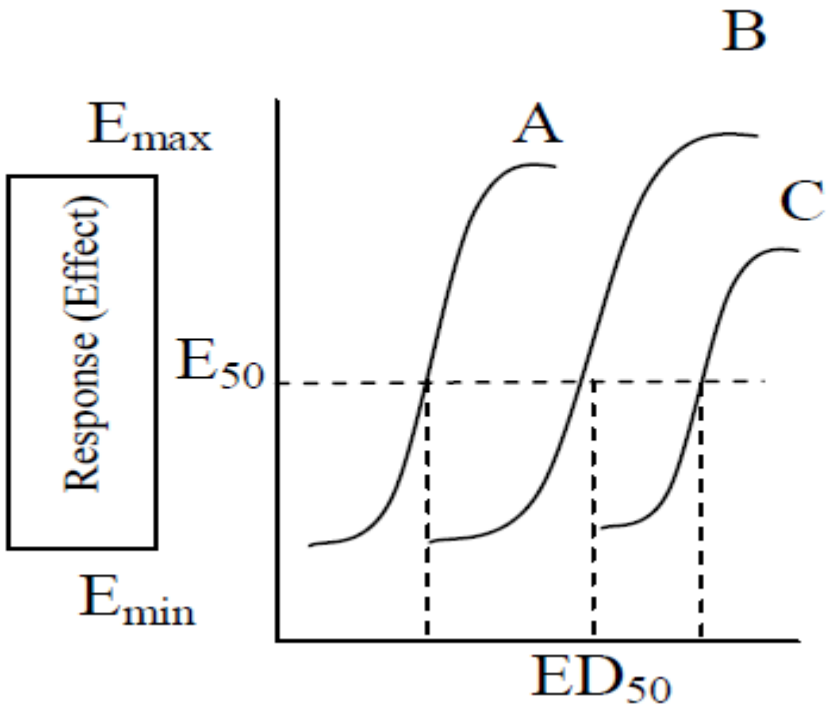
Examples: **Succinylcholine (NM).**

* Dose – Response Curve of Drugs:

1- **Relation between Log Dose and Response (Effect) of a drug.**

2- Useful to know *Effects* (responses):
Minimal effect (Emin),
Maximal Effect (Emax) &
Submaximal effects e.g. 50% effect (E50)

3- Useful to know *Doses* that produce:
Minimal effect (EDmin),
Maximal effect (EDmax) &
Submaximal effect e.g. 50% effect (ED50)



4- Useful to *compare* drugs: ED50

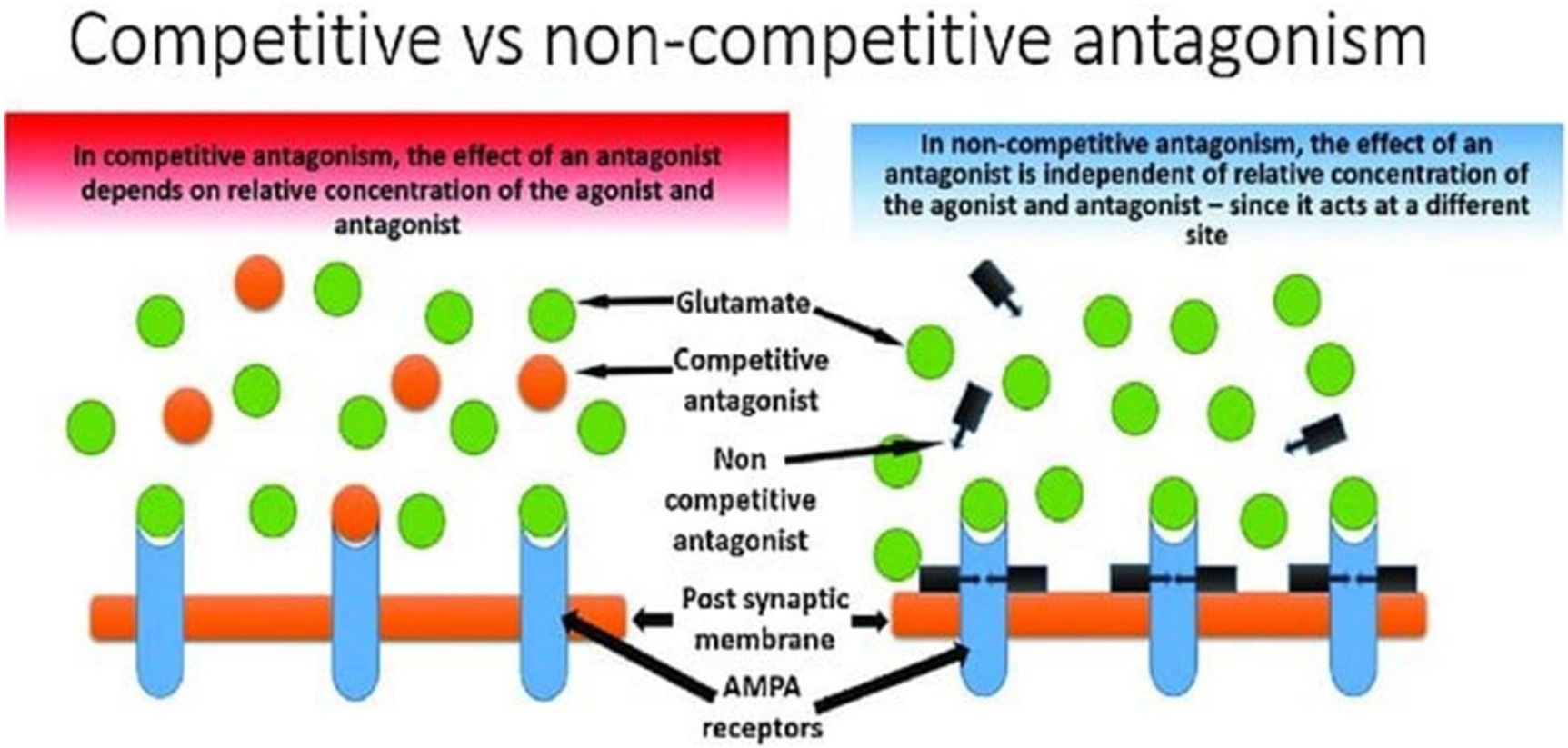
a- **Efficacy** → Compare Emax (B>A>C)

b- **Potency** → Compare the doses that produce the same Submaximal effect (A>B>C).

* Dose – Response Curve of Drugs:

5- Useful to determine the type of a ***blocker*** whether:

a- Competitive **b- Non-competitive**

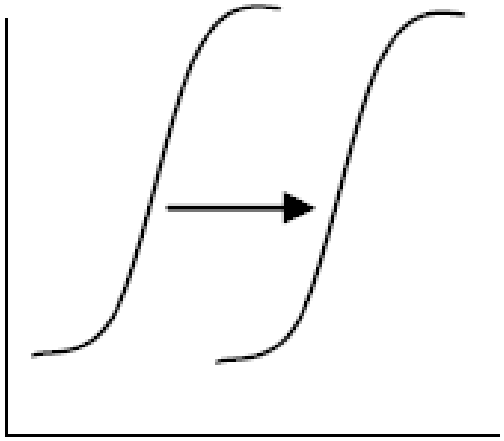


* Dose – Response Curve of Drugs:

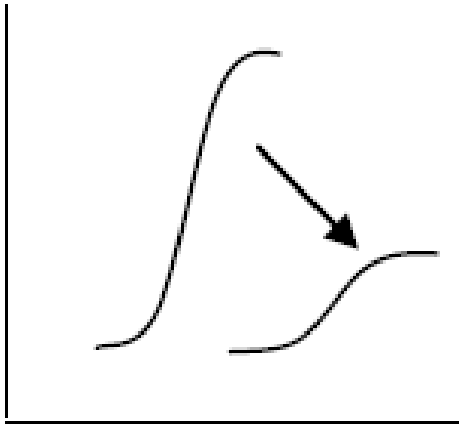
5- Useful to determine the type of a ***blocker*** whether:

a- Competitive → Parallel shift to right (↓ Potency) with same Emax (Same efficacy).

b- Non-competitive → Non-parallel shift to right (↓ Potency) with decreased Emax (↓ Efficacy).



Competitive

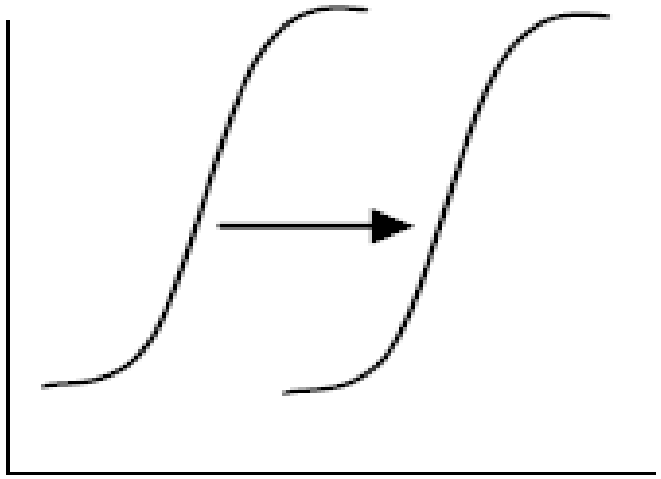


Non-Competitive

* Types of Block:

A) Competitive Block:

1- **Antagonists bind *REVERSIBLY* with the receptors**.
2- Antagonists can be ***DISPLACED*** by excess agonists → Surmountable.
3- *PARALLEL* shift of the curve to the *RIGHT* → ↓ ***Potency***.
4- NO effect on the maximum response (E-max) = ***Same Efficacy***
5- *Examples* : Propranolol, atropine .



Competitive

B) Non-Competitive Block:

1- Antagonist is NOT displaced by agonist. Not Surmountable.
2- Non-Parallel shift of curve to the Right = → ↓ Potency.
3- Decrease maximum response (E-max) = → ↓ Efficacy.
4- Types of Non-Competitive Block:

a- REVERSIBLE:

i- The antagonist binds ***REVERSIBLY*** to the receptor.
ii- The block ends by the *Metabolism* of the blocker.
iii- Usually of *Short* duration of action.
iv- *Examples* : Nicotine LD & Succinylcholine.

b- IRREVERSIBLE:

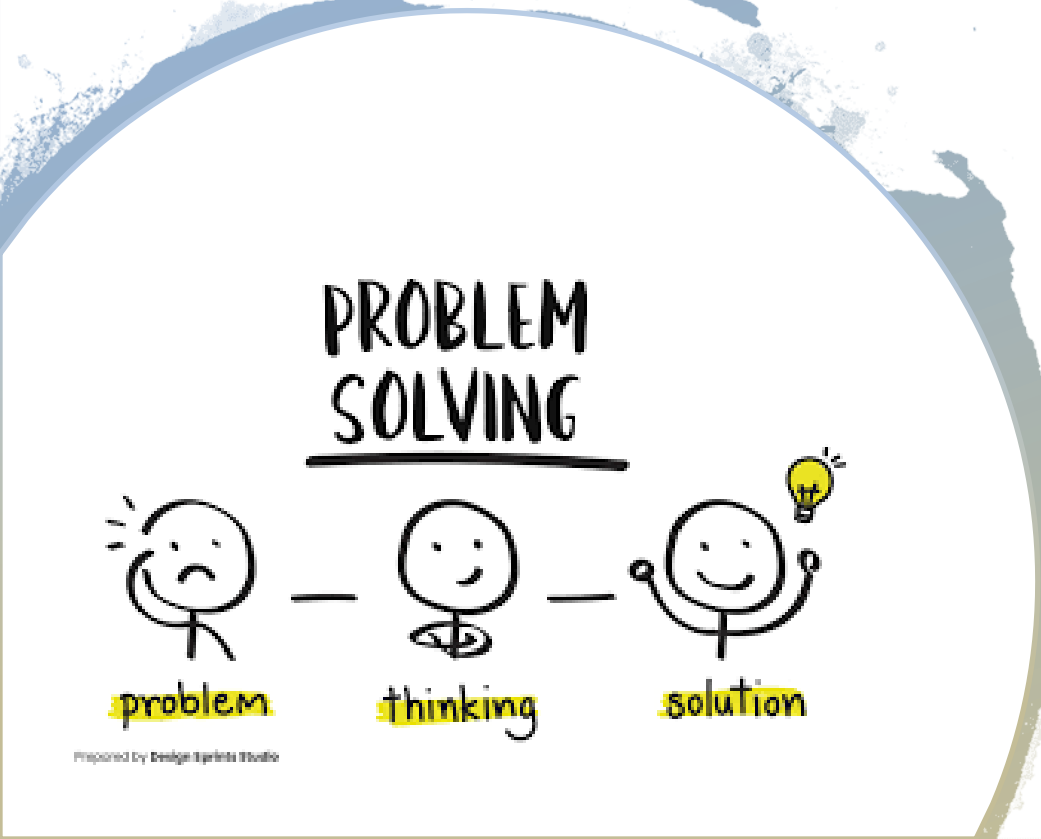
i- The antagonist binds ***COVALENTLY*** to the receptor.
ii- The block ends by Re synthesis of new receptors.
iii- Usually of Long duration of action.
iv-Examples: organo phosphorus compounds.

Chronic Use of Drugs Affects the No. & Sensitivity of Receptors:

1- Long use of Agonists → ↓ No. & Sensitivity of Receptors → **Down Regulation.**

2- Long use of Antagonists or drugs that ↓ transmission → ↑ No. & Sensitivity of Receptors → **Up Regulation.**

Chronic Use of Drugs Affects the No. & Sensitivity of Receptors:



- What are the precautions with up and down regulation of receptors ??

Questions

1-Give examples for drugs that should be stopped gradually.

2-Mention different types of antagonists.

3-Mention the difference between DRC of different types of antagonists.

4- What is the significance of ED50 ?

THANK YOU