

Introduction to CNS Pharmacology

Pharmacology II
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Introduction

- Drugs acting in the central nervous system (CNS) include medications used to treat a wide range of neurologic and psychiatric conditions as well as drugs that relieve pain, suppress nausea, and reduce fever.

- Drugs with CNS effects act on specific receptors that modulate synaptic transmission.

الفرق بين CNS و ANS
CNS one to one connection وهو عبارة عن شبكة من neurons
ANS
هاد الفرق بشكل أساسي يعني مجموعة نقاط أخرى

C N S

V E R S U S

A N S

CNS

The part of the nervous system, consisting of the brain and the spinal cord

One of the two main divisions of the nervous system

Occurs in the dorsal body cavity

Components: The brain and the spinal cord

The main function is to receive sensory output from the PNS, process and send necessary information to the various parts of the body through the PNS

Does not require any cofactors

ANS

The part of the nervous system responsible for the coordination of involuntary functions of the body

One of the two divisions of the PNS

Occurs in the periphery of the body

Components: Sympathetic, parasympathetic, and enteric nervous systems

The main function is to control involuntary functions of the body including the heart rate, digestion, respiratory rate, pupillary response, urination, and sexual arousal

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Neurotransmission in the CNS

كيفاهي الأدوية يستعمل على CNS

- Most drugs that act on the central nervous system (CNS) appear to do so by changing ion flow through transmembrane channels of nerve cells.

تبادل أيونات

- Ion flow across the membrane of the neuron alters the postsynaptic potential, producing either depolarization (EPSP) or hyperpolarization (IPSP) of the postsynaptic membrane, depending on the specific ions that move and the direction of their movement.

نتيجة تدفق الأيونات عبر membrane

تغير EPSP أو IPSP حسب نوع الأيونات التي تدفقت

تبادل membrane وانحلالها

Na⁺ Cl⁻ K⁺ outside (+)

* EPSP → When membrane potential become **less** negative.

* IPSP → " " " " **more** negative

inside (-)

Excitatory postsynaptic potential

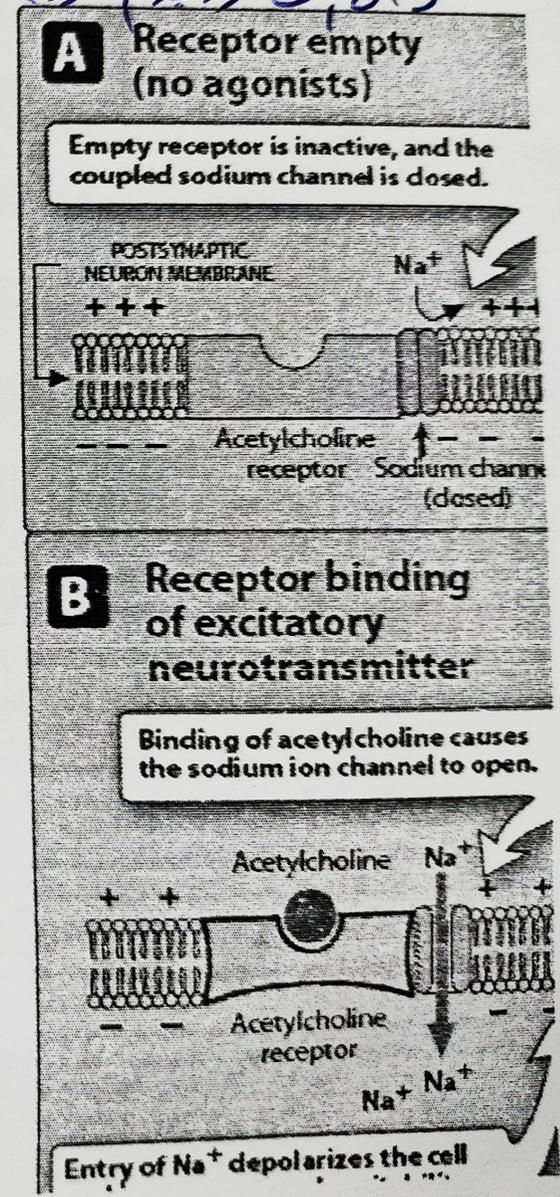
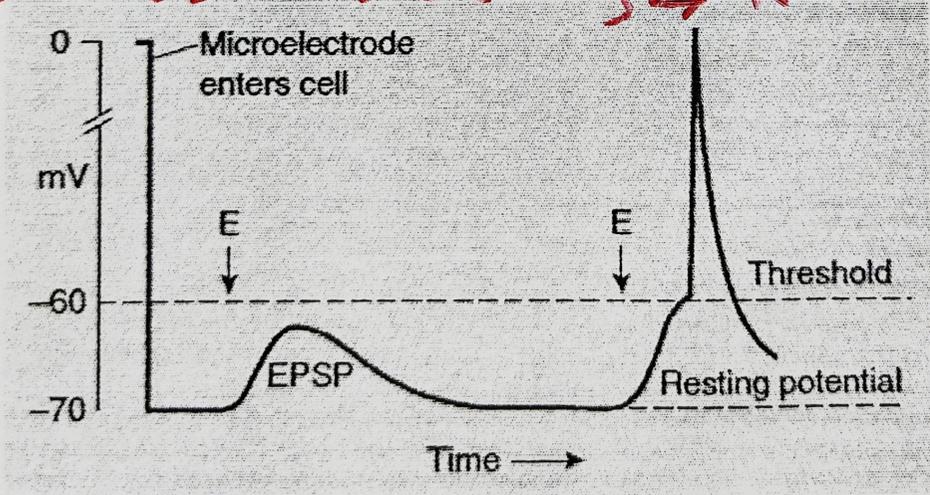
صوديوم

(EPSP) ① يرتبط ACh بال receptor في يستغل قنوات صوديوم ودفلة أيونات الصوديوم لاض الكلية وها de polarization

- Excitatory postsynaptic potentials (EPSPs) are usually generated by the opening of sodium or calcium channels.

In some synapses, similar depolarizing potentials result from the closing of potassium channels.

EPSPs ← opening → Na, Ca
 ← closing → K



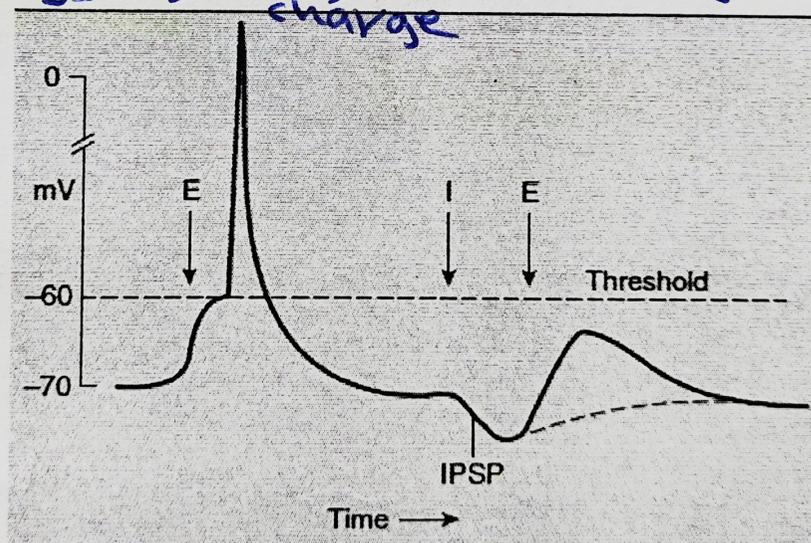
Inhibitory postsynaptic potential (IPSP)

صل أدوية أو selective
إلى مع تكي حينها الحاضر
الحاية

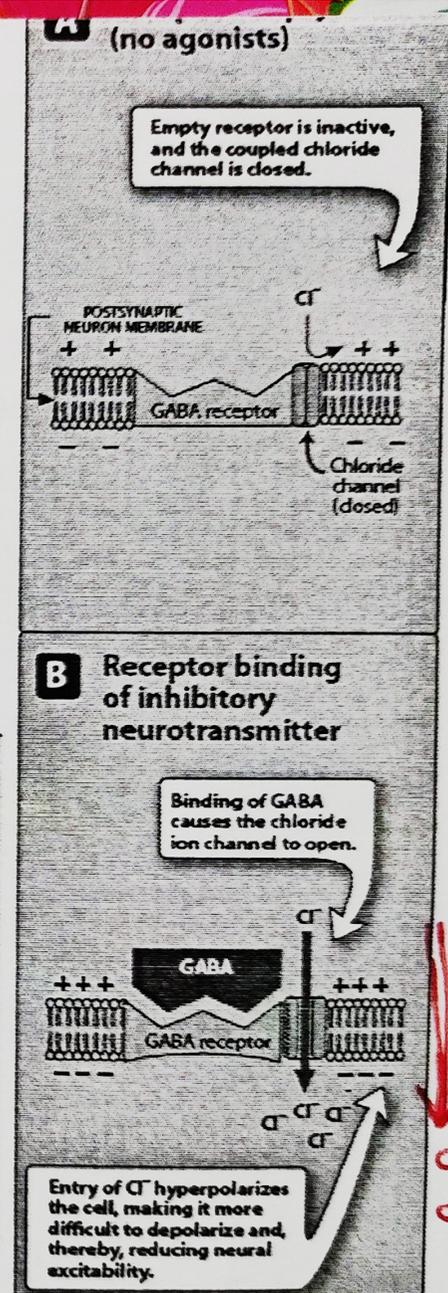
- Inhibitory postsynaptic potentials (IPSPs) are usually generated by the opening of potassium or chloride channels (efflux of K^+ or influx of Cl^- , respectively).

بترتيبها أو GABA receptor فبتفتح قنوات أيونات الكلورائيد
عرج تدخل أو negative charge و بصير inhibitory

- مجرد و سهولة تد
Threshold
action potential.



أو صوفوا اتجاه حركة أيونات الكلورائيد



sign

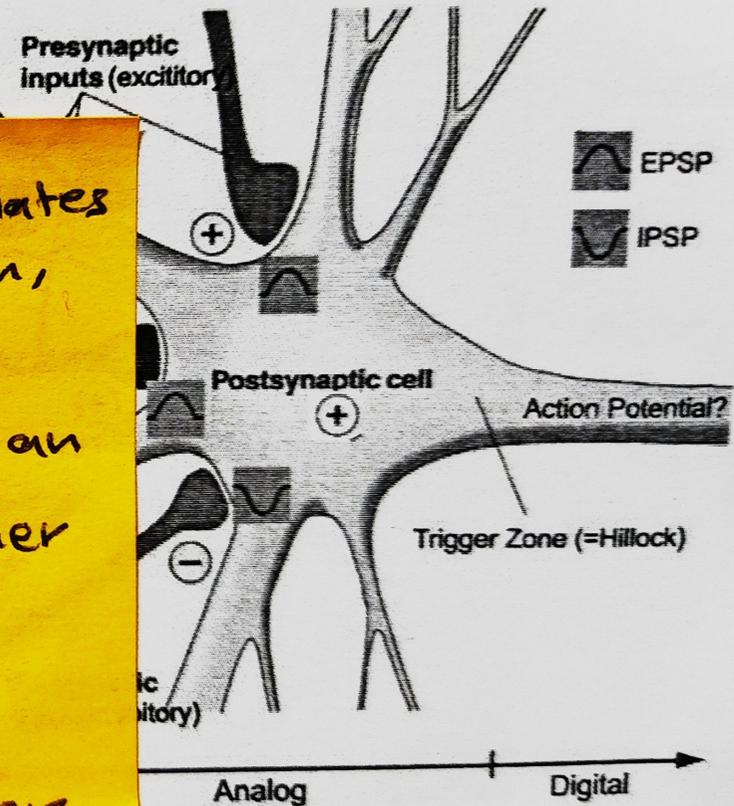
Cl⁻ Cl⁻
Cl⁻ Cl⁻
Cl⁻

Combined effects of the EPSP and

- The overall resultant postsynaptic potential is due to the **summation** of the individual actions of the various neurotransmitters on the neuron.

signal summation *إجمالي*

if a neurotransmitter stimulates the target cell to an action, then it is an excitatory neurotransmitter acting in an excitatory synapse. on other hand, if it ~~inhi~~ inhibits the target cell, it is an inhibitory neurotransmitter acting in an inhibitory synapse.



in CNS

Transmitters at central synapses

excitatory يمكن يكون
inhibitory يمكن تاني ←

1. Acetylcholine (+/-) صو الأشر
2. Dopamine (-)
3. γ -Aminobutyric acid (GABA) (-)
4. Glutamate (+/-) "رج نخي عنها كثر"
5. Glycine (-)
6. 5-hydroxytryptamine (Serotonine) (-)
7. Opioid peptides (-)

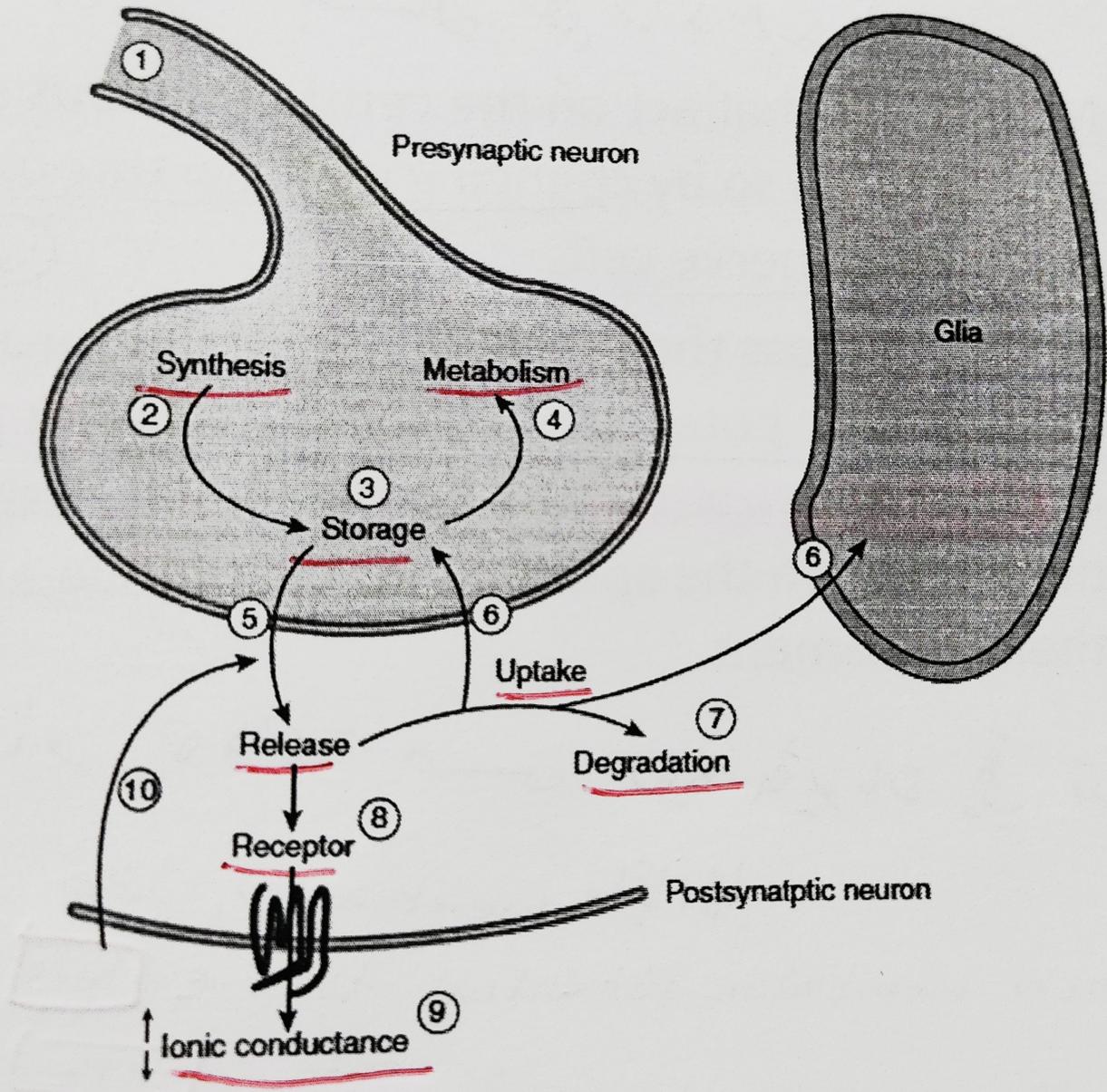
(+) → Excitatory

(-) → Inhibitory

بار ANS كان عنا neurotransmitter
ACh, NE, Dopamine ←
Epinephrine

بينما هون بار CNS
هم كتار شوي وهار
فرجه تاني بين ال
ANS, CNS.

Sites of drug action in CNS





Artery Academy