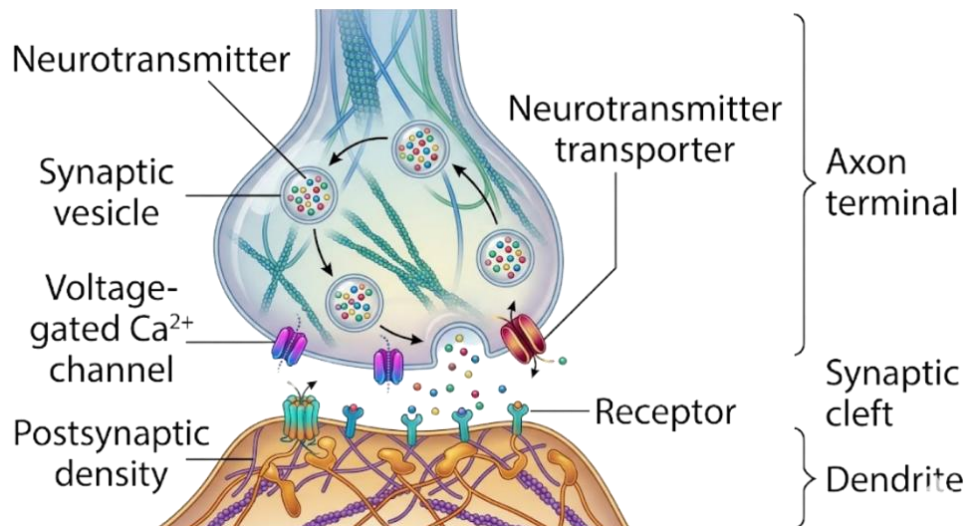


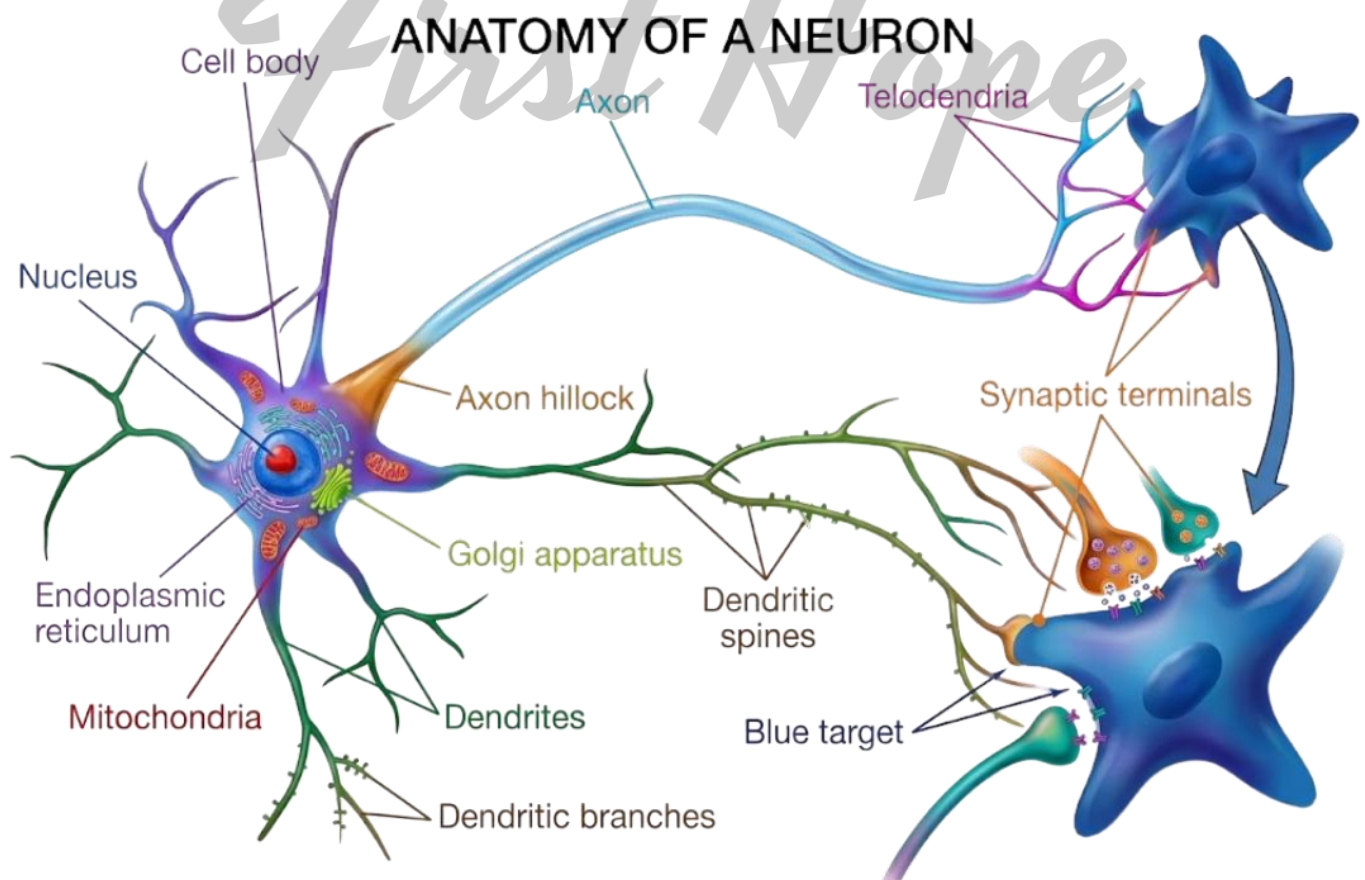
Neurotransmission

Neurotransmission: General Concept

- **Neurotransmission** is the process by which nerve cells (neurons) communicate with each other or with target organs (muscles, glands) using chemical substances called neurotransmitters.



What is a Neuron?



- **A neuron is a specialized cell that:**
 - Receives signals
 - Processes them

- Transmits them to another cell
- **Main parts:**
 - **Cell body (soma):** contains nucleus
 - **Dendrites:** receive signals
 - **Axon:** carries signals away
 - **Axon terminal:** releases neurotransmitter

Types of Neurotransmissions

- **Electrical transmission** – via electrical impulses (within neuron)
- **Chemical transmission** – via neurotransmitters (between neurons)

Synapse (Site of Communication)

- A synapse is the junction between two neurons or between neuron and effector organ.
- **Types:**
 - Chemical synapse (most common)
 - Electrical synapse (less common)

Components of Chemical Synapse

1. Presynaptic neuron – releases neurotransmitter
2. Synaptic cleft – small gap
3. Postsynaptic neuron – receives signal

Importance in Pharmacology

- **Most drugs act by:**
 - Increasing neurotransmitter action
 - Blocking neurotransmitter action

Steps Involved in Neurotransmission

- Neurotransmission occurs in a **step-by-step sequence:**

Steps

Step 1: Synthesis of Neurotransmitter

- Neurotransmitter is produced inside the neuron

Example:

- **Acetylcholine is synthesized from:** Choline + Acetyl-CoA

Step 2: Storage in Vesicles

- Neurotransmitter is stored in synaptic vesicles
- Protects it from degradation

Step 3: Arrival of Action Potential

- Electrical signal travels along axon
- Reaches presynaptic terminal

Step 4: Calcium Entry

- Voltage-gated Ca^{2+} channels open
- Calcium enters the neuron

Step 5: Release of Neurotransmitter

- Vesicles fuse with membrane
- Neurotransmitter released into synaptic cleft
- This process is called exocytosis

Step 6: Binding to Receptors

- Neurotransmitter binds to receptors on postsynaptic cell

Step 7: Generation of Response

Causes:

- Excitation (activation)
- Inhibition (suppression)

Step 8: Termination of Action

- Neurotransmitter action must stop to avoid continuous stimulation.

Mechanisms:

a) Enzymatic degradation

- **Example:** Acetylcholine broken by acetylcholinesterase

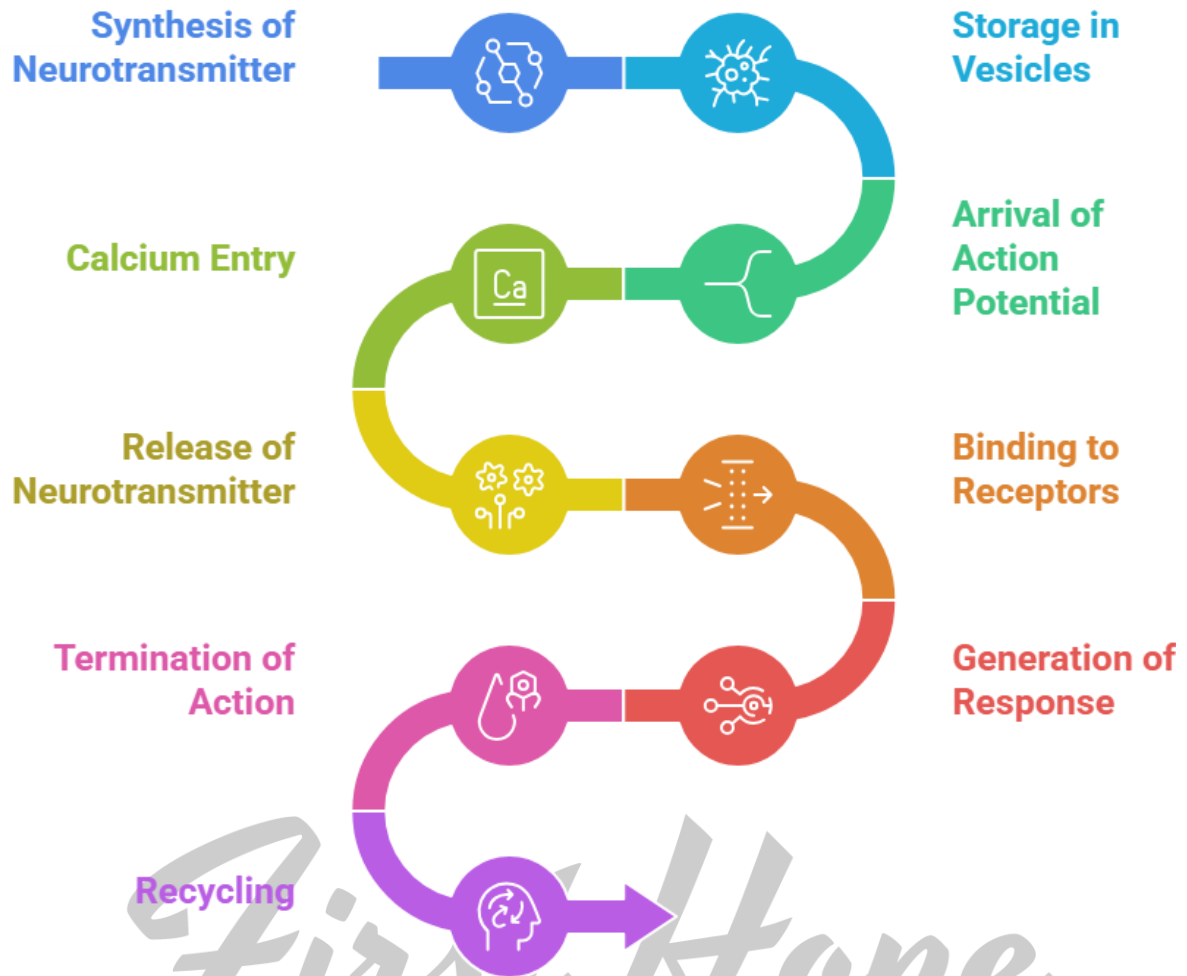
b) Reuptake into neuron

- **Example:** Noradrenaline

Step 9: Recycling

- Components reused for new neurotransmitter synthesis

Neurotransmitter Release and Action Timeline

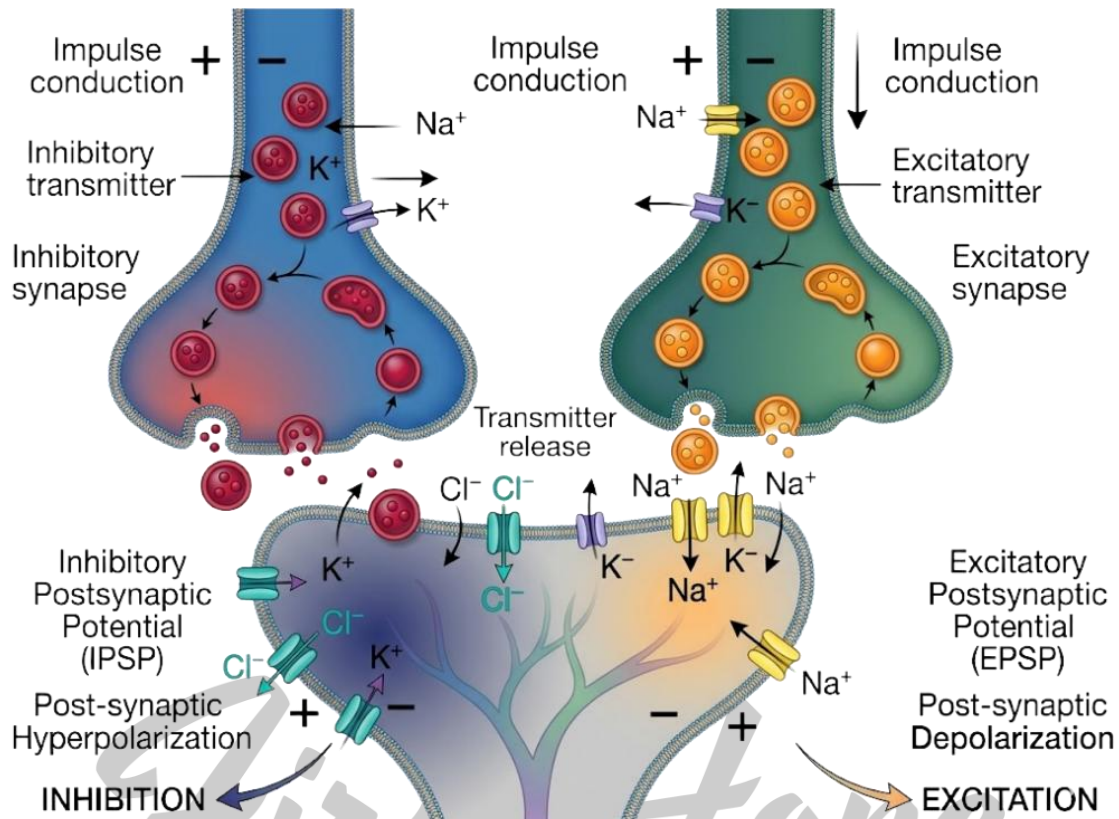


Clinical Importance

- **Drugs can act at any step:**
 - Block synthesis
 - Enhance release
 - Inhibit degradation

Neurohumoral Transmission in Autonomic Nervous System (ANS)

- The ANS controls **involuntary functions** like heart rate, digestion, and glandular secretion.



Divisions of ANS

1. Sympathetic Nervous System (SNS)

- "Fight or flight"
- Uses adrenaline (epinephrine) and noradrenaline

2. Parasympathetic Nervous System (PNS)

- "Rest and digest"
- Uses acetylcholine

Basic Organization

Each pathway has two neurons:

1. Preganglionic neuron

- Originates in CNS
- Releases acetylcholine

2. Postganglionic neuron

- Innervates target organ
- Releases:



FREE PREVIEW

[Click here to visit our website](#)

PHARMACY PREMIUM NOTES

Complete subject
and semesters are
available on
FirstHope app only.



[Scan or click here](#)

Click here to get the app



Available on Google Play

JOIN THE FIRSTHOPE COMMUNITY

Join our Telegram channel

Click here to join Telegram



[Scan or click here](#)

@FirstHopeNotes

Instagram

@firsthope.official

[Click here to follow >](#)

YouTube channel

FirstHope-Pharmacy / Live streams

[Click here to watch >](#)

WhatsApp channel

Follow FirstHope on WhatsApp

[Click here to join >](#)

FirstHope website

firsthopenotes.com

[Click here to visit >](#)

B.Pharm / D.Pharm / M.Pharm / Pharm.D

Preview notes. Complete subjects and semesters in the FirstHope app.