

Drugs acting on Autonomic Nervous System

The Nervous System: An Overview

- The nervous system is a complex network of nerves and cells, known as neurons, that transmit signals between different parts of the body.
- It essentially functions as the body's electrical wiring.
- The nervous system is divided into two main components:

1. Central Nervous System (CNS)

2. Peripheral Nervous System (PNS)

Peripheral Nervous System (PNS)

- The peripheral nervous system consists of the nerves and ganglia outside the brain and spinal cord.
- It connects the CNS to the rest of the body.

The PNS is divided into two main parts:

A. Somatic Nervous System

- Controls voluntary movements.
- Composed of nerves that connect the brain and spinal cord to muscles and sensory receptors in the skin.

B. Autonomic Nervous System

- Controls involuntary body functions.
- It is further divided into two subdivisions:
 - Sympathetic Division:** Prepares the body for stressful or emergency situations ("fight or flight").
 - Parasympathetic Division:** Controls body processes during normal conditions (rest and digestion).

Drugs Acting on the Sympathetic Nervous System (SNS)



1. Adrenergic Agonists (Sympathomimetics)

Stimulate the SNS by acting on adrenergic receptors.

A. Alpha Agonists

- ↑ Vasoconstriction, used for hypertension, nasal congestion.
- Example: Phenylephrine.

B. Beta Agonists

- Selective/non-selective, used for asthma, heart conditions.
- Examples:
 - β 1-selective (heart): Metoprolol (hypertension).
 - β 2-selective (lungs): Albuterol (asthma).
 - Non-selective: Isoproterenol.

2. Adrenergic Antagonists (Sympatholytics)

Block adrenergic receptors, inhibiting SNS effects.

A. Alpha Blockers

- Used in hypertension, benign prostatic hyperplasia (BPH).
- Example: Prazosin.

B. Beta Blockers

- Used in hypertension, heart disease, anxiety.
- Example: Propranolol.

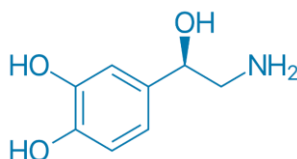
Direct Acting: Sympathomimetic Agents

1. Nor-Epinephrine (Norepinephrine)*

Chemical Name:

- (R)-4-(2-amino-1-hydroxyethyl)benzene-1,2-diol

Chemical Structure:



Uses:

- Acute hypotension
- Cardiac arrest
- Vasoconstrictor in shock

Stability & Storage:

- Light-sensitive; store in amber containers.
- Aqueous solutions are unstable; pH-dependent degradation (optimal pH 3–4).
- Refrigeration (2–8°C) recommended.

Formulations:

- Injectable solution (IV infusion)

Popular Brand Names:

- Levophed
- Arterenol

2. Epinephrine (Adrenaline)

Chemical Name:

- (R)-4-[1-hydroxy-2-(methylamino)ethyl]benzene-1,2-diol

Uses:

- Anaphylaxis
- Cardiac arrest
- Bronchospasm
- Prolongation of local anesthetic action

Stability & Storage:

- Light and air-sensitive
- Store in tightly closed, light-resistant containers
- Solutions discolor with oxidation (pink to brown)

Formulations:

- Injection (SC, IM, IV)
- Inhaler, auto-injectors (EpiPen)

Popular Brand Names:

- Adrenaline
 - EpiPen
 - Adrenaclick
-

3. Phenylephrine

Chemical Name:

- (R)-3-[(1-hydroxy-2-phenylethyl)amino]phenol hydrochloride

Uses:

- Nasal decongestant
- Ocular vasoconstrictor
- Hypotension during anesthesia

Stability & Storage:

- Stable under standard conditions
- Protect from moisture and light
- Store below 25°C

Formulations:

- Oral tablets, nasal sprays, ophthalmic drops, injectable

Popular Brand Names:

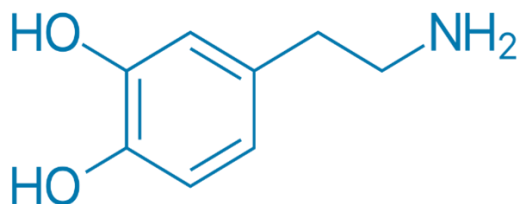
- Neo-Synephrine
 - Sudafed PE
 - Vazculep (injection)
-

4. Dopamine*

Chemical Name:

- 4-(2-aminoethyl)benzene-1,2-diol

Chemical Structure:



Uses:

- Shock and heart failure
- Hypotension
- Improves renal perfusion at low doses

Stability & Storage:

- Oxidation sensitive
- Light-sensitive; store in amber glass vials
- Refrigerate (2–8°C)

Formulations:

- Injectable solution (IV)

Popular Brand Names:

- Intropin
- Dopastat (discontinued in some regions)

5. Terbutaline

Chemical Name:

- (RS)- α -[(tert-butylamino)methyl]-3,5-dihydroxybenzyl alcohol

Uses:



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