

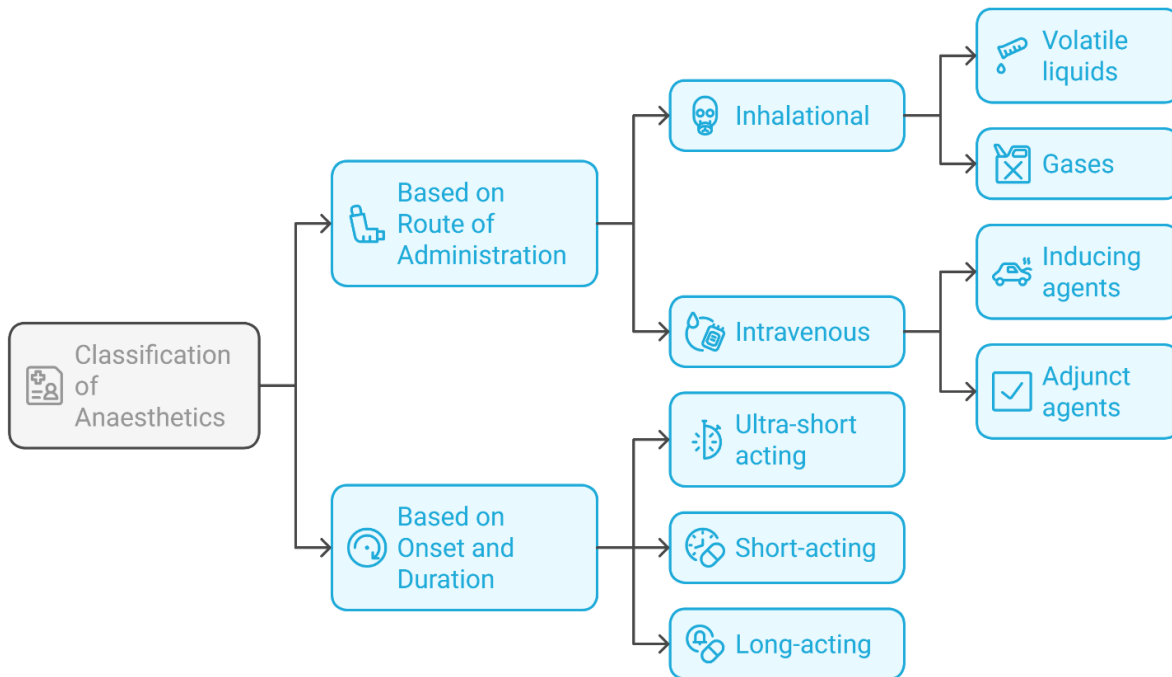
Drugs Acting on the Central Nervous System

General Anaesthetics

Definition:

- General anaesthetics are drugs that cause **reversible loss of consciousness, analgesia, amnesia, and muscle relaxation**, facilitating painless surgical procedures.
- They act on the **CNS**, especially the **reticular activating system** and **cortical areas**.

Classification:



A. Based on Route of Administration:

1. Inhalational Anaesthetics:

- Volatile liquids:** Halothane, Isoflurane, Sevoflurane, Desflurane
- Gases:** Nitrous oxide, Xenon

2. Intravenous Anaesthetics:

- Inducing agents:** Propofol, Thiopentone, Etomidate, Ketamine
- Adjunct agents:** Midazolam, Fentanyl

B. Based on Onset and Duration:

1. Ultra-short acting

- **Examples:** Thiopentone, Propofol

- **Features:** Used for induction

2. Short-acting

- **Examples:** Etomidate
- **Features:** Suitable for short procedures

3. Long-acting

- **Examples:** Inhalational agents
- **Features:** Used for maintenance of anaesthesia

Pharmacological Actions:

CNS:

- Loss of consciousness
- Sedation and amnesia
- Suppression of protective reflexes
- Dose-dependent CNS depression

CVS:

- May cause hypotension (due to vasodilation and myocardial depression)

RS:

- Respiratory depression (except ketamine)
- Risk of apnea (especially IV agents)

Others:

- Muscle relaxation (enhanced by co-administered neuromuscular blockers)
- Nausea/vomiting (post-op)

Dose (Examples):

Drug	Induction Dose (IV)	Inhaled MAC
Propofol	1.5–2.5 mg/kg IV	—
Thiopentone	3–5 mg/kg IV	—
Ketamine	1–2 mg/kg IV	—
Sevoflurane	—	1.8%
Isoflurane	—	1.2%
Nitrous oxide	—	105% (used in combination)

MAC (Minimum Alveolar Concentration): Concentration required to prevent movement in 50% of patients.

Indications:

- Induction and maintenance of general anaesthesia
- Short surgical/dental procedures (e.g., with Propofol or Ketamine)
- Electroconvulsive therapy (ECT) – e.g., Methohexital, Propofol
- Status epilepticus (Thiopentone)
- Analgesia/sedation (Nitrous oxide, Ketamine)

Contraindications:

- **Hepatic disease** (especially with halothane)
- **Cardiovascular instability** (caution with propofol)
- **Raised intracranial pressure** (avoid ketamine)
- **Porphyria** (avoid barbiturates)
- **Pregnancy** (except in emergencies)
- **Malignant hyperthermia** (genetic susceptibility; avoid halothane)

Adverse Effects:

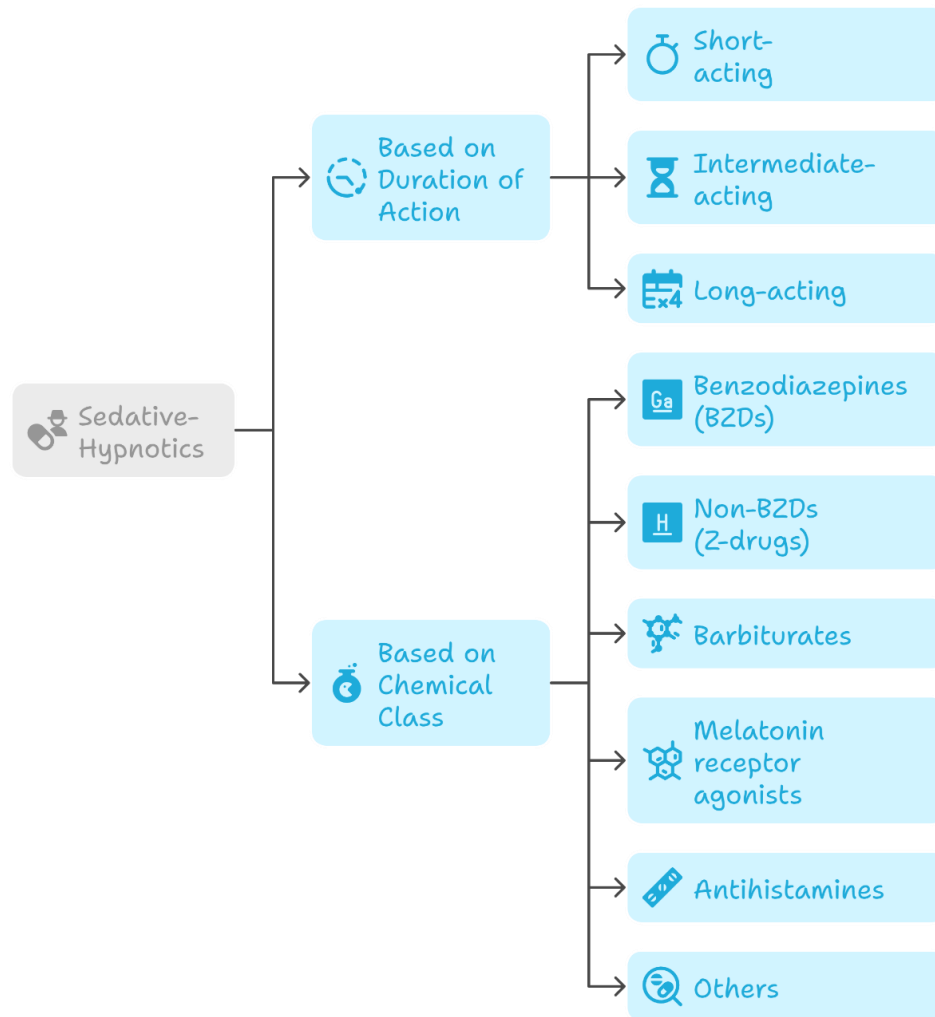
- **Postoperative nausea/vomiting** (esp. inhaled agents)
- Respiratory depression
- Hypotension
- Arrhythmias (Halothane)
- **Malignant hyperthermia** (rare, with Halothane + Succinylcholine)

Hypnotics and Sedatives

Definition:

- Hypnotics and sedatives are CNS depressants used to **induce sleep (hypnotics)** or **reduce anxiety and exert calming effects (sedatives)**.
- The **same drug can be sedative at low doses and hypnotic at higher doses**.

Classification:



A. Based on Duration of Action:

1. Short-acting

- **Examples:** Triazolam, Zolpidem
- **Use:** Sleep induction

2. Intermediate-acting

- **Examples:** Lorazepam, Temazepam
- **Use:** Sleep maintenance

3. Long-acting

- **Examples:** Diazepam, Clonazepam
- **Use:** Anxiety, seizures

B. Based on Chemical Class:

1. Benzodiazepines (BZDs)

- **Examples:** Diazepam, Lorazepam, Triazolam

- **Features:** Enhance GABA-A activity

2. Non-BZDs (Z-drugs)

- **Examples:** Zolpidem, Zaleplon, Eszopiclone
- **Features:** Short-acting, fewer hangover effects

3. Barbiturates

- **Examples:** Phenobarbital, Secobarbital
- **Features:** Rarely used due to high toxicity

4. Melatonin receptor agonists

- **Example:** Ramelteon
- **Features:** Regulates sleep-wake cycle

5. Antihistamines

- **Examples:** Hydroxyzine, Diphenhydramine
- **Features:** Over-the-counter (OTC) sedatives

6. Others

- **Example:** Chloral hydrate (obsolete)

Pharmacological Actions

CNS:

- **Sedation** at low doses
- **Hypnosis (sleep induction)** at higher doses
- **Anxiolysis, muscle relaxation, and anticonvulsant activity** (especially benzodiazepines)
- **Reduced sleep latency** and increased sleep duration

CVS/RS:

- Minimal depression at therapeutic doses
- Respiratory depression in overdose (especially barbiturates)

Dose (Examples):

Drug	Dose	Route
Diazepam	2–10 mg	Oral/IV
Lorazepam	1–4 mg	Oral/IV



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