CNS Pharmcology Quick Revision

By **Doctor Of Choice**

📌 CNS Pharmacology Revision

1. Sedative-Hypnotics & Anxiolytics

(a) Benzodiazepines (BZDs)

- **Examples**: Diazepam, Lorazepam
- **MOA**: Enhance **GABA-A receptor** activity → ↑ Cl^- influx → CNS depression
- **Uses**: Anxiety, insomnia, status epilepticus, muscle relaxation, alcohol withdrawal
- **Side Effects**: Drowsiness, dependence, respiratory depression (high doses)

(b) Barbiturates

- **Examples**: Phenobarbital, Thiopental
- **MOA**: ↑ Duration of **GABA-A receptor** opening → CNS depression
- **Uses**: Seizures (phenobarbital), induction of anesthesia (thiopental)
- **Side Effects**: Severe respiratory depression, addiction, enzyme induction

(c) Non-BZD Hypnotics

- **Examples**: Zolpidem, Zaleplon
- **MOA**: Act on **BZ_1 (omega-1) receptor subtype** of GABA-A
- **Uses**: Insomnia
- **Side Effects**: Less dependence than BZDs, drowsiness, dizziness

---

2. General Anesthetics

(a) Intravenous (IV) Anesthetics

Drug	MOA	Uses	Side Effects
Propofol	GABA-A agonist	Induction of anesthesia	Hypotension, apnea
Ketamine	NMDA receptor antagonist	Dissociative anesthesia	Hallucinations, ↑ BP
Etomidate	GABA-A agonist	Hemodynamically stable anesthesia	Adrenal suppression

(b) Inhalational Anesthetics

- **Examples**: Isoflurane, Sevoflurane
- **MOA**: Enhance GABA-A & K^+ channels
- **Uses**: Maintenance of anesthesia
- **Side Effects**: Hypotension, respiratory depression, malignant hyperthermia (treated with **dantrolene**)

---

3. Local Anesthetics

(a) Amide-type

- **Examples**: Lidocaine, Bupivacaine
- **MOA**: **Block Na^+ channels** in activated nerves
- **Uses**: Local anesthesia, epidural, nerve blocks
- **Side Effects**: Cardiotoxicity (bupivacaine), CNS toxicity

(b) Ester-type

- **Examples**: Procaine, Tetracaine
- **MOA**: Same as amides but metabolized faster
- **Side Effects**: **More allergic reactions** (due to PABA metabolites)

---

4. Antiepileptic Drugs (AEDs)

Drug	MOA	Uses	Side Effects
Phenytoin	Na^+ channel blocker	Generalized & focal seizures	Gingival hyperplasia, ataxia
Valproic Acid	Na^+ channel + GABA enhancer	Broad-spectrum epilepsy	Hepatotoxicity, neural tube defects
Carbamazepine	Na^+ channel blocker	Trigeminal neuralgia, epilepsy	Bone marrow suppression, SIADH
Levetiracetam	SV2A protein inhibition	Epilepsy	Minimal side effects

---

5. Antipsychotics

(a) Typical (First-Generation) Antipsychotics

- **Examples**: Haloperidol, Chlorpromazine
- **MOA**: **D_2 receptor blockade**
- **Uses**: Schizophrenia (positive symptoms), psychosis, Tourette's
- **Side Effects**: Extrapyramidal symptoms (EPS), tardive dyskinesia, neuroleptic malignant syndrome

(b) Atypical (Second-Generation) Antipsychotics

- **Examples**: Risperidone, Clozapine
- **MOA**: **D_2 & 5-HT_2A blockade**
- **Uses**: Schizophrenia (positive & negative symptoms), bipolar disorder
- **Side Effects**: Metabolic syndrome (weight gain, diabetes), agranulocytosis (clozapine)

---

6. Antidepressants

(a) SSRIs (Selective Serotonin Reuptake Inhibitors)

- **Examples**: Fluoxetine, Sertraline
- **MOA**: Inhibit **5-HT reuptake**
- **Uses**: Depression, OCD, anxiety disorders
- **Side Effects**: Sexual dysfunction, GI upset, serotonin syndrome

(b) SNRIs (Serotonin-Norepinephrine Reuptake Inhibitors)

- **Examples**: Venlafaxine, Duloxetine
- **MOA**: Inhibit **5-HT & NE reuptake**
- **Uses**: Depression, neuropathic pain
- **Side Effects**: Hypertension, insomnia

(c) Atypical Antidepressants

- **Examples**: Mirtazapine, Bupropion
- **MOA**: Mirtazapine (α_2-antagonist), Bupropion (dopamine & NE reuptake inhibitor)
- **Uses**: Depression, smoking cessation (Bupropion)
- **Side Effects**: **Weight gain (Mirtazapine), seizures (Bupropion)**

---

7. Mood Stabilizers (Bipolar Disorder)

Drug	MOA	Uses	Side Effects
Lithium	Unknown (possibly inhibits IP3 pathway)	Bipolar disorder	Nephrotoxicity, hypothyroidism
Valproate	Na^+ blocker + GABA enhancer	Bipolar disorder, epilepsy	Hepatotoxicity, teratogenicity
Lamotrigine	Na^+ channel blocker	Bipolar disorder	Skin rash, SJS

---

8. Anti-Parkinson Drugs

Drug	MOA	Side Effects
Levodopa/Carbidopa	Dopamine precursor + peripheral dopa decarboxylase inhibitor	Dyskinesia, nausea
Pramipexole	Dopamine agonist	Impulse control issues, sleep attacks
Selegiline	MAO-B inhibitor	Insomnia

---

9. Opioid Analgesics

- **Examples**: Morphine, Fentanyl, Codeine
- **MOA**: **Mu-opioid receptor agonists** → Inhibit pain transmission
- **Uses**: Severe pain, cough suppression (codeine)
- **Side Effects**: Respiratory depression, constipation, addiction
- **Antidote**: **Naloxone**

---

10. CNS Stimulants

- **Examples**: Amphetamines, Methylphenidate
- **MOA**: **Increase dopamine & NE release**
- **Uses**: ADHD, narcolepsy
- **Side Effects**: Insomnia, weight loss, hypertension

🔹 Summary Table

Category	Examples
Sedative-Hypnotics	Diazepam, Phenobarbital
General Anesthetics	Propofol, Sevoflurane

Category	Examples
Local Anesthetics	Lidocaine, Procaine
Antiepileptics	Phenytoin, Valproate
Antipsychotics	Haloperidol, Clozapine
Antidepressants	Fluoxetine, Venlafaxine
Mood Stabilizers	Lithium, Lamotrigine
Anti-Parkinson	Levodopa, Pramipexole
Opioids	Morphine, Fentanyl
Stimulants	Amphetamines, Methylphenidate