

Introduction to Psychopharmacology

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Key concepts, drug classes, mechanisms, and clinical considerations

1. What Is Psychopharmacology?

Aspect	Description
Definition	The scientific study of how drugs affect mood, cognition, behavior, and perception.
Goal	To understand, develop, and use medications that treat mental health disorders safely and effectively.
Scope	Includes basic neuroscience (receptor pharmacology, neurotransmitter systems) and clinical practice (prescribing, monitoring, side effect management).

2. Fundamental Pharmacological Concepts

Concept	Key Points
Pharmacokinetics (PK)	Absorption, distribution, metabolism, excretion (ADME). Determines drug concentration over time.
Pharmacodynamics (PD)	Interaction of drug with its target (receptor, enzyme, transporter) ? agonist, antagonist, partial agonist, inverse agonist.
Therapeutic Window	Range between the minimum effective concentration and the concentration at which adverse effects appear.
Half-life ($t_{1/2}$)	Time for plasma concentration to drop by 50%; influences dosing interval.
First-Pass Metabolism	Hepatic metabolism that reduces oral bioavailability; important for drugs like propranolol.
Drug-Drug Interactions	Enzyme induction/inhibition (e.g., CYP450), pharmacodynamic synergy, additive toxicity.

3. Major Neurotransmitter Systems Targeted in Psychiatry

System	Primary Neurotransmitters	Typical Clinical Effects of Modulation
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Monoamine	Serotonin (5-HT), Norepinephrine (NE), Dopamine (DA)	Mood regulation, anxiety, cognition, reward.
GABAergic	Gamma-aminobutyric acid (GABA)	Inhibition, anxiolysis, anticonvulsant.
Glutamatergic	Glutamate, NMDA receptors	Excitation, learning, memory; dysregulation implicated in psychosis and depression.
Cholinergic	Acetylcholine (ACh)	Attention, memory, autonomic function.
Neuropeptide	Substance P, CRF, neuropeptide Y	Stress response, mood, pain perception.

4. Core Drug Classes in Psychopharmacology

Class	Representative Agents	Primary Indications	Mechanism of Action (MOA)
Antidepressants	SSRIs (fluoxetine), SNRIs (venlafaxine), TCAs (amitriptyline), MAOIs (phenelzine), atypical (bupropion)	Major depressive disorder, anxiety, OCD, PTSD	? Synaptic serotonin/NE (reuptake inhibition), ? dopamine (bupropion), ? monoamine breakdown (MAOIs)
Anxiolytics	Benzodiazepines (diazepam), Buspirone, Hydroxyzine	Generalized anxiety, panic, insomnia	Benzos: Positive allosteric modulators of GABA _A ; Buspirone: 5-HT _{1A} partial agonist
Antipsychotics	First-gen: haloperidol; Second-gen: risperidone, olanzapine, aripiprazole		