

Introduction to Pharmacology

Introduction to Pharmacology – Study Notes

1. What Is Pharmacology?

Aspect	Definition
Scope	The scientific study of drugs and their interactions with living organisms.
Goal	Understand how drugs produce therapeutic effects, how they are processed by the body, and how to use them safely and effectively. • Pharmacodynamics – what the drug does to the body. • Pharmacokinetics – what the body does to the drug.
Branches	• Clinical Pharmacology – application in patient care. • Toxicology – harmful effects and overdose management. • Pharmacogenomics – genetic influences on drug response.

2. Basic Terminology

Term	Meaning
Drug	Any chemical substance that alters normal physiological functions when administered.
Medication	A drug prepared for therapeutic use (dose form, packaging, labeling).
Dose	Amount of drug given at one time.
Regimen	Schedule of doses (frequency, duration).
Therapeutic Index (TI)	Ratio of toxic dose to effective dose; a measure of safety.
Adverse Effect	Unintended, harmful response to a drug at normal doses.
Contraindication	Situation where a drug should not be used because risks outweigh benefits.
Interaction	Modification of a drug's effect by another drug, food, or disease.

3. Pharmacodynamics – “What the Drug Does to the Body”

Introduction to Pharmacology

Concept	Description
Receptor	Protein (or other molecule) that a drug binds to, initiating a biological response.
Agonist	Binds to a receptor and activates it (e.g., morphine ? ??opioid receptor).
Antagonist	Binds without activating, blocking the receptor (e.g., naloxone).
Partial Agonist	Produces a sub?maximal response even at full receptor occupancy (e.g., buprenorphine).
Dose?Response Curve	Graph of effect magnitude vs. drug concentration; key parameters: ED?? , EC?? , E_{max} .
Potency	Amount of drug needed to achieve a given effect (lower dose = higher potency).
Efficacy	Ability of a drug to produce a maximal response when all receptors are occupied.

4. Pharmacokinetics – “What the Body Does to the Drug”

Phase	Definition	Key Processes	Typical Units
Absorption	Entry of drug from site of administration into systemic circulation.	Diffusion, active transport, first? pass metabolism (oral).	% dose absorbed, C _{max} , T _{max}
Distribution	Movement of drug from blood to tissues.	Protein binding, tissue binding, volume of distribution (V _d).	L/kg
Metabolism	Chemical alteration (usually in liver).	Phase I (oxidation, reduction, hydrolysis) & Phase II (conjugation).	Clearance (Cl), half?life (t _{1/2})
Excretion	Removal of drug or metabolites from the body.	Renal filtration/secretion, biliary excretion, pulmonary elimination.	mL/min, % unchanged drug in urine

Key Equations

- Half?life (t_{1/2}): $t_{1/2} =$