Basic Principles of Pharmacology Study Guide

1. Pharmacokinetics

a. **Absorption**

- **Definition:** The process by which a drug enters the bloodstream from the site of administration.
- **Factors influencing absorption:** Route of administration, drug formulation, blood flow to the site, and drug properties.

b. **Distribution**

- **Definition:** The transport of a drug throughout the body to its target site of action.
- **Factors influencing distribution:** Blood flow, drug solubility, protein binding, and tissue permeability.

c. **Metabolism (Biotransformation)**

- **Definition:** The enzymatic alteration of a drug into metabolites, often in the liver.
- **Enzymes involved:** Cytochrome P450 system.
- **Consequences:** Metabolism can lead to activation or inactivation of drugs.

d. **Excretion**

- **Definition:** The removal of drugs or their metabolites from the body, primarily through the kidneys.
- **Other routes of excretion:** Bile, feces, lungs.

2. Pharmacodynamics

a. **Receptors**

- **Definition:** Specific sites on cells where drugs bind to produce their effects.
- **Agonists vs. Antagonists:** Agonists activate receptors, while antagonists block receptor activation.

b. **Drug-Receptor Interactions**

- **Affinity and Efficacy:** Affinity is the strength of the drug-receptor binding, and efficacy is the ability of the drug to produce a response.

c. **Dose-Response Relationships**

- **Dose-Response Curve:** Graphical representation of the relationship between drug dose and its effect.
- **ED50 and LD50:** Effective dose for 50% of the population and lethal dose for 50%, respectively.

d. **Therapeutic Index**

- **Definition:** The ratio of the median lethal dose (LD50) to the median effective dose (ED50).
- **High vs. Low Therapeutic Index:** High TI indicates a wide margin of safety; low TI requires careful monitoring.

e. **Drug Interactions**

- **Pharmacokinetic Interactions:** Changes in drug absorption, distribution, metabolism, or excretion.
- **Pharmacodynamic Interactions:** Combined effects on the same receptor.

3. Drug Classification

a. **Based on Therapeutic Use**

- **Example:** Analgesics (pain relievers), antibiotics, antihypertensives.

b. **Based on Chemical Structure**
   - **Example:** Beta-blockers, ACE inhibitors, statins.

c. **Based on Mechanism of Action**
   - **Example:** Beta-2 adrenergic agonists, ACE inhibitors, serotonin reuptake inhibitors.

4. Pharmacotherapy Principles

a. **Individual Variation**
   - **Factors affecting response:** Age, gender, genetics, comorbidities, and organ function.

b. **Placebo Effect**
   - **Definition:** A psychological and physiological response to an inactive substance.
   - **Importance in Clinical Trials:** Used as a control to assess the true effect of a drug.

c. **Adverse Drug Reactions (ADR)**
   - **Types:** Side effects, allergic reactions, idiosyncratic reactions, toxic reactions.
   - **Monitoring and Reporting:** Importance of identifying and reporting ADRs.

d. **Patient Education and Compliance**
   - **Importance:** Enhances treatment outcomes and reduces the risk of adverse effects.
   - **Factors influencing compliance:** Understanding, motivation, and convenience.

5. Drug Development and Approval Process

a. **Preclinical Testing**
   - **Animal studies:** Assess safety, toxicity, and efficacy.

b. **Clinical Trials**
   - **Phase I, II, III, IV trials:** Progressively larger studies to evaluate safety and effectiveness.
   - **Regulatory Approval:** Obtaining approval from health regulatory agencies.