Pharmacokinetic I

Absorption: refers to the process of drug movement from the site of administration into the systemic circulation. Several factors and mechanisms influence drug absorption, including:

Mechanisms of Absorption:

1. **Passive Diffusion:** Lipid-soluble drugs move rapidly across cell membranes. Water-soluble drugs move across aqueous channels (water pores) without requiring energy, following the concentration gradient.
2. **Facilitated Diffusion:** Drugs are transported into the cell via carriers or transporters, also without energy, following the concentration gradient.
3. **Active Transport:** Drug molecules move against the concentration gradient with the help of carriers or transporters, requiring energy.
4. **Endocytosis:** For drugs with high molecular weight, the drug binds to the cell membrane, becomes enveloped by it, and is absorbed into the cell.

Factors Affecting Absorption:

- **Route of Administration:** Intravenous (IV) and inhalation provide the fastest absorption, followed by intramuscular (IM), subcutaneous (SC), oral, and topical routes.
- **Absorbing Surface**: Larger and more vascularized surfaces (e.g., alveoli) provide better absorption.
- **Co-administration of Food/Drugs:** Some foods and drugs can either increase or decrease absorption. For instance, calcium in milk reduces oral absorption of tetracyclines.
- **Solubility:** Lipid-soluble drugs are absorbed more efficiently than water-soluble drugs. Non-ionized (uncharged) drugs have better absorption.
- **pH and Ionization:** Weak acids are absorbed better in acidic environments, while weak bases are absorbed better in alkaline environments. The degree of ionization (pKa) plays a critical role in absorption.
- **Pharmaceutical Preparation:** Solutions are absorbed more quickly than suspensions, tablets, or other solid forms.

Absorption Modifiers:

- **Bioavailability:** This refers to the percentage of the drug that reaches systemic circulation. Drugs with poor oral bioavailability often undergo first-pass metabolism, where they are metabolized by the liver or gut wall before reaching systemic circulation. Examples include nitroglycerin and propranolol

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