Chapter 2

Principles of Drug Action
The Drug Administration Phase

- **Drug dosage forms**
  - Drug formulations and additives

- **Routes of administration**
  - Enteral
  - Parenteral (injectable)
  - Transdermal
  - Inhalation
  - Topical
The Pharmacokinetic Phase

- Absorption
  - Aqueous diffusion
  - Lipid diffusion
  - Carrier-mediated transport
  - Pinocytosis
  - Factors affecting absorption
The Pharmacokinetic Phase

• Distribution
  - Volume of distribution

• Metabolism
  - Site of drug biotransformation
  - Enzyme induction and inhibition
  - First-pass effect
The Pharmacokinetic Phase

- Elimination
  - Plasma clearance
  - Maintenance dose
  - Plasma half-life
  - Time-plasma curves
The Pharmacokinetic Phase

- Pharmacokinetics of inhaled aerosol drugs
  - Local versus systemic effect
  - Inhaled aerosols in pulmonary disease
  - Distribution of inhaled aerosols
    - Oral portion (stomach)
    - Inhaled portion
The Pharmacokinetic Phase

- **L/T ratio**
  - Proportion of drug available from the lung, out of the total systemically available drug
  - Formula: \( \frac{\text{Lung dose}}{\text{Lung dose} + \text{GI dose}} \)
  - The higher the ratio the more efficient the aerosol drug delivery to the respiratory tract
The Pharmacodynamic Phase

- Structure-activity relations
- Nature and type of drug receptors
  - Drug receptors
  - Lipid-soluble drugs and intracellular receptor activation
  - Drug-regulated ion channels
  - Receptors linked to G proteins
The Pharmacodynamic Phase

- Dose-response relations
  - Potency versus maximal effect
  - Therapeutic index (TI)
  - Agonists and antagonists
  - Drug interactions
  - Terms for drug responsiveness
Pharmacogenetics

- Variations in patient response to drugs due to hereditary differences

- Examples:
  - Isoniazid
  - Succinylcholine
  - Isoflurane