Pharmacokinetics and Pharmacogenomics: Clinical Implications

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The 4 Phases of Pharmacokinetics

• Absorption
• Distribution
• Metabolism
• Excretion
Pharmacokinetics

Absorption

- Pharmaceutical Factors
  - Rate of dissolution
  - Lipid solubility
  - Route
- Clinician/Patient Factors
  - Surface area
  - Blood flow
  - Route
  - Competition
Absorption

- The liberation phase extends from the time of drug administration to the point where the drug is dissolved in body fluids and ready for absorption. Absorption is the process of drug movement from the absorption site across one or more cell membrane barriers into the circulation.
- The most common mechanism for drug absorption is PASSIVE DIFFUSION.

Physiologic Factors Affecting Absorption

- **First-pass effect (presystemic metabolism)**
- During the process of drug absorption from the gastrointestinal (GI) tract, there are two potential sites for metabolism of the drug to occur: 1) gut wall, and 2) liver. If the drug is metabolized (chemically altered) as it passes through either of these sites, it is said to undergo first-pass metabolism. Effectively, the drug has been metabolized before it ever reaches the systemic circulation.
Physiologic Factors Affecting Absorption

- First-pass effect (presystemic metabolism)
- Some drugs are so extensively metabolized when taken orally that therapeutic effects cannot be obtained, e.g., lidocaine. These drugs must be given by injection. Other drugs must be given in very large doses orally, compared to parenteral doses, to achieve therapeutic effects; e.g. propranolol per os (PO) 10 to 30 mg every six to eight hours (antihypertensive), intravenous 1 to 3 mg (antiarrhythmic).

Pharmacokinetic Factors Affecting Absorption

- Elevation of gastric pH by antacids
  - Increases the absorbance of basic drugs; decreases that of acidic drugs
- Laxatives
  - Increase peristalsis and decrease GI transit time
- Drugs that are constipating may increase absorption of other meds
- Adsorbents
- Drugs that decrease GI blood flow