Drug Activity in the Body

**Pharmaceutic Phase**
During this phase the drug is dissolved in the body. Liquid medications and IV medications are already dissolved therefore they absorb much faster in the body. A tablet or capsule must pass through the GI tract to become dissolved. Enteric coated medications are time released capsules or tablets that must meet the alkaline environment of the small intestine before it dissolves.

**Pharmacokinetic Phase**
This phase refers to how the drug is transported and distributed. The drug can be distributed or transported via absorption, distribution, metabolism, and excretion.

- **Absorption**: moves the drug from the point of administration to the body fluids via active transport, passive transport, pinocytosis.
- **Distribution**: The systemic circulation distributes drugs to various body tissues. Distribution depends on protein binding, blood flow, and solubility. The drug comes into contact with albumin or remain free, only free circulating particles can produce a therapeutic effect.
- **Metabolism**: Or biotransformation, the body changes the drug to be more or less active and excretable. Most are metabolized by the liver or kidneys, lungs, plasma, and intestinal mucosa.
- **Excretion**: Elimination of the drug from the body after the liver renders it in active it is then excreted by the kidneys via urine.

**Pharmacodynamic Phase**
Deals with the drugs action and effect on the body.

- **Primary effect**: The desired therapeutic effect.
- **Secondary effect**: Any other effect the drug has on the body. For example, sildenafil was made for treatment of hypertension. It was also found to help with Erectile dysfunction which is its secondary effect.

A drug exerts its action by two main mechanisms.

- Alteration in cellular function
- Alteration in cellular environment

**Phases of Activity**
- Pharmacologic phase
- Pharmacokinetic phase
- Pharmacodynamic phase

**Influences on Absorption**
- Route: IV/IM are the fastest to be absorbed.
- Solubility
- Condition of body tissues

**Influence on Metabolism**
- Age
- Weight
- Sex
- Disease
- Route

**Interactions**
- **Additive drug interaction**: The combined effect of two drugs has an equal effect if the drug was given alone.
- **Synergistic interaction**: When drugs interact and create an increased effect example: Hypnotics and alcohol when taken together will cause increased CNS depression.
- **Antagonistic interaction**: One drug interferes with the action of another for example : Naloxone reverses the effects of opioids.
- **Food interaction**: Some food and decrease or increase the metabolism of a drug.

**Effects on the nervous system**
- **Sympathomimetic**: physiological effects characteristic of the sympathetic nervous system by promoting the stimulation of sympathetic nerves.
- **Sympatholytic**: antagonistic to or inhibiting the transmission of nerve impulses in the sympathetic nervous system.
- **Parasympathomimetic**: reduces the activity of the parasympathetic nervous system.
- **Parasympatholytic**: stimulates the parasympathetic nervous system (PSNS). These chemicals are also called cholinergic drugs because acetylcholine. (ACh) is the neurotransmitter used by the PSNS.

**Key Terms**
- **First pass effect**: The concentration of a drug is greatly reduced before it reaches the systemic circulation.
- **Half life**: Time is takes for the body to eliminate 50% of the drug.
- **Onset of action**: Time it takes for the drug reach therapeutic effect after administration.
- **Peak concentration**: When the absorption rate equals the elimination rate.
- **Duration**: How long the drug produces a therapeutic effect.
- **Pharmacogenomics**: People’s response to medication are variable. Genetic makeup can alter how a drug works.
- **Teratogen**: Any substance that causes abnormal development of a fetus.
- **Idiosyncrasy**: unusual or abnormal reaction to a drug.
- **Drug tolerance**: Decreased response to a drug that requires an increase in dosage.
- **Cumulative drug effect**: Seen in people with liver or kidney disease, the body is unable to excrete one dose of the drug before the next dose is given causing an accumulation of the drug in the system.

**Reactions**
- **Adverse drug reactions**: Undesirable drug effects. They may be mild, severe or life threatening. May occur at the first dose or after subsequent doses.
- **Allergic drug reactions**: Immediate hypersensitivity reaction. Occurs because the individual’s immune system responds to the drug as a foreign substance. Some reactions occur immediately or they can take time. They can be mild, severe or life threatening.
- **Anaphylactic shock**: Extremely serious reaction that usually occurs immediately after drug administration. This requires immediate medical intervention to raise the BP and improve breathing. Can be fatal if not treated immediately.
- **Angioedema**: Allergic reaction manifested by collection of fluid in the subcutaneous tissue. Most commonly affects the eyes, lips, mouth and throat.
- **Toxic reaction**: Toxic levels build up in the body when the body cannot excrete the drug.