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Commentary

Mechanism of Multiple Dosage Regimen forms of Pharmacokinetic Drug Interactions

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ABOUT THE STUDY

The overarching principle in pharmacokinetic theory is drug absorption, defined as the transport of un-metabolized drugs from the site of administration into the systemic circulation. The term pharmacokinetics summarizes the study of the absorption, distribution, metabolism, excretion, and the body's effects on drugs. The application of pharmacokinetic methods to ensure that patients are treated safely and effectively is called clinical pharmacokinetics. Drug absorption is determined by the drug's physicochemical properties, formulation, and route of administration. Dosage forms (e.g., tablets, capsules, solutions) consisting of drugs and other ingredients are formulated to be administered by a variety of routes (e.g., oral, buccal, sublingual, rectal, parenteral, topical, and inhalation). Many factors can affect the therapeutic efficacy of a drug. Pharmacokinetics refers to the route by which a drug enters and exits the body. Pharmacokinetics is the process by which a drug moves through the body. During that time, the drug goes through four stages: Absorption, distribution, metabolism, and excretion.

Drug absorption

Drug absorption is a pharmacokinetic parameter related to how a drug is absorbed from a pharmaceutical formulation into the bloodstream. Several factors influence how a drug is absorbed into the body. These include Physico-chemical properties (solubility), Formulations (tablets, capsules, solutions), Route of administration (oral, buccal, sublingual, rectal, parenteral, topical, or inhalation), and Gastric emptying rate. Passive diffusion involves the passage of pharmaceuticals across cell membranes from areas of high drug concentration, such as the gastrointestinal tract, to areas of low drug concentration, such as the blood.

Drug distribution

Once absorbed, most drugs are not evenly distributed throughout the body. Drugs that dissolve in water (water-soluble drugs), such as the antihypertensive drug atenolol, tend to stay in the blood and fluids that surround cells (interstices). The anxiolytic drug clorazepate tends to accumulate in adipose tissue. Drugs penetrate different tissues at different rates, depending on the ability of the drug to permeate the membrane. In general, fat-soluble drugs can cross cell membranes faster than water-soluble drugs. For some drugs, transport mechanisms help move them into and out of tissues. Some drugs leave the bloodstream very slowly because they bind tightly to proteins circulating in the blood. Because they are weakly bound to blood proteins, some leave the bloodstream quickly and enter other tissues. The distribution of the drug also varies from person to person. For example, obese people can store large amounts of fat-soluble drugs, while very lean people can store relatively small amounts. Elderly people, even if they are thin, can store large amounts of fat-soluble drugs because their body fat percentage increases with age.

Drug metabolism

Drug metabolism is the biotransformation of drugs in the body so that they are more readily excreted. Most of the metabolic processes involving drugs take place in the liver. This is because the enzymes that make the reaction possible are concentrated in the liver. The purpose of metabolism in the body is usually to change the chemical structure of a substance to facilitate its removal from the body. When the drug is metabolized, it is inactivated in most cases. However, the metabolites of some drugs are pharmacologically active and affect the body. In this case, the drug formulation is called a prodrug.

Drug excretion

Drug elimination is the process by which medicinal substances are removed from the body. All drugs are eventually cleared from the body, and several pathways may be involved in this process. Some drugs are metabolized before being excreted, while others are excreted largely unchanged in their original dosage form. These organs or structures remove drugs from the body using

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specific pathways known as elimination pathways like urine, tears, sweat, saliva, breath, milk, feces, and bile. Other routes of elimination are less important for drug elimination, except in very specific cases such as the respiratory tract of alcohol and anesthetic gases.

Most drugs are weak acids or weak bases and therefore exist in aqueous environments such as the gastrointestinal tract in equilibrium between ionized and non-ionized forms. Drugs administered by Intravenous (IV) injection or infusion are delivered directly into the bloodstream and do not need to be absorbed. However, there are some non-oral routes of administration that must be absorbed through cell membranes to reach systemic circulation.