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Commentary

Drug Metabolism Rate and its Phases

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DESCRIPTION

A major part of pharmacology and medical practice is drug metabolism. Most medications are altered chemically by various biological processes to produce substances that can be eliminated from the body more quickly. These chemical changes, sometimes referred to as biotransformation's, predominantly take place in the liver. Any provider who regularly administers medication to patients should be interested in learning more about these changes in chemical activity since they are essential in using the best pharmacological intervention for any patient.

Phases of metabolism

There are two phases of drug metabolism.

- Phase I: Non-synthetic reactions such as cleavage (e.g. oxidation, reduction, hydrolysis), formation or modification of a function group.
- Phase II: Chemical processes like the conjugation of an endogenous molecule (e.g. sulfate, glycine, glucuronic acid).

Synthetic processes in Phase II produce more polar metabolites, which are easier to eliminate in the bile or urine. These phases don't follow a specific order and reflect the sort of reaction.

Drug metabolism rate

The speed at which a medicine metabolizes after administration is known as the drug metabolism rate. Due to genetic variables, lifestyle choices, and medical history, this can differ from person to person for a given medicine. Phase 1 of drug metabolism, which is often measured in hours or days, is the slowest phase. Phase 2 on the opposite side is fast.

The primary organ in charge of drug metabolism is the liver. However, other organs can also metabolize medicines, including the gut and lungs. Many variables impact the rate at which these organs metabolize medicines. Some medications metabolize more quickly than others. As a result, some medications can be taken more frequently than others without reducing their effectiveness of drug administration. A drug's half-life is the duration it takes for the body to eliminate it. Drugs with a short half-life are rapidly eliminated from the body. In contrast, because their removal processes take longer, those with long half-lives can be taken less frequently.

Metabolic enzymes

The maximum rate of metabolism exists for the majority of drugs. This restriction results from the saturating of the enzymes required for the metabolic pathway to occur. The therapeutic doses that are usually utilized, though much lower than the saturation level. As a result, the rate of metabolism rises as drug concentration does. First-order kinetics is the term used to describe this process. The metabolism rate in first-order kinetics is a significant fraction of the drug concentration in the body.

Therapeutic doses of the medication may possibly cause the enzyme sites to become saturated. When this occurs, even though the drug doses are raised, the metabolism remains same. Zero-order kinetics is a term used to describe this.

Conjugation

Glucuronidation is the most prevalent form of Phase II reaction, occurring in the microsomal enzyme system of the liver. The medications become more soluble as a result of this process, making it possible for them to be excreted in the urine or bile. Aging does not affect the metabolic rate of glucuronidation, and there's therefore not usually a need to reduce the dose of such drugs for metabolic reasons in the elderly—unlike the repercussions of the cytochrome P-450 group of enzymes in Phase I.

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