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Perspective

Pharmacodynamics and Pharmacokinetic Mechanism of a Drug

Shawana Aslam*

Department of Pharmaceutical Sciences, Manipal College of Medical Sciences, Dharan, Nepal

DESCRIPTION

Pharmacodynamics is the study of the biochemical, physiologic, and molecular effects of medications on the body. Pharmacodynamics includes chemical interactions, receptor binding, and post-receptor consequences. The onset, duration, and severity of a drug's impact are determined by its pharmacokinetics. Pharmacodynamics, in conjunction with pharmacokinetics (what the body does to a drug or the outcome of a medication within the body), assists in explaining the relationship between dose and response, i.e. the drug's effects. The pharmacologic response is determined by the drug's ability to bind to its target. The drug's action is influenced by the concentration of the drug at the receptor site.

The pharmacodynamics of a medicine can be influenced by physiologic changes caused by a disease, ageing process and other medications. The pharmacokinetic behaviours of the majority of medications are summarized by formulas linking these processes. A medicine's pharmacokinetics is influenced by elements specific to the patient as well as by the chemical composition of the drug. Population-level predictions of pharmacokinetic parameters can be made using some patient-related variables, such as renal function, genetic make-up, sex, and age. For instance, in elderly individuals, the half-life of some medications, particularly those that require both metabolism and excretion, may be substantially prolonged. In reality, several pharmacokinetics elements are impacted by physiologic changes that come with ageing. Prescribers are better able to quickly and precisely change dosage when they are familiar with pharmacokinetic concepts. Therapeutic drug monitoring is the use of pharmacokinetic principles to customize pharmacotherapy.

Stages of pharmacokinetics

Absorption: The method by which a medicine enters the bloodstream is called absorption. The two most popular methods of delivery are intravenous and oral, while there are numerous more options. The absorption phase of a medicine is bypassed if it is given intravenously since the drug enters circulation right away. However, because it allows patients to self-administer, many medications are dosed orally. When consumed, xenobiotics first pass through the digestive system before passing into the liver *via* the portal circulation and then entering the systemic circulation, where they can be transported to the site of action.

Distribution: The reversible movement of a substance from one part of the body to another is referred to as distribution. Drug developers can use radiolabeled *in vivo* ADME investigations, such as Quantitative Whole Body Autoradiography (QWBA), microautoradiography (mARG), and tissue dissection, to gain a comprehensive understanding of drug concentration in diverse tissues and organs over time.

Metabolism: The process of metabolism involves turning xenobiotic substances, which are typically more lipophilic, into hydrophilic metabolites that can be excreted from the body. Enzymes are involved in the metabolism of drugs, and it may take a number of research investigations to pinpoint the main metabolites and pertinent metabolic pathways.

Excretion: The permanent removal of a material from the body is known as excretion. Most of the time, the parent medication and all of its metabolites are finally eliminated from the body. Which excretion routes are the most significant must be distinguished.

CONCLUSION

The pharmacokinetics of a medicine determines when, how long, and how severely it will have an effect. Some patient-related characteristics, including as renal function, genetic make-up, sex, and age, can be used to construct population-level estimates of pharmacokinetic parameters. To acquire a thorough understanding of drug concentration in various tissues and organs, drug developers can perform radiolabeled *in vitro* ADME investigations, such as Quantitative Whole Body Autoradiography (QWBA). When a medication is administered intravenously, the absorption period is avoided because the medication immediately reaches the bloodstream.

Correspondence to: Shawana Aslam, Department of Pharmaceutical Sciences, Manipal College of Medical Sciences, Dharan, Nepal, E-mail: shawanaaslam50@gmail.com

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