

A Brief Study on Biochemical Pharmacology

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EDITORIAL NOTE

Biochemical pharmacology and drug absorption includes drug transformation reactions and a general introduction to pharmacology, drug discovery and clinical trials for new drug candidates. It introduces the concept of individualization of drug therapies. One is expected to demonstrate understanding the Linkage between the various pharmacological processes; Routes of drug administration; Mechanisms of drug absorption; The kinetics of drug disposition and concepts, such as volume of distribution, initial dose and half-life; The biotransformation and excretion of drugs; The role of biochemical knowledge in the discovery and development of candidate drug compounds into useful drugs; Basic design of clinical trials of new drugs and the drug approval process; The linkage between genetic variations and varied drug responses in different individuals; The various adverse drug reactions in different patients; How different dosage regimens are calculated with respect to the prevailing health status of individuals and how adjustments are carried out in old patients or geriatrics.

Pharmacology is the science that deals with drugs, their properties, actions and fate in the body. It embraces the sciences of pharmaceutics (preparation of drugs), therapeutics (treatment of diseases by use of drugs) and toxicosis or adverse side-effects that arise from the therapeutic interventions. Pharmacology can be divided into the following processes: The pharmaceutical process of drugs; deals with chemical synthesis, formulation and distribution of drugs. Pharmacokinetic process deals with the time course of drug concentration in the body. This process can be further subdivided into; absorption, distribution, biotransformation and excretion of the drug. The pharmacodynamic process; deals with the mechanism of drug action: that is interaction of drugs with the molecular structures in the body. The therapeutic process; deals with the clinical response arising from the pharmacodynamic process. Toxicologic process deals with adverse effects of drugs arising from either over dosage or interference of biochemical pathways unrelated to the intended drug target. Biochemical pharmacology is concerned with the effects of drugs on biochemical pathways underlying the pharmacokinetic and pharmacodynamic processes and the subsequent therapeutic and the toxicological

processes. The pharmaceutical process is, however, outside the realms of biochemical pharmacology.

Routes of drug administration and systemic availability

This depends on the actual biochemical characteristics of the drug and the interaction of drug molecules with body fluids and tissues. The main routes of drug administration are the topical application, parenteral, and enteral routes. The route of drug application determines how quickly the drug reaches its site of action. The choice of the route of administration of a drug, therefore, depends on the therapeutic objectives of the treatment. For instance, intravenous injection or inhalation may be selected to produce intense, but rather short-lived effects, whereas oral dosing may be better and more convenient for long lasting effects and even intensity. The various types of drug administration include:

Topical application: This is the most direct and easiest mode of drug administration. It involves local application of a drug to the site of action e.g. eye drop solutions, sprays and lotions for oral, rectal, vaginal and urethral use. These drugs are absorbed through the cell membranes. Absorption of drugs through the skin is proportional to their lipid solubility since the epidermis behaves like a hydrophilic barrier. Lipid insoluble drugs are therefore suspended in oily vehicles to enhance solubility and hence absorption.

Oral administration: The drugs administered orally are absorbed at different sites along the Gastrointestinal Tract (GIT).

Rectal administration: This is the preferred route when the oral route is unsuitable because of nausea or if the drugs have objectionable taste or odor. This route also protects susceptible drugs from the biotransformation reactions in the liver. However, absorption by this route is often irregular and incomplete. Formulations such as suppositories or enemas are applied via rectal route.

Parenteral administration: This mode of administration is also known as injection. It is generally more rapid and enables more accurate dose selection and predictable absorption.

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Received: April 08, 2021; **Accepted:** April 22, 2021; **Published:** April 29, 2021

Citation: Catherine S (2021) A Brief Study on Biochemical Pharmacology. J Clin Exp Pharmacol. 11:e158.

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