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Commentary

Understanding the Pharmacokinetics of Naphthalene on Endocrine Function

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DESCRIPTION

Naphthalene and its derivatives are chemical substances with several industrial, medical, and toxicological uses. Understanding these drugs' pharmacokinetic characteristics is critical for their safe and effective use. Pharmacokinetics is the study of drug or substance Absorption, Distribution, Metabolism, and Excretion (ADME) in living organisms. The pharmacokinetic analysis of naphthalene and its derivatives gives essential information regarding the fate of these compounds in the body, including absorption, distribution, metabolism, and elimination.

Absorption

Depending on the mode of exposure, naphthalene and its compounds are absorbed *via* several routes. The principal mode of exposure for naphthalene vapours is inhalation, which is easily absorbed in the lungs and disseminated throughout the body *via* the bloodstream. Ingestion is another route of exposure for naphthalene, which is absorbed mostly in the small intestine and transported to the liver and other organs *via* the portal vein.

The chemical structure and physical features of naphthalene derivatives influence their absorption. Hydrophobic compounds, for example, are absorbed more efficiently through the skin, whereas hydrophilic derivatives are absorbed less efficiently. Some naphthalene derivatives, such as 1-naphthol, can be absorbed by the lungs inhalation.

Distribution

Naphthalene and its derivatives are transported throughout the body *via* the bloodstream once consumed. Several factors influence the distribution of these chemicals, including lipophilicity, protein binding, and tissue permeability. Because of their lipophilic nature, naphthalene and its derivatives have a strong affinity for adipose tissue. They can also accumulate in other lipid-rich tissues such as the liver, kidney, and brain. Another factor influencing the distribution of naphthalene and its derivatives is protein binding. Compounds that are highly protein-bound, such as naphthalene, have a lower ability to diffuse through the cell membrane and are thus limited to the bloodstream.

Metabolism

Naphthalene and its derivatives are largely metabolized in the liver, where they are bio transformed by several Cytochrome P450 (CYP) enzymes. Naphthalene and its metabolites are often less poisonous and more water-soluble than the parent molecules, allowing for easier removal from the body. Naphthalene metabolism is divided into two stages: oxidation and conjugation. CYP enzymes convert naphthalene to naphthalene oxide in the oxidation route. Naphthalene oxide can then be broken down further to generate 1,2-naphthoquinone or 1,4-naphthoquinone, which can react with cellular nucleophiles like glutathione to form adducts that can be eliminated in the urine.

The chemical structure and functional groups of naphthalene derivatives influence their metabolism. CYP enzymes, for example, can metabolise hydroxylated derivatives like 1-naphthol to generate glucuronide or sulphate conjugates, which are eliminated in the urine. Other naphthalene derivatives, such as 2-naphthylamine, can be metabolically activated to create reactive intermediates capable of binding to DNA and causing genotoxicity and carcinogenicity.

They are also used in the production of resins and dyes, among other things. Two more naphthalene derivatives are naphthalene-1,2-diol and naphthalene-1,2,6,7-tetrol. It has been proven that naphthalene and its derivatives are metabolically transformed by cytochrome P450 enzymes into reactive chemicals capable of triggering a number of illnesses, including oxidative stress. Exposure to naphthalene and its derivatives has been related to poisoning, the creation of unfavourable physiological changes, morbidity, and mortality in various studies.

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