

Chapter-10

Safety, Dosage, and Drug Interactions

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Abstract

Flavonoids represent a structurally diverse class of plant-derived polyphenolic compounds known for their wide-ranging biological activities, including antioxidant, anti-inflammatory, antiviral, anticancer, and immunomodulatory effects. With growing interest in their integration into therapeutic regimens for chronic diseases, infections, and immune-related disorders, it becomes imperative to critically evaluate their safety, dosing strategies, and potential for drug interactions. Various flavonoid subclasses—such as flavanols, flavones, flavanones, isoflavones, and anthocyanins have distinct toxicological profiles. Key toxicological considerations, including acute and chronic toxicity, organ-specific effects, genotoxicity, reproductive toxicity, and dose-limiting adverse effects, are systematically discussed. Furthermore, the chapter explores the complex interplay between flavonoids and pharmacological agents, with particular attention to commonly co-administered drugs such as antivirals, anticoagulants, chemotherapeutics, and antidiabetic medications. Mechanistic insights into these interactions are provided, focusing on flavonoid-mediated modulation of drug-metabolizing enzymes (e.g., cytochrome P450 isoenzymes), drug transporters (e.g., P-glycoprotein), and metabolic pathways that can significantly impact drug absorption, distribution, metabolism, and excretion. Such interactions may result in altered plasma drug concentrations, diminished therapeutic efficacy, or heightened risk of adverse effects, underscoring the need for careful clinical consideration and pharmacovigilance. In addition, the regulatory landscape governing the use of flavonoids as therapeutic agents or dietary supplements is reviewed. Guidelines and safety assessments from