

A Comprehensive Review on the Therapeutic Applications of Metronidazole

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Abstract: *Metronidazole is an important antimicrobial agent widely used in the treatment of bacterial and protozoal infections. It belongs to the nitroimidazole class of antibiotics and has demonstrated efficacy against anaerobic bacteria and certain protozoa. Its mechanism of action involves the generation of toxic radicals that disrupt DNA function, ultimately leading to cell death. Clinically, metronidazole is used to treat conditions such as bacterial vaginosis, trichomoniasis, amebiasis, and infections caused by Clostridium difficile. Additionally, it has applications in dental infections, gastrointestinal conditions, and certain dermatological disorders. The drug is available in various formulations, including oral, intravenous, and topical preparations, making it versatile in therapeutic settings. Despite its effectiveness, metronidazole is associated with side effects such as gastrointestinal disturbances, neurological symptoms, and potential carcinogenic effects in long-term use. Moreover, concerns regarding bacterial resistance have emerged, necessitating judicious use and adherence to treatment guidelines. This review explores the pharmacology, clinical applications, mechanisms of action, and emerging considerations related to metronidazole therapy. Through an in-depth analysis of its therapeutic scope, this paper aims to provide a comprehensive understanding of the drug's significance in modern medicine.*

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