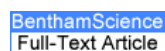


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Novel Targets and Nanotechnology Approaches in Treating Vulvovaginal Candidiasis: Insights into Host-Microbe Interactions and Immunotherapy

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Abstract

The aim of this article is to study recent developments in the management of vulvovaginal candidiasis (VVC) with emphasis on overcoming antifungal resistance and recurrent VVC by examining host-microbe interaction, new molecular targets, immunotherapeutic interventions, and nanotechnology-based strategies. This review integrates recent VVC pathogenesis, immune response, and therapeutic development literature with a focus on immunomodulation, vaccine development, and nanotechnology interventions. Literature on immunotherapy and nanoparticle-based drug delivery systems was comprehensively reviewed. Immunotherapeutic concepts, such as cytokine modulation and vaccine therapy candidates, hold promise to substitute or supplement current antifungals. Nanoparticles exhibit efficacy in advancing drug solubility, reaching fungal cells, and minimizing unwanted effects. The synergy between nanotechnology and immunotherapy provides combined advantages over the multiple drawbacks of current therapies. Although novel methodologies have shown strong promise, aspects of safety, clinical relevance, and regulatory issues continue to remain key challenges. Nanotechnology-based host-targeted immunotherapy is most probably going to transform the scenario of VVC treatment, especially in drug-resistant cases. Additional research is needed to elucidate molecular host-fungal interaction mechanisms, validate vaccine efficacy in the clinic, and design standardized, reproducible nanotherapeutic platforms. Personalized regimens of treatment through immunological and microbiome profiling can enhance long-term outcomes in VVC treatment.

Keywords: Fungal infection; candidiasis; immunotherapy; molecular targets.; nanotechnology; vaginal microbiome.

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