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Harnessing the power of bioactive mushrooms; Innovations in Anticancer Diagnostic and Therapeutic benefits

Mushrooms, particularly those rich in bioactive compounds, have garnered significant interest in both diagnostic and therapeutic fields due to their notable antimicrobial and anticancer properties. Recent studies have highlighted the antimicrobial efficacy of various edible mushroom extracts, which have demonstrated substantial activity against a range of bacterial and fungal pathogens. In addition to their antimicrobial capabilities, mushrooms are being explored for their anticancer properties. Research has identified several bioactive compounds within mushrooms that may inhibit tumor growth and enhance immune responses by modulating critical signaling pathways involved in cancer progression, such as the PI3K pathway. This growing body of evidence underscores the importance of mushrooms in developing novel therapeutic strategies for cancer treatment. The TaqMan assays, represents a significant advancement over traditional methods for detecting bacterial blotch in mushroom cultivation. These assays provide high specificity, sensitivity, and speed, allowing for the rapid quantification and differentiation of pathogens, which is crucial for effective disease management in economically important mushroom species. Furthermore, the unique properties of mushroom mycelium have inspired the development of sustainable biomimetic materials, offering alternatives to non-biodegradable products. The extraction and characterization of polysaccharides from wild mushrooms reveal a wide array of biological activities, including immunomodulatory and antioxidant effects. These polysaccharides can be extracted using various methods, and advanced analytical techniques are employed to characterize their molecular properties. Overall, the multifaceted applications of mushrooms in diagnostics and therapeutics highlight their potential as valuable resources in clinical settings and sustainable material development.

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