Successful Inhibition of Candida albicans Utilizing Borate-Based Bioactive Glass: An Emerging Antifungal Material

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This study focused on antifungal susceptibility of Candida albicans, a normal gut flora microbe, to borate-based bioactive glass (BBG). C. albicans becomes pathogenic in immunocompromised individuals or during acute disturbance to tissue homeostasis. Compromised patients face a 30% chance of mortality when exposed to the fungus which increases by 20% if it progresses to sepsis. Patients become contaminated when C. albicans adheres to medical equipment and surgical implants. To a lesser degree, nuisance yeast infections can be caused by C. albicans, afflicting 75% of women in their lifetime. Antifungal treatments are difficult to implement because of cost and propensity to damage host cells. BBG is antimicrobial and non-toxic to the host, suggesting possible antifungal application. Research specific to C. albicans inhibition is missing from the literature. Live cell imaging, spectrophotometer optical density, proliferation and toxicity assays were utilized to test the efficacy of BBG against C. albicans. Initial results show inhibition and eventual clearance of C. albicans following BBG treatment. The study was expanded to include a combination of BBG, C. albicans and Dictyostelium discoideum cells. Results support Dictyostelium cell viability while inhibiting C. albicans suggesting selective antifungal clearance. BBG is a material with possible species-specific antifungal applicability. BBG may enhance the sterility of medical and at home products and devices.