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Chemobiological approaches for enhancing the efficacy of antifungal intervention

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Control of fungal pathogens, such as causative agents for aspergillosis, candidiasis, cryptococcosis or producers of mycotoxins is problematic since effective antifungal agents are often very limited. Also, the expansion of fungal resistance to conventional drugs or fungicides is a global health or food safety/security issue. Therefore, there is persistent need to improve the drug efficacy or to develop new intervention strategies. Fungal drug resistance frequently involves mutations caused by environmental stressors. In fungi, stress signals resulting from oxidative or cell wall stress are integrated into mitogen-activated protein kinase (MAPK) systems that regulate defense genes countering the stress. Of note, mutations in MAPK signaling system could result in tolerance to antifungal agents. Many natural compounds are promising antifungals or leads due to their ability to disrupt fungal defense systems such as antioxidant pathway. Natural compounds could also serve as chemical probes for identifying new antifungal targets. To enhance drug susceptibility of fungi, the model yeast *Saccharomyces cerevisiae* was used as a tool for identifying cellular targets of natural compounds, where targeting vulnerable components such as antioxidant system effectively disrupted pathogen growth, overcame antifungal tolerance or inhibited mycotoxin production. Finally, chemo-biological approaches enabled the development of novel antifungal chemosensitization which significantly improved the drug susceptibility of fungal pathogens.

Biography

Jong H Kim is a Researcher in the Food-borne Toxin Detection and Prevention Research Unit, Western Regional Research Center, US Department of Agriculture, Albany, California. His research focuses on the development of intervention strategies for control of pathogenic fungi. He provides chemo-biological expertise, particularly in the identification of cellular targets and compound interaction and participates in resistance management in collaboration with industry and academia.

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