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Chemo-genetic approaches for improved antifungal intervention

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Treatment of fungal pathogens such as *Aspergillus fumigatus* or producers of toxic secondary metabolites, viz., mycotoxins, is increasingly problematic due to the limited number of effective drugs or fungicides available for fungal control. Moreover, the expansion of fungal resistance to commercial drugs or fungicides is a global public health issue. For example, certain azole fungicides that are applied to agricultural fields have the same antifungal mechanism of action as clinical azole drugs. Such long-term application of azole fungicides to farms could provide selection pressure for the emergence of pan-azole-resistant fungal pathogens. Therefore, there is persistent need to enhance the effectiveness of conventional antifungal agents or discover/develop new intervention strategies. Current industry estimation indicates that development of new agrochemicals from discovery to the first sale requires 159,574 compounds to be screened on average, where the time and costs for this new development exceed 11 years and $286 million, respectively. We developed chemo-genetic approaches for compound screening to expedite the identification of new, safe antifungal agents. Screening United States Food and Drug Administration (FDA)-classified generally recognized as safe compounds led to the identification of chemicals targeting fungal antioxidant or cell wall integrity systems, which effectively inhibit the growth of pathogens. They possess antifungal, anti-mycotoxigenic or chemosensitizing capability to enhance the efficacy of conventional antifungal agents. Therefore, our methods can reduce costs, abate resistance and alleviate negative side effects associated with current antifungal treatments.

Biography

Jong H Kim is a Research Molecular Biologist in the Agricultural Research Service (ARS), US Department of Agriculture, Albany, California. His research focuses on the development of intervention strategies for the control of mycotoxigenic and phytopathogenic fungi. He provides chemo-biological expertise, particularly in the identification of cellular targets, mechanisms of action and compound interaction and participates in resistance management in collaboration with producers, industry and academia.

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