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Short Communication

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Signaling Lipids in Fungal Development

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Abstract

Filamentous fungi differentiate along complex developmental programs directed by abiotic and biotic signals. Currently, intrinsic signals that govern fungal development remain largely unknown. We found that an endogenously produced and secreted fungal oxylipin, 5,8-diHODE, induces fungal cellular differentiation, including lateral branching in pathogenic Aspergillus fumigatus and Aspergillus flavus, and appressorium formation in the rice blast pathogen Magnaporthe grisea. The Aspergillus branching response is specific to a subset of oxylipins and is signaled through G-protein coupled receptors. RNA-Seq profiling shows differential expression of many transcription factors in response to 5,8-diHODE. Screening of null mutants of 33 of those transcription factors identifies three transcriptional regulators that appear to mediate the Aspergillus branching response; one of the mutants is locked in a hypo-branching phenotype, while the other two mutants display a hyper-branching phenotype. Our work reveals an endogenous signal that triggers crucial developmental processes in filamentous fungi and opens new avenues for research on the morphogenesis of filamentous fungi.

Biography

Mengyao completed her PhD in the University of Wisconsin-Madison in 2020. In Dr. Nancy Keller's laboratory, she studied the opportunistic human pathogen Aspergillus fumigatus on several topics, including unraveling lipid signals that direct fungal differentiation, macrophage-spore interactions, and its pathogenesis in polymicrobial infection and allergy, which yielded 5 publications. After graduation, she joined the biotechnology company LifeMine Therapeutics, which focuses on using genomic platforms to mine fungal natural products. As a research scientist and fungal microbiologist, Mengyao works on creating new platforms for fungal fermentation. She's also serving as an editorial board member of Frontiers in Fungal Biology.