Analysis of expression of cell wall-related genes in the pkcA^{G579R} mutant of fungal pathogen Aspergillus fumigatus

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INTRODUCTION Aspergillus fumigatus is a ubiquitous saprophytic mold and the causative agent of invasive pulmonary aspergillosis in immunocompromised individuals. The CWIP (cell wall integrity pathway) signaling cascade is activated in fungal cells under stressing conditions and plays a role in the adaptation of several fungal pathogens to the human host. In many fungi, CWIP is launched via the activation of protein kinase C (PKC) which is ultimately associated to the rlmA-dependent transcription of a number of genes related to cell wall reinforcement and remodeling. Here, we analyzed the expression of cell wall-related genes in the pkcA^{G579R} mutant.

MATERIALS AND METHODS: Total RNA was extracted from A. fumigatus wild type and mutant strains and exposed or not to the cell wall disturbing agent congo red (CR). The CWIP activation by CR was verified by immunoblots using anti-phospho-p44/42 MAPK antibody targeting the A. fumigatus phosphorylated MpkA.

RESULTS AND DISCUSSION: The levels of MpkA phosphorylation upon CR exposure was lower in the mutant strain in comparison to the wild type strain indicating that the CWIP activation was impaired under partial pkcA loss-of-function. The pkcA^{G579R} and wild type strains presented similar mRNA levels of genes such as fksA and gelA before and after CR treatment. However, the mpkA agsB, agsC, chsA abundance was lower in the mutant strain during the time course analysis indicating that the expression of such genes may be dependent of the pkcA signaling cascade. The expression of rlmA, fksA, agsA, agsC gelC, chsC and chsE was increased in the mutant strain even in the absence of CR-induced cell wall stress. CONCLUSIONS: These data reinforce the role of PkcA signaling cascade in cell wall maintenance in A. fumigatus and also indicate that the PkcA-MpkA-RlmA signaling circuit is not the major pathway regulating the transcription of downstream cell wall integrity effector genes.

Keywords: Aspergillus fumigatus, protein kinase C, cell wall integrity

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