Candida albicans Pde1p and Gpa2p comprise a regulatory module mediating agonist-induced cAMP signalling and environmental adaptation.

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Abstract

Deletion of PDE2, but not of PDE1 has been shown to reduce invasion and virulence. However simultaneous deletion of PDE2 and PDE1 abolishes these processes completely, suggesting that although Pde1 has a secondary role it also contributes to virulence in Candida albicans. In the present study the roles of the two phosphodiesterases, as well as that of Gpa2, in agonist-induced cAMP signalling, growth, morphogenesis and response to some stresses have been investigated. Our biochemical evidence shows that Gpa2 stimulates cAMP signalling in response to intracellular acidification and that Pde1, but not Pde2, is responsible for down-regulation of cAMP signalling induced by glucose addition or intracellular acidification. Furthermore, the genetic interactions of PDE1 and in some cases PDE2, with GPA2 caused synthetic defects in growth, morphogenesis and responses to some stresses, suggesting that Gpa2 mediates its effects on these processes in a cAMP pathway-independent manner. Remarkably, the synthetic interactions involving PDE1, PDE2 and GPA2 are not observed in Saccharomyces cerevisiae suggesting that conserved

components of the cAMP pathway are used for different purposes in different yeast species. We suggest that cAMP phosphodiesterases have species-specific differential roles, which make them attractive antifungal targets, for combinatorial treatment.

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