

# Identification of *Candida albicans* heat shock proteins and *Candida glabrata* and *Candida krusei* enolases involved in the response to oxidative stress

Rapid Communication

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**Abstract:** In the past two decades, *Candida* species have become the second leading cause of invasive mycosis in immunocompromised patients. In order to colonize their hosts, these microorganisms express adhesins and cell wall proteins that allow them to adhere and neutralize the reactive oxygen species produced by phagocytic cells during the respiratory burst. However, the precise mechanism by which *Candida* cell wall proteins change their expression in response to oxidative stress has not been described. In an attempt to understand this change in response to oxidative stress, in this study, three *Candida* species, namely, *C. albicans*, *C. glabrata* and *C. krusei*, were exposed to increasing concentrations of H<sub>2</sub>O<sub>2</sub> and induced cell wall proteins were identified by two-dimensional gel electrophoresis and peptide mass fingerprinting. Sequence analysis of differential proteins led to the identification of two heat-shock proteins in *C. albicans*, two enolases in *C. glabrata* and one enolase in *C. krusei*. Enolases may be involved in the protection of pathogenic cells against oxidative stress as suggested by the decrease in their expression when they were exposed to high concentrations of H<sub>2</sub>O<sub>2</sub>. To our knowledge, this is the first demonstration that expression of these proteins changes in response to oxidative stress in different *Candida* species. This knowledge can eventually facilitate both an early diagnosis and a more efficient treatment of this mycosis.

**Keywords:** *Candida* species • Oxidative stress • Reactive oxygen species • Enolase • Heat shock proteins

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## 1. Introduction

Invasive fungal infections are the leading cause of high morbidity and mortality in hospitalized and immunocompromised patients [1]. Due to the indiscriminate use of antifungal drugs and broad

spectrum antibiotics, *Candida* species have become the second leading cause of invasive mycoses [2,3]. In order to colonize human hosts, these pathogens need to express adhesins and cell wall proteins (CWPs) that enable them to adhere and adapt to the reactive oxygen (ROS) and nitrogen (RNS) species produced

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