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Role of cell surface hydrophobicity in *Candida albicans* biofilm

Communication

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Abstract: Overall cell surface hydrophobicity (CSH) is predicted to play an important role during biofilm formation in *Candida albicans* but is the result of many expressed proteins. This study compares the CSH status and *CSH1* gene expression in *C. albicans* planktonic cells, sessile biofilm, and dispersal cells. Greater percentages of hydrophobic cells were found in non-adhered (1.5 h) and dispersal forms (24 or 48 h) (41.34±4.17% and 39.52±7.45%, respectively), compared with overnight planktonic cultures (21.69±3.60%). Results from quantitative real-time PCR confirmed greater up-regulation of the *CSH1* gene in sessile biofilm compared with both planktonic culture and dispersal cells. Up-regulation was also greater in dispersal cells compared with planktonic culture. The markedly increased CSH found both in *C. albicans* biofilm, and in cells released during biofilm formation could provide an advantage to dispersing cells building new biofilm.

Keywords: *Candida albicans* • *Cell surface hydrophobicity* • *Biofilm* • *Planktonic cells* • *Dispersal cells*

1. Introduction

The cell surface hydrophobicity (CSH) of the yeast *Candida albicans* is believed to be a putative virulence factor [1]. It has been postulated that the CSH1 protein significantly affects the overall CSH status of *C. albicans*. *CSH1* has been detected on the *C. albicans* cell surface, although its expression is temperature- and strain-dependent [2-4]. Contradictory results evaluating direct associations between CSH and adherence or an ability to form biofilm in *C. albicans* suggest that the hydrophobic phenotype is not exclusive but a contributing factor in irreversible adhesion [4,5]. In respect to certain conditions, adhered cells can continue to build biofilm – a community of self-controlling microorganisms. The formation of biofilm is a process composed of several phases [6]. Hydrophobic phenotype can promote formation during the first phase (*i.e.* adhesion). CSH status is also predicted to play an important role in the dispersal of cells from mature biofilm, the main function of which is probably to build new biofilm. Previous studies have found changes in gene expression of sessile biofilm and dispersal cells [7,8]. Based on these previous results, different gene transcription of the *CSH1* gene was expected in dispersal cells (non-sessile cells spread from biofilm) and sessile biofilm in comparison with planktonic culture (cells cultivated overnight in liquid medium). To determine whether this is the case, this work compared CSH status and *CSH1* gene expression in *C. albicans* planktonic cells with biofilm and dispersal cells.

2. Experimental Procedures

2.1 Preparation of yeast suspension for CSH and biofilm

For this study, *C. albicans* SC5314 was used [9]. The strain was cultivated on YPD plates (1% yeast extract, 1% mycological peptone and 1% *D*-glucose, supplemented with 2% agar, Applichem) at 28°C for

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