

A clue to drug resistance in *Candida* biofilm proteome?

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Candida albicans is a common, opportunistic human fungal pathogen that causes a variety of both oral and systemic afflictions, especially in compromised patient groups. It persists in the biofilm or the sessile phase, as well as in the free-floating or the planktonic phase. *Candida* biofilms, which are structured communities encased in a matrix of exopolymers, display unique characteristics that confer survival advantages over their planktonic counterparts, for instance their recalcitrance to common antifungals. **Objectives:** To characterize the protein biomarkers differentially expressed between *Candida* biofilm and planktonic counterparts and then to evaluate the clinical significance of the identified biomarkers. **Methods:** *Candida albicans* biofilms were prepared on polystyrene surfaces for 48 hours according to a standard protocol and, planktonic cultures were used as controls. Two dimensional gel electrophoresis was used to obtain the differential proteome profiles. Differentially expressed proteins were excised and subjected to tryptic digestion, followed by MALDI-TOF/TOF mass spectrometric analysis. **Results:** Altogether, twenty up- and down-regulated protein markers were identified in the biofilm phase including a significant number involved in oxidative stress defenses that were up-regulated. Further, lucigenin based chemiluminescence assays showed a consistent decreased activity of reactive oxygen species in *Candida* biofilms compared with its planktonic counterpart. In addition, we noted that echinocandin, a new antifungal drug target, was abundantly expressed in the *Candida* biofilm phase. **Conclusions:** We have established a model system and a platform for proteomic studies of *Candida* biofilms and described, for the first time, the differentially expressed protein profiles of 48-hour *Candida* biofilms. Taken together, our data imply that the increased oxidative stress defenses may contribute to the widely recognized higher antifungal activity of *Candida* biofilms when compared with their planktonic counterparts. (Supported by the Hong Kong Research Grants Council (Grant No 7624/06M)).

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