

## ABSTRACT - STRESS IN FUNGAL PATHOGENESIS

### APPLICATION OF PROBIOTICS FORMULATIONS TO PREVENT ORAL CANDIDIASIS: IN VITRO AND IN VIVO STUDY

*Felipe De Camargo Ribeiro (felipe\_c\_ribeiro@hotmail.com)*

*Jéssica Diane Dos Santos (jessicadiane.santos@yahoo.com.br)*

*Rodnei Dennis Rossoni (dennisrossoni@hotmail.com)*

*Patrícia Pimentel De Barros (barrosdnapp@yahoo.com.br)*

*Shashank Shukla (shashank\_shukla@brown.edu)*

*Anita Shukla (anita\_shukla@brown.edu)*

*Helen Elizabeth Burgwyn Fuchs (helen\_fuchs@brown.edu)*

*Eleftherios E. Mylonakis (emylonakis@Lifespan.org)*

*Juliana Campos Junqueira (juliana@ict.unesp.br)*

Probiotic encapsulation technology is an emerging field that has the challenges of maintaining the viability of probiotic cells in commercial products, as well as providing controlled release that result in the inhibition of pathogens, such as *Candida* spp. Candidiasis is a major fungal infection of the oral cavity and the increased antifungal resistance has led to the search for alternative antimicrobial treatments. In this context, the objective of this work was to develop probiotic formulations by encapsulating *Lactobacillus paracasei* 28.4 in gellan gum, aiming its application in the control of oral candidosis. After preparation of the probiotic formulations at various concentrations of gellan gum

(0.5-1% w / v), cell viability monitoring under different storage conditions (4°C and room temperature) and release systems (PBS or saliva) for 7 days was evaluated. The ability of formulations to inhibit *C. albicans* was analyzed in vitro and in the oral candida model in mice. After analyzing the data (ANOVA and Tukey's test), it was verified that *L. paracasei* 28.4 remained viable in all gellan gum formulations, showing a 1.1-1.4-fold decrease of *L. paracasei* 28.4 viability. In addition, there was greater release of *Lactobacillus* when the formulations were in contact with artificial saliva ( $2.53 \times 10^6$  CFU/mL) in relation to PBS ( $5.33 \times 10^3$  CFU/mL,  $p < 0.001$ ). All formulations were able to inhibit in vitro the growth, biofilm and filamentation of *C. albicans*. In the in vivo study, only the formulation of 1% can promote colonization of *L. paracasei* 28.4 in the oral cavity of the mice. Consequently, only this concentration was tested in oral candidiasis, reducing approximately 3 logs of *C. albicans* CFU/mL when compared with the control group (*C. albicans*). Therefore, gellan gum presents potential as a biomaterial for probiotics encapsulation in the development of products for oral candidosis control, and the formulation of 1% w/v showed promising results, since this formulation was able to promote the colonization of *L. paracasei* 28.4 in the mice oral cavity, reducing *C. albicans* in oral infection.