Effect of Some Antifungal Drugs on Adherence of Candida albicans.

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The aim of this study was to compare the effect of 4 antifungal drugs: miconazole, fluconazole, clotrimazole and clotrimazole on adherence of Candida albicans to human buccal epithelial cells (BEC) in vitro. Epithelial cells were collected from the buccal mucosa of healthy human volunteers using a sterile swab. A suspension containing 2 × 10⁶ BEC/mL was incubated with drugs at minimum inhibitory concentrations on a shaker at 37°C for 1 h. Cell adherence to each drug was determined by counting the cells attached to the cover slip using an inverted microscope. Drug adherence was determined by dividing the number of non-adherent cells by the total number of adherent cells, and subtracting this value from 1. No significant differences were found between the four drugs, indicating that all drugs: miconazole, fluconazole, clotrimazole and clotrimazole significantly reduced (P<0.01) the adherence of C. albicans to BEC (by more than 50%). Overall, predilation of BEC with drugs or yeast in the absence of drugs gave greater inhibition of adherence than did direct microscopy. No significant differences were found between different drugs. However, with direct addition of drugs to the medium of BEC and C. albicans, some differences in drug efficacies were observed, possibly due to a time requirement in the interaction of drug to cell. In conclusion, antifungal drugs decrease the adherence of C. albicans to buccal epithelial cells with the effectiveness of miconazole, fluconazole, clotrimazole and clotrimazole being similar.

Rule of dentine pellets in Candida albicans biofilm development in vitro. 
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There is little data on the long term activity of Candida albicans biofilm on mucin. This study analysis on the initial and follow-up stages of C. albicans biofilm formation on dentine in vitro. The biofilm formation was investigated by the hemocytometer ATP (adenosine triphosphate) analysis and the number of viable cell counts. Initial adherence of C. albicans to the dentine substrate was equal to 1.22 ± 0.13. At the sixth day, the ATP content was equal to 0.12 ± 0.02, whereas on the 14th day, it was equal to 0.07 ± 0.01. These results indicated that C. albicans biofilm was observed on the surface, as verified by confocal microscopy and the number of viable cells. The number of viable cells decreased by 50% after 14 days of the experiment. The biofilm formation of C. albicans biofilm on dentine is not significantly affected by the presence of saliva. Dentine pellets on initial and subsequent stages of C. albicans biofilm formation on dentine are a good model system for the study of C. albicans biofilm formation on dentine in vitro.

Antifungal activity of lactoferrin and lysozyme against Candida species. Y.H. SAMARANAYAKE, P.C.WU and L.P. SAMARANAYAKE
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Lactoferrin and lysozyme are non-immune defence factors present in polymorphonuclear granulocytes and various mucous esciences including saliva. Previous studies have shown that both proteins either singly, or in combination are bactericidal in nature and their combined activity is synergistic. Few workers, however, have studied this interaction with Candida species and therefore evaluated the susceptibility of 20 oral isolates of C. krusei and 5 isolates of C. albicans to both lactoferrin and lysozyme; the combined activity of the two proteins was tested against one isolate from each species. To assess the effects of lactoferrin alone, and in combination with lysozyme, the percentage of viable yeast was calculated for each of the latter. Afterward, the viable yeast were assessed by counting 50 μL of suspension on Sabouraud agar, incubating at 37°C and quantifying the resulting growth (CFU). The two Candida species exhibited significant inter-species difference in their susceptibility to lactoferrin but not for lysozyme, i.e. being more sensitive to lactoferrin than C. albicans. Both species revealed significant intra-species difference in their susceptibility to lysozyme (P < 0.05), but not for lactoferrin. No synergic antifungal activity of the two proteins on either Candida species was noted. These results imply that both lactoferrin and lysozyme may act variably on Candida species and modulate the oral carriage of yeasts in a very complex manner.

Effect on buccal epithelial cells of BEC in vitro. Epithelial cells were collected from the buccal mucosa of healthy human volunteers using a sterile swab. A suspension containing 2 × 10⁶ BEC/mL was incubated with drugs at minimum inhibitory concentrations on a shaker at 37°C for 1 h. Cell adherence to each drug was determined by counting the cells attached to the cover slip using an inverted microscope. Drug adherence was determined by dividing the number of non-adherent cells by the total number of adherent cells, and subtracting this value from 1. No significant differences were found between the four drugs, indicating that all drugs: miconazole, fluconazole, clotrimazole and clotrimazole significantly reduced (P<0.01) the adherence of C. albicans to BEC (by more than 50%). Overall, predilation of BEC with drugs or yeast in the absence of drugs gave greater inhibition of adherence than did direct microscopy. No significant differences were found between different drugs. However, with direct addition of drugs to the medium of BEC and C. albicans, some differences in drug efficacies were observed, possibly due to a time requirement in the interaction of drug to cell. In conclusion, antifungal drugs decrease the adherence of C. albicans to buccal epithelial cells with the effectiveness of miconazole, fluconazole, clotrimazole and clotrimazole being similar.

Humoral immune responses in Candida-associated denture stomatitis. D.H. FELIX, V. BISSELL and D.W. RAY (Department of Oral Medicine, Dental Hospital and School, University of British Columbia, Vancouver, B.C., Canada)

Previous studies have demonstrated an increased incidence of Candida carriage and infection among cigarette smokers when compared to non-smokers. However, the mechanisms underlying this difference remain unclear. The aim of the present study was to investigate the effects of cigarette smoking on the humoral immune response of oral Candida species. Fifty-two patients (24 smokers, 28 non-smokers) were investigated. Samples of serum and whole saliva were obtained before the start of treatment and at one, four, and twelve weeks thereafter. Total serum and salivary antibodies against Candida albicans IgG and IgA were measured using an enzyme-linked immunosorbent assay (ELISA). Data was analysed using non-parametric Wilcoxon and Mann-Whitney U tests. A total of 12 patients (6 smokers, 6 non-smokers) started treatment with serum Candida albicans IgG levels in non-smokers (476 ± 9 [S.E.M.]) were significantly higher than in smokers (170 ± 30); p = 0.001. A similar difference was observed at all other times throughout the study. Total serum IgG levels were higher among non-smokers at baseline and week one (p = 0.05). Total serum IgA concentrations were higher among non-smokers at weeks one, four and twelve (p < 0.05). No significant differences were observed in salivary immunoglobulin concentrations. This study provides evidence of the effects of cigarette smoking on the immune response and may help to explain the higher incidence of Candida carriage and infection among smokers.

A Model to Study Relationships between Candida albicans and Oral Bacteria. N.J. BASSOON* and C.W. VAN WYK (University of Stellenbosch, South Africa)

A breakdown of the microbial homeostasis in the oral cavity may lead to the proliferation and overgrowth of Candida albicans, a process that is difficult to study in situ. The purpose of this study was to establish and identify a mixed community of oral bacteria that will control the growth of C. albicans in the chemostat and that can be used to investigate cause-and-effect relationships between C. albicans and oral infections. By changing the growth-limiting conditions and at a dilution of 20 = 0.5 h⁻¹, a temperature of 37°C, the pH of 7.5 and 25% CO₂ and 75% N₂, the chemostat was inoculated with a suspension of a tongue scraping on three different occasions. After steady-state conditions were reached, 20% of the bacterial culture was removed and replaced with fresh bacterial culture to investigate the influence of the chemostat on C. albicans and other oral bacteria. No significant differences were observed in the chemostat basally for further studies to determine the parameters of oral significance that influence the relationships between the oral bacteria and C. albicans. This study was supported by the M.R.C.


The fermentation involvement of 100 isolates in 25 patients suffering from moderate to advanced periodontitis was investigated. The horizontal probing attachment level (PAL) was within the measured zone was assessed twice within 2 weeks using the pressure-calibrated (0.25 N) flexible plastic universal explorer version of the TPS Probe (TPS). To determine the measurement error of PAL-H measurements, the standard deviation of single measurements was calculated. The measurements were repeated using a color-coded Nibers Probe and compared to the TPS assessments. 253 fermentations were evaluated (100 buccal, 47 lingual, 35 mesiobuccal and 35 distobuccal). The standard deviation of the mean and distribution deviations were 0.486 mm, 0.298 mm, 0.844 mm, 1.039 mm, respectively. Measurement error was less in buccal and lingual fermentations than in mesiobuccal and distobuccal sites (0.486 ± 0.298). The measurement error was calculated for buccal and lingual fermentations (weighted kappas [standard error] 0.824 ± 0.076) and 0.779 (0.011), respectively, but only moderate for mesiobuccal and distobuccal fermentations (weighted kappas [standard error] 0.848 ± 0.096) and 0.844 (0.014), respectively. Only in distobuccal sites there was a significant increase (P < 0.002; paired t-test) underestimation of PAL-H by the TPS compared to the Nibers probe. At all locations the TPS underestimation fermentation degrees significantly (P < 0.001; Stuart-Maxwell's χ²) as compared to the Nibers Probe. Measurement error was lower for the TPS when compared to that of buccal or lingual sites. The reproducibility of PAL-H measurements in buccal and lingual fermentations is comparable to data published for vertical PAL measurements (e.g. GOODCHILD 1986). Through and through locations are likely to be understood with the TPS similar to that of the TPS. These results for degree 0 to 4 fermentation invasion provides valid information as compared to a color-coded Nibers Probe.