

## **Scientific References (abstracts)**

### **1. Evaluation of the sanitization effectiveness of a denture-cleaning product on dentures contaminated with known microbial flora. An in vitro study.**

**Glass RT, Bullard JW, Conrad RS, Blewett EL.**

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**OBJECTIVES:** To see if dentures contaminated with *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Bacillus cereus*, *Candida albicans*, and herpes simplex virus 1 could be effectively decontaminated by using Medical Tabs for Dentures. **METHOD AND MATERIALS:** Ten methacrylate dentures with processed soft liners (soft-liner dentures) and 10 methacrylate dentures without processed soft liners (hard dentures) were aseptically fragmented and individually incubated with a target microorganism. Test denture fragments were immersed in Medical for 5 minutes, vortexed for 5 minutes, and serially diluted onto media. The control denture fragments were similarly treated in sterile water. For virus contamination, denture fragments were contaminated with  $1.2 \times 10^9$  tissue culture infective dose (TCID)<sub>50</sub>/mL. They were treated with either Medical for 5 minutes (test fragments) or water (controls) for 5 minutes. Serial dilutions were performed and viral (TCID)<sub>50</sub>/mL titers were calculated using the Reed-Muench method. **RESULTS:** Medical treatments effectively eliminated *C. albicans*, *S. aureus*, and *P. aeruginosa* from soft-liner dentures. Treatment of hard dentures eradicated *C. albicans* and reduced the numbers of *S. aureus* and *P. aeruginosa* to  $< 10$ . *B. cereus* showed a reduction of 10 microorganisms in hard dentures while the soft-liner dentures did not show an appreciable reduction. Viral analyses found that both types of dentures retained large amounts of virus when washed with water, but no virus was recovered from any of the 40 samples treated with Medical. **CONCLUSION:** A single use of Medical Tabs for Dentures is effective in eliminating certain species of microorganisms, including selected viruses, in vitro.

### **2. Reassessing the presence of *Candida albicans* in denture-related stomatitis.**

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**OBJECTIVE:** The aim of this study was to reevaluate the link between *Candida albicans* and denture-related stomatitis according to a modified Newton classification, which reflects the classic types of inflammation as well as the extent to which the tissue is affected. **STUDY DESIGN:** Two groups of denture wearers were evaluated for denture-related stomatitis. The presence and number of yeasts on

the dentures, the identification of the *Candida* species present, and the amount of plaque coverage were determined. Putative risk factors were included in the study. Relations between these variables and stomatitis were analyzed statistically. RESULTS: According to Newton's classification, the presence of yeast on the denture was not linked to whether subjects had stomatitis. But with our classification, higher prevalence of yeast carriers, yeast colony number, and plaque coverage were found on the dentures of individuals with the most extensive inflammation, regardless of Newton type. Among risk factors evaluated, wearing dentures at night and smoking were associated with the most extensive inflammation. We also demonstrated that the presence of *C. albicans* as well as the cohabitation of different *Candida* species was more frequent in denture-related stomatitis. The differences were statistically significant. CONCLUSIONS: Statistical analysis of microbiologic data from different denture-related stomatitis categories according to our modified classification showed that the presence of yeast on dentures was significantly associated with the extent of the inflammation, rather than with the Newton type. Our findings suggest that the inflammatory process of stomatitis favors the colonization of *Candida*. These results could have new implications for diagnosis and management of the condition.

### **3. The postantifungal effect (PAFE) of antimycotics on oral *C. albicans* isolates and its impact on candidal adhesion.**

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Oral Dis. 1998 Dec;4(4):260-7

OBJECTIVE: Postantifungal effect (PAFE) is defined as the suppression of growth that persists following limited exposure of yeasts to antimycotics and subsequent removal of the drug. As there are no data on the PAFE of oral *C. albicans* isolates the main aim of this investigation was to measure the PAFE of 10 oral isolates of *C. albicans* following limited exposure (1 h) to five antifungal drugs, including nystatin which has not been previously used in PAFE assays. A secondary aim of the study was to evaluate the biological significance of PAFE, using a nystatin pre-exposed isolate of *C. albicans* and observing its adherence to denture acrylic surfaces, during the PAFE period. DESIGN: A total of 10 oral isolates of *C. albicans* were examined for the presence of the PAFE after 1 h exposure to five antifungal drugs, nystatin, amphotericin B, 5-fluorocytosine, ketoconazole and fluconazole. PAFE was automatically assessed with the help of a Spectramax machine which utilizes the principle of periodic turbidometric assessment of growth rates at a given temperature over a given period. The data thus collected are automatically processed in a graphic format as a computer printout. The PAFE was determined as the difference in time (h) required for growth of the drug-free control and the drug-exposed test cultures to increase to 0.05 absorbance level following removal of the antifungal agent (by repeated washing). The adhesion of the single isolate to denture acrylic following limited exposure to nystatin was assessed by a previously described in vitro adhesion assay. RESULTS: Significant PAFE were observed for nystatin, amphotericin-B and 5-fluorocytosine. A marginal PAFE was observed for ketoconazole and little or none for fluconazole. The mean duration of the PAFE of nystatin, amphotericin-B, 5-fluorocytosine, ketoconazole and fluconazole were 2.89 (+/- 0.27) h, 2.83 (+/- 0.23) h, 3.18 (+/- 0.31) h, 0.65 (+/- 0.11) h and 0.16 (+/- 0.06) h, respectively. The mean percentage reduction of adhesion of oral *C. albicans* BU47204 to denture acrylic during the PAFE period following exposure to nystatin for 10, 30, 50, 70 and 90 min was 9.12%, 61.73%, 65.99%, 82.16% and 83.14%, respectively. CONCLUSIONS: These in vitro findings imply that even a short period of exposure to antifungals may result in modulation of the growth and the virulent attributes of *C. albicans*, which however is largely

dictated by the antimycotic agent in question. Whether such mechanisms operate in vivo needs to be clarified by further studies.

#### **4. Oral fungal infections.**

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Candidiasis is the most common oral fungal infection diagnosed in humans. Candidiasis may result from immune system dysfunction or as a result of local or systemic medical treatment. Because oral candidiasis is generally a localized infection, topical treatment methods are the first line of therapy, especially for the pseudomembranous and erythematous variants. Patients with dental prostheses should also be advised to disinfect the prosthesis routinely during the candidal treatment period, because the prosthesis may serve as a source of reinfection. Additionally, patients should be advised that oral hygiene aids, such as toothbrushes and denture brushes, may also be contaminated and should be discarded or disinfected. A disinfecting solution of equal parts of hydrogen peroxide and water may be used. Likewise, 2% chlorhexidine gluconate solution may be used as a disinfecting solution for dental prostheses and oral hygiene aids. Occasionally the clinician encounters a more resistant form of oral candidiasis such as the hyperplastic variant or a variant that does not respond to topical therapy. Appropriate systemic therapy should be employed for the treatment of these infections. Additionally, a biopsy should be undertaken in individuals with the hyperplastic variant of *Candida* because there is some degree of risk for malignant transformation. Deep fungal infections should be managed in association with appropriate medical specialists to rule out other systemic involvement. The dental health care provider plays an important part in the diagnosis and management of fungal disease, and therefore clinicians should be aware of the presenting signs and symptoms of oral fungal disease.

#### **5. Colonization and penetration of denture soft lining materials by *Candida albicans*.**

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**OBJECTIVES:** Colonization of denture soft lining materials by *Candida albicans* can result in clinical problems, and deterioration of the material. This study aimed to monitor this interaction by comparing the short-term adhesion of *C. albicans* to six denture lining materials and to monitor any longer term penetration of material by the yeast. **METHODS:** Denture lining materials (Molloplast B, Flexor, Permaflex, Luci-soft, Eversoft and Ufi Gel hard C) were processed against glass slides or dental stone. Adhesion of yeast to surfaces was monitored after one hour incubation (37 degrees C) of standardized ( $2.8 \times 10^6$  cfu/ml) washed cell suspension with test materials. Attached cells stained with acridine

orange were counted microscopically. Penetration of yeast into materials bonded onto acrylic after six weeks incubation (culture medium was replaced weekly) was observed through sections stained using acridine orange. Hyphal and yeast penetration was estimated (qualitatively and quantitatively, respectively) for three levels of the liner (subsurface, central section and adjacent to lining-acrylic junction). RESULTS: None of the materials produced a zone of inhibition when compared with the nystatin control. There was no significant difference ( $p>0.5$ ) in cell numbers on any of the smooth surfaces. Significantly, ( $p<0.001$ ) higher numbers of cells were observed on roughened surfaces. Both hyphal and yeast forms were observed when penetration was monitored. Penetration was greatest into Ufi Gel hard C (no hyphae observed), but not at the acrylic-liner junction and least into Eversoft. SIGNIFICANCE: Different denture lining materials exhibit different properties in terms of susceptibility to yeast penetration, although the initial attachment is comparable. Smoother surfaces retain fewer cells. The selection of appropriate materials for a given function, and their fabrication may affect performance.

## **6. The aetiology, diagnosis and management of denture stomatitis.**

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This article examines the evidence for the aetiology, diagnosis and management of denture stomatitis. Extensive reviews of the literature using the Index to Dental Literature, references in relevant publications and computerised databases were employed. Microbiological confirmation of implicated Candida infection should be sought before prescribing antifungal drugs.

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## **7. Microbiological hazard analysis in dental technology laboratories.** **Verran J, McCord JF, Maryan C, Taylor RL.**

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Dental technicians are trained in a range of skills involved in the fabrication of prostheses used in the mouth and facial region. Items entering the dental laboratory are essentially inert materials which have been in contact with the patient's mouth, saliva, and possibly blood. Appliances leaving the laboratory are then returned to the clinician to be tried/inserted in the patient's mouth. Relatively little attention has been paid to infection control policy within dental laboratories, perhaps due to perceived and/or actual remoteness from patients, lack of appropriate training, and lack of relevant research. More controlled studies are desirable, in order to identify any potentially hazardous procedures, and to make an assessment of risk for these procedures.