

- 0577** Non-surgical periodontal therapy with adjunctive topical doxycycline. 6 months results. EICKHOLZ, P.¹, KIM, T.-S.¹, RATKA-KRÜGER, P.², SCHACHER, B.², BÜRKLIN, T.³, KÜBLER, A.³, HOLLE, R.⁴, SCHAECKEN, M. T.⁵, RENGGLI, H. H.³ (Universities of Heidelberg, ²Frankfurt, ³Cologne, ⁴medis Institute, Neuherberg, Germany, ⁵Univ. of Nijmegen, the Netherlands).

The aim of this study was the evaluation of the clinical effect of topical application of a newly developed biodegradable 15% doxycycline gel (DOXI) adjunctive to non-surgical periodontal therapy. A total of 111 patients suffering from untreated or recurrent moderate to severe periodontitis were treated at 3 centers (Heidelberg, Frankfurt, Nijmegen) in this double blind split mouth study. In each patient 3 treatment modalities were assigned randomly to 3 test teeth: scaling and root planing alone (SRP), SRP with subgingival vehicle control (VEH), and SRP with subgingival application of DOXI. At baseline clinical parameters were measured using a reference splint: PII, PPD, relative attachment level (RAL), GI. 108 patients finished the 6 months reexamination, which was performed by examiners blinded to baseline data and test sites. DOXI provided statistically significantly more favorable PPD reduction (SRP: -2.4 ± 1.4 mm, VEH: -2.7 ± 1.2 mm, DOXI: -3.1 ± 1.2 mm; SRP vs. DOXI $p = 0.0001$, VEH vs. DOXI $p = 0.0066$) and RAL gain (SRP: 1.6 ± 1.9 mm, VEH: 1.6 ± 2.2 mm, DOXI: 2.0 ± 1.7 mm; SRP vs. DOXI $p = 0.027$, VEH vs. DOXI $p = 0.038$) than SRP and VEH after 6 months. Adjunctive topical subgingival application of a biodegradable 15% doxycycline gel was safe and provided better clinical results than SRP alone and VEH. Thus, by use of topical doxycycline the threshold for periodontal surgery might be moved toward deeper pockets. Supported by Ivoclar/Vivadent

- 0581** Effect of Vitamin C-Containing Chewing Gum on Calculus Formation. P. LINGSTRÖM*, S. FURE, D. BIRKHED (Dept. of Cariology, Göteborg University, Sweden).

Studies have reported beneficial properties on different oral parameters, particularly the periodontal health, during the intake of vitamin C. The aim of the present investigation was to study the effect of frequent use of a sugar-free vitamin C-containing chewing gum on the calculus formation and other oral parameters. Thirty persons, all calculus formers, participated in a double-blind, cross-over study. Three 3-month periods were carried out: 1) chewing 5 pieces/day of a sugar-free vitamin C-containing chewing gum (60 mg vitamin C/piece), 2) chewing 5 pieces/day of a sugar-free non-vitamin C-containing chewing gum, 3) no gum-chewing (control). The subjects were scored for calculus at mesio-lingual, lingual, and disto-lingual sites of the six anterior mandibular teeth using the Volpe-Manhold index. Salivary secretion rate, buffer capacity, plaque and gingival bleeding indices, various microorganisms in plaque and saliva, and erosion scores were also determined. The total mean calculus score was 0.45 after the vitamin C period, 0.51 after the non-vitamin C period and 0.67 after the no-gum period. This difference was statistically significant when comparing the vitamin C and no-gum periods ($p < 0.05$). The same trend was found when comparing amount of calculus on tooth and surface level ($p < 0.05$). Less plaque was formed after both chewing gum periods compared to the no-gum period ($p < 0.01$). Lower gingival bleeding index was also found for the vitamin C gum compared to the no-gum period ($p < 0.05$). No significant differences were found for any of the other parameters among the three test periods. The results of this investigation show that frequent chewing on a sugar-free chewing gum containing 60 mg of vitamin C reduces the calculus formation, gingival bleeding and plaque formation. Also the non-vitamin C gum had a similar effect, but it was not statistically significant. This study was supported by FERTIN A/S (DANDY A/S), Vejle, Denmark.

- 0578** Differences in antimicrobial activity of four chlorhexidine mouthwash formulations. D. HERRERA*, S. ROLDÁN, I. SANTACRUZ, A. CONNOR, M. SANZ (Univ. Complutense de Madrid, Spain)

The purpose of this double blind randomised crossover study was to evaluate the antimicrobial activity of four mouthwash formulations, all of them containing 0.12% chlorhexidine (CLX). 10 volunteers participated in this study. The volunteers, the supervisors and the laboratory staff were blind for the products, which were codified. A negative control (saline) and four mouthwashes were evaluated: CLX without alcohol (Chlorhexidina Lacer®), CLX plus NaF (Cariax®), CLX plus 0.12% cetylpyridinium chloride (CPC) and CLX with 5% alcohol (PerioAid®). Washout periods of at least 1 week were used between study periods. On the test days, the volunteers refrained from oral hygiene in the morning and during the study period. They rinsed with the assigned mouthwash for 1 min. Un-stimulated saliva samples of 1 mL were taken before rinsing and after 5 min, 1, 3, 5 and 7 h. Samples were processed within 30 min, and inoculated onto 2 series of blood-agar plates, for aerobic and anaerobic incubation. Total colony forming units and percentages of bacterial reduction were calculated. Student t-test with Bonferroni correction tested for significance in antimicrobial efficacy between the mouthwashes. The four tested products reduced when compared with the control in all five evaluations, while CLX+alcohol did so in three. No significant differences were found between the products. Both CLX+CPC and CLX+alcohol reduced significantly ANAEROBIC salivary counts until the 5 h evaluation, while CLX and CLX+NaF reached the level of significance only at 1 h. A significantly higher antimicrobial efficacy was seen between CLX+CPC and CLX or CLX+NaF, and between CLX+alcohol and CLX+NaF at different time points. Significant differences were observed between different mouthwash formulations containing 0.12% CLX. The strongest antimicrobial activity in this model was demonstrated by the mouthwash containing CLX+CPC, followed by CLX+alcohol. Supported by Dentaid, S.A. grant.

- 0582** The distribution of ¹⁴C-triclosan in human gingival fibroblast. MANAL MUSTAFA*, BINIYAM WONDIMU, HULTENBY KJELL, THOMAS MODER (Institute of Odontology, Karolinska Institutet, Sweden)

Triclosan (2,4,4'-trichloro-2'-hydroxydiphenyl ether) is an antibacterial agent which is included in dentifrices. Recently, we reported that triclosan exhibits an inhibitory effect on the production of inflammatory mediators such as PGE₂, IL-1 β and IFN γ in human gingival fibroblasts (HGF). The aim of the present study was to investigate the intracellular distribution of ¹⁴C-triclosan in HGF. Autoradiography as well as radioactivity measurements in a liquid scintillation counter were performed to detect ¹⁴C-triclosan in HGF. ¹⁴C-triclosan was rapidly taken up and detected in the different cellular compartments of HGF already after 1 min. The concentration of ¹⁴C-triclosan in the nuclear extract reached the maximum level after 30 min while the level of the agent in the cytoplasm extract increased continuously during the study period (6 h). The apparent volume distribution of radioactivity was at an average 84% in the cytoplasm extract while 16% of the radioactivity was detected in the nuclear extract. The distribution of ¹⁴C-triclosan in 24-h cultures of HGF was not affected when the cells were treated simultaneously with TNF α at different concentrations (1.0 and 10 ng/ml) or Dexamethasone (1 μ M). Observation of the autoradiography film by light microscopy showed an even intracellular distribution of ¹⁴C-triclosan. This study showed that triclosan was taken up and rapidly distributed into HGF and suggest that the inhibitory effect of triclosan on the production of inflammatory mediators may involve intracellular processes associated with cytokine production. This study was supported by the Swedish Medical Council (Project No.7211)

- 0579** The effect of a specific halitosis therapeutic approach on the oral microbial environment. S. ROLDÁN*, D. HERRERA, I. GONZÁLEZ, M. SANZ (Univ. Complutense de Madrid, Spain)

The purpose of this case series study was to evaluate the effect of a combined antimicrobial protocol aimed to reduce bad breath on the different oral niches, including specific periodontal pathogens. 19 periodontally healthy patients complaining of oral halitosis were selected. After the baseline visit, using the bass technique, interdental cleaning, tongue scraping twice per day, and to gargle with a mouthrinse containing 0.05% chlorhexidine, 0.05% cetylpyridinium chloride, 0.14% zinc lactate (Halita®) during one month twice per day, and once per day for two more months. Periodontal outcome variables, and the tongue coating index were recorded at each visit (baseline, 1 and 3 months), and three microbiological samples were collected from the tongue coating, unstimulated saliva, and subgingival plaque. The samples were inoculated on blood-agar plates, incubated aerobically and anaerobically, and total counts, and different periodontal pathogens were evaluated. Student t test was used to test for differences along the study. Probing pocket depth (Baseline 2.78; 1m 2.32; 3m 2.11), plaque index (0.63; 0.21; 0.39), and tongue coating index (8.5; 6.5; 6.4) were significantly reduced at 1 and 3 months. *P.gingivalis* demonstrated a reduction in prevalence (subgingival, baseline 44% vs 3m 19%; saliva, 61% vs 23%; tongue, 42% vs 12%) and in percentage of the flora at the three studied niches. *P.micrus* showed similar results in tongue (16% vs 12%) and saliva samples (22% vs 6%), but subgingival values were almost unaffected. *F.intermedia* was only affected at a lingual level (68% vs 47%), while *F.nucleatum* did not show any change. The interactions between the three niches at each visit showed that the subgingival area was the least affected and therefore, may act as a reservoir for the other niches, although important differences were found between the studied pathogens. This specific antibacterial regime aimed to treat halitosis demonstrated a differential effect on the different oral bacterial ecosystems and on the different bacterial pathogens. Supported by Dentaid, S.A. grant.

- 0583** Determination of Color Coordinates of a New Shade Tab Distribution for Japanese Population. M.Matsukawa¹, K.Kinoshita¹, A.Hasegawa¹, and M.Analoui² (¹GC Dental Products, Kasugai, Japan, ²Indiana University, Indiana, USA)

Inconsistency of Vita Lumin, which is the most commonly available shade guide in Japan, with natural tooth color of Japanese population, has been reported. Despite large number of tabs in VitaPan 3D (26 tabs), which adds complexity in the selection process, it does not provide sufficient coverage of natural tooth color. The aim of this study was to propose the color distribution for a new shade guide to provide suitable number of shade tab for easy selection and high consistency with the natural tooth color of Japanese population. Natural central incisors of 87 subjects (42 male and 45 female) ranging in age from 13 to 84 and two commercially available shade guides (Lumin: 16 tabs and 3D Master: 26 tabs) were evaluated. Area with 1.0 mm diameter at the center site was measured for L*, a*, b* according to CIELAB color spaces using Spectroradiometric Color Computer. The coordinates of the new shade tabs (GCSG) was determined in terms of the mean values and standard deviations of L*, a*, b* for the natural teeth. The degree of the consistency of the shade tabs with natural tooth color of Japanese population was calculated as the average minimum ΔE (Ave. ΔE) between each tab and each subject, and the value of Ave. ΔE was also compared with those of Lumin and 3D Master. The number of tab and the Ave. ΔE for GCSG were determined as 17 tabs and 2.49 respectively. The values of the Ave. ΔE for Lumin and 3D Master were 4.22 (16 tabs) and 2.89 (26 tabs) respectively. The number of tab and the Ave. ΔE for GCSG in this study were fewer and lower than those of Lumin and 3D Master, respectively. In conclusion, it was suggested that the proposed GCSG covered the whole age of range of the natural tooth color of Japanese population more effectively than Lumin and 3D Master shade guides.

- 0580** Antimicrobial efficacy of an antiseptic mouthrinse in the treatment of oral halitosis. M SANZ*, S. ROLDÁN, E.G. WINKEL, A.J. VAN WINKELHOFF, D. HERRERA, R. SIMÓN (Univ. Complutense de Madrid, Spain, ACTA, The Netherlands)

The aim of this multicenter study, was to evaluate the effects of a newly formulated mouthrinse containing chlorhexidine (0.05%), cetylpyridinium chloride (0.05%) and zinc lactate (0.14%) (Halita®), on oral halitosis related microbiological parameters. 20 subjects complaining of oral malodour were included in a double-blind placebo-controlled parallel study design in each centre. Entrance criteria required a full mouth odour score ≥ 1 in a 0-5 organoleptic scale, VSC level ≥ 170 pph (Halimeter®) and a tongue coating score ≥ 4 . Untreated periodontitis with probing pocket depths ≥ 5 mm and intake of antibiotics in the previous month were the main exclusion criteria. Patients enrolled in the study abstained from oral hygiene and ingestion of food and liquids at least eight hours before examinations. At baseline (t1) and post-treatment (2w) examinations standardised microbiological samples of unstimulated whole saliva were collected for culture analysis. Additionally, standardised tongue coating samples were also collected in the Spanish group. The samples were inoculated on blood-agar plates, incubated aerobically and anaerobically, and total counts, and different periodontal pathogens were evaluated. Patients were randomly assigned to the test or placebo group, and instructed to gargle with their assigned mouthrinse twice daily during one minute for a period of two weeks. Non-parametric tests were used to analyse intra and intergroups differences. The results showed reductions in the test group, both in total anaerobic counts in saliva (2.5×10^7 cfu/mL / $2w$ 1.79×10^7 cfu/mL) and in tongue coating samples (8.38×10^7 cfu/mL / $2w$ 5.32×10^7 cfu/mL). By contrast, we observed slight increases in total aerobic counts both in saliva (3.74×10^7 cfu/mL / $2w$ 6.80×10^7 cfu/mL) and tongue coating samples (1.26×10^8 cfu/mL / $2w$ 3.86×10^8 cfu/mL) resulting in an inversion of the ratio of anaerobic/aerobic bacteria in the test group. Differences between the test group and the placebo group were significant at 2 weeks regarding the ratio of anaerobic/aerobic bacteria. The tested antimicrobial rinse has shown efficacy in the short-term reduction of microbial outcome variables associated with oral halitosis. Supported by Dentaid, S.A.

- 0584** Tooth Color Statistics of North American Population. S. NAGAI*, K. SAKASHITA, H. YAMAMOTO, K. ISHIBASHI, D. NATHANSON, (Boston Univ. School of dental Medicine, Boston, Iwate Med Univ. School of Dentistry, Iwate, Japan)

The study of natural tooth color is cardinal for the improvement of dental shade guides. The purpose of this study is to examine the tooth color spectrum of a large sample of North American population. The color of anterior incisors of 500 volunteer subjects from the Boston area with diverse ethnic backgrounds and age (11 to 78 years) was measured by use of a spectrophotometer (MSC-2000, Olympus, Japan). The entire spectrum of natural tooth color by L* and C* was plotted, and the color coordinates L*, a*, b* were statistically analyzed for gender, age, ethnic background and bleaching experiences. The mean of L* was 69.4 ± 5.0 ranging from 50.3 to 82.1, and the mean of C* was 14.9 ± 3.3 ranging from 6.4 to 23.6. Although, the mean L* value for females was significantly higher than for males, there was no significant difference in a* and b* values. Twenty's and thirty's age groups had higher L* and lower a* and b* values, and there were significant differences among ages for L* and a*. With regards to ethnic background, the mean L* value for Caucasian was significantly higher than for Asian and Afro-American populations, but there was no significant difference in a* and b*. Subjects with tooth bleaching experiences (68% of all study population) had significantly higher L* and lower b* as compared to subjects having no bleaching experiences. Natural tooth color was influenced by the factors of age, gender, ethnic background and bleaching experience. Therefore, new dental shade guides considering these factors should be developed for clinical use. *sinagai@iwate-med.ac.jp*