

General Research Abstracts

1. S Yeganeh, C Morris-Clapp, L Zou, V Jovanovski and E Lynch
(Department of Conservative Dentistry, LHMC, UK)
THREE DIMENSIONAL QUANTIFICATION OF PLAQUE ON TEETH *IN VIVO*
Journal of Dental Research 74: 831, 80, 1995.

Clinical dentistry involves the continuous subjective analysis of the forms of oral structures: the surface morphology of teeth; their relationship to each other; and to the gingivae and the distribution of plaque and calculus. The aim of this study was to assess a method to quantify plaque thickness on tooth surfaces and the associated gingivae. For this preliminary investigation, exposed root surfaces of at least 1.5mm were selected in patients and impressions were taken in order to produce study models. Individual jigs specific to the exposed root surfaces were made using peripheral-seal material to stabilise rectangular brass tubes of 12mm x 12mm. A replica of the site was then taken using light body addition polysiloxane (Extrude-Kerr). A second replica of the site was then obtained following manual plaque removal. The replicas were scanned to collect co-ordinates of the surface points at a density of 20um spacing using the Renishaw OP2 laser probe. The plaque thickness and volume were measured by superimposing the data from the two replicas. Plaque thickness ranged from 0.010-0.131mm. Reproducibility of the system measuring a 25mm diameter precision sphere was 24.9996 ± 0.0024 (mean \pm SD)

This preliminary study illustrates a method of quantitative measurement of plaque thickness distribution and volume on root surfaces and its relationship to adjacent gingivae.

2. J Hughes, N West, S Watson, N Wood and M Addy
(Restorative Dentistry, Dental School, Bristol)
EFFECT OF SEVEN BICARBONATE OF SODA TOOTHPASTES ON
DENTINE *IN VITRO*.
Journal of Dental Research 75: 1190, 487, 1996.

Bicarbonate of soda has had a significant use within dentistry for over a 100 years. Since 1936, the American Dental Association has rated it as the least abrasive material next to plain water. Recently there has been an increase in the use of this ingredient with baking soda toothpastes occupying 5% of the toothpaste market in 1994 (Audits of Great Britain BDA News, July 1995). However, the data surrounding the use of this ingredient is limited. An *in vitro* study to compare commercially available bicarbonate toothpastes was undertaken, including a conventional fluoride paste, BSI paste and bicarbonate of soda for controls. Six human dentine samples per product were brushed with a toothpaste machine for 120 minutes, being measured during this period for dentine loss on a surfometer. A further 12 samples per product were brushed with the same products for 1 minute with either etched or smeared surfaces before observing under the S.E.M. results showed that there were significant ($P < 0.05$) between the abrasivity of some

of the products compared with the fluoride product, in the order of 9µm. However, this was thought to be due to other constituents of the product, possibly silica, rather than the bicarbonate abrasive. The etched samples showed only the silica based products occluded the tubules. The smear samples showed varying degrees of tubular opening, which for the majority of specimens was consistent with the toothpaste abrasivity.

In conclusion, the abrasivity of bicarbonate of soda based toothpastes on dentine varies considerably, however bicarbonate of soda *per se* is not very abrasive. Bicarbonate of soda abrasive does not occlude dentine tubules.

3. C Silwood¹, M Grootveld¹, and E Lynch²
(Infl. Res. Group¹ and Cons Dent², SBRLHSMD, London, UK)
SIMULTANEOUS DETERMINATION OF MONOFLUOROPHOSPHATE
AND FLUORIDE IN HUMAN SALIVA FOLLOWING TOOTHBRUSHING
EPISODES
Journal of Dental Research 76: 1049, 242, 1997.

This study utilised fluorine (¹⁹F) nuclear magnetic resonance (NMR) spectroscopy as an analytical 'descriptor' of the fate of and interrelationship between these agents in human saliva with increasing time following brushing with a MFP-containing dentrifice¹. Simulated saliva samples were collected from subjects (n=6) both prior (-4.00 min.) and subsequent to (0.05-5.00 min.) brushing with the dentrifice for a period of 4 min. Samples were centrifuged and the supernatant derived therefrom then subjected to high field ¹⁹F NMR analysis at an operating frequency of 376.50 MHz. External trifluoroacetic acid was employed as a chemical shift and concentration reference. ¹⁹F NMR-determined mean ± S.E. concentrations of MFP (and F) anions in human saliva at time points of -4.00 (pre-brushing), 0.05, 1.00, 2.00, 3.00, 4.00 and 5.00 min (post brushing) were 0.00±0.00 (0.00±0.00), 11.02±0.49 (3.09±0.28), 0.26±0.05 (0.56±0.07), 0.20±0.03 (0.34±0.06), 0.07±0.03 (0.08±0.03), 0.00±0.00 (0.06±0.02) and 0.00±0.00 (0.045±0.02) 10⁻³, mol.dm⁻³ respectively. These data yielded mean [F]/[MFP] concentration ratios of 0.28, 2.17, 1.67 and 1.13 at time-points of 0.05, 1.00, 2.00 and 3.00 min. post brushing respectively. The decrease in salivary F concentration appeared to exhibit a first-order dependence on time, a typical estimated value for k (first order rate constant) being 1.39 x 10⁻² s⁻¹.

These data demonstrate the facile simultaneous ¹⁹F NMR determination of salivary MFP and F subsequent to toothbrushing with a MFP-containing dentrifice. The greatest [F]/[MFP] concentration ratio was observed at a time-point of 1.00 min post-brushing.

¹Janina Opal Ultrawhite, Janina International, UK

N.B. Since this study was carried out Janina Opal Ultrawhite has changed its name to Janina Opale Whitening Toothpaste.