print ISSN 0008–6568 | Caries Res 42(3): 157–238 (2008) | 42 | 3 | 08 | online ISSN 1421–976X | www.karger.com//

Journal of the European Organisation for Caries Research (ORCA)

Caries Research

Including the Abstracts of the
55th Annual ORCA Congress

June 25–28, 2008, Groningen, The Netherlands

S. Karger
Medical and Scientific Publishers
Basel · Freiburg · Paris ·
London · New York ·
Bangalore · Bangkok · Shanghai ·
Singapore · Tokyo · Sydney

Caries Research

Journal founded 1967 by Y. Ericsson; edited 1970–1987 by K.G. König; 1987–1994 by J.M. ten Cate; 1994–2000 by J. Tenovuo

Caries Research is the Journal of the European Organization for Caries Research (ORCA), an organization founded in 1953 by Dr. Hans R. Held, Geneva, Switzerland to promote research into dental caries and related matters.

KARGER

Printed in Switzerland on acid-free and non-aging paper (ISO 9706) by Reinhardt Druck, Basel

Appears bimonthly: 1 volume per year (6 issues)

Caries Research

ISSN Print Edition: 0008–6568
ISSN Online Edition: 1421–976X

Journal Homepage: www.karger.com/cre

Publication Data: 'Caries Research' is published 6 times a year. Volume 42 with 6 issues appears in 2008.

Subscription Rates: Subscriptions run for a full calendar year. Prices are given per year.

Personal subscription:

Print or Online	Print+Online combined
CHF 704.–	CHF 749.–
EUR 503.–	EUR 535.–
USD 640.00	USD 681.00

postage and handling (added to print and print+online)
CHF 36.– Europe, CHF 54.– Overseas
EUR 25.80
USD 49.50

Institutional subscription:

Print or Online	Print+Online combined
CHF 1408.–	CHF 1549.–
EUR 1006.–	EUR 1106.–
USD 1280.00	USD 1408.00

postage and handling (added to print and print+online)
CHF 45.– Europe, CHF 67.50 Overseas
EUR 32.40
USD 61.80

Airmail surcharge: CHF 45.60 / USD 41.40
Discount subscription prices:
European Organization for Caries Research

Back Volumes and Single Issues: Information on availability and prices of single print issues and print or electronic back volumes can be obtained from Customer Service at *service@karger.ch*.

Bibliographic Indices: This journal is regularly listed in bibliographic services, including *Current Contents*® and PubMed/MEDLINE.

Subscription Orders:
Orders can be placed at agencies, bookstores, directly with the Publisher

S. Karger AG
Medical and Scientific Publishers
P.O. Box
CH–4009 Basel
Switzerland
(for courier services only:
Allschwilerstrasse 10
CH–4055 Basel)
Tel. +41 61 306 11 11
Fax +41 61 306 12 34
E-Mail karger@karger.ch
www.karger.com

or further Karger offices or representatives:

France:
Librairie Medi-Sciences Sarl
36, bd de Latour-Maubourg
75007 Paris
France
Tél. +33 (0) 1 45 51 42 58
Fax +33 (0) 1 45 56 07 80
E-Mail librairie@medi-sciences.fr
www.medi-sciences.fr

Germany:
S. Karger GmbH
Postfach
79095 Freiburg
Deutschland
(Hausadresse: Lörracher Strasse 16A
79115 Freiburg)
Tel. +49 761 45 20 70
Fax +49 761 45 20 714
E-Post information@karger.de
www.karger.de

India, Bangladesh, Sri Lanka:
Panther Publishers Private Ltd.
33, First Main
Koramangala First Block
Bangalore 560 034
India
Tel. +91 80 25505 836
Tel. +91 80 25505 837
Fax +91 80 25505 981
E-Mail panther_publishers@vsnl.com
www.pantherpublishers.com

Japan:
Karger Japan, Inc.
Yushima S Bld. 3F
4-2-3, Yushima, Bunkyo-ku
Tokyo 113-0034
Japan
Tel. +81 3 3815 1800
Fax +81 3 3815 1802
E-Mail publisher@karger.jp

China, Taiwan and Malaysia:
Karger China
Suite 409, Apollo Building
1440 Central Yan An Road
Shanghai 200040
China
Tel. +86-21-6133 1861
Fax +86-21-6133 1862
E-Mail karger.ray@gmail.com

South America and Central America:
Cranbury International LLC
7 Clarendon Ave., Suite 2
Montpelier, VT 05602
USA
Tel. +1 802 223 6565
Fax +1 802 223 6824
E-Mail
eatkin@cranburyinternational.com
www.cranburyinternational.com

United Kingdom, Ireland:
S. Karger AG
c/o London Liaison Office
4 Rickett Street
London SW6 1RU
United Kingdom
Tel. +44 (0) 20 7386 0500
Fax +44 (0) 20 7610 3337
E-Mail uk@karger.ch

USA:
S. Karger Publishers, Inc.
26 West Avon Road
P.O. Box 529
Unionville, CT 06085
USA
Toll free: +1 800 828 5479
Tel. +1 860 675-7834
Fax +1 860 675-7302
E-Mail karger@snet.net

Change of Address:
Both old and new address should be sent to the subscription source.

Caries Research

Caries Res 2008;42:185–238
DOI: 10.1159/000128562

Published online: Mai 5, 2008

55th ORCA Congress

June 25–28, 2008, Groningen, The Netherlands

ORCA thanks the following companies for generous contributions which make it possible to distribute this issue of *Caries Research* widely:
Gaba International AG; Mars Inc.; Unilever plc

Session 1
Erosion

1
Acid-Mediated Softening of Human and Bovine Enamel at Ultra-Short Exposure Times

A.J. White[a,*], *C. Yorath*[a], *V. ten Hengel*[b], *S.B. Jones*[c], *M.-C.D.N.J.M. Huysmans*[b], *M.E. Barbour*[c]

* m.e.barbour@bristol.ac.uk

[a]Department of Physics, University of Bristol, UK; [b]Academic Center for Oral Health Groningen, University Medical Center Groningen, The Netherlands; [c]Department of Oral and Dental Science, University of Bristol, UK

Atomic force microscopy nanoindentation has previously been used to investigate the very early stages of dental erosion, with exposure times as low as 30 s. The aim of this study was to evaluate the feasibility of measuring erosion of human and bovine enamel after even shorter exposure times. 56 human enamel specimens prepared from 21 permanent human molars, and 56 bovine enamel specimens prepared from 10 bovine incisors were embedded in epoxy resin and finely polished. Specimens were exposed to 150 ml 14.4 mmol · l^{-1} citric acid, pH 3.20, for 0, 2, 5, 10, 20, 30, or 60 s (n = 8 per group), using a quantitative rotating device providing an equivalent linear speed of 0.25 m · s^{-1}. Specimens were rinsed in deionized water and air-dried. Nanoindentation was performed in air using a Hysitron Triboscope. Hardness after each exposure time, H(t), was calculated, and the mean of 5 indentations of each sample was used to perform a non-parametric Kruskal-Wallis analysis. Statistically significant softening of human enamel occurred after the minimum exposure time: $H_H(0\ s)$ = 4.41 (4.18, 4.64) and $H_H(2\ s)$ = 3.82 (3.69, 3.95) GPa; with bovine enamel it occurred after 5 s exposure: $H_B(0\ s)$ = 4.10 (3.90, 4.30) and $H_B(5\ s)$ = 3.34 (3.04, 3.64) GPa (median hardnesses with 95% confidence intervals in brackets). H_H and H_B exhibited an approximately linear dependence with time after the initial 5 s exposure; before this time there was an accelerated period of softening (H_H) or no softening (H_B). This might reflect the dissolution of a thin superficial Bielby-type layer of enamel damaged during specimen preparation. In conclusion, nanoindentation is a very sensitive method capable of measuring enamel surface hardness loss due to acid exposure times as low as 2 s.

2
Surface Roughness of Dental Enamel after in vitro Exposure to Alcopops or Acidic Beverages and Streptococci

A. Callaway[a], *H. Meisberger*[a,*], *B. Willershausen*[a], *E. Stender*[b]

* hannosolo@web.de

[a]Department of Restorative Dentistry, Johannes Gutenberg University, Mainz, [b]Institute for Dental Material Sciences and Technology, Johannes Gutenberg University, Mainz, Germany

The objective of this in vitro study was to investigate the surface roughness of enamel after exposure to acidic beverages or microbial acids, alone or in combination. 240 slices, cut from 48 dental crowns of impacted wisdom teeth, were fixed in 12-well plates and incubated for 48 h at 37°C with one of two alcopops or one of two acidic soft drinks, or with Schaedler broth, inoculated with *S. mutans* 10449 or *S. oralis* H1. Subsequently the specimens were incubated either first with an acidic beverage (24 h) and then with the streptococcus (24 h) or vice versa. In previous studies, the amounts of released calcium from enamel had been determined. In this study, the roughness (R_a) of these dental surfaces was measured using an optical profilometric device (perthometer, Mahr, Göttingen, Germany) and compared with the control specimens, incubated in saline for 48 h. 10 measurements of a length of 1.75 mm in randomly chosen areas were performed for each sample and evaluated with MarSurfX20 software. R_a values (6/group) were compared by Wilcoxon-test (α = 0.05). The specimens were also examined by SEM. Incubation with an acidic beverage led to a significant reduction in R_a (median 1.94–2.48 μm) compared with the controls (median 3.97 μm) (p = 0.03–0.05). Exposure of the dental slices first to acidic beverages and then to bacteria caused higher R_a values (median 2.57–3.87 μm) than af-

* Presenting authors.

KARGER

Fax +41 61 306 12 34
E-Mail karger@karger.ch
www.karger.com

0008–6568/08/0423–0185$24.50/0

Accessible online at:
www.karger.com/cre

(range 23–1,635) and mean LD was 93 μm (range 3–139). After 3 weeks mean IML was 726 vol% · μm (range 64–2,116) and mean LD was 95 μm (range 9–197). We conclude that the advanced dentine lesions are suitable for studying different oral hygiene protocols on de- and remineralisation.

Supported by GABA.

35

Dentine Regeneration in the Carious Cavity

*S.D. Litvinov[a,] *, G.Y. Nicolau[b], R.I. Rakhimov[c], R.R. Demina[d]*

* litvinov@sama.ru

[a]JCS 'LitAr', Samara, Russia; [b]University of Medicine and Pharmacy, Kishinev, Moldova; [c]Emergency Dental Service, Samara, [d]Orenburg Academy of Medicine, Russia

The purpose was to test the possibility of completely regenerating lost dentine in the carious cavity using a polymer-salt-based composite material (LitAr) to restore the mantle and circumpulpal dentine. A caries treatment method using LitAr was developed [Litvinov et al.: Caries Res 2007;41:272]. LitAr was laid in caries cavities up to the enamel-dentine junction in 25 patients with extensive caries. X-ray examination was conducted after 2 weeks and after 1, 3 and 6 months. After 2 weeks it was possible to detect on the radiographs under the filling material a carious cavity with distinct limits and low X-ray density which differed markedly from the sound dentine. After 1–3 months optical density was diminished and after 6 months the differences in optical density between the carious cavity and the surrounding dentine became more marked. Morphological investigation of the cavity after 6 months revealed for all patients complete biodegradation of the LitAr with the formation of isolated dentine islands surrounded by connective tissue. We could detect no complications, either immediate or long-term. Thus, LitAr seemed to be biodegradable after 6 months with formation of new dentine – this fact was connected with the trend for restoring the cavity up to the enamel-dentine junction. All the data suggest restoration of the physiological processes in the carious cavity.

36

The Influence of Ozone on Cariogenic Bacteria in Deep Carious Lesions ex vivo

W. Dukic, H. Juric*

* walter.dukic@zg-t-com.hr

School of Dental Medicine, University of Zagreb, Croatia

The aim of this study was to evaluate the efficacy of ozone in reducing ex vivo the total bacteria count and the counts of the bacteria *Streptococcus mutans* ATCC 33402 and *Lactobacillus paracasei* ATCC 11974 ex vivo. From 20 patients aged between 7 and 18, during clinical work, samples of cariogenic dentine from deep lesions were taken ex vivo, before and after the treatment with ozone. The samples were placed in Stuart transport medium and afterwards cultured to ascertain the influence of ozone on the total bacteria count (CFU) and on *S. mutans* and *L. paracasei*. The results showed decrease of the total bacteria count (CFU) by 72.2%. After treatment with ozone, the reduction of *S. mutans* was 71.5%, and of *L. paracasei* 61.4%. All results showed statistically significant difference in the number of bacteria before and after the ozone treatment ($p < 0.05$). Ozone is a very useful disinfectant and it appears that it can successfully eliminate most of the cariogenic bacteria in human dentine samples ex vivo. Because of its antimicrobial properties, its usage is recommendable in the therapy of deep carious lesions as a cavity disinfectant.

37

Immunological Response in the Dental Pulp after Caries Treatment

A. Sotirovska-Ivkovska, L. Ivkovski, E. Zabokova, L. Popovska*

* anasotirovska@yahoo.com

School of Dentistry, Skopje, Republic of Macedonia

The class II major histocompatibility complex (MHC) molecule-expressing cells, termed dendritic cells, and lymphocytes present in human dental pulp, are highly sensitive to exogenous antigenic stimuli. Their drastic changes in number and localization have been induced by dental caries. This study investigated the responses of the immune system under 3 different clinical conditions: shallow and deep cavities and treated caries. Teeth were extracted and immediately cut longitudinally, pulp tissue was extirpated and fixed in formalin for 24 h at 4°C. The specimens were embedded in paraffin, according to standard laboratory procedure, sectioned at 5 μm thickness and stained by the streptavidin-biotin complex immunoperoxidase method. Cells were identified immunohistochemically using the monoclonal antibodies HLA-DR, CD45 and CD20. Initial pulpal response was characterized by a localized accumulation of HLA-DR antibody-positive cells in the pulp tissue beneath the caries lesion. In the pulp of advanced caries, large number of HLA-DR-positive cells were observed with a marked increase of CD45- and CD20-positive cells. This might indicate the occurrence of antigen presentation locally in the pulp tissue which is very important for the immune response. However, six months after treatment, clusters consisting of HLA-DR-positive cells and CD45-positive T lymphocytes were recognized locally in the pulp tissue, regardless of cavity depth. CD20-positive B cells were seen only under the deeper cavities. Present study demonstrated that dental pulps respond to cavity preparation and restoration. Antigen presentation and cellular or humoral immunoresponses persist for many months after caries treatment, which indicates that antigenic substances remain deep in the dentinal tubules.

26

A Clinical Trial of Tooth Mousse to Remineralize White Spot Lesions in a Post-Orthodontic Population

D.L. Bailey, G.G. Adams, C. Tsao, A. Hyslop, K. Escobar, D. Manton, E.C. Reynolds, M.V. Morgan*

* dlbailey@unimelb.edu.au

CRC for Oral Health Science, School of Dental Science, The University of Melbourne, Australia

The aim was to investigate the progression and regression of white spot lesions (WSL) in post-orthodontic adolescent subjects using Tooth Mousse in a twelve-week, double-blind, randomized, positive-controlled, parallel-group clinical trial. Subjects, who were recruited from private orthodontic practices, exhibited at least two WSL on the buccal surfaces of teeth 14–24 and 34–44. In the 45 subjects (age 12–18 years) recruited, 408 WSL (mean 9 WSL per subject) were recorded. 23 subjects were randomised into the intervention (Tooth Mousse) group and 22 subjects into the control (placebo cream) group. Subjects were instructed to apply the study product twice daily for 12 weeks after normal oral hygiene procedures (subjects were supplied with toothpaste containing 1,000 ppm F as NaF). Clinical assessments were undertaken by three examiners at baseline (within 7 days of bracket removal), and at weeks 4, 8 and 12. WSL were scored for lesion severity and activity using the ICDAS II criteria. A transition matrix was used to assess changes in severity and activity of a WSL between two examinations. Transitions were coded as either progressing, regressing or stable. Ordinal logistic regression models were used to analyse the transition scores. 92% of WSL were assessed as severity code 2 or 3. At 12 weeks, 31% more of these lesions had regressed with Tooth Mousse than with the placebo control (OR 2.3; $p = 0.04$). Differences in the regression rates between the two treatments were not statistically significant at 4 and 8 weeks. In both treatment groups, active lesions were more likely to regress than inactive lesions (OR 5.07; $p < 0.001$). In conclusion, significantly more post-orthodontic WSL regressed with Tooth Mousse compared to a placebo control over a 12-week period.

Supported by CRC for Oral Health Science and GC Corporation, Japan.

27

Antimicrobial Effect of Chlorhexidine Varnish in Orthodontic Patients

H. Juric, I. Masek, D. Matosevic, S. Mestrovic, W. Dukic*

* juric@sfzg.hr

School of Dental Medicine, Zagreb, Croatia

The aim of this study was to evaluate the effect of 1% chlorhexidine-1% thymol varnish (Cervitec, Ivoclar Vivadent, Schaan, Liechtenstein) on mutans streptococci (MS) and *Lactobacillus* spp. (LB) counts in patients with fixed orthodontic appliances. 24 patients were divided into two groups of 12 according to baseline bacterial counts, creating high ($\geq 10^5$ CFU/ml saliva) and low ($\leq 10^4$ CFU/ml saliva) bacterial colonization groups. Bacterial analysis was performed using the CTR-bacteria chair-side test (Ivoclar Vivadent). Patients then went through an intensive mode of application: chlorhexidine varnish was administered three times within one week according to the manufacturer's recommendations. The baseline MS and LB determinations before varnish administrations were followed by sampling 1 and 2 months after the period of varnish application. For hypothesis testing, χ^2 test, Mann-Whitney and Kruskal-Wallis tests were used. One month after administration the group with high colonization levels exhibited a statistically significant reduction of MS and LB counts when compared with baseline ($p < 0.05$). In this group, reduction for MS was from 10^5 CFU/ml to slightly below 10^4 CFU/ml. For LB, reduction was from more than 10^5 CFU/ml to 10^4 CFU/ml. The group with low colonization levels exhibited no statistically significant reduction. Two months after treatment a slight growth of MS and LB counts were observed but did not reach the baseline values. This indicated a time period of chlorhexidine efficiency and a necessary schedule for varnish application. In conclusion, for patients with high baseline MS and LB counts, therapy with 1% chlorhexidine-1% thymol varnish every 3 months suppresses salivary MS and LB.

28

Effectiveness of Conventional Etch versus Self-Etch Primer in Sealant Application: A Six-Month Clinical Trial

*K. Salem[a], *, A. Anissian[b], A. Raessi[c], A. Salem[c]*

* k_salem@gums.ac.ir

[a]Guilan University of Medical Sciences, Rasht, [b]Shaheed Beheshti University of Medical Sciences, Tehran, Iran; [c]Private Practice

The purpose of this study was to compare the effectiveness of conventional etch and bond (Excite) versus self etch primer (prompt l-pop) in respect of sealant retention and caries inhibition. 47 6- to 8-year-old children with good cooperation (Frankl rating 3 or 4) were examined before placing sealant, to gain baseline data, and at the end of the study to record dmft according to visual-tactile method. After prophylaxis with a dry brush and irrigation and without any manipulation of the enamel surface, one operator placed pairs of sealant in random order on lower permanent molars on opposite sides of the mouth of each child. Dry field was maintained by cotton roll isolation and saliva ejector. 6-month evaluation was performed after between 6 and 11 months (mean 10.9 months), according to the CCC Sealant Evaluation System criteria [Deery et al.: Community Dent Oral Epidemiol 2001;29:83–91]. Complete retention was recorded in 40.4% of the etch sealants versus 34% in self-etch sealants ($p = 0.001$; χ^2). Total losses were the same in both groups: 4.2%. CCC Score B was found in 38.3% of etch sealants and 46.8%, in self-etch sealants, score C in 17 and 14.9%, respectively. The most common site of loss was the distal portion. Caries prevention, estimated as the mean number of intact surfaces, was found to be better in the Etch group: 76 versus 66% ($p < 0.001$). Considering baseline caries score, those with dmft <3 at baseline remained more caries-free in the Etch group than in the Self-etch group ($p = 0.007$; χ^2). In conclusion, conventional etch and bond remains the better approach for sealant application at this time.