ALLERGY- ISSUES

References:

DOI: 10.1111/j.1365-263X.2011.01186.x

Mother and youth access (MAYA) maternal chlorhexidine, counselling and paediatric fluoride varnish randomized clinical trial to prevent early childhood caries

FRANCISCO J. RAMOS-GOMEZ[1], STUART A. GANSKY[2], JOHN D. B. FEATHERSTONE[3], BONNIE JUE[2], ROCIO GONZALEZ-BERISTAIN[3], WILLIAM SANTO[2], ED MARTINEZ[3] & JANE A. WEINTRAUB[2]

[1]Section of Pediatrics, Los Angeles School of Dentistry, University of California, Los Angeles, [2]Center to Address Disparities in Children's Oral Health, UCSF School of Dentistry, San Francisco, and [3]San Ysidro Community Health Center, San Ysidro, CA, USA

B.,
1993;

se,
Cariostatic Mechanism, Efficacy and Safety. JADA May 1, 2000. 131 (5): 589 -596.

PulpDent ACTIV Fluoride Varnish

Minimally Invasive Dentistry

Preventive Care- Sealants

- Hydrophilic Sealants vs. Hydrophobic
  - Much easier to place
  - Less resistant to wear
  - Ability to release amorphous calcium phosphate or fluoride

Decisions

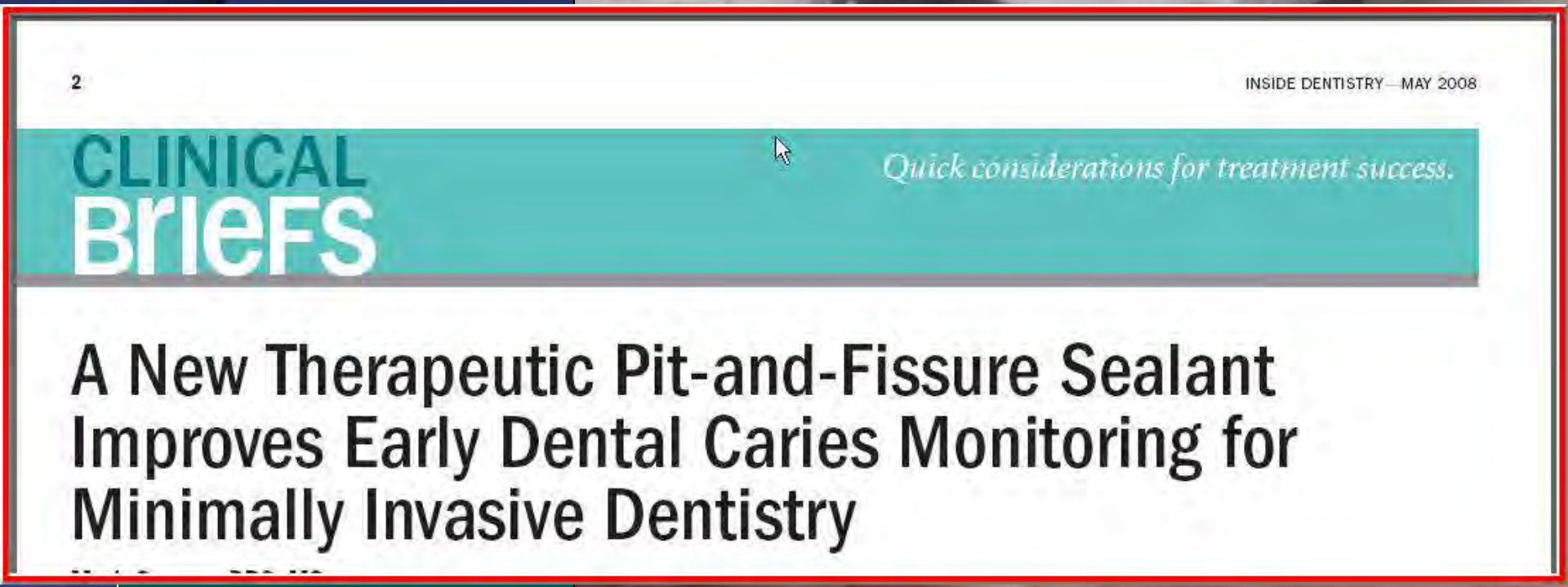
Minimally Invasive Dentistry

Diagnosis Friendly Sealants

- *Clear for visual inspection*
- *Clear for use with DIAGNOdent*
- *Approved by the FDA*
- *Hydrophilic*
- *Allows re-mineralization*
- *Current Research*

Minimally Invasive Dentistry

Diagnosis Friendly Sealants



2

INSIDE DENTISTRY—MAY 2008

CLINICAL BRIEFS

Quick considerations for treatment success.

A New Therapeutic Pit-and-Fissure Sealant Improves Early Dental Caries Monitoring for Minimally Invasive Dentistry

chart

Minimally Invasive Dentistry

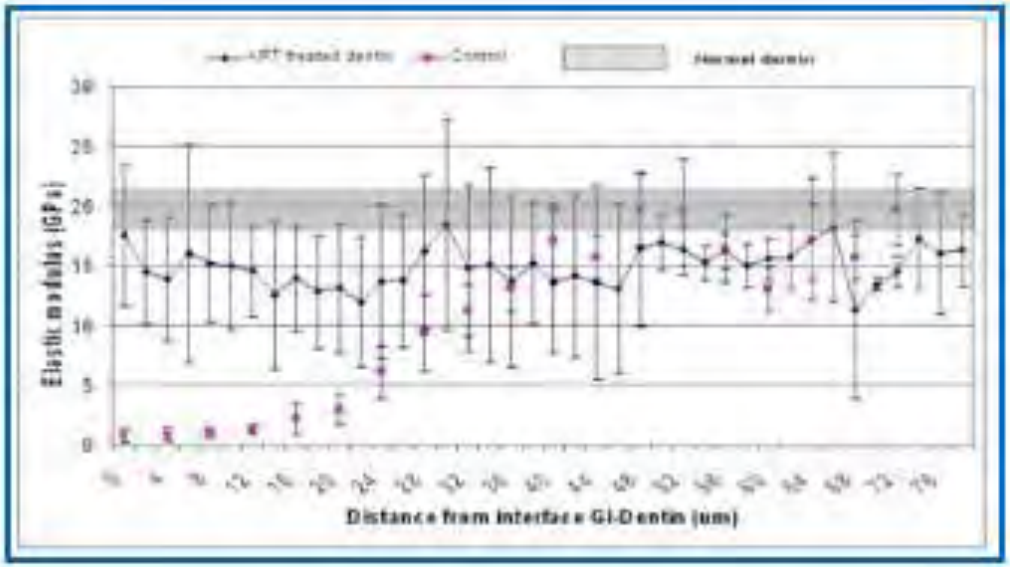
Preventive Care- Re-mineralize

- Triage

Re-mineralizing sealant instead
Of invasive occlusal restorations

Atraumatic

Preventive Dentistry



Preliminary Evidence of Mechanical Recovery of ART Treated Carious Dentin

Carious dentin recovered

L.E. BERTASSONI[1], R. STANISLAWSKI[2], R. MOSS[3], M.L. CANNON[4], S. HABELITZ[1], S.J. MARSHALL[1], and G.W. MARSHALL[5], [1]University of California - San Francisco, San Francisco, CA, [2]University of California, San Francisco, San Francisco, CA, [3]University of California - San Francisco, Berkley, CA, [4]Northwestern University, Chicago, IL, [5]University of California San Francisco, San Francisco, CA

Atraumatic restorative treatment technique consists of hand excavation of carious dentin and preservation of sound tissues that might be suitable for remineralization after restoration with glass ionomer (GI) cement. ART restorations allow fluoride release over their lifetime thus favoring remineralization, but little information exists about the mechanical recovery of treated tissues and the depth of remineralization under ART restorations. Objective: This pilot study sought to provide preliminary data on the clinical effectiveness of ART in remineralizing and recovering the mechanical properties of carious dentin. Methods: Twelve teeth prepared by the same practitioner were obtained, gamma-irradiated, embedded and subsequently cross-sectioned to expose the inner surface of the teeth and the interface between the glass ionomer and the treated dentin. Simulated caries lesions in dentin substrates (12mm2) were used as a control. Representative specimens (n=5) of the ART teeth and the control had their elastic-modulus determined by AFM-based nanoindentation in water. 2 lines containing 30-40 indents with an interval of 2 um between each was performed across the dentin-GI interface extending into dentin. Data was analyzed using ANOVA ($P < .05$). Additionally, specimens (n=7) were embedded, cross-sectioned and metalographycally prepared to obtain 100 µm thick samples for subsequent imaging with a polarized light microscope (PLM). Results: Elastic-modulus of ART treated dentin was not significantly different from normal dentin through the extension of the indented area; yet, ART yielded properties significantly higher than the control group until a depth of about 20 um. It was also noted that full mechanical recovery was not homogeneously distributed along the areas measured. PLM images suggested similarities between the inner-most affected zone of the simulated caries with the dentin right under the GI. Conclusion: This study suggested that the clinical application of ART might facilitate remineralization and provide the mechanical recovery of treated carious dentin. Supported: NIH DE16849

Sealant- developments

“Triage” patients

Preventive

MINIMUM INTERVENTION

1375 DENTAL COMPOSITE SURFACES AND URINARY BISPHENOL A LEVELS AMONG CHILDREN

Location: Exhibit Hall D (Walter E. Washington Convention Center)

Y.-H. CHOI, Scool of Dentistry, Kyungpook Nati... SC, H. KWON, College of Medicine, Dankook Uni... University, Daegu, South Korea, H.-J. JIN, Scool... Kyungpook National University, Deagu, South ... Columbia, S...

...ina, Columbia, ...ok National ...of Dentistry, ... Carolina,

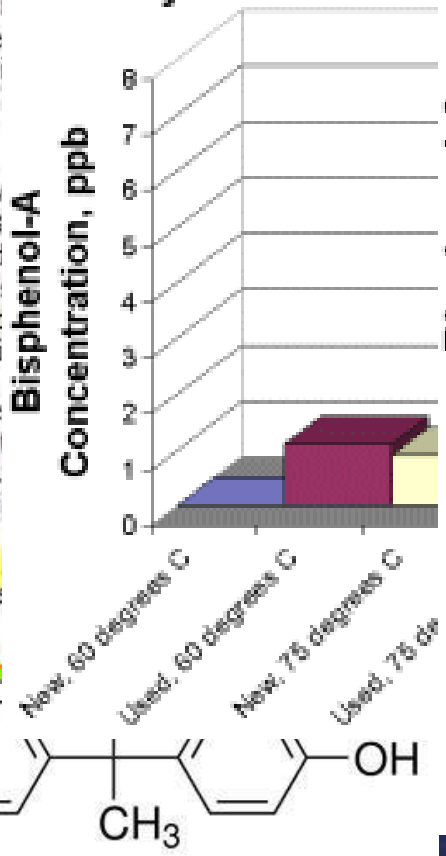
Objectives: ... fissure on te... Epidemiologi... relationship ... children.

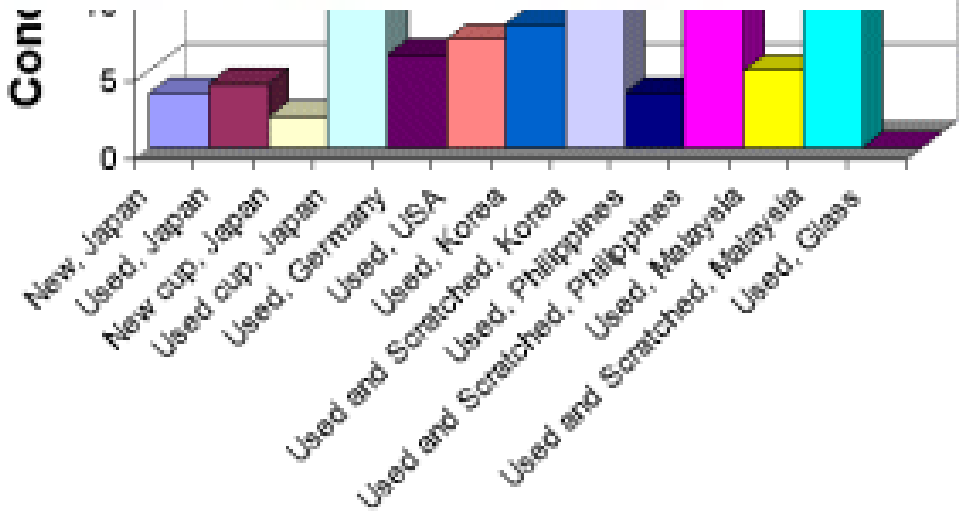
Methods: Fiv... with grade 3... missing, and... BPA. We cla... creatinine ac... analyzed usi...

Results: The... two third of ... was 2.08±3.... creatinine hi...

Conclusion: ... studies inves... children.

Leachin... Polycarbonate Tab...





BPA

...pits and ...ne the ...ean ... children ... decayed, ...evel of ...vere ...tition, ...tion level ...7 µg/g ...her ...in

In Situ Evaluation of the Re-mineralizing Capacity of Pit-and-Fissure Sealants Containing Amorphous Calcium Phosphate and/or Fluoride.

KÉLIO GARCIA SILVA, DDS, MS, PHD, POST GRADUATION PROGRAM IN PEDIATRIC DENTISTRY, UNESP – SÃO PAULO STATE UNIVERSITY, ARAÇATUBA DENTAL SCHOOL, SP, BRAZIL.
DENISE PEDRINI, DDS, MS, PHD, PROFESSOR, DEPARTMENT OF SURGERY AND INTEGRATED CLINIC, UNESP – SÃO PAULO STATE UNIVERSITY, ARAÇATUBA DENTAL SCHOOL, SP, BRAZIL.
ALBERTO CARLOS BOTAZZO DELBEM, DDS, MS, PHD, PROFESSOR, DEPARTMENT OF CHILD AND SOCIAL DENTISTRY, UNESP – SÃO PAULO STATE UNIVERSITY, ARAÇATUBA DENTAL SCHOOL, SP, BRAZIL.
MARK CANNON, DDS, MS, CHILDRENS' MEMORIAL HOSPITAL, NORTHWESTERN UNIVERSITY, CHICAGO IL, USA.
LILIAN FERREIRA, DDS, POSTGRADUATE STUDENT, POST GRADUATION PROGRAM IN PEDIATRIC DENTISTRY, UNESP – SÃO PAULO STATE UNIVERSITY, ARAÇATUBA DENTAL SCHOOL, SP, BRAZIL.

Purpose:

- The purpose of this study was to evaluate *in situ* the re-mineralizing potential of pit-and-fissure sealants containing ACP and/or fluoride in artificially induced carious lesions on smooth enamel surfaces.

Materials and Methods:

- Ten young adults (5 men and 5 women) aged 20 to 29 years with normal non-stimulated salivary flow (≥0.2 mL/min) were enrolled in this study.
- The study design was independently reviewed and approved by the Research Ethics Committee of the Dental School of Araçatuba, UNESP, Brazil

Materials and Methods: (cont.)

- Enamel slabs (4x4x2 mm) were obtained from bovine incisor teeth
- Two hundred enamel slabs with an average SMH_1 between 320 and 360 KHN were selected for the study.

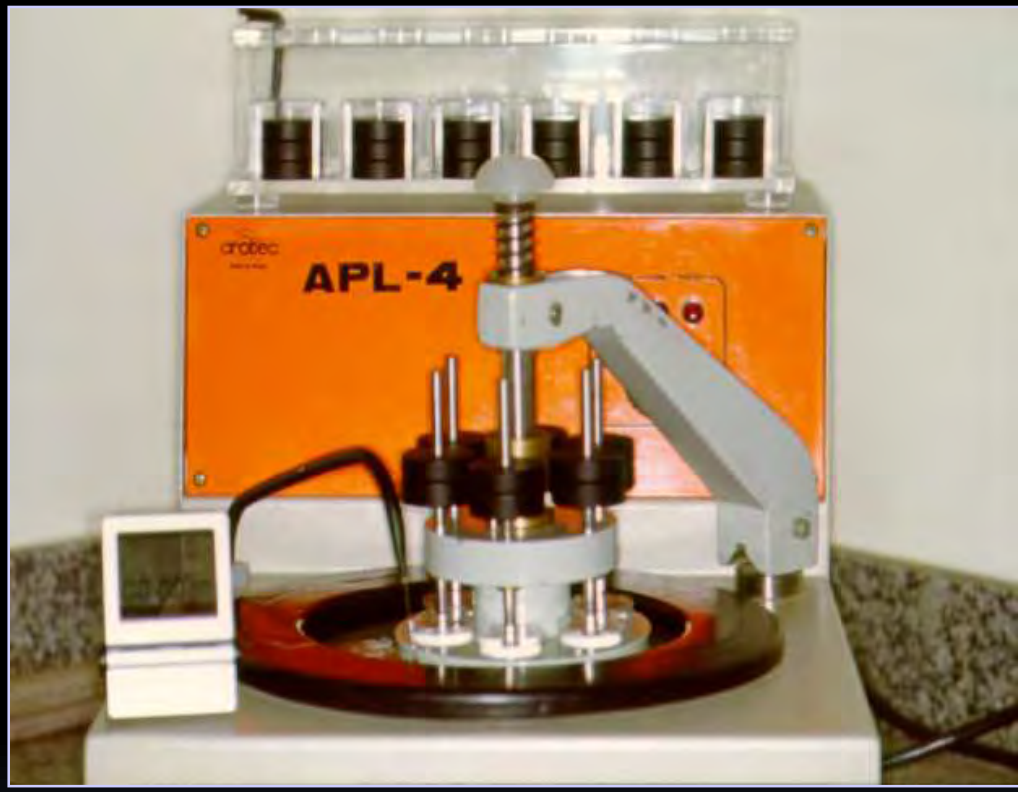
✓ Enamel Blocks 4x4x2 mm








✓Enamel Polishing



The enamel surface was polished and the slabs were cross-sectioned at 1 mm from the border resulting in specimens with 4x3x2 mm

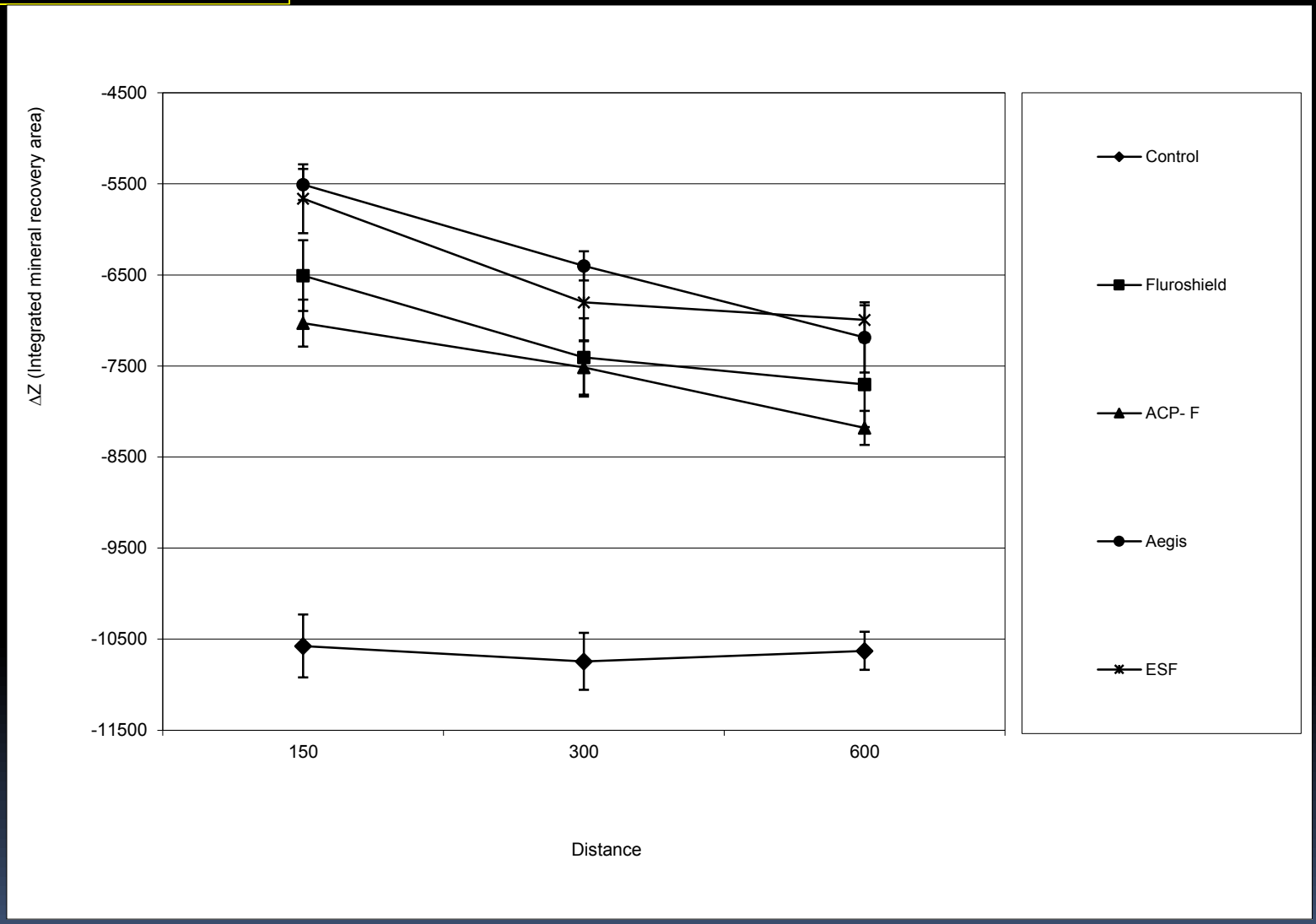
Materials and Methods (cont.):

- Forty specimens were prepared for the control and each tested sealant [Fluroshield (Dentsply International Inc, Milford, DE, USA; with fluoride); Aegis (Bosworth, Skokie, IL, USA; with ACP); experimental sealant containing fluoride (ESF) (Bosworth); and experimental sealant containing ACP and fluoride (ACP-F) (Bosworth)] using a metallic matrix (4x2x1 mm).

Materials and Methods (cont.):

- Acrylic intraoral removable palatal devices were constructed with 4 cavities, being two in the region of the 2nd premolar (one right, one left) and two in the region of the 1st molar (one right, one left).

Results:



- Figure 2. Integrated mineral recovery area (ΔZ) (mean ± se, n=10) according to the distance of indentation from enamel border in contact with the material.

Conclusion:

In Practice

FOCUS ON | MATERIALS | TECHNOLOGY | CLINICAL BRIEF | TECH PROFILE

r fluoride

Acta Odontologica Scandinavica, 2010; 68: 11–18

informa
healthcare

ORIGINAL ARTICLE

In situ evaluation of the remineralizing capacity of pit and fissure sealants containing amorphous calcium phosphate and/or fluoride

KÉLIO GARCIA SILVA[1], DENISE PEDRINI[2], ALBERTO CARLOS BOTAZZO DELBEM[3], LILIAN FERREIRA[1] & MARK CANNON[4]

[1]*Post graduation Program in Pediatric Dentistry,* [2]*Department of Surgery and Integrated Clinic,* [3]*Department of Child and Social Dentistry, UNESP–São Paulo State University, Araçatuba Dental School, São Paulo, Brazil and* [4]*Childrens' Memorial Hospital, Northwestern University, Chicago, Illinois, USA*

New Sealant Technology

In Vitro Evaluation of a Highly-Cross-Linking Pit and Fissure Sealant

- **M.L. CANNON1, K. GARCIA2, D. BARSTAD2, L. CHEN2, S.**

HAPISeal

Hydrophilic

Adhesion promoted

Polymerizing with highly cross linking mutli -functional

Inhibition of plaque adhesion

Sealant

and less oxygen inhibition of surface polymerization. The purpose of this study is to compare the physical properties of this new experimental sealant to current commercial products.

New Sealant Technology

Results:
Mean enamel bond strength and surface microhardness (standard deviation) are shown in the Table below. Means with different letters in the same column are statistically different ($p<0.05$).

	Shear bond strength, MPa	MicroHardness	Elasticity, GPa
Experimental Sealant (Bisco) HAPISeal	**32.2(1.9)a**	**151.7(48.5)a**	**6.8 (1.4)bc**
Clinipro (3M ESPE)	17.0(2.2)c	55.9(13.5)d	2.5 (1.2)e
Delton FS+ (Dentsply)	26.5(5.8)ab	123.2(12.8)a	7.7(0.4)b
Pulpdent Corp (Embrace)	20.9(6.8)bc	73.9(4.2)c	7.2(0.3)c
Ultraseal XT Plus (Ultradent)	21.0(7.0)bc	135.1(12.6)a	9.5(0.3)a
Fortify Plus (Bisco Composite Sealant)	20.7(3.3)bc	96.6(7.2)b	5.3(0.9)d

New Sealant Technology

- **Micro-leakage evaluation:**
- Extracted premolars were obtained and stored in 1% thyamine solution for 72 hours. The teeth were prepared for sealant application in the same manner as is typically used in clinical practice.
- Prophylaxis with rubber cup and pumice. Etch for 30 seconds and rinsed for 10 seconds. Sealant applied with micro-brush and light cured for 20 seconds.

New Sealant Technology

- **Micro-leakage evaluation:**
- The specimens were stored in 2% methylene blue solution for 72 hours then sectioned with Buehler Isomet saw for microleakage evaluation.
- Sections were compared to control hydrophilic sealant, (Pulpdent) Embrace.
- Results: Both sealants displayed acceptable resistance to micro-leakage.

New Sealant Technology

- Micro-leakage with 2% methylene blue solution.

New Sealant Technology

- Discussion: HAPISeal
- Pit and Fissure sealants that have improved properties, such as:
  - Hydrophilic on placing
  - Hydrophobic upon polymerization
  - More resistant to wear and chipping
  - Possibly have anti-microbial effect

  Would be more readily placed by the dental profession and accepted by all practitioners.

New Sealant Technology

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BPA free

New Sealant Technology

- Bis Phenol A- IS BACK IN THE NEWS!!!

Compendium
September 2013, Volume 34, Issue 8
Published by AEGIS Communications

Bioactive and Therapeutic Preventive Approach to Dental Pit and Fissure Sealants

Mark L. Cannon, DDS, MS; and John C. Comisi, DDS, MAGD

BPA free

New Sealant Technology

- Bis Phenol A- IS BACK IN THE M

BPA's possible role in miscarriages

.Int Dent J. 2012 Apr;62(2):65-9. doi: 10.1111/j.1875-595X.2011.00089.x.

Dental composite fillings and bisphenol A among

.J Dent Hyg. 2010 Summer;84(3):145-50. Epub 2010 Jul 5.

Bisphenol A blood and saliva levels prior to and after dental sealant placement in adults.

Zimmerman-Downs JM, Shuman D, Stull SC, Ratzlaff RE.

College of Health Sciences, Old Dominion University, Norfolk, VA, USA.

New Sealant Technology

National Health and Nutrition Examination Survey

nhanes

National Center for Health Statistics

nchs CDC

- Bis Phenol A- IS BACK IN THE NEWS!!!

Environ Health Perspect. 2012 Sep;120(9):1297-300. doi: 10.1289/ehp.1104114. Epub 2012 May 29.

Bisphenol A and peripheral arterial disease: results from the NHANES.

Acta Diabetol. 2013 Aug;50(4):625-31. doi: 10.1007/s00592-013-0472-z. Epub 2013 May 1.

Relationship between urinary bisphenol A levels and prediabetes among subjects free of diabetes.

J Clin Endocrinol Metab. 2011 Dec;96(12):3822-6. doi: 10.1210/jc.2011-1682. Epub 2011 Sep 28.

Relationship between urinary bisphenol A levels and diabetes mellitus.

Shankar A, Teppala S.

Department of Community Medicine, West Virginia University School of Medicine, P.O. Box 9190, Morgantown, West Virginia 26506-9190, USA. ashankar@hsc.wvu.edu

THE SECRETS!!! SHHHHHH!!!

Urinary bisphenol A and obesity: NHANES 2003–2006 ☆

Jenny L. Carwile [a], Karin B. Michels [a,b,c,*]

[a] Department of Epidemiology, Harvard School of Public Health, 677 Huntington Ave, Boston, MA 02115, USA
[b] Obstetrics and Gynecology Epidemiology Center, Department of Obstetrics, Gynecology and Reproductive Biology, Brigham and Women's Hospital, Harvard Medical School, 221 Longwood Avenue, Boston, MA 02116, USA
[c] Division of Cancer Epidemiology, Comprehensive Cancer Center Freiburg, Freiburg University, Freiburg, Germany

Environ Health Perspect. 2011 January; 119(1): 63–70. PMCID: PMC3018502
Published online 2010 September 8. doi: 10.1289/ehp.1002347

Research

Does BPA change biofilm?

Estrogenic Activity of Bisphenol A and 2,2-bis(*p*-Hydroxyphenyl)-1,1,1-trichloroethane (HPTE) Demonstrated in Mouse Uterine Gene Profiles

Sylvia C. Hewitt and Kenneth S. Korach

In vitro Estradiol Hemisuccinate Activity as anti Vaginal Microbiota Biofilm Strategy

M. Marques, A. Farinati, M. Arcos, L. Sibert, A. Orsini
USAL, Buenos Aires, ARGENTINA

THE SECRETS!!! SHHHHHH!!!

Diabetes Care. 2012 Mar;35(3):520-5. doi: 10.2337/dc11-1043. Epub 2012 Jan 25.

Helicobacter pylori infection is associated with an increased rate of diabetes.

Jeon CY, Haan MN, Cheng C, Clayton ER, Mayeda ER, Miller JW, Aiello AE.

Center for Infectious Diseases Epidemiologic Research, Mailman School of Public Health, Columbia University, New York, New York, USA.

Abstract

OBJECTIVE: Chronic infections could be contributing to the socioeconomic gradient in chronic diseases. Although chronic infections have been associated with increased levels of inflammatory cytokines and cardiovascular disease, there is interest in how infections affect risk of diabetes.

RESEARCH DESIGN AND METHODS: We examined the association between serological evidence of chronic viral and bacterial infections and incident diabetes in a prospective cohort of Latino elderly. We analyzed data on 732 individuals aged 60 years and diabetes free in 1998-1999, whose blood was tested for antibodies to herpes simplex virus 1, varicella virus, cytomegalovirus, Helicobacter pylori, and Toxoplasma gondii and who were followed until June 2008. We used Cox proportional hazards regression to estimate the relative incidence rate of diabetes by serostatus, with adjustment for age, sex, education, cardiovascular disease, smoking, and other covariates.

RESULTS: Individuals seropositive for herpes simplex virus 1, varicella virus, cytomegalovirus, and T. gondii did not show an increased rate of diabetes, whereas those who were seropositive for H. pylori at enrollment were 2.7 times more likely at any given time to develop diabetes than seronegative individuals (hazard ratio 2.69 [95% CI 1.10-6.60]). Controlling for insulin resistance, C-reactive protein and interleukin-6 did not attenuate the effect of H. pylori infection.

CONCLUSIONS: We demonstrated for the first time that H. pylori infection leads to an increased rate of incident diabetes in a prospective cohort study. Our findings implicate a potential role for antibiotic and gastrointestinal treatment in preventing diabetes.

2.7X increase of diabetes

When seropositive for H. pylori

THE SECRETS!!! SHHHHHH!!!

- Manufacture Dependent For Levels of Bis Phenol A
- -three methods to make Bis GMA
  - Reaction of two moles of glycidyl methacrylate with one mole of bisphenol a.
  - Condensation of sodium salt of bisphenol a with glycidyl methacrylate and anhydrous hydrochloric salt
  - Reaction of glacial methacrylate acid with the diglycidyl ether of bisphenol and a tertiary amine
- - no Bis GMA in pr

Saliva Testing

OralDN

Minneapolis MI
(was N

Metametrix
Clinical Laboratory
3425 Corporate Way
Duluth, GA 30096
770.446.5483 Fax:770.441.2237

Accession Number:
Reference Number:
Patient:
Age: 26
Date of Birth:
Date Collected:
Date Received:
Report Date:
Telephone:
Fax:
Reprinted:
Comment:

Ordering Physician:
Assocaited Dental Specialists
Mark Cannon DDS,MS
Grove Medical Center STE 308
RDD 4160
Long Grove, IL 60047

Date of collection not provic
results are questionable.

2100 Gastrointestinal Function Profile

Methodolog
Colo

Percentile Ranking by Quintile

Results CFU/gram	1st	2nd	3rd	4th	5th	95% Reference Range
		20%	40%	60%	80%	

Predominant Bacteria (E+007) E+007

Obligate anaerobes

Bacteroides sp.	4.1	1.6	6.7	>= 1.3
Clostridia sp.	2.0	1.5	6.2	>= 1.0
Prevotella sp.	3.5	1.6	6.2	>= 1.1
Fusobacteria sp.	2.2	1.6	7.4	>= 1.1
Streptomyces sp.	3.2	1.6	5.8	>= 1.0
Mycoplasma sp.	1.7	1.7	6.2	>= 1.2

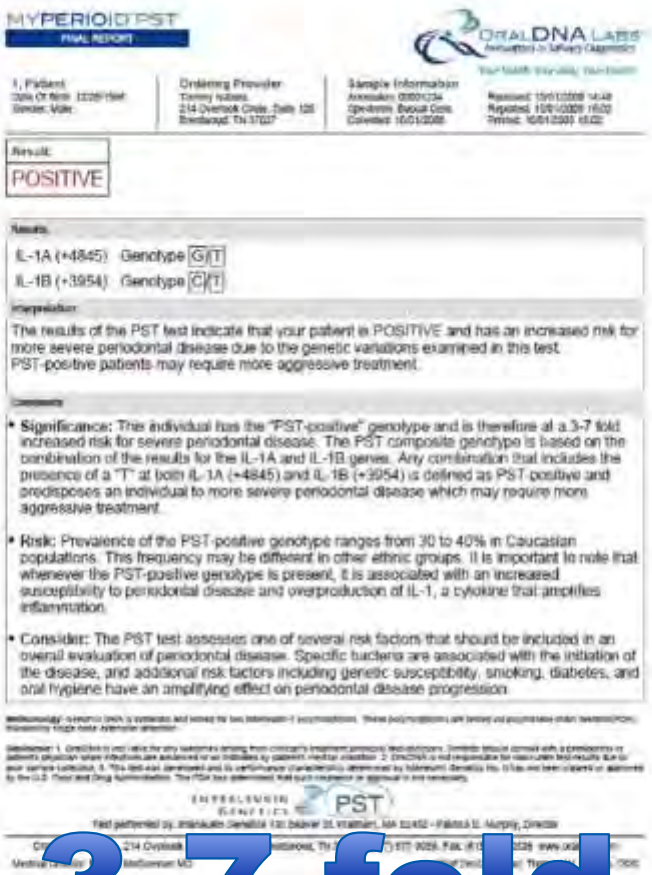
Facultative anaerobes

Lactobacillus sp.	3.5	1.8	7.8	>= 1.2
Bifidobacter sp.	4.2	2.3	7.6	>= 1.8

ORALDNA® LABS
Innovations in Salivary Diagnostics
A Quest Diagnostics® Company

- Determines who is at risk!
- Treat more aggressively
- Interleukin 1A and 1B
- 30-40% of Caucasian

INTERLEUKIN GENETICS
Empowering health


MYPERIOID PST
FINAL REPORT

ORALDNA LABS

Result:
POSITIVE

IL-1A (+4845) Genotype G/T
IL-1B (+3954) Genotype C/T

The results of the PST test indicate that your patient is POSITIVE and has an increased risk for more severe periodontal disease due to the genetic variations examined in this test. PST-positive patients may require more aggressive treatment.

- **Significance:** The individual has the "PST-positive" genotype and is therefore at a 3-7 fold increased risk for severe periodontal disease. The PST composite genotype is based on the combination of the results for the IL-1A and IL-1B genes. Any combination that includes the presence of a "T" at both IL-1A (+4845) and IL-1B (+3954) is defined as PST-positive and predisposes an individual to more severe periodontal disease which may require more aggressive treatment.
- **Risk:** Prevalence of the PST-positive genotype ranges from 30 to 40% in Caucasian populations. This frequency may be different in other ethnic groups. It is important to note that whenever the PST-positive genotype is present, it is associated with an increased susceptibility to periodontal disease and overproduction of IL-1, a cytokine that amplifies inflammation.
- **Consider:** The PST test assesses one of several risk factors that should be included in an overall evaluation of periodontal disease. Specific bacteria are associated with the initiation of the disease, and additional risk factors including genetic susceptibility, smoking, diabetes, and oral hygiene have an amplifying effect on periodontal disease progression.

INTERLEUKIN GENETICS PST

3-7 fold increase


MYORALPATH
Just change the
oral environment!!

Age One Test

Age One Test

Ideally Recommended by ADA, AAPD and AAP

Sterile saline on Toothette swab

-Streptococcus mutans

-Lactobacillus acidophilus

-Nocardia ss

-Streptococcus sanguinus

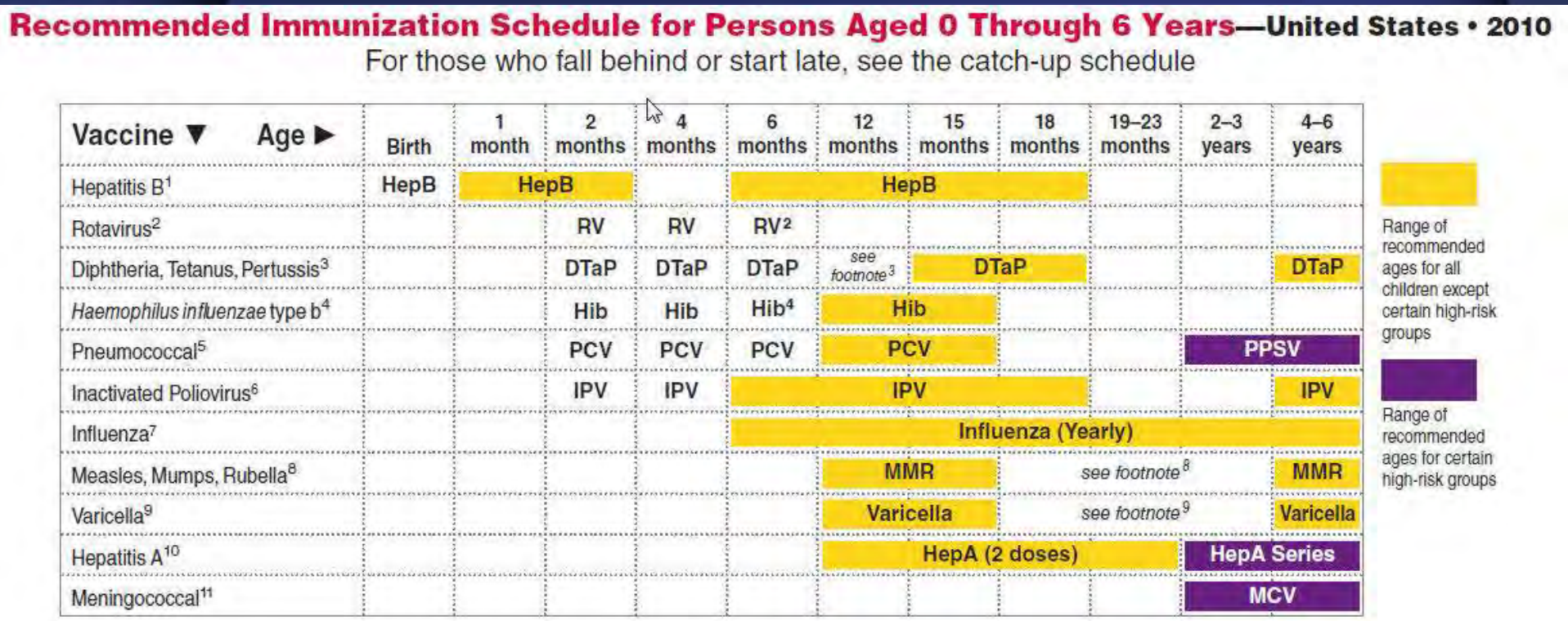
-Actinomyces viscosus

Top secret Classified

DNA testing only once!

KLK4 or OPN genotypes?

Pediatric Dentists' Diagnostic plan



Recommended Immunization Schedule for Persons Aged 0 Through 6 Years—United States • 2010

For those who fall behind or start late, see the catch-up schedule

Vaccine ▼ Age ►	Birth	1 month	2 months	4 months	6 months	12 months	15 months	18 months	19–23 months	2–3 years	4–6 years
Hepatitis B[1]	HepB	HepB			HepB						
Rotavirus[2]			RV	RV	RV[2]						
Diphtheria, Tetanus, Pertussis[3]			DTaP	DTaP	DTaP	*see footnote[3]*	DTaP				DTaP
Haemophilus influenzae type b[4]			Hib	Hib	Hib[4]	Hib					
Pneumococcal[5]			PCV	PCV	PCV	PCV				PPSV	
Inactivated Poliovirus[6]			IPV	IPV	IPV						IPV
Influenza[7]					Influenza (Yearly)						
Measles, Mumps, Rubella[8]						MMR		*see footnote[8]*			MMR
Varicella[9]						Varicella		*see footnote[9]*			Varicella
Hepatitis A[10]						HepA (2 doses)				HepA Series	
Meningococcal[11]										MCV	

Range of recommended ages for all children except certain high-risk groups

Range of recommended ages for certain high-risk groups

Follow Schedule

In Summary

Testing!!
Better Diagnosis
Targeted Population
Effective Treatment

-Treating a bacterial disease as a bacterial
dis
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SPEAKING OF GENETICS!

Questions?

"Do not follow where the path may lead. Go instead where there is no path and leave a trail."

- Harold R. McAlindon

Minimally Invasive Dentistry

In pediatric dentistry…

Total Patient Care

- Total Patient Care
- All treatment
- emotional health
- All treatment should be conservative and esthetic by design

Am J Phys Anthropol. 1985 Dec;68(4):479-93.

Factors affecting the distribution of enamel hypoplasias within the human permanent dentition.

Goodman AH, Armelagos GJ.

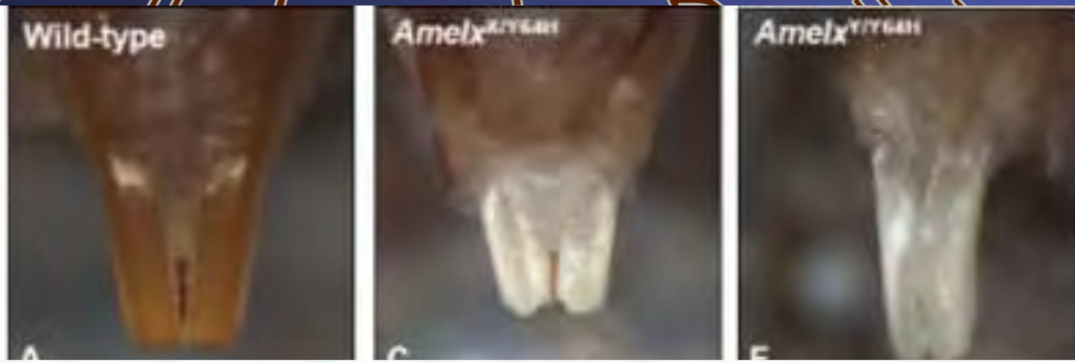
Amerindians- 0.7 to 1.27 defects per anterior

MIH

22-24% of Northern Europeans

Mola… on

Eur J Paedi… d Articles, Links



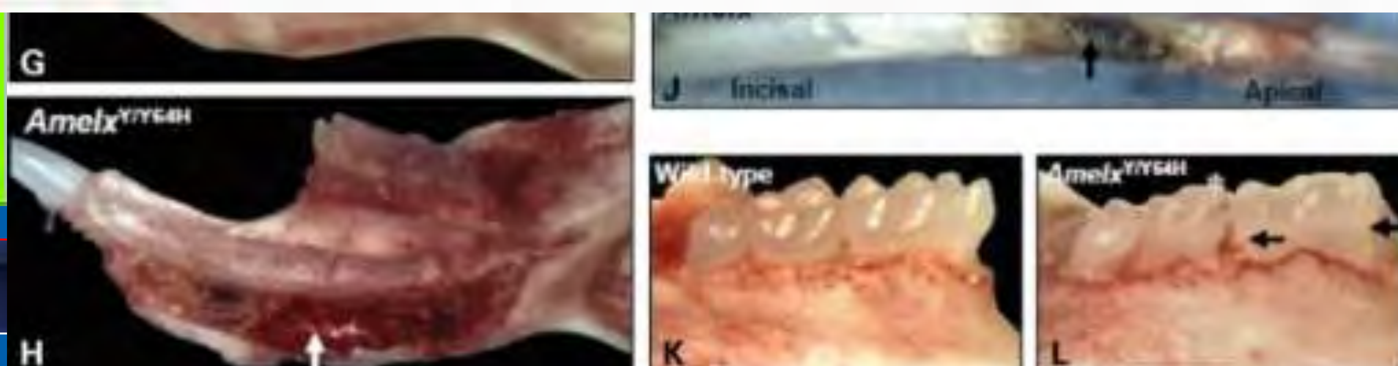
Knockout & Knockin Mouse Services

We generate knockout, conditional knockout or knockin mice by homologous recombination. Services include knockout vector construction, ES cell electroporation and screening, blastocyst injection, and genotyping/breeding of chimeras and F1 mice.

Nuclease-mediated Knockout Mouse Services

Traditional recombination-based knockout mice can take close to a year to make. If you cannot wait that long, please consider our nuclease-mediated knockout mouse services, which take just a few months and also cost less.

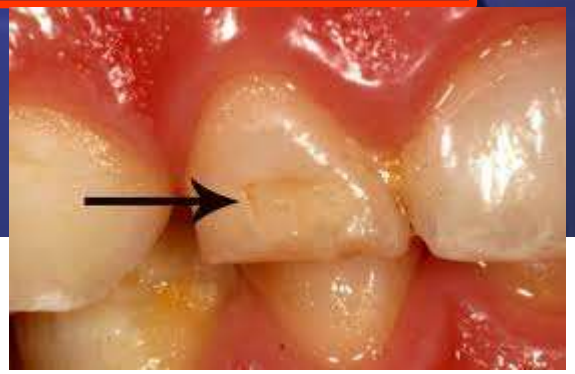
ena…
dev…



3 times the prevalence of dental erosions in primary teeth than permanent with Brisbane kids Ped Dent-2007

Molar Incisor Hypoplasia

Oral Disease 2011 May;17(4):420-6.



Oral Dis. 2011 May;17(4):420-6. doi: 10.1111/j.1601-0825.2010.01770.x. Epub 2010 Nov 29.

The relationship of enamel defects and caries: a cohort study.

Targino AG, Rosenblatt A, Oliveira AF, Chaves AM, Santos VE.

Department of Clinical and Social Dentistry, Federal University of Paraiba, João Pessoa, Brazil. rosen@nlink.com.br

Abstract

OBJECTIVE: Is there a relationship between enamel defects and early childhood caries?

METHODS: A total of 275 children participated in a cohort study from birth to 54 months of age. Enamel defects were determined by the development defects enamel index and dental caries was registered according to the WHO criteria. Data were analyzed using descriptive, analytical techniques, multivariate analysis, and evidence-based tools as number needed to harm (NNH).

RESULTS: In the follow up, 224 children were still in the study, 81.3% presented at least one tooth with enamel defect and 44.2% had dental caries. An association was found between enamel defects and dental caries ($P = 0.0091$). Multivariate analysis showed that night bottle-feeding, absence of fluoride and enamel defects were predictors of dental caries at 18 months ($P < 0.05$). Enamel defect was the only statistically significant variable to influence the development of caries at 24, 30, 36, and 42 months. At 48 months, the use of fluoride toothpaste had effect on the decrease of caries ($P < 0.05$). The NNH for enamel defects in relation to dental caries was 3.0, at 24 months and 5.0 at 54 months.

CONCLUSION: Enamel defect is a predisposing factor for ECC.

- “Enamel defect is a predisposing factor for ECC”

Molar Incisor Hypoplasia

- "Enamel defects strongly associated with ECC."

Molar Incisor Hypoplasia

J Dental

J Dent Res. 2012 Jun;91(6):5

Hypoplasia-associ

Caufield PW, Li Y, Bromag

Cariology and Comprehensive

Abstract

We propose a new clas
of caries affects mostly y
to dental caries. These p
researchers consider EH
Differentiation of HAS-EC
management. Defining H
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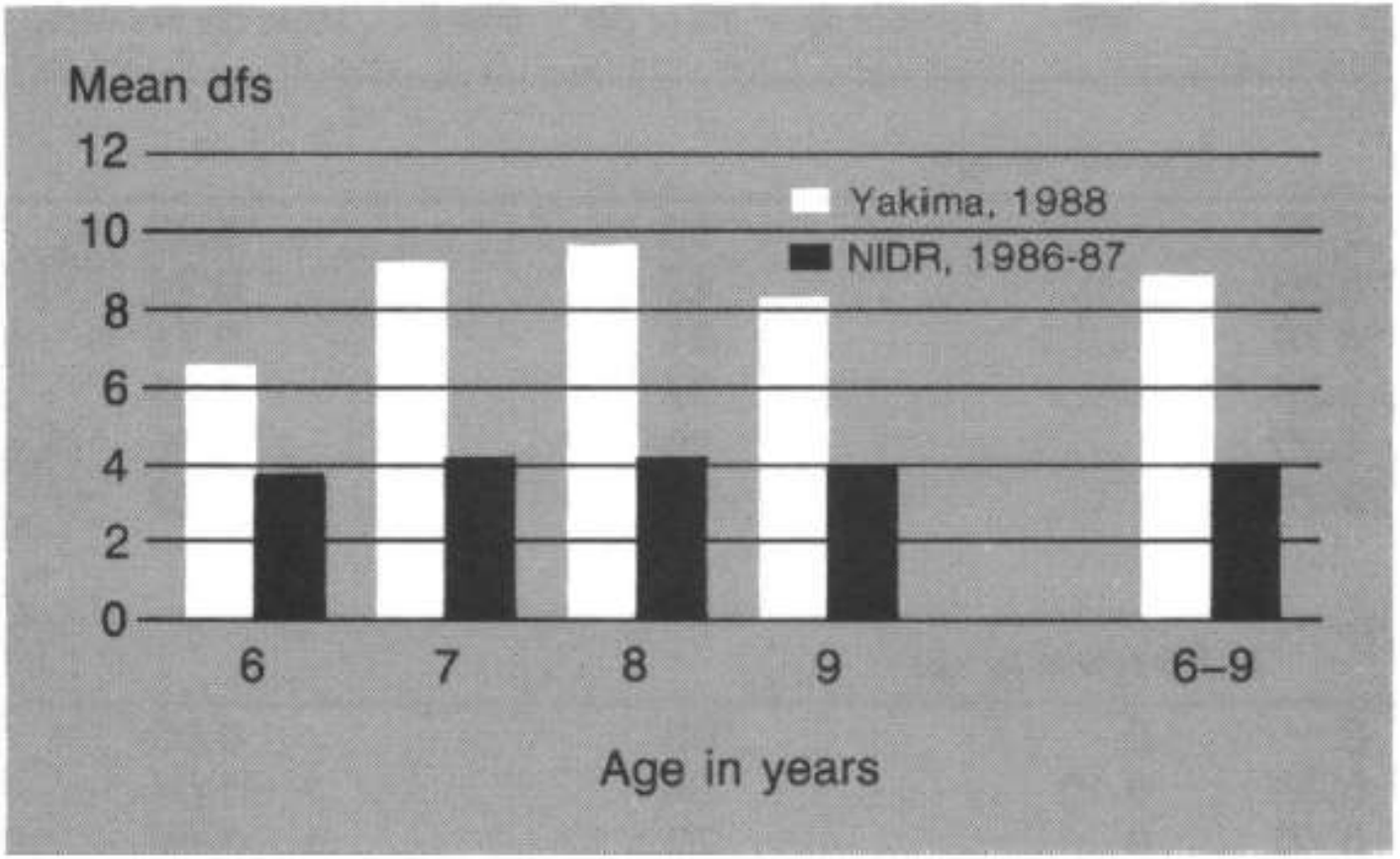


- "EHP an indicator for infant and maternal stresses

Molar Incisor Hypoplasia

J Clin Microbiology 2011 April;49(4):1464-1474.

J Clin Microbiol. 2011 April; 49(4): 1464–1474.
doi: 10.1128/JCM.02427-10
PMCID: PMC3122858

Cultivable Anaerobic Microbiota of Severe Early Childhood Caries

A. C. R. Tanner,[1,3,*] J. M. J. Mathney,[1] R. L. Kent,[2,3] N. I. Chalmers,[1,3,†] C. V. Hughes,[6] C. Y. Loo,[7] N. Pradhan,[7] E. Kanasi,[1,3,4,‡] J. Hwang,[5] M. A. Dahlan,[6,§] E. Papadopolou,[1,6] and F. E. Dewhirst[1,2,3]

The major species associated with severe ECC included *Streptococcus mutans*, *Scardovia wiggsiae*, *Veillonella parvula*, *Streptococcus cristatus*, and *Actinomyces gerensceriae*. *S. wiggsiae* was significantly associated with severe ECC children in the presence and absence of *S. mutans* detection.

- Not at all what we previously thought! Scardovia wiggsiae?

Molar Incisor Hypoplasia

J Dental Research 2011 Nov;90(11):1296-305

J Dent Res. 2011 Nov;90(11):1298-305. Epub 2011 Aug 25.

Microbiota of severe early childhood caries before and after therapy.

Tanner AC, Kent RL Jr, Holgerson PL, Hughes CV, Loo CY, Kanasi E, Chalmers NI, Johansson I.

Department of Molecular Genetics, The Forsyth Institute, 245 First Street, Cambridge, MA 02142, USA. annetanner@forsyth.org

Abstract

Severe early childhood caries (ECC) is difficult to treat successfully. This study aimed to characterize the microbiota of severe ECC and evaluate whether baseline or follow-up microbiotas are associated with new lesions post-treatment. Plaque samples from 2- to 6-year-old children were analyzed by a 16S rRNA-based microarray and by PCR for selected taxa. Severe-ECC children were monitored for 12 months post-therapy. By microarray, species associated with severe-ECC (n = 53) compared with caries-free (n = 32) children included Slackia exigua ($p = 0.002$), Streptococcus parasanguinis ($p = 0.013$), and Prevotella species ($p < 0.02$). By PCR, severe-ECC-associated taxa included Bifidobacteriaceae ($p < 0.001$), Scardovia wiggsiae ($p = 0.003$), Streptococcus mutans with bifidobacteria ($p < 0.001$), and S. mutans with S. wiggsiae ($p = 0.001$). In follow-up, children without new lesions (n = 36) showed lower detection of taxa including S. mutans, changes not observed in children with follow-up lesions (n = 17). Partial least-squares modeling separated the children into caries-free and two severe-ECC groups with either a stronger bacterial or a stronger dietary component. We conclude that several species, including S. wiggsiae and S. exigua, are associated with the ecology of advanced caries, that successful treatment is accompanied by a change in the microbiota, and that severe ECC is diverse, with influences from selected bacteria or from diet.

- Scardovia wiggsiae and Slackia exigua associated with advanced decay (S-ECC)

Minimally Invasive Dentistry

Total Patient Care...

- Preventive Care
  - Fluoride varnish
  - MI Paste

- Anterior Composites- flowable
  - -7th generation adhesive

Genetic issues, enamel hypoplasias

Proper Testing is essential!

Co stry

Pr ity

- Pulpal Protection
- Maintaining Hybrid Layer
- Preventing Microleakage

TheraCal

the innovative light-curable Calcium Silicate-based pulp-capping material

190 A1
5, 2008

433/228.1

ONE AMERICAN SQUARE, SUITE 3100
INDIANAPOLIS, IN 46282-0200 (US)

sitions and
osed, nearly
exposed, or breached pulp chamber are disclosed herein. Embodiments include dental pulp healing lining or capping

Pulp Capping with Dentin bonding Agents

1: Quintessence Int. 2001 Mar;32(3):211-20.

Pulp r[illegible] and cytotoxicit[illegible]atio[illegible] of 2 [illegible]entin bonding age[illegible]

Demarco FF, Tarquinio SB, Jaeger MM, de Araujo VC, Matson E.

Department of Op[illegible]ive Dentist[illegible], Fe[illegible] University of [illegible]lotas, S[illegible]ool [illegible] Dentistry, Rua Go[illegible]alves Chaves 457, Pelotas, Rio Grande do Sul, B[illegible]anch[illegible]

OBJECTIVE: This study evaluated the biocompatibility of two dentin bonding agents (Clearfil Liner Bond 2 and Scotchbond Multi-Pur[illegible] applied [illegible] human dental pulps and cell cultures. METHOD AND MATERIALS: In vivo: Twenty human third [illegible] avity preparation, pulp exposure was achieved with a [illegible] solution. In 16 teeth, adhesive pulp capping was performed and the cavities were sealed with resin composite. In the control group (n = 4), pulps were [illegible] with Ca(OH)2 and the [illegible]vities were seale[illegible] with IRM. Teeth were extracted 30 or [illegible] days following treat[illegible] [illegible]ere applied in Petri dishes, where NIH-3T3 cells were plate[illegible] The cells w[illegible]e counted 2, 4, a[illegible] [illegible]ys after plating to obtain the growth curves and to determine cell viability. All data were submitted to statistical analysis. RESULTS: In vivo: Dentin [illegible] [illegible]sponse. Mild inflamm[illegible] [illegible]ecimens treated with Liner Bond 2. Pulps treated with Scotchbond Multi-Purpose presented mild to severe inflammatory response, and no mineralized tissue formation was detected. Bacteria were not disclosed in any specimen. In vitro: The cytotoxicity was similar between the two [illegible] [illegible]d both had statistically higher cytotoxic effects (P < 0.002) than Ca(OH)2. CONCLUSION: Ca([illegible] healing in all teeth and exhibited lower cytotoxic effects than both adhesive systems; however, pulp [illegible]aling was also observed under Liner Bond 2.

Clearfil Liner Bond 2

And Scotchbond

Multi-purpose

20 teeth pulp capped

And extracted 30-90

days

$Ca(OH)_2$ less cytotoxic, less inflammation

Pulp Capping with Dentin bonding Agents

There should be a better pulp capping agent

1: Oper…

Direct pulp … dentin … ion.

Silva GA, Lanza LD, Lopes-Junior N, Moreira A, Alves JB.

Department of Morphology, Instit… of Biological Sciences, Belo Horizonte, Brazil.

This study evaluated … e Single Bond Adhesive System (SB… alcium Hydroxide (CH). The degree of bleedi… ique. The pulps of 78 sound premolars we… capped w… SBAS after 3… phosphoric a… tching … up I) or 10% phosphoric acid etching (Group II) and CH (Group III control). The cavities were restored with a resin composite (Charisma). After … for li… showed the po… ity of hemostasis with saline solution only. There was no statistical difference between bleeding generated by 10% and 37% acid solutions. In some cases, contact of the pulp tissue with SASB started the bleeding process, thus damaging the adhesive technique. The histologi… sponse … up I … up … 30 d… served … itive) underneath the area of coagulation necrosis. Dentin bridging was observed at the thirtieth day. The postoperative period was asymptomatic for all groups. In conclusion, SBAS should be avoided for vital pulp therapy, while CH remains the capping agent of choice for mechanically exposed human dental pulp.

Single Bond Adhesive System versus $Ca(OH)_2$

$Ca(OH)_2$ remains agent of choice

OPERATIVE DENTISTRY

y, 2009, **34-5,** 615-625

Invited Paper

1. Avoid exposing the pulp. The chances for tooth survival are excellent if the tooth is asymptomatic and well sealed, even if residual caries remains.
2. Control hemorrhage with water, saline or sodium hypochlorite. Water and saline are the most benign to the pulp; sodium hypochlorite is best at controlling hemorrhage and disinfecting.
3. ZOE, GI/RMGI and adhesives are poor direct pulp-capping agents and should be avoided for this application.
4. MTA demonstrates comparable results to calcium hydroxide as a direct pulp cap agent in short-term data.
5. Calcium hydroxide remains the "gold standard" for direct pulp capping. It has the longest track record of clinical success, is the most cost-effective and is the likely effective component in MTA.
6. Provide a well-sealed restoration immediately after pulp capping. This will provide protection against ongoing leakage and bacterial contamination that can compromise the success of the pulp cap.

Table 2: *A Comparison of* … *Systems*

Study	Histo	Results
Accorinte and others, 2008[117]	Y	Equal
Tuna and Olmez, 2008[118]	N	Equal
Aenichi and others, 2002[108]	Y	No Stats
Iwamoto and others, 2006[119]	Y	Equal
Min and others, 2008[120]	Y	Mixed
Qudeimat and others, 2007[121]	N	Equal
Percinato and others, 2006[122]	N	Equal
Nair and others, 2008[52]	Y	MTA
Chacko and Kurikose, 2006[123]	Y	MTA

"Histo" refers to whether histological analys

…oxide to Adhesive

Confusion an… erature provi… process when…

…iew of the lit… …ision-making

Thomas J Hilt… …fessor
in Operative Dentistry, Oregon Health & Science University, School of Dentistry, Department of Restorative Dentistry, Portland, OR, USA

Glass Ionomer Cements

Effect of polyacrylic acid on the apatite formation of a bioactive ceramic in a simulated body fluid: fundamental examination of the possibility of obtaining bioactive glass-ionomer cements for orthopaedic use.

Kawashita M, Kokubo T, Nakamura T.

Biomaterials. 2001 Dec;22(23):3191-6.

"PAA inhibits the apatite formation in the body environment. It is speculated that when glass-ionomer cements are implanted into the body, PAA can be released from the glass-ionomer cements and inhibits the apatite formation on their surfaces. It is reasonable to suppose that this will occur with any glass-ionomer cement that contains PAA. Therefore, it might be considered difficult to obtain bioactive glass-ionomer cements"

PAA inhibits apatite

Ability to maintain alkalinity

Ability to Sustain Alkalinity Over Time

TheraCal	A	B	C	Dycal	Dycal VLC	Room Stability (No separation)
Day	**pH**	**pH**	**pH**	**pH**	**pH**	
1	11.21	10.911	11.288	11.67	8.599	OK
28	9.36	8.606	9.667	10.24-	8.44	OK
112	9.21			(Crumbled)	7.50	OK
160	8.88					OK
204	8.71					OK
490	8.75					
686	7.95		7.90			OK

TheraCal LC

IADR
International Association for Dental Research

IADR 2011 Abstract #2520 Gandolfi et al.
Apatite-forming ability of TheraCal pulp capping material

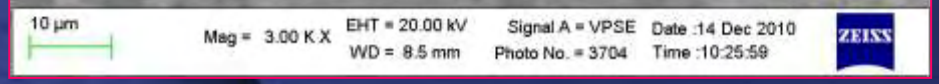
IADR 2011 Abstract #2521 Gandolfi et al.
Chemical-physical properties of TheraCal pulp capping material

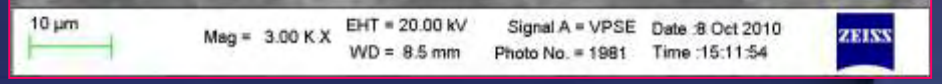
IADR 2011 Abst. #2520 Gandolfi et al. Apatite-forming ability of TheraCal pulp-capping material

24 h TheraCal

28 days TheraCal

Conclusions: TheraCal was able to induce the formation of apatite and represents a promising material in direct pulp-capping clinical procedures. The ability to form apatite may play a critical/positive role in new dentine formation.





Ca^{+2} Ion Release (ppm)

	Calcium	Released	In Soaking	Water	(ppm)	(n=10)
	3 hrs	1 day	3 days	7 days	14 days	28 days
TheraCal	74.7 (9.2)	37.4 (4.5)	25.2 (6.5)	24.6 (2.0)	24.1 (1.1)	19.6 (3.1)
Control	1.2 (0.3)	0.5 (0.4)	0.6 (0.4)	0.6 (0.4)	0.6 (0.4)	0.6 (0.4)
ProRoot	32.2 (4.5)	29.8 (3.5)	35.4 (2.3)	24.5 (3.9)	14.3 (2.7)	16.1 (2.9)

IADR 2011 Abst. #2521 Gandolfi et al.

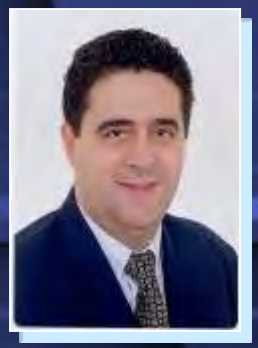
		pH of	Soaking	Water	(n=10)	
	3 hrs	1 day	3 days	7 days	14 days	28 days
TheraCal	10.96 (0.03)	10.19 (0.24)	9.28 (0.41)	8.32 (0.06)	8.63 (0.15)	8.04 (0.18)
Control	6.96 (0.19)	7.23 (0.25)	7.24 (0.13)	7.25 (0.25)	7.27 (0.25)	7.20 (0.12)
ProRoot	11.52 (0.75)	10.91 (0.13)	11.52 (0.41)	11.25 (0.82)	7.84 (0.13)	8.25 (0.24)
Water	6.88 (0.04)	7.00 (0.02)	7.07 (0.09)	7.10 (0.1)	6.96 (0.06)	7.22 (0.12)

pH changes

Biocompatibility of Dental Materials

Cytotoxic Effects of Resin-Based L/C Pulp Capping Materials

Applied on the Immortalized Odontoblast Cell Line MDPC-23



Prof. Dr. Carlos Alberto de Souza Costa

Araraquara School of Dentistry – Unesp

Departament of Physiology and Pathology

Materials

1. TheraCal (Bisco) – MTA (“Portland” Cement) based resin
2. Ultra-Blend Plus (UltraDent) – Ca $(OH)_2$ based resin
3. Vitrebond (3M/ESPE) – Resin modified glass ionomer

4. DMEM (Dulbecco’s Modified Eagle Medium) – Control (complete culture medium)

TheraCal presented the lowest decrease in cell metabolic activity

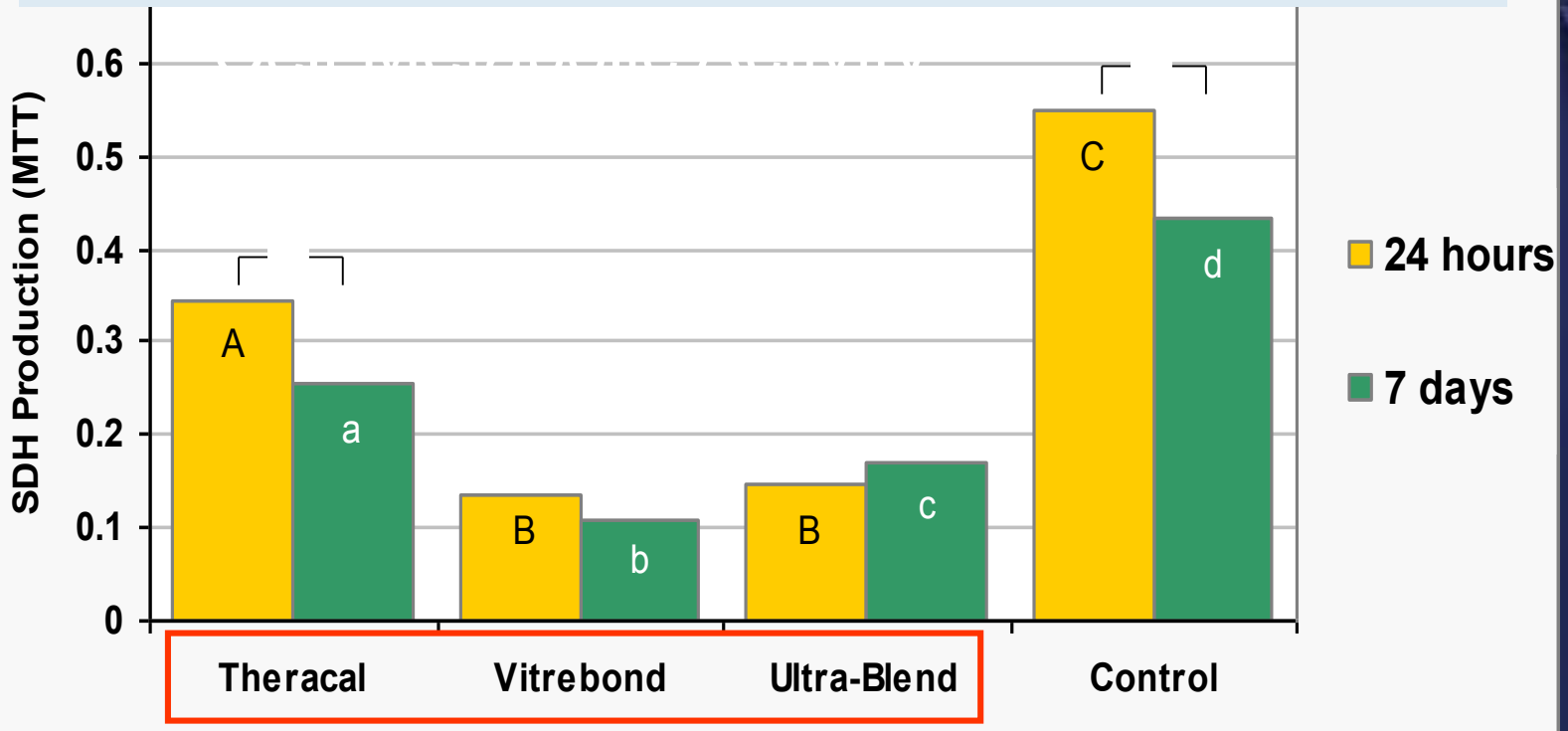


Figure 1. Succinic dehydrogenase (SDH) production detected by the MTT assay according to the groups and extract aging. Letters allow comparison among groups within the same period. Bars indicated by the same letter do not differ statistically (Mann-Whitney, $p>0.05$). Asterisks indicate statistical difference between periods within the groups (Mann-Whitney, $p<0.05$).

TheraCal presented the lowest suppression of cell protein expression

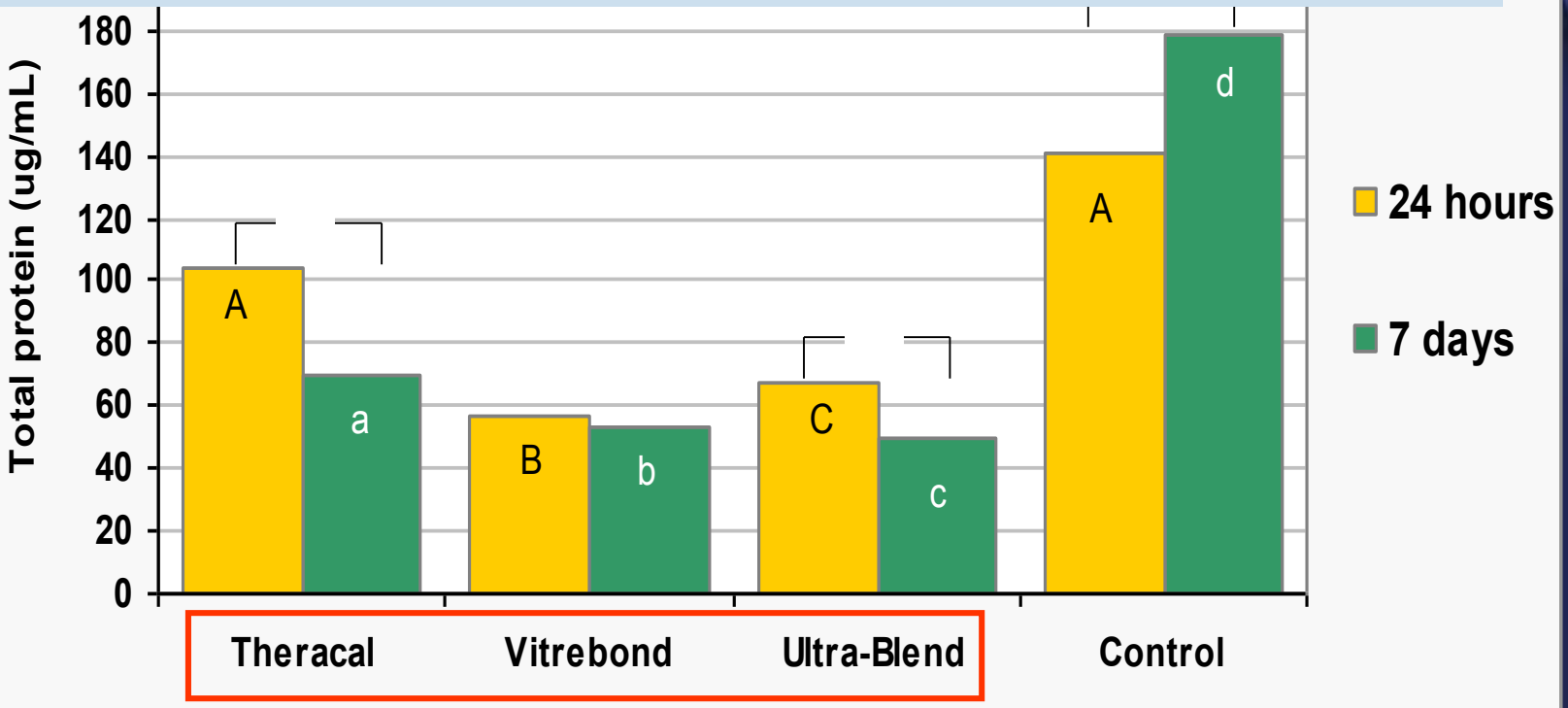


Figure 2. Total protein expression (µg/mL) according to the groups and extract aging. Letters allow comparison among groups within the same period. Bars indicated by the same letter do not differ statistically (Mann-Whitney, $p>0.05$). Asterisks indicate statistical difference between periods within the groups (Mann-Whitney, $p<0.05$).

Bioactivity and Dental Materials

DIAGNOdent reading of 68
Odd radiolucency on radiograph

Bioactivity and Dental Materials

"Giant tubular dentin" defect in mesial fossa

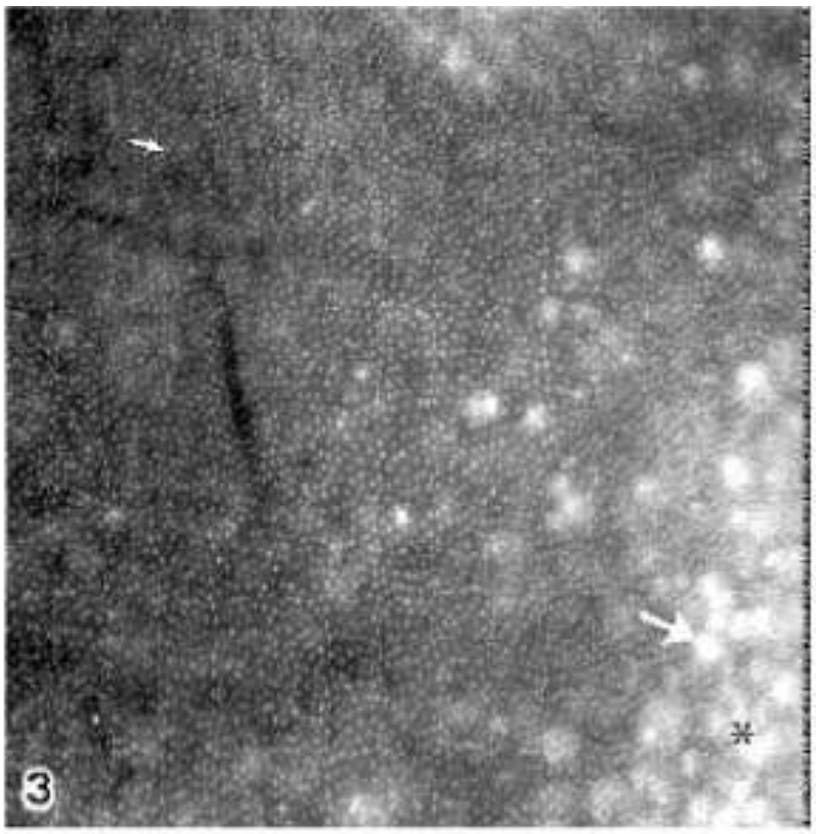


Figure 3. Transverse demineralized section of a non-erupted human deciduous incisor tooth showing dentinal tubule holes (small arrow), giant tubules (large arrow), and interglobular dentin (*). Picrosirius. Original magnification: 250X.

Bioactivity and Dental Materials

Selective etching of enamel for 30 seconds followed by application of semi-gel to dentin for 3-5 seconds

Uni-Etch with BAC

Bioactivity and Dental Materials

TheraCal DC placed on affected dentin for re-mineralization

Bioactivity and Dental Materials

ALLBond Universal DC (Bisco)- dual cure for deep preparations and undercut areas

Bioactivity and Dental Materials

When equal amounts are mixed it turns pink- **self etching** and also provides **hemostasis**

Bioactivity and Dental Materials

ALLBond Universal DC applied to preparation creates glossy appearance to TheraCal DC

Bioactivity and Dental Materials

Light cure for ten seconds at 500 milliwatts/cm^2

Bioactivity and Dental Materials

Glossy appearance of properly placed TheraCal DC

Bioactivity and Dental Materials

A dual cure Liner/base is injected into the cavity preparation

Bioactivity and Dental Materials

The dual cured Liner/Base is teased into place with an explorer tine

Bioactivity and Dental Materials

Light cured- pulse and allowed to auto cure to reduce polymerization stress

Bioactivity and Dental Materials

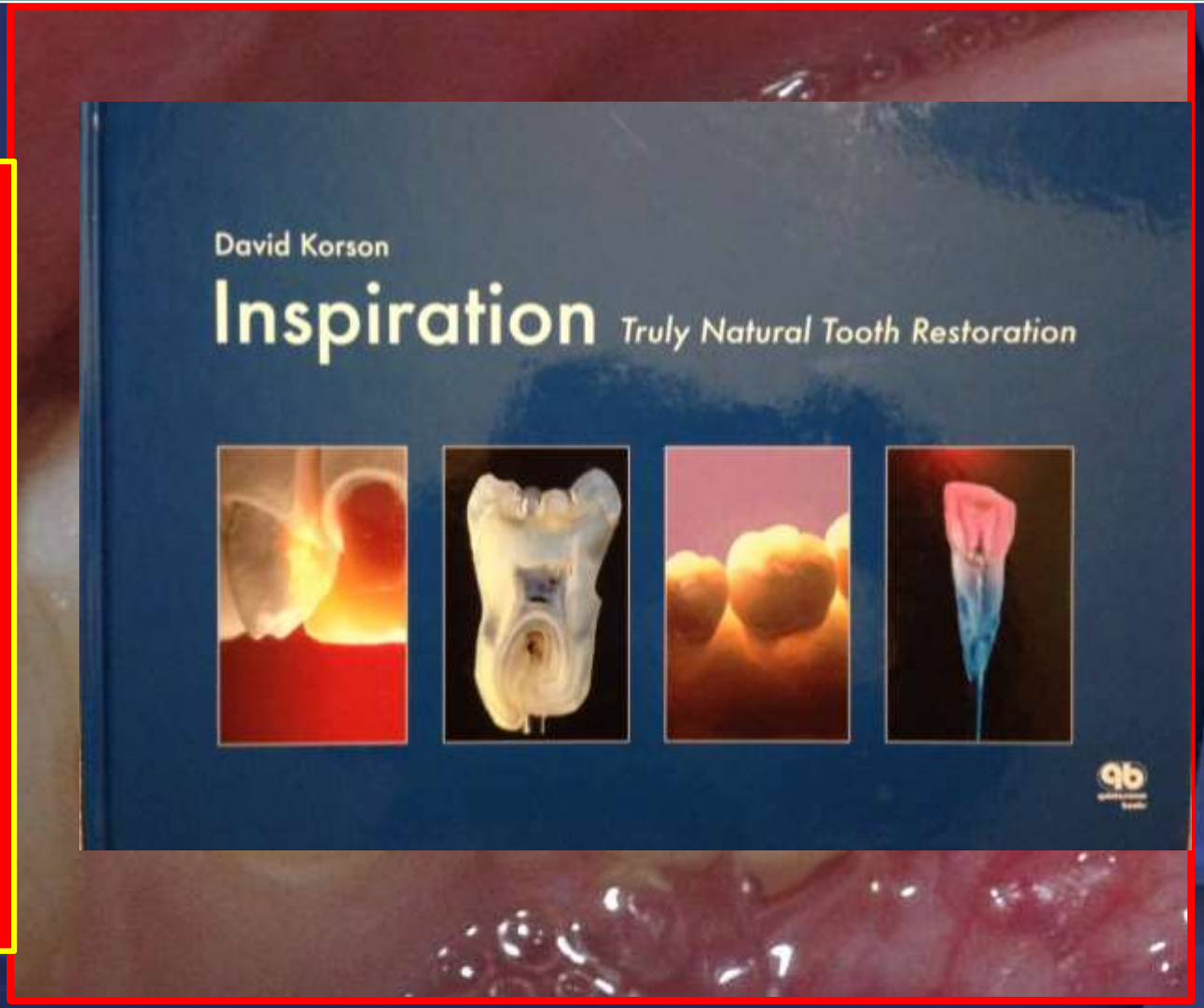
Liner/base placed- should be a Dentin replacement
-biomemetic
-bioactive
-biofunctional

Bioactivity and Dental Materials

Restoration completed by placement of a nano-hybrid restorative material, replacing the enamel

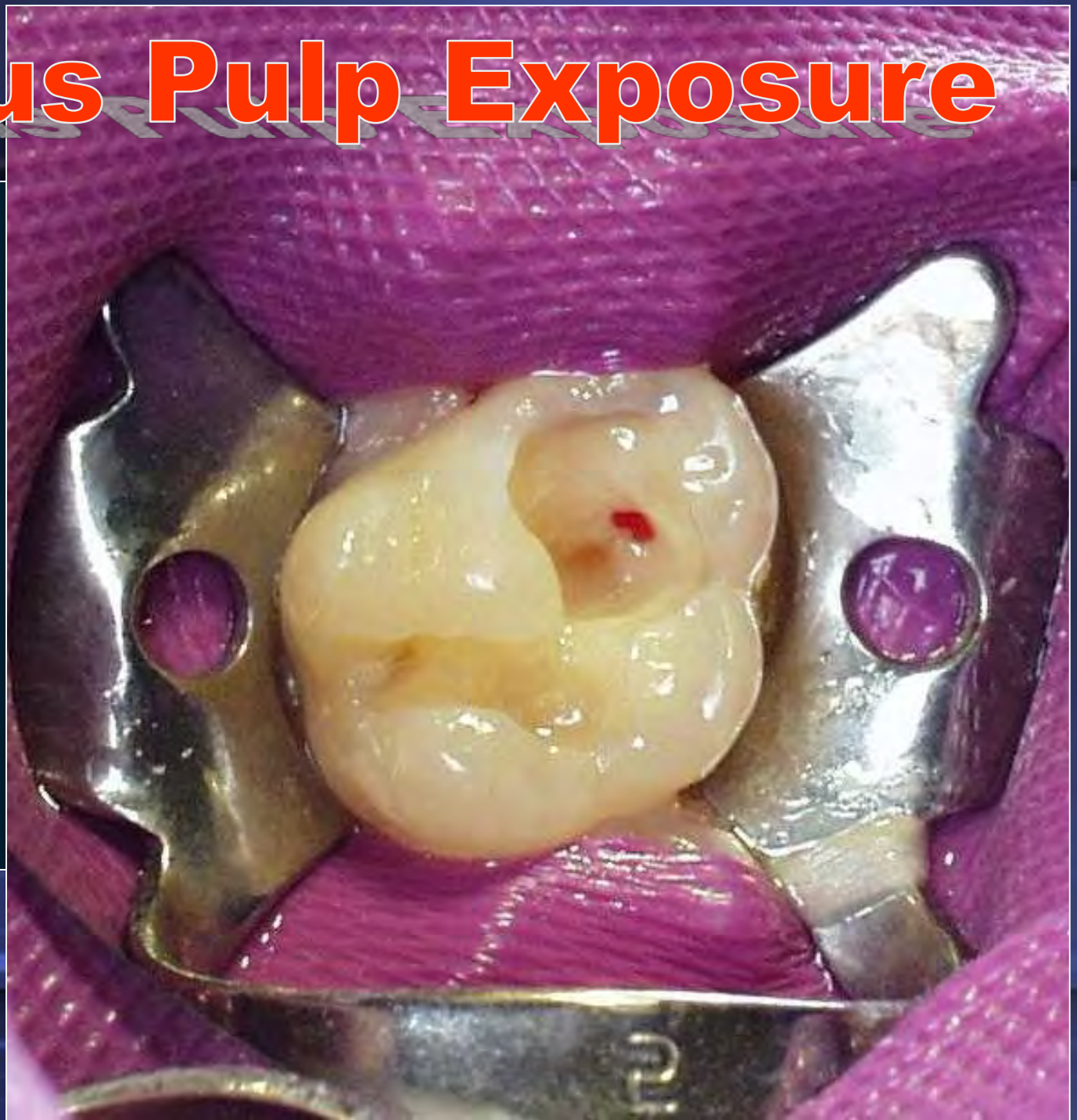
Bioactivity and Dental Materials

Rubber dam removed and occlusion checked - Restoration polished.



Carious Pulp Exposure

- Pulp exposure
- Not symptom-atic
- All decay removed



Easily placed

- TheraCal applied
- Thin layer- can see blush through it

resin based tricalcium silicate and dicalcium silicate

Follow Up- Recall

- Six month recall
- Totally asymptomatic
- Marginal integrity quite good

Follow Up- Recall

- Six years later
- Still totally asymptomatic
- Marginal integrity still excellent
- ALLBOND2 and Aelite LS

Trauma

- Complicated profound crown fracture
- Pinpoint exposure
- ble

Trauma

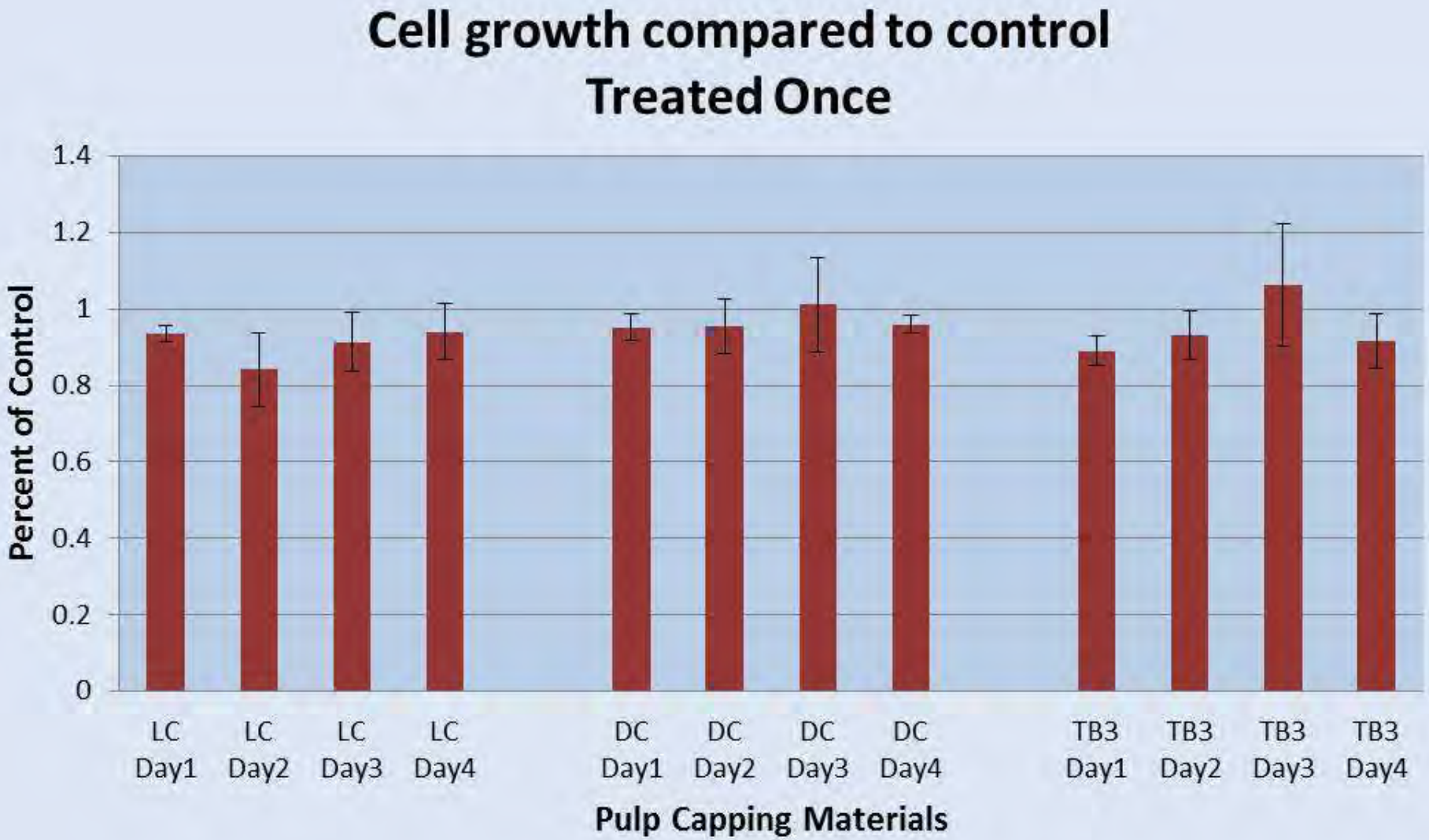
- Complicated profound crown fracture
- Exposure protected by TheraCal
- Fragment re-attached

Trauma

TheraCal Products

Effects of Novel TheraCal Formulation Extracts on OD21 Cells

Yantong Wang, Satin Salehi, John C. Mitchell, Byoung In Suh



• Research by Dr. John Mitchell

TheraCal® studies:

Part 1 - apatite formation

- **Discs of TheraCal LC® (1mm x 10mm) made in custom molds**
- **Light-cured for 40 seconds each side**
- **Soaked in fresh SBF (6ml) for up to 10 days**
- **Disc surfaces were gently scraped and mixed with KBr to make FT-IR samples**

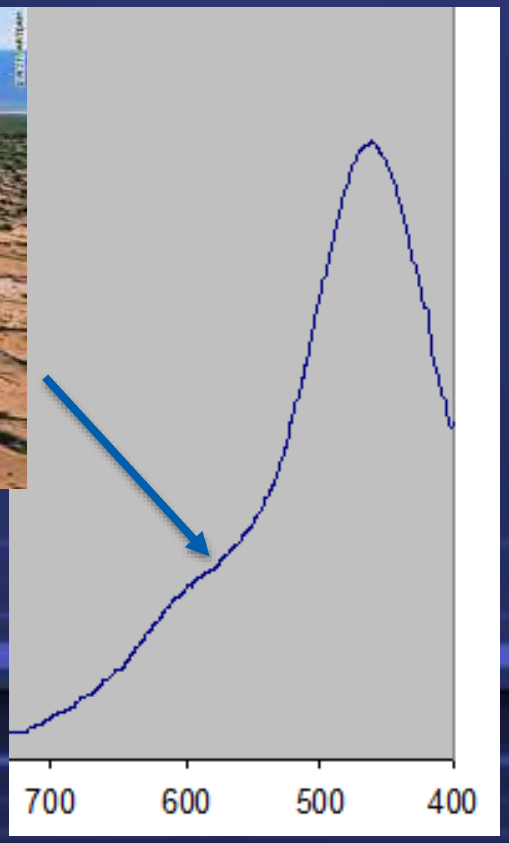
	SBF mM	Blood
Plasma		
Mg^{2+}	1.5	1.5
Ca^{2+}	2.5	2.5
K^{+}	5.0	5.0
Na^{+}	142.0	142.0
SO_4^{2-}	0.5	0.5
HPO_4^{2-}	1.0	1.0
HCO_3^{-}	4.2	27.0
Cl^{-}	147.8	103.0

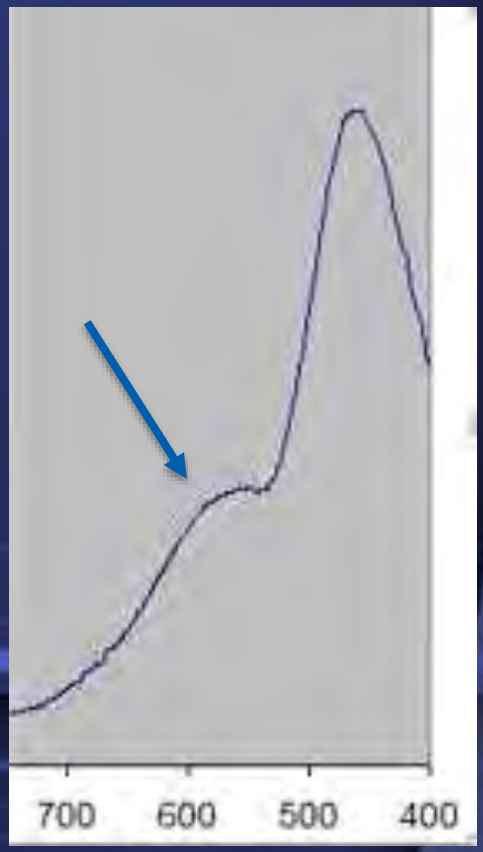
- Research by Dr. John Mitchell

Preliminary FT-IR results suggest confirmation of bioactivity

Day 10

Fourier transform spectroscopy is a measurement technique whereby spectra are collected based on measurements of the coherence of a radiative source, using time-domain or space-domain measurements of the electromagnetic radiation or other type of radiation.





- Research by Dr. John Mitchell

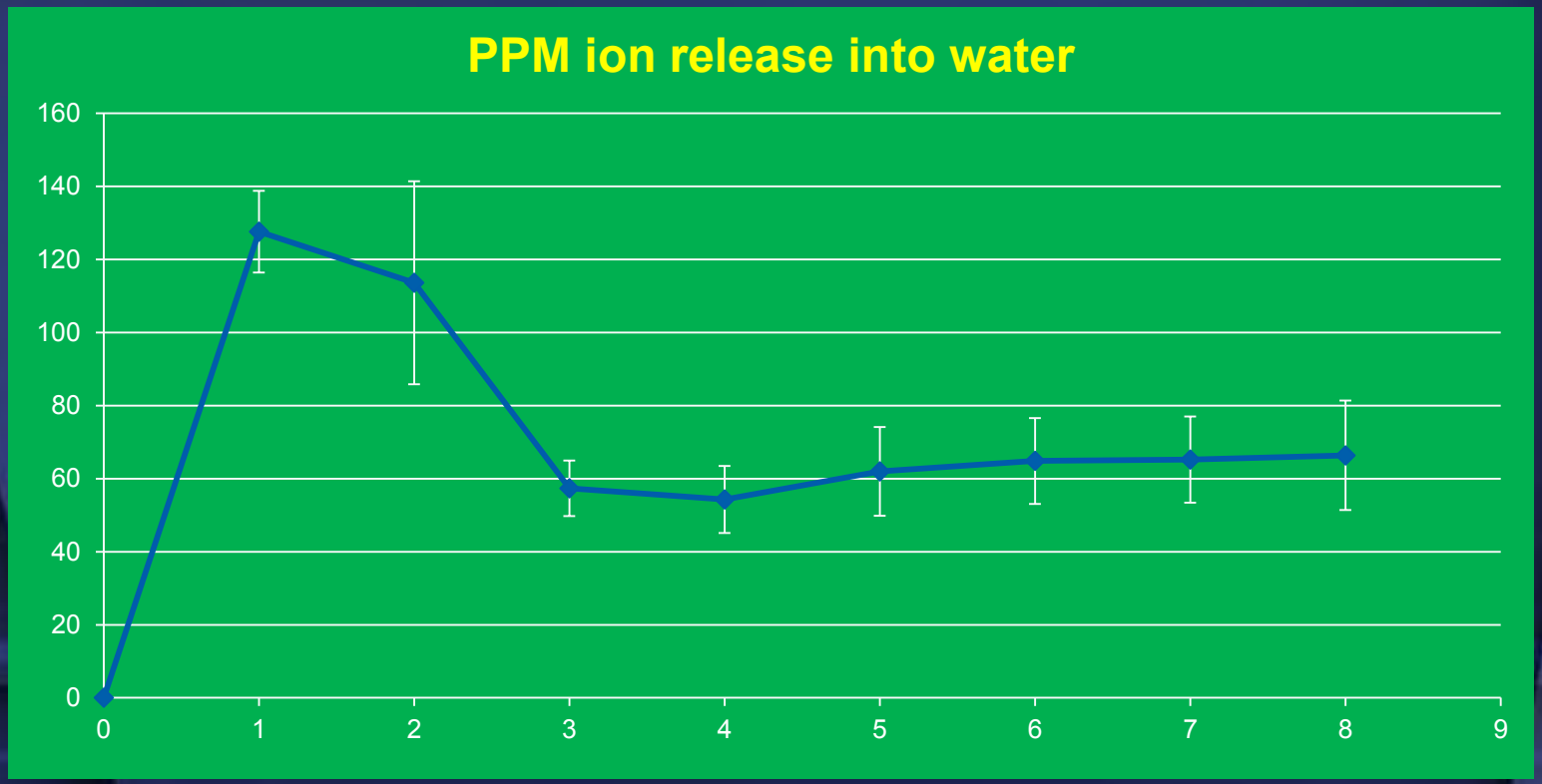
TheraCal® studies:

Part 2 - ion release

- **Discs of TheraCal LC® (1mm x 10mm) made in custom molds**
- **Light-cured for 40 seconds each side**
- **Soaked in fresh SBF and RO water (6ml) for up to 6 days**
- **Fluid was analyzed for Ca ion using an ion selective electrode**

- Research by Dr. John Mitchell

Initial ISE results indicate that ions release rapidly and then slowly & continuously



- Research by Dr. John Mitchell

What is the Ca^{2+} concentration released from the three materials over 4 days into 5 ml?

- **TheraCal LC:** **140.0 ± 1 ppm**
- **TheraCal DC:** **78.7 ± 4 ppm**
- **TheraCal BAG:** **108.3 ± 5 ppm**

measured by ICP-MS

- Calcium concentration highest from TheraCal LC- but is that the desired result? What is sufficient? Or too much?

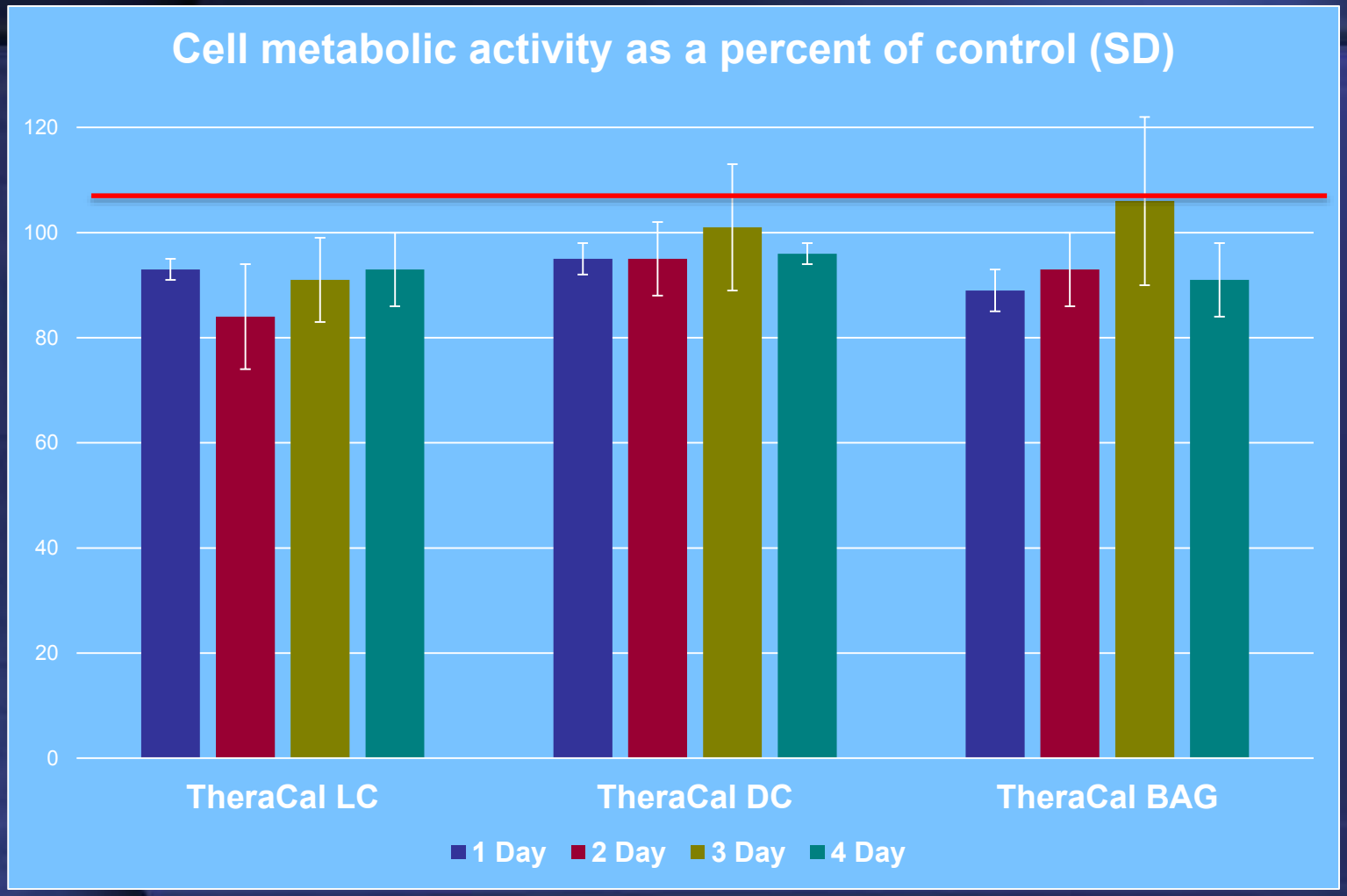
- Research by Dr. John Mitchell

Cell metabolic activity as a percent of control (SD)

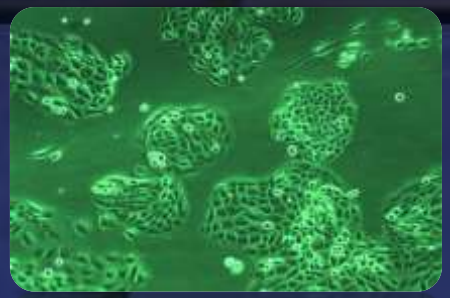
Treated once	1 Day N=20	2 Day N=5	3 Day N=5	4 Day N=5
TheraCal LC	0.93 (0.02)^{cd}	0.84 (0.1)^{a}	0.91 (0.08)^{be}	0.93 (0.07)^{cd}
TheraCal DC	0.95 (0.03)	0.95 (0.07)^{cd}	1.01 (0.12)^{e}	0.96 (0.02)^{de}
TheraCal BAG	0.89 (0.04)^{b}	0.93 (0.07)^{cd}	1.06 (0.16)^{f}	0.91 (0.07) ^{be}

- Cell metabolic activity is actually BETTER than control at 3 days for both Theracal DC and TheraBAG

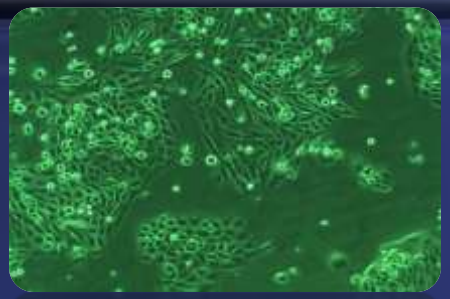
- Research by Dr. John Mitchell



- Research by Dr. John Mitchell

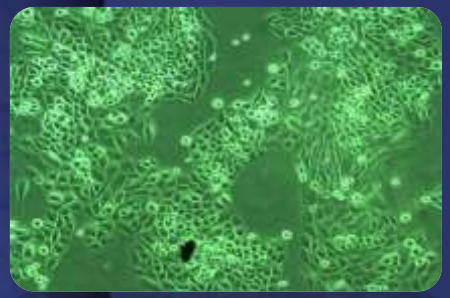


LC D4 control

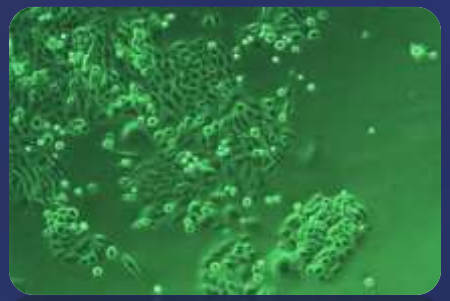


DC D4 control

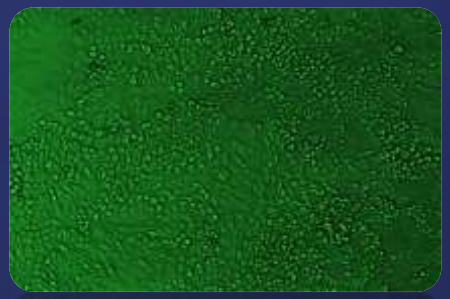
Bag3 D4 control



LC T1 D4



DC T1 D4



BAG T1 D4

- DAY 4- LC, DC and BAG- confocal microscopy- one treatments

Numerous Studies

TheraCal

Primate premolar section-example

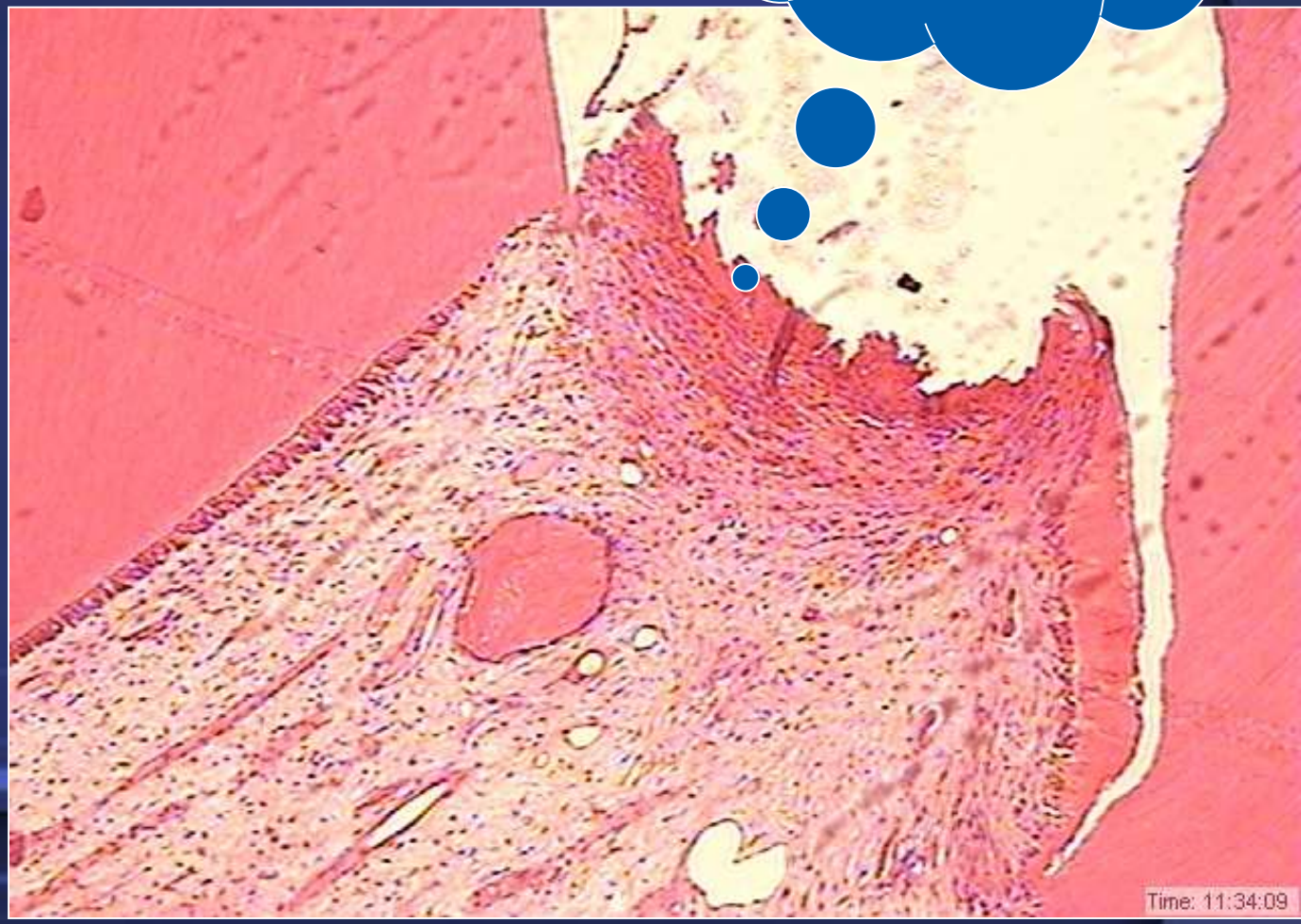
Results:

- TheraCal
- Light Cured

Very little if any inflammation and good hard tissue bridge formation

Results:

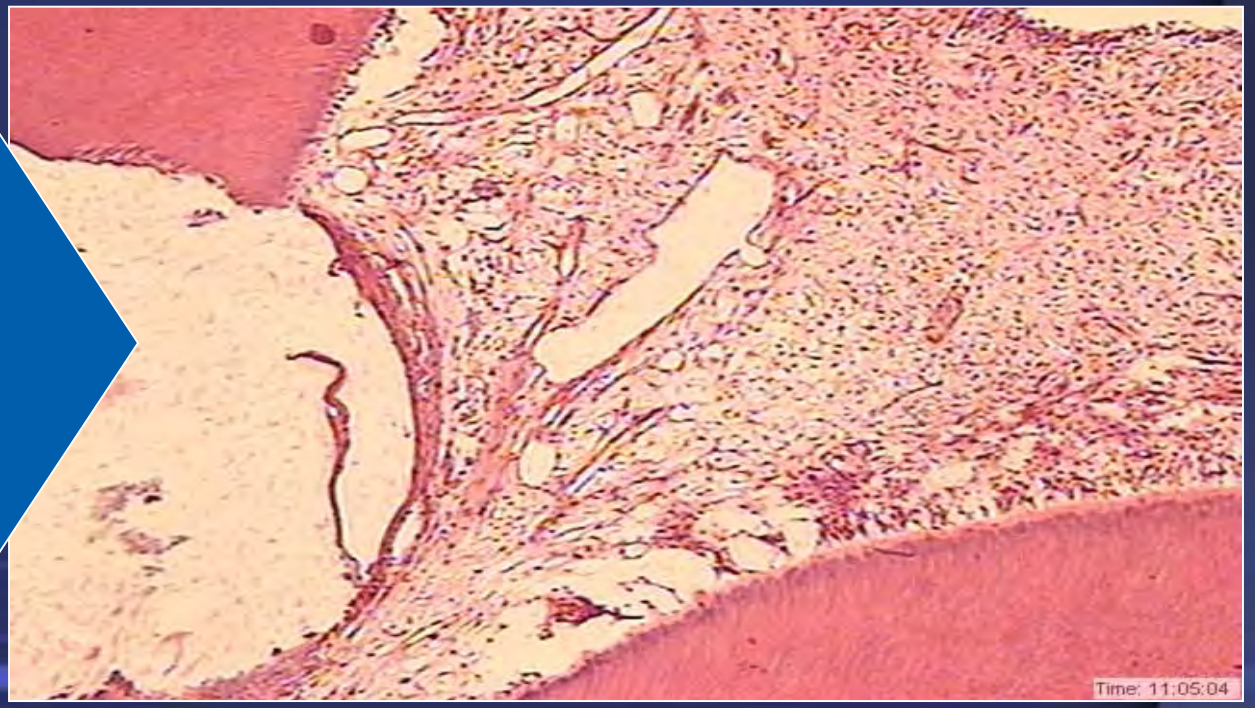
- Glass Ionomer Cement



Results:

- Visible Light Cured Dycal

Very poor dentin bridging
Some
Inflammatory infiltrate and vacuoles



Results:

- Two evaluators with data compared (good agreement)
- 44 specimens ranked for inflammation
- 48 specimens examined for hard tissue bridge formation (44 were sectioned and 4 were by microCT)

Inflammation Ranks- based on hyperemia, presence of giant cells and necrosis

0- no inflammation
1- mild inflammation
2- moderate inflammation
3- severe inflammation
4- abscess formation

Bridge Ranks- based on completeness and organization of bridge formation

0- no presence of bridging
1- slight formation, mostly soft tissue
2- moderate amount of bridge, irregular
3- hard tissue bridge, regular and complete
4- hard tissue bridge with apparent odontoblasts, tubules present

Results:

Eight each of the pure Portland and resin based calcium trioxides had little or no inflammation at 28 days

- Histological Results- Inflammation

28 Days

Rank	TheraCal	Portland	Glass Ionomer	VLC Dycal
0	7	4	3	2
1	1	4	1	2
2	1	1	3	4
3	1	1	1	3
4	1	1	3	0