

The Evolution of Pediatric Changing Core Clinical Programs

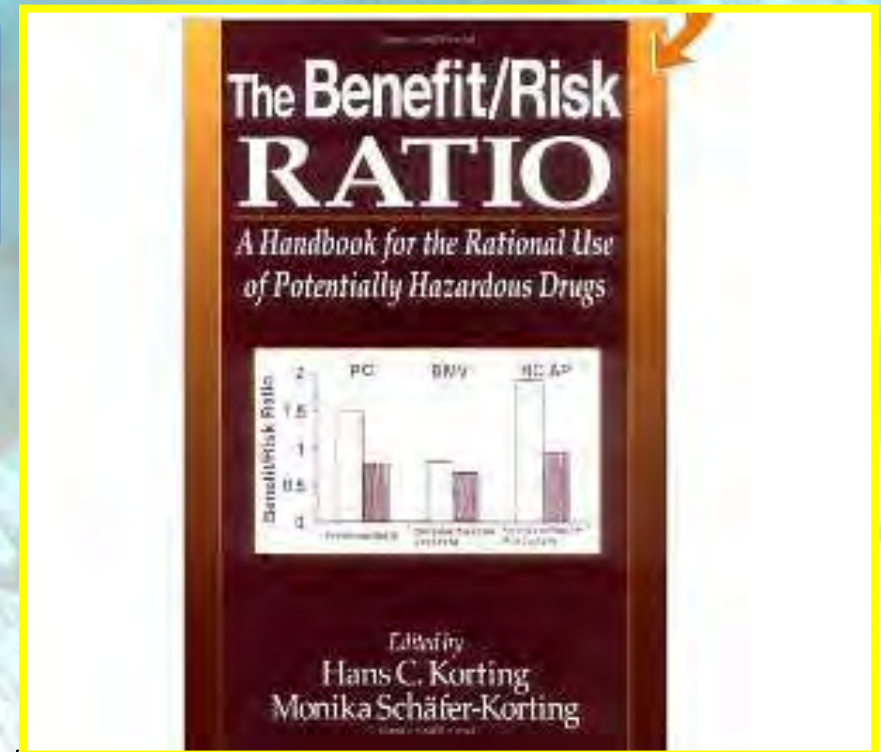
Mark Cannon DDS MS Professor Fe
Northwestern University, Residents
and Robert Lurie Children's Hospital
(Hospital) Chicago,





T.A.N.S.T.A.A.F.L.
**There ain't no such thing as
A free lunch!**





Risk Benefit Ratio

Outline- Concepts

1. PREVENTIVE CARE

2. PRESERVING VITALITY

**3. CONSERVATIVE
RESTORATIVE**

Clinical applications with supportive research

“New Concepts for the Prevention of Dental Disease”

**“a tide in the affairs of
men which, when taken at the
Flood, leads on to fortune”**

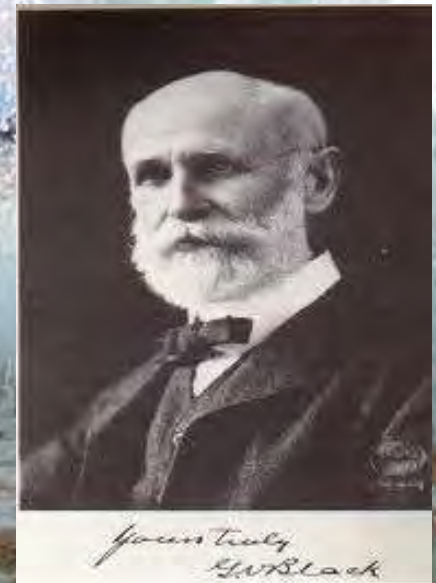
-Shakespeare

Julius Caesar, Act 4, scene 3

“The day is surely coming and perhaps within the lifetime of you young men before me when

G. V. Black Classification of Carious Lesions

**ing preventive
When we will
pathology of
e to combat its
medication”.**



1996

Plaque

Distribution of *Porphyromonas gingivalis* fimA genotypes in cardiovascular specimens from Japanese patients

K. Nakano¹, H. Inaba², R. Nomura¹, H. Nemoto¹, H. Takeuchi², H. Yoshioka², K. Toda⁴, K. Taniguchi⁴, A. Amano², T. Ooshima¹

Departments of ¹Pediatric Dentistry and ²Oral Frontier Biology, Osaka University Graduate School of

Evid Based Dent. 2008;9(1):8.

Possible link between periodontal disease and coronary heart disease.

Matthews D.

Link between PD

Arterioscler Thromb Vasc Biol. 2005 Jul;25(7):1446-51, Epub 2005 Apr 21.

Porphyromonas hypercholesterolemia

Brodala N, Merricks EF

Maxillary and aortic atherosclerosis in normocholesterolemic and

(J, Madianos P, Sotres D

EROSCLEROSIS IN

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NUJAM, J, KIM, S. P

both chronic inflam

Porphyromonas gi

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injury. Methods: Apo



Pg accelerates And atherosclerosis

<>Background: Pe
demonstrated peri
this study we asse
mouse models with

without balloon angioplasty surgery. Mice were infected with *P. gingivalis* FDC. bacterial samples were collected and colonization/infection assessed by PCR. Serum IgG antibody, plasma IgG, and the response of monocytes to *P. gingivalis* DNA responses to *P. gingivalis* infection were also assessed. Results: *P. gingivalis* was detected by PCR in nearly all mice throughout the experiment. Mice infected with *P. gingivalis* showed significantly elevated IgG antibody compared to controls. *P. gingivalis* increased maxillary atherosclerosis in mice without balloon angioplasty surgery. Mice infected with *P. gingivalis* showed significantly increased atherosclerosis in the maxillary aorta when compared to control mice. Similarly, *P. gingivalis* increased aortic plaque after BA in mice on normal diet on comparison to uninfected controls. A significant increase in circulating inflammatory monocytes after infection was observed in the intimal and adventitial layers of the aorta ($P < 0.05$). This is the first study examining the effect of *P. gingivalis* infection on atherosclerosis in ApoE^{null} mice. We found accelerated periodontal disease (ABR) and plaque in non-injured mice but not in mice with angioplasty injury. Supported by University of Florida Opportunity Research Fund, R01DE015720-01, and U24 DE016509 from the NIH, NIDCR.

ASTY

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ApoE^{null}

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ABR

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MEDICINE



Electric Current to the Brain Boosts Memory
Stimulating a particular region in the brain via non-invasive delivery of electrical current improves memory and may help treat disorders from stroke, Alzheimer's disease and brain injury, according to Northwestern Medicine.

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Caries Risk Assessment

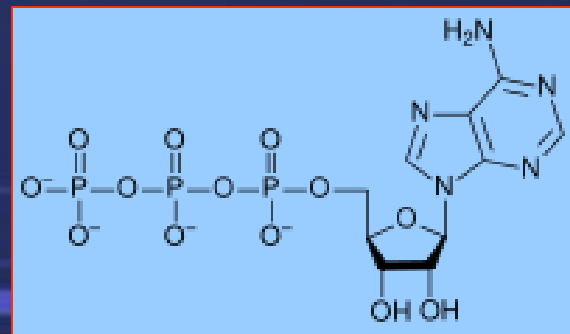
CariScreen Caries Susceptibility Test



The CariScreen Caries Susceptibility Test is a quick, 1 minute chair-side test for ATP (adenosine tri-phosphate) levels on the teeth.



Keep swabs refrigerated until 5 minutes before use



"There is no reason anyone would want a computer in their home."
– Ken Olson, president, chairman and founder of Digital Equipment Corp., 1977.

Ca

Appl Environ Microbiol. 1991 April; 57(4): 1134-1138

Adaptation of *Streptococcus mutans* and *Enterococcus hirae* to acid stress in continuous culture.

W A Belli and R E Marquis

Department of Microbiology, University of Rochester, New York 14642.

ABSTRACT

Streptococcus mutans GS-5 and IB1600 adapted to growth in acidic environments in continuous culture at slow (generation time = 8.3 h) or fast (generation time = 2.4 h) rates of growth in complex medium with a restricted glucose supply. The extent of

stability
side test
(te) levels

-ATP depleted in hypoxia

ATP depletion in macrophages in the core of advanced rabbit atherosclerotic plaques in vivo.

Killing macrophages

-Measure ATP with bioluminescence

**"There is no reason anyone would want a computer in their home."
– Ken Olson, president, chairman and founder of Digital Equipment Corp., 1977.**

Caries Risk Assessment

Interpreting the Results

Risk Indication Values (RLU's)

- 0-1500 = low risk
- 1501-3500 = moderate risk
- 3501-9999 = high risk



“And in the end it's not the years in your life that count. It's the life in your years.”

Caries Risk Assessment

Interpreting the Results



Saliva Check Mutans

- Chew paraffin gum
- Spit into collection vial and add reagents (1 drop Reagent 1 and 4 drops Reagent 2), mix
- Pipette up to third mark
- Place into well
- Wait for 15 minutes
- Check position of red line
- At T- over 500,000 cfu

But what about
Actinomyces viscosus?
Apotobium and
Propionibacterium?
Lactobacilli?



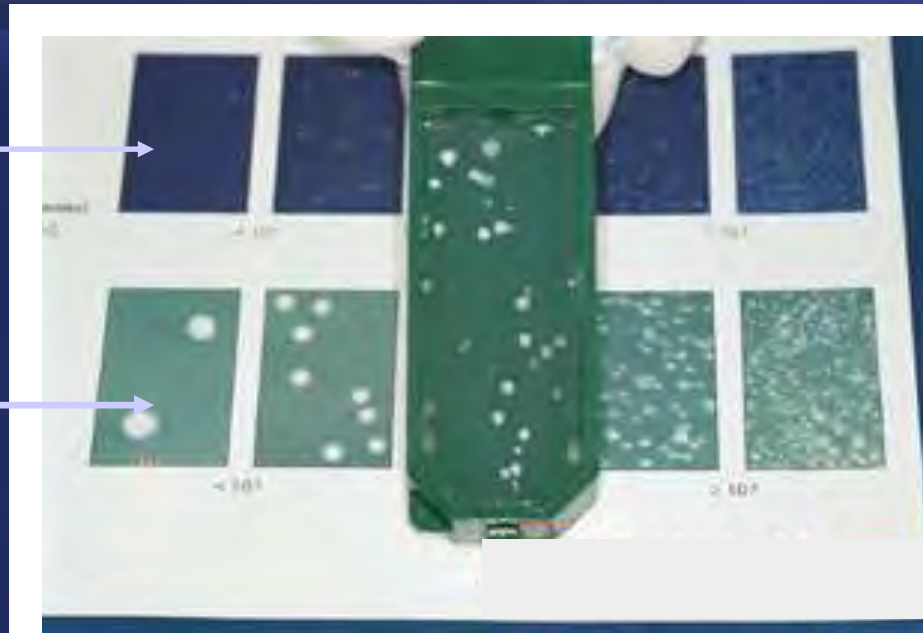
Evaluating Caries Risk CRT by Ivoclar

S. Mutans

**Mitis-salivarius
bacitracin agar**

Lactobacilli

Rogosa agar



Which strain of SM?
Which species of
Lactobacilli?

Abstract

A pair of polymerase chain reaction (PCR) primers was designed on the basis of the nucleotide sequence homology of dextranase genes (*dex*) of *Streptococcus mutans*, *S. sobrinus* and *S. downei*. The primer pair amplified a 530-bp DNA fragment on the *dex* genes of mutans streptococcal species: *S. mutans*, *S. sobrinus*, *S. downei*, *S. rattus* and *S. cricetus*. *Hae*III digestion of the 530-bp fragments generated species-specific subfragments, which were easily distinguishable from each other by agarose gel electrophoresis. These results suggest that the PCR-amplification of the *dex* gene followed by the *Hae*III digestion is useful for rapid identification of the five species of mutans streptococci.

seven species: *Streptococcus mutans*, *S. sobrinus*,




Journal of Microbiological Methods

Volume 46, Issue 2, August 2001, Pages 99–105



Identification of mutans streptococcal species by the PCR products of the *dex* genes

Takeshi Igarashi  , Kiyoko Ichikawa, Ayako Yamamoto, Nobuichi Goto

Department of Oral Microbiology, Showa University School of Dentistry, 1-5-8 Hatanodai, Shinagawa, Tokyo 142-8555, Japan

Received 1 February 2001. Revised 3 February 2001. Accepted 4 February 2001. Available online 12 June 2001.

Author: W. Kim Seow, Esther Cheng, Vincent Wan

Title: Effects of Oral Health Education and Tooth-brushing on Mutans

Proc Natl Acad Sci U S A. 2002 Oct 29;99(22):14434-9. Epub 2002 Oct 23.

Genome sequence of *Streptococcus mutans* UA159, a cariogenic dental pathogen.

Ajdlic D, McShan WM, McLaughlin RE, Savić G, Chang J, Carson MB, Primeaux M, Kenton S, Jia H, Lin S, Qian Y, Li S, Zhu H, Najjar F, et al. *Proc Natl Acad Sci U S A*. 2002 Oct 29;99(22):14434-9. Epub 2002 Oct 23.

Department of Microbiology and Immunology, University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma, USA.

Streptococcus mutans is the leading cause of dental caries (tooth decay) worldwide and is considered to be the most cariogenic of all of the oral streptococci. The genome of

Future Microbiol. 2009 Sep;4:891-902.

Serotype classification of *Streptococcus mutans* and its detection on the oral cavity

Nakano K, Ooshima T.

J Dent Res. 2008 Oct;87(10):964-8.

Protein antigen in serotype k *Streptococcus mutans* clinical isolates

Nakano K, Nomura R, Nemoto H, Lanirattanakul J, Taniguchi N, Grönroos J, Alaluusua R, Ooshima T.

PLoS One. 2010 Feb 5;5(2):e9073.

Generation of diversity in *Streptococcus mutans* genes demonstrated by MLST.

Do T, Gilbert SC, Clark D, Ali F, Fatima PA, Cho CC, Maltz M, Russell P, Holbrook P, Wade WG, Beighton D.

Infection Research Group, Dental Institute, University of Liverpool, Liverpool, UK.

Streptococcus mutans, consisting of serotypes c, e, f and k, is an oral acidogenic organism associated with the initiation and progression of dental caries. A total of 135 independent *Streptococcus mutans* strains from caries-free and caries-active subjects isolated from various geographical locations were examined in two versions of an MLST scheme consisting of either 6 housekeeping genes [accC (acetyl-CoA carboxylase biotin carboxylase subunit), gki (glucokinase), lepA (GTP-binding protein), recP (transketolase), sodA (superoxide dismutase), and tyrS (tyrosine tRNA synthetase)] or 8 housekeeping genes supplemented with 2 extracellular putative virulence genes [gtfB (glucosyltransferase B) and spaP (surface protein antigen I/II)] by sequence typing. The number of alleles found varied between 20 (lepA) and 37 (spaP). Overall, 121 sequence types (STs) were defined using the housekeeping genes alone and 122 with all genes. However pi, nucleotide diversity per site, was low for all loci being in the range 0.019-0.007. The virulence genes exhibited the greatest nucleotide diversity and the recombination/mutation ratio was 0.67 [95% confidence interval 0.3-1.15] compared to 8.3 [95% confidence interval 5.0-14.5] for the 6 concatenated housekeeping genes alone. The ML trees generated for individual MLST loci were significantly incongruent and not significantly different from random trees. Analysis using ClonalFrame indicated that the majority of isolates were singletons and no evidence for a clonal structure or evidence to support serotype c strains as the ancestral *S. mutans* strain was apparent. There was also no evidence of a geographical distribution of individual isolates or that particular isolate clusters were associated with caries. The overall low sequence diversity suggests that *S. mutans* is a newly emerged species which has not accumulated large numbers of mutations but those that have occurred have been shuffled as a consequence of intra-species recombination generating genotypes which can be readily distinguished by sequence analysis.

Genome-2002

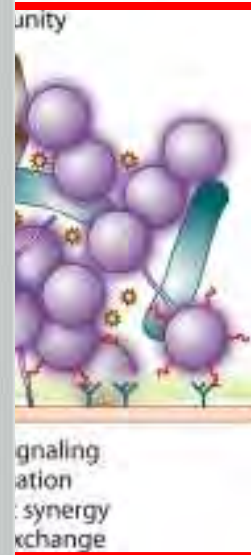
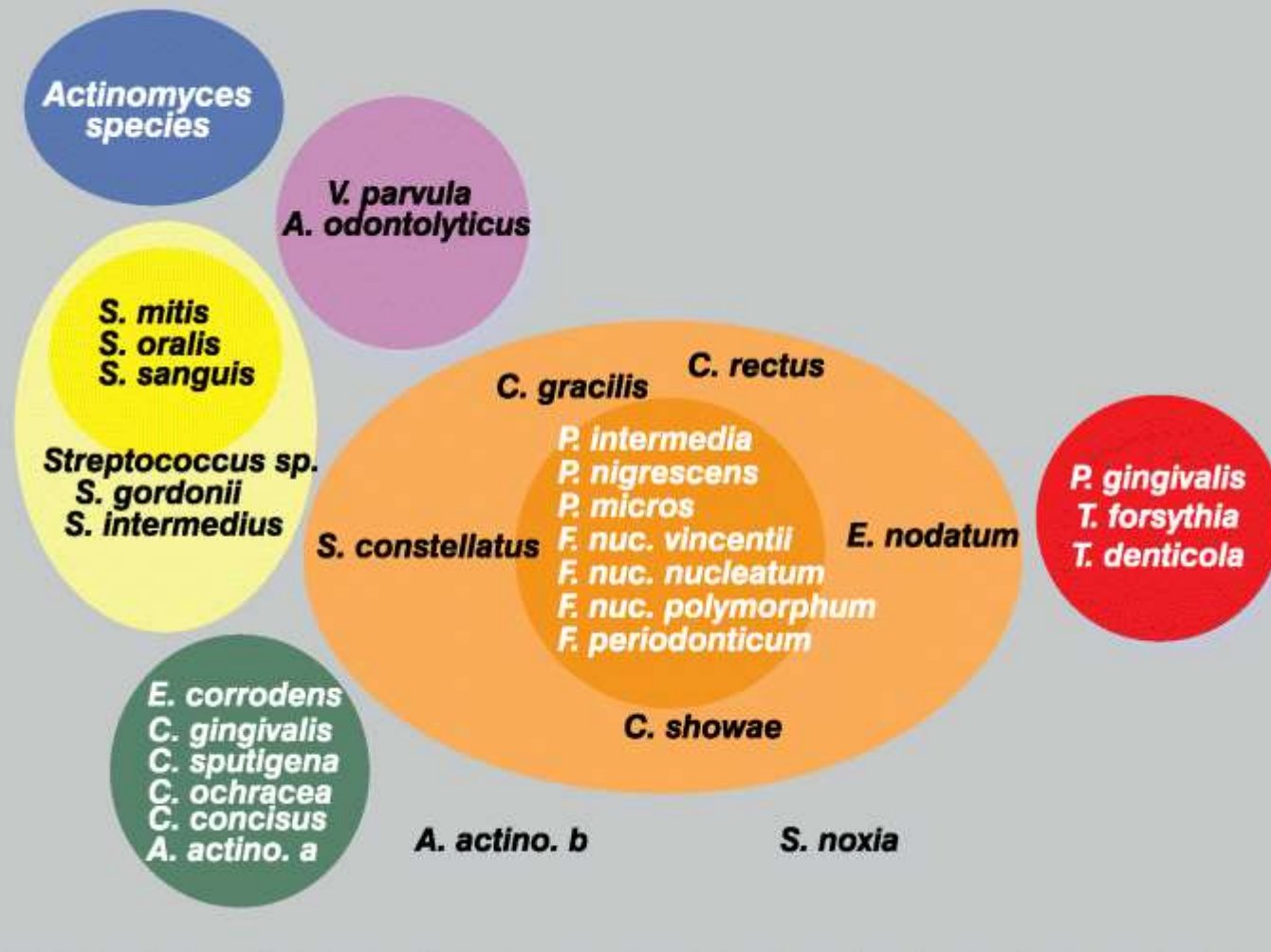
Serotype-k

endocarditis

Newly emerged species!

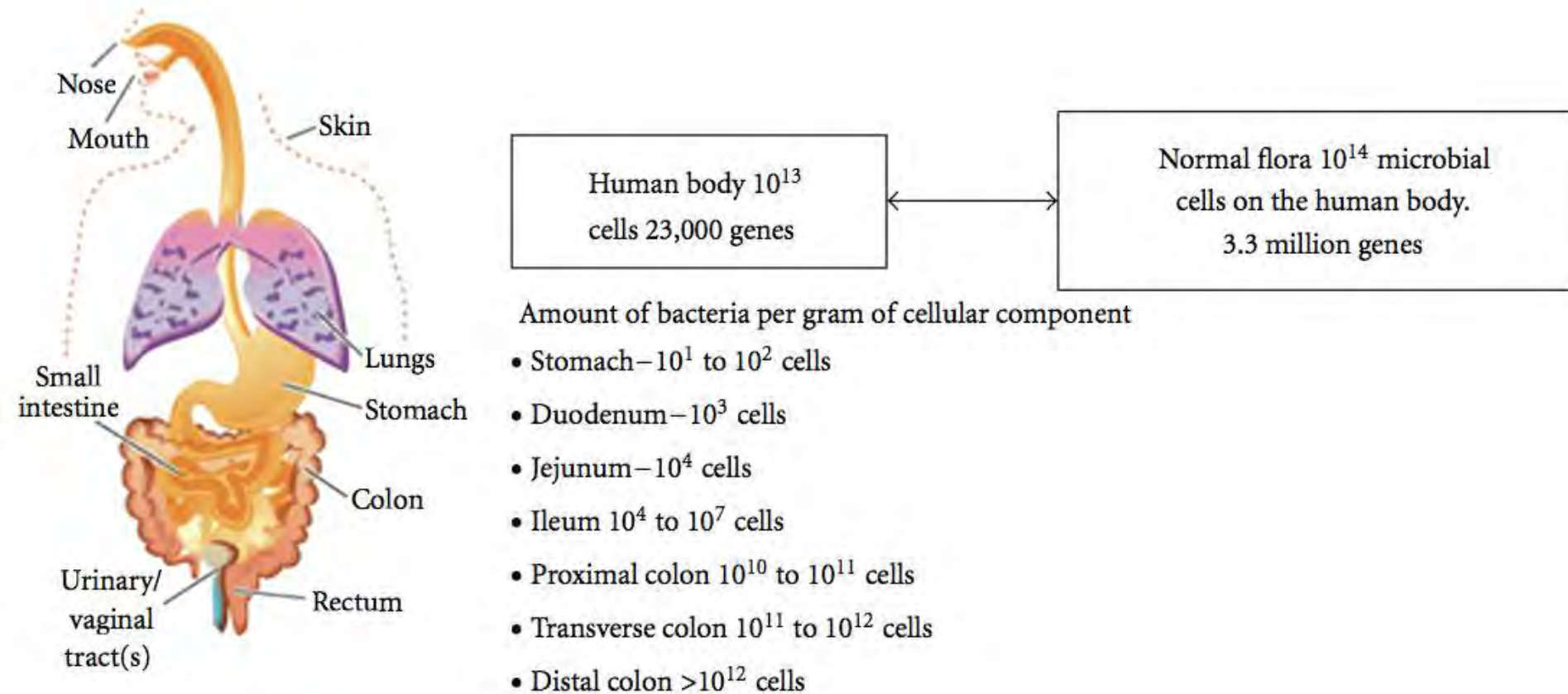
Streptococci- Plaque Kingdoms

- Disease
- color
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- Peptide



S. mutans

It's contagious too....



The Transmission of Anaerobic Periodontopathic Organisms

Y Lee et al, J Dent Res 85(2):182-186 2006

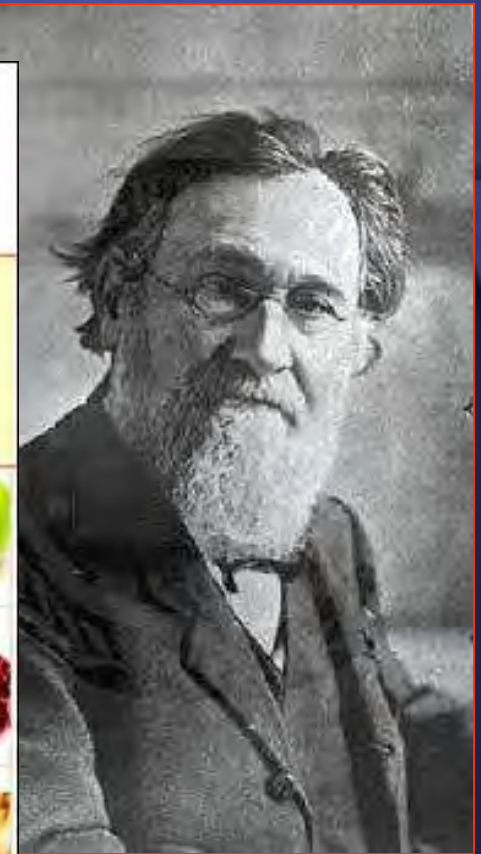
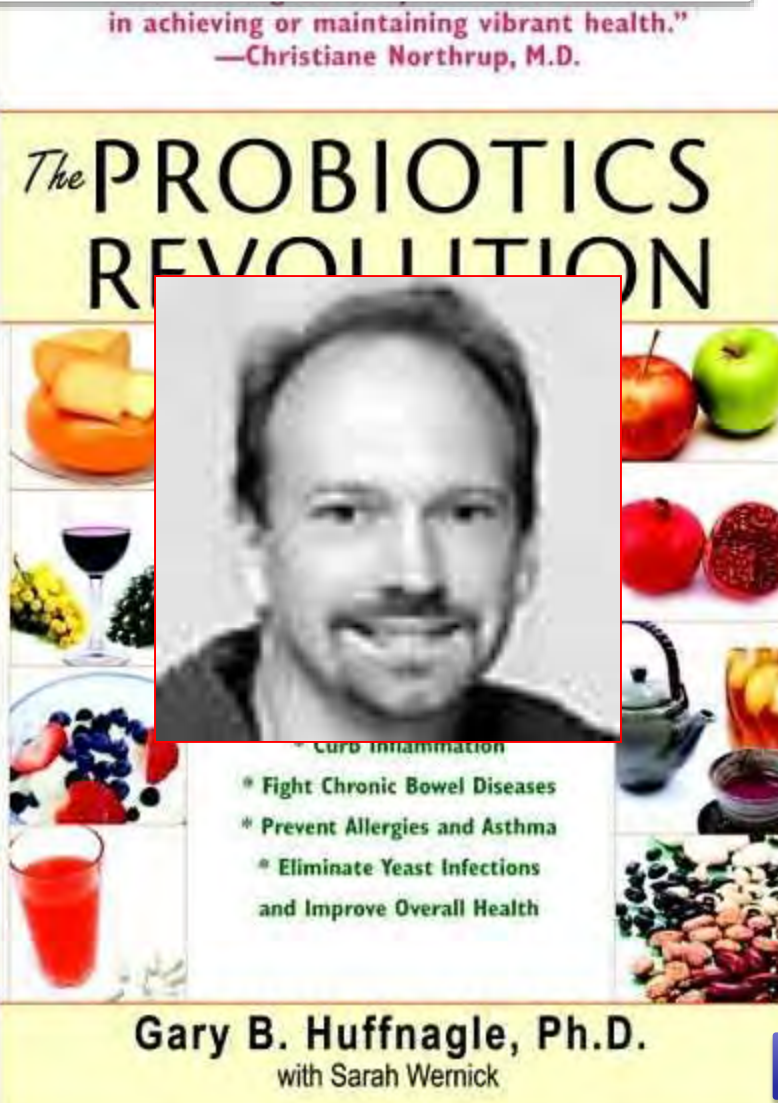
The Transmission of Periodontopathic Organisms Between Children and Caregivers

Y Lee et al Pre-publication Data

Gary B. Huffnagle, Ph.D., is Professor of Internal Medicine, Microbiology, and Immunology, University of Michigan Medical Center. His research on probiotics has appeared in leading scientific journals and has been featured in *Newsweek*, *Forbes*, and on *BBC News*.

Ilyich Metchnikov (Elie Metchnikov)

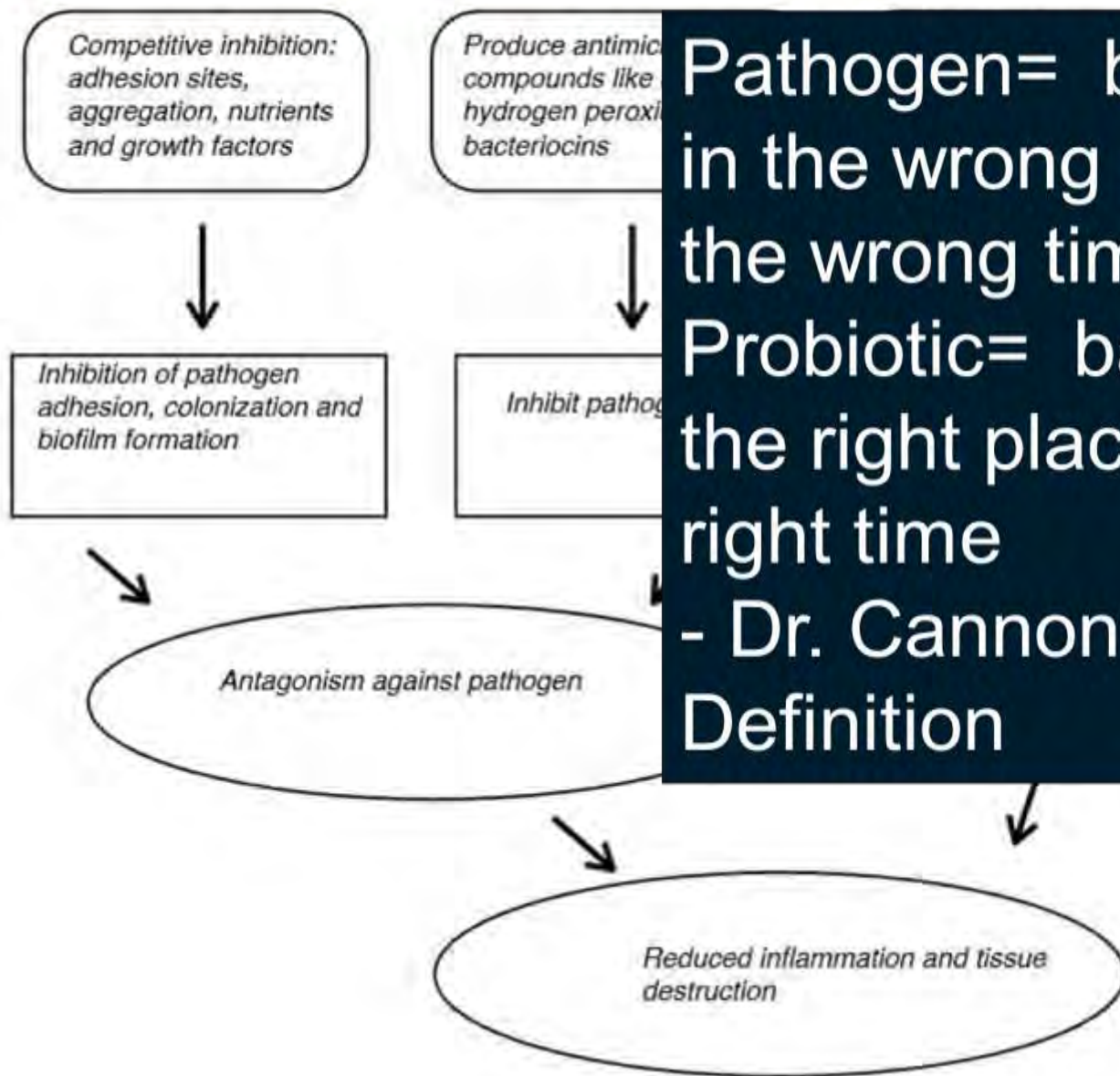
- Born May 28, 1848
Ivanivka, K.
Kharkiv Prov.
Died July 10, 1916
Paris, France
Fields Microbiology
Institutions University of
Alma mater
University of
phagocytosis
Nobel Prize



Probiotics
"pioneer"
Lactobacillus
bulgaricus

"A general belief is that microbes are harmful. This belief is erroneous. There are many useful microbes....."

Probiotic's mechanisms of action



Pathogen= bacteria in the wrong place at the wrong time
Probiotic= bacteria in the right place at the right time
- Dr. Cannon's Definition

Pr

“A post-antibiotic era — in which common infections and minor injuries can kill — far from being an apocalyptic fantasy, is instead a very real possibility for the 21st century.” (1)

-Dr. Keiji Fukuda, Assistant Director-General for Health Security, World Health Organization

The num
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today that figure is over 1200 per year or 100 publications per month.

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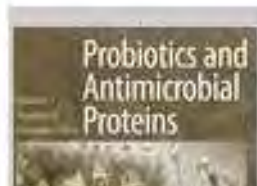


I FEEL BETTER SO I
STOPPED TAKING THE
ANTIBIOTICS...

NO! TAKE THE WHOLE
REGIMEN! STOP BREEDING
ANTIBIOTIC-RESISTANT
SUPERBACTERIA!

the effective
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viruses and fungi. A
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Preservation of
Antibiotics for
Medical Treatment
H.R. 1549/S. 619



Characterization

Tejinder Pal Singh, Gurpreet
Kapila



Probiotics

as and Suman



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d not exceed 40%,
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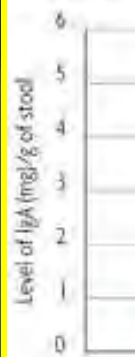
and their ability to deconjugate bile salts. The safety of the nine
rted by the absence of transferable antibiotic resistance
activity and hemolysis. The results obtained so far suggest that
bile salts and duodenum juice, so they could survive when passing
estinal tract and fulfill their potential probiotic action in the host
e *L. reuteri* strains isolated from human infant feces possess
interesting probiotic properties that make them potentially good candidates for probiotics.

How do probiotics

Chronic disease prevalence in the last 50 years³



Effect of



Dur

Adapted infants



For: Szajewska H, Berry M, Mrukiewicz G, Guandalini F. Probiotics for the Treatment of Gastrointestinal Diseases in Children: Hard and Not-So-Hard Evidence of Efficacy. *J Pediatr Gastroenterol Nutr* 2012;55:75.



MATERNAL IMPRINTING

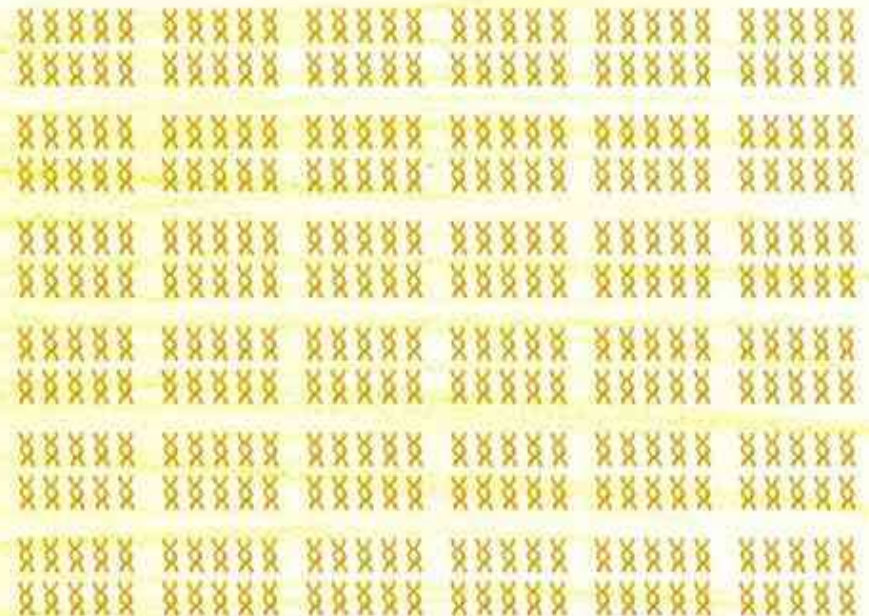
• **CONCLUSIONS.** Bacterial translocation is a unique physiologic event which is increased during pregnancy

For every HUMAN gene in your body, there are 360 microbial genes.



us
↓
X

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Res

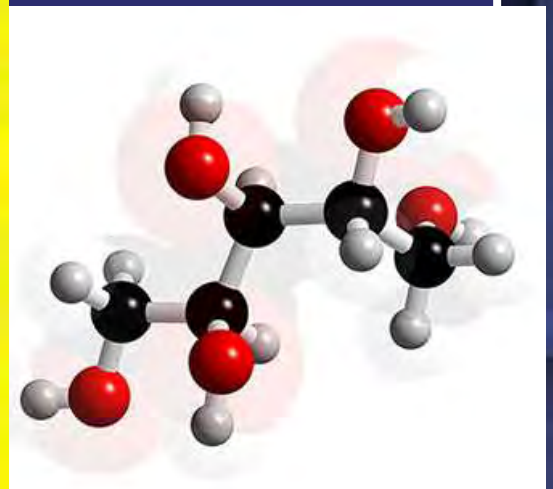
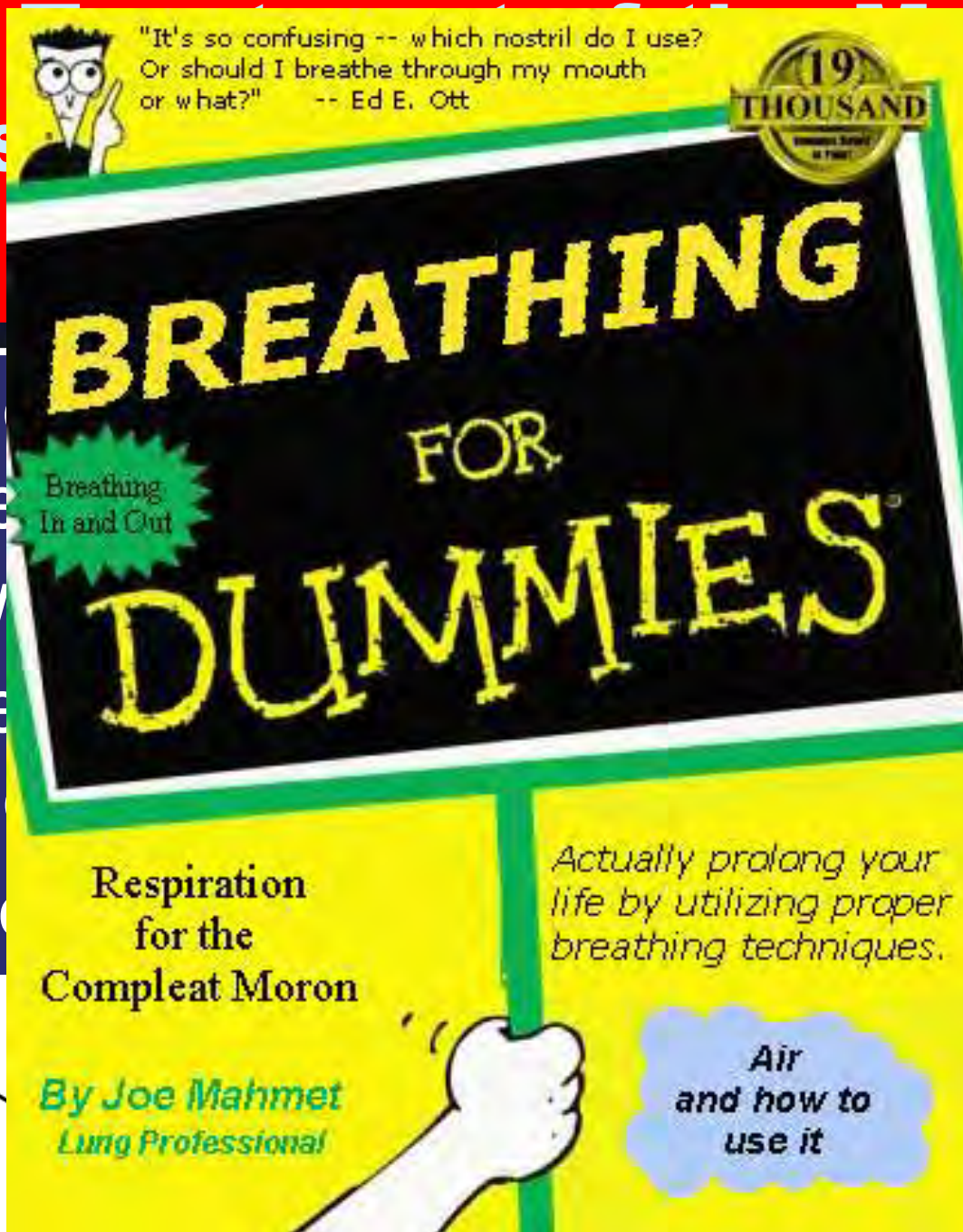
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***L. reuteri* effect on infections in infants attending child care**

- *Results of a study by Weizman, Z. et al. (2005), Pediatrics: Effect of a probiotic infant formula on infections in child care centers: comparison of two probiotic agents.*
 - Study group: 201 healthy, full-term infants aged four to ten months were studied at 14 child care centers for 21 months, covering two winter and two summer seasons.



L. reuteri effect on infections in infants attending child care




L. reuteri inhibits intestinal pathogenic microorganisms



US Patent 7112323 - Intracellular proteinacious antimicrobial agents from lactic acid bacteria derived from fermented food samples

US Patent Issued on September 26, 2006

Estimated Patent Expiration Date:  May 7, 2023

KRAFT FOOD

El-Ziney (2000), Ejehorn (2000)

NU study: Dirt's good for kids

Playing in, and even eating, dirt helps develop immune system, report says



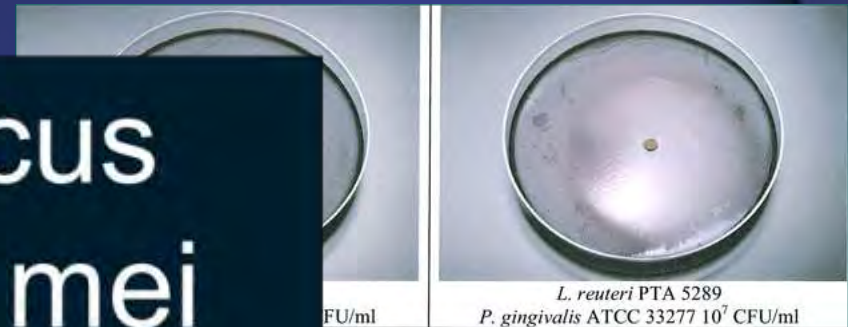
Thom McDade sorts plasma samples at Northwestern University in Evanston. McDade participated in research that shows that kids who are exposed to dirt and germs have healthier hearts. (Andrew A. Nelles, Chicago Tribune / March 7, 2010)

In *Lactic Acid Bacteria in Health and Disease*, Ed 1, p. 76. Elsevier Applied Science.

L. reuteri inhibits oral pathogenic bacteria

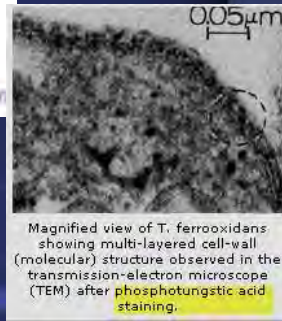
- *A. actinomycet*
- *Fusobacterium*
- *Porphyromona*
- *Prevotella inter*
- *Streptococcus*

"inimicus
inimici mei
amicus meus
est"



inhibits growth of *P. gingivalis*

CC[®]
The Global Bioresource Center



Hedberg (2006), Nikawa (2004), Caglar (2006, 2007)

"Computers in the future may weigh no more than 1.5 tons."
– Popular Mechanics, forecasting the relentless march of science, 1949.

Lactobacilli reuteri

- Probiotic chewing gum
- Probiotic chewing gum
- Probiotic chewing gum

□ 1: [Acta Odontol Scand.](#) 2006 Oct;64(5):314-8.

Tablets, straws 3 weeks

□ 1: [Clin Oral Investig.](#) 2007 Dec;11(4):425-9. Epub 2007 Jun 16.

Gum and Xylitol

□ 1: [Arch Oral Biol.](#) 2002 Nov;47(11):799-804.

Cheese-reduced caries

[Ahola AJ](#), [Yli-Knuuttila H](#), [Suomalainen T](#), [Poussa T](#), [Ahlström A](#), [Meurman JH](#), [Korpela R](#).

Division of Nutrition, University of Helsinki, Helsinki, Finland.

Cheese is known to contain compounds that reduce the risk of dental caries. The long-term consumption of milk containing *Lactobacillus rhamnosus* GG, ATCC 53103 (LGG), has been shown to reduce caries risk in children. The aim of the present study was to examine whether short-term consumption of cheese containing LGG and *Lactobacillus rhamnosus* LC 705 would diminish caries-associated salivary microbial counts in young adults. Altogether, 74 18-35 year-old subjects completed this double-blinded, randomised, placebo-controlled study. During the 3 week intervention, the subjects ate 5 x 15 g cheese per day. Oral examinations were made before and after the study. Stimulated salivary secretion rates, buffer capacity and counts of salivary *Streptococcus mutans*, yeast and lactobacilli were evaluated before and after the intervention and after a 3 week post-treatment period. The results showed no statistically significant difference between the groups in *Streptococcus mutans* counts after the intervention, but during the post-treatment period there was a significantly greater reduction in these counts in the intervention group compared to the control group ($P=0.05$). However, *Streptococcus mutans* counts decreased in 20% ($P=0.01$) and yeast counts in 27% ($P=0.005$) of all the subjects, regardless of the intervention group. Results from logistic regression showed a trend indicating that probiotic intervention might reduce the risk of the highest level of *Streptococcus mutans* ($OR=0.37$, 95% CI 0.08-1.75, $P=0.21$) and salivary yeasts ($OR=0.40$, 0.09-1.71, $P=0.22$).

Probiotic

BioGaia Probiotic lozenges



As E

Probiotic lozenges
positive effects on
You let the lozenges
BioGaia Probiotic
nice fresh mint flav

BioGaia Probiotic straw



Another

system is the probiotic
contained in an oil droplet.
Probiotic Straws are
separately or attached

International Journal of Paediatric Dentistry

Volume 18 Issue 1 Page 35-39, January 2008

To cite this article: ESBER ÇAĞLAR, ÖZGÜR ÖNDER KUSCU, SÜLE KAVALOĞLU CİLDİR, SENEM SELUI KUVVETLİ, NUKET SANDALLI (2008) A probiotic lozenge administered medical device and its effect on salivary mutans streptococci and lactobacilli
International Journal of Paediatric Dentistry 18 (1) , 35–39 doi:10.1111/j.1365-263X.2007.00866.x



10 days lozenge

A probiotic lozenge administered medical device and its effect on salivary mutans streptococci and lactobacilli

ESBER ÇAĞLAR, ÖZGÜR ÖNDER KUSCU, SÜLE KAVALOĞLU CİLDİR, SENEM SELUI KUVVETLİ & NUKET SANDALLI

Department of Paediatric Dentistry, Dental School, Yeditepe University, Istanbul, Turkey

✉ **Correspondence to:** Dr Esber Çağlar, Department of Pediatric Dentistry, School of Dentistry, Yeditepe University, Bağdat cad 238, Göztepe 34728 Istanbul, Turkey. Tel. +90 216 3636044/323; Fax: +90 216 3636211; E-mail: caqlares@yahoo.com

International Journal of Paediatric Dentistry 2008; 18: 35–39

Abstract

Background. Previous studies have suggested that lactobacilli-derived probiotics in dairy products may affect oral ecology, but the effects of different delivery methods have received little attention.

Aim. The aim of the present study was to investigate the effect of the probiotic *Lactobacillus reuteri*, delivered by a new medical device, on the levels of salivary mutans streptococci and lactobacilli in young women with high *Streptococcus mutans* counts.

Design. This is a randomized, double-blind, placebo-controlled study involving 20 healthy young women (aged 20 years): 10 as subjects and 10 as controls. The study subjects (Group A) sucked the medical device containing the probiotic lozenge with *L. reuteri* ATCC 55730/*L. reuteri* ATCC PTA 5289 (1.1×10^8 CFU) once daily for 10 days, while the control subjects (Group B) received placebo medical devices without bacteria. Salivary mutans streptococci and lactobacilli were enumerated with chair-side kits at baseline and 1 day after the final ingestion.

Results. Salivary *S. mutans* levels in the probiotic test group were significantly reduced, with statistical significance of reduction ($P < 0.05$).

Conclusions. A short-term daily ingestion of lactobacilli-derived probiotics delivered via medical device containing probiotic lozenge reduced the levels of salivary mutans.

Cervitec Plus- Ivoclar

- FDA approved in 2008
- Used in Europe for many years
- 1% chlorhexidine and 1% thymol varnish



Cervitec Plus- Ivoclar

- Swollen and inflamed gingival tissues
- Periodontal Classification Type I- gingivitis



Cervitec Plus- Ivoclar

Use of chlorhexidine varnish to prevent root caries may benefit some patients

A critical summary of Slot DE, Vaandrager NC, Van Loveren C, Van Palenstein Helderma WH, Van der Weijden GA. The effect of chlorhexidine varnish on root caries: a systematic review. Caries Res 2011;45(2):162-173.

David Leader, DMD, MPH

Systematic review conclusion. Chlorhexidine varnish (CHX-V) may be effective in preventing root caries in the absence of regular professional tooth cleaning and oral hygiene instructions for patients who need special care.

Critical summary assessment. A review of six randomized controlled trials demonstrates that CHX-V may benefit patients who require special care.

Evidence quality rating. Limited.

(which they assessed according to color and texture). The studies had, on average, a moderate estimated risk of bias. Meta-analysis of two studies that involved applications of CHX-V 1 percent and one study that involved CHX-V 10 percent



Cervitec Plus- Ivoclar

Inside Dentistry

June 2011, Volume 7, Issue 6

Published by AEGIS Communications

Clinical Application of Probiotic Therapy

New adjunctive therapies offer new alternatives for treatment.

By Mark L. Cannon, DDS, MS

then start a probiotic

Product from BioGaia counteracts bleeding gums by interacting with the immune system

A study, published by Acta Odontologica Scandinavica, was performed by Professor Svante Twetman and his team in the Department of Cariology and Endodontics at the University of Copenhagen in Denmark. Commenting on the new study, Professor Twetman says "The importance of this study is not only that it supports earlier findings that *L. reuteri* Prodentis can be effective in the treatment of gingivitis, but also that it points towards an extended mechanism of action beyond the ability of fighting off pathogens. Our immune system involves mediators that promote inflammation when they are "turned on". Our results suggest that these mediators can be down-regulated by *L. reuteri* Prodentis."

In the study, 42 subjects with moderate gingivitis were randomly assigned to receive either chewing gum containing *Lactobacillus reuteri* Prodentis (either one or two chewing gums per day) or placebo (non- active) chewing gums during a two-week period.

The number of bleeding sites was reduced in both groups taking Prodentis chewing gums, by 85% for those taking one Prodentis chewing gum per day and by 86% for those taking two. Both decreases were statistically significant.

In the Prodentis groups, the amount of fluid in the teeth pockets was decreased by 43% for those taking one chewing gum per day and by 53% for those taking two chewing gums per day. Again the decrease was statistically significant in both Prodentis groups.

In the group that took two Prodentis chewing gums per day, Professor Twetman's group found a significant decrease of some important inflammatory mediators, TNF- α and IL-8, which points towards a possible mechanism of action for Prodentis.

DNA-PCR and CRT Results in Children After Probiotic use

Methods



- 60 patients 6 to 12 years of age- caries prone with 4 or more restorations and /or lesions
- CRT collected before and after probiotic use
- 8 week (60 day) experimental time period- considered optimal to see effect

DNA-PCR and CRT Results in Children After Probiotic use

**THE PRIMARY OBJECTIVE
OF THIS CLINICAL STUDY
IS TO DETERMINE THE
EFFECT, IF ANY, OF “OVER
THE COUNTER” PROBIOTIC
SUPPLEMENTS ON THE
DNA-PCR And CRT
ANALYSIS**



DNA-PCR and CRT Results in Children After Probiotic use

Methods

-Frozen samples in CRT tubes
Kept at minus 80 degrees Celsius
Glycerol stabs of colonies for further analysis.



Current Research

- Statistically

Results

ANOVA Table

Analysis of Variance

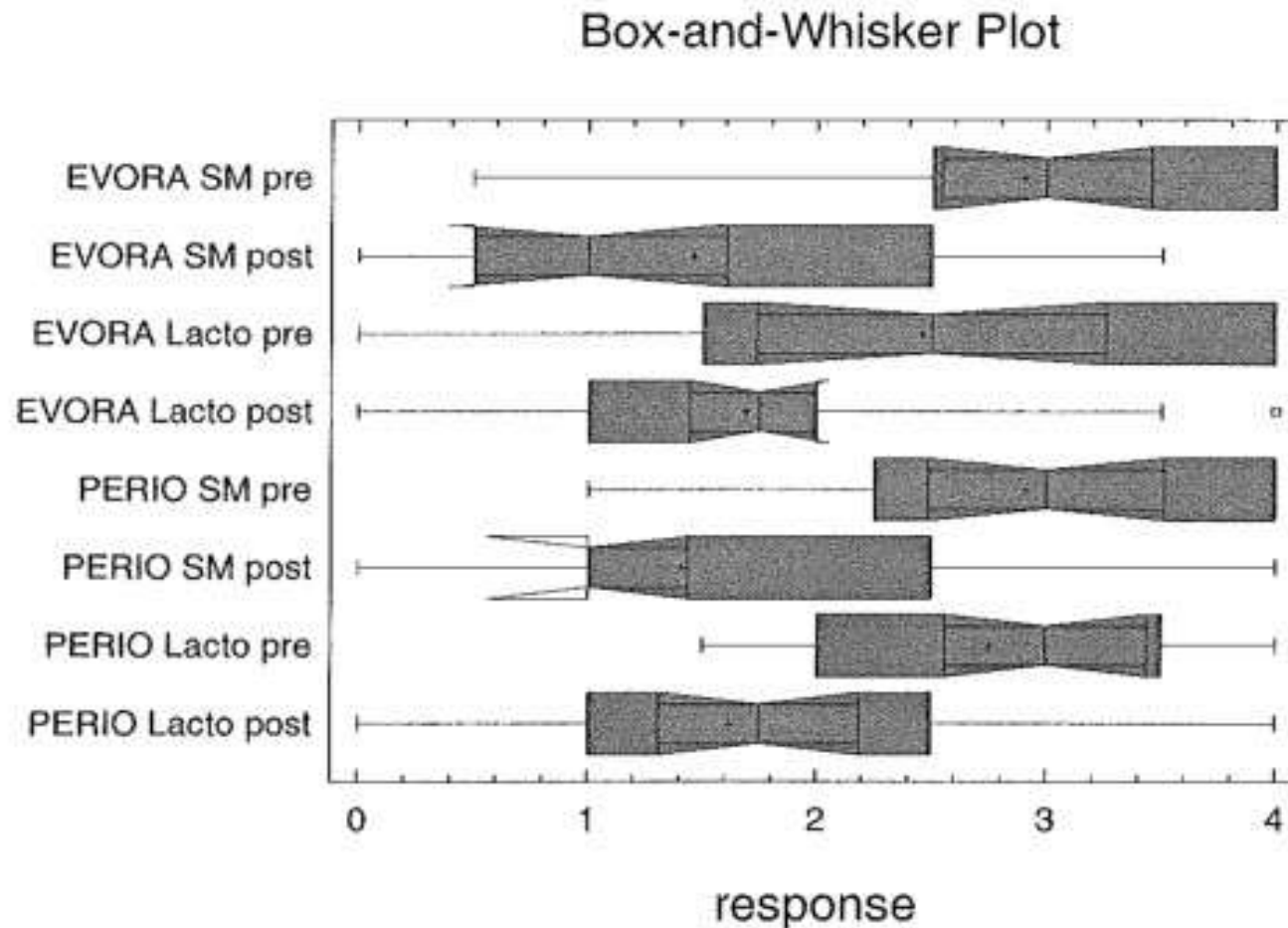
Source	Sum of Squares	Df	Mean Square	F-Ratio	P-Value
Between groups	84.3711	7	12.053	10.36	0.0000
Within groups	242.087	208	1.16388		
Total (Corr.)	326.458	215			

The StatAdvisor

The ANOVA table decomposes the variance of the data into two components: a between-group component and a within-group component. The F-ratio, which in this case equals 10.3559, is a ratio of the between-group estimate to the within-group estimate. Since the P-value of the F-test is less than 0.05, there is a statistically significant difference between the means of the 8 variables at the 95.0% confidence level. To determine which means are significantly different from which others, select Multiple Range Tests from the list of Tabular Options.

DNA-PCR and CRT Results in Children After Probiotic use

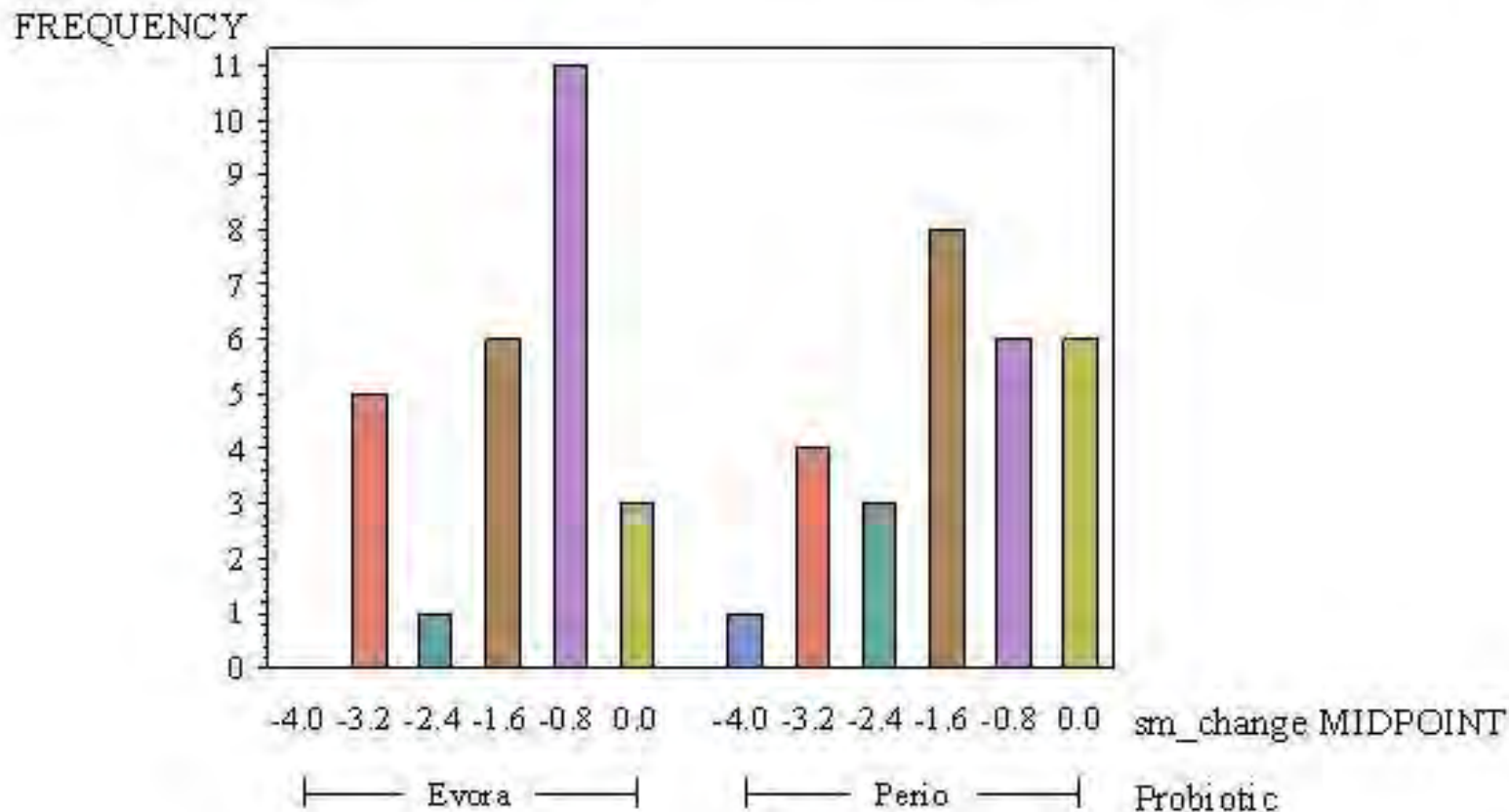
Statistics



DNA-PCR and CRT Results in Children After Probiotic use

Statistics

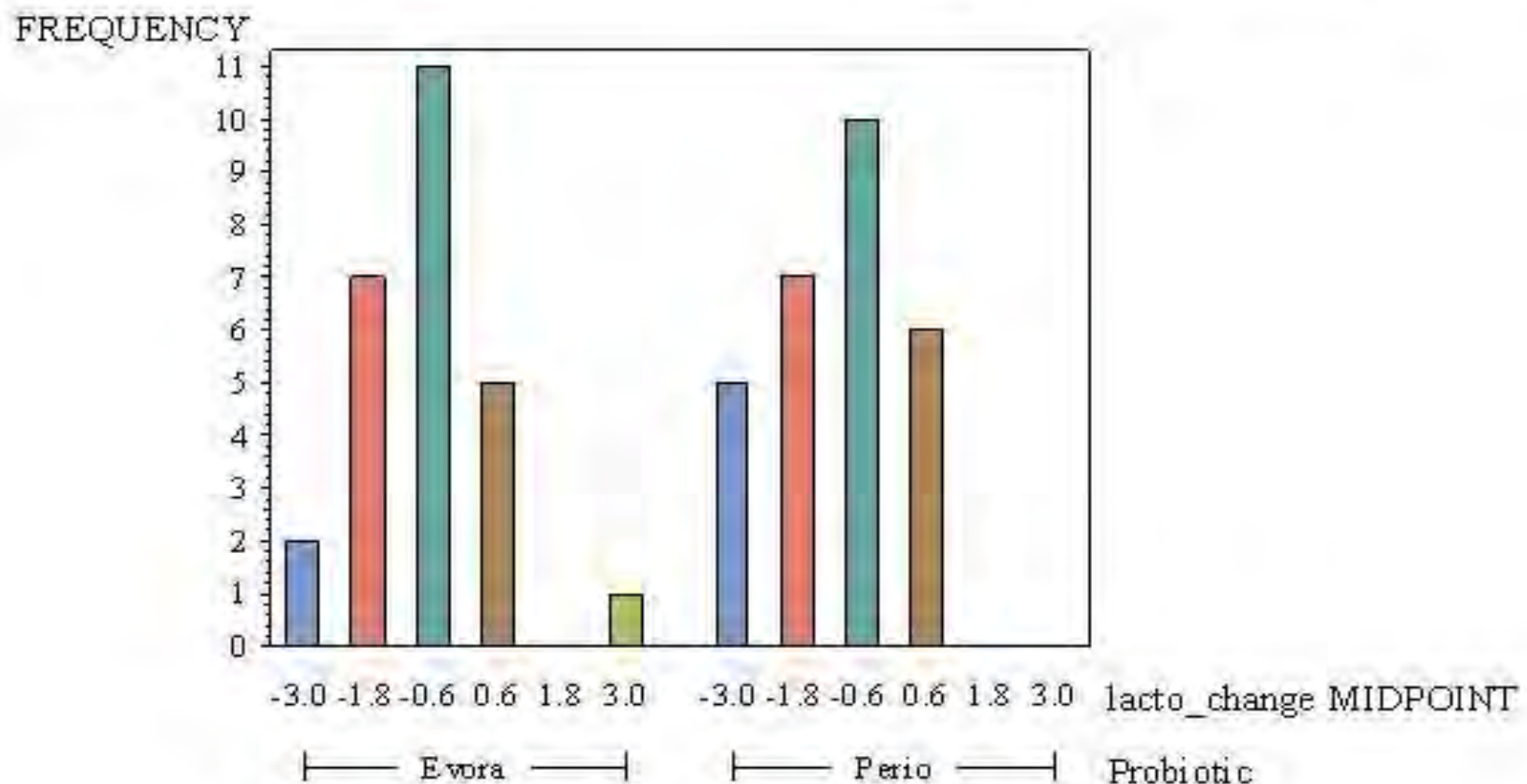
Changes in SM before/after probiotic treatment



DNA-PCR and CRT Results in Children After Probiotic use

Statistics

Changes in Lacto before/after probiotic treatment



DNA-PCR and Results in Children After Probiotic use

Difference between the two probiotics?

Wilcoxon Two-Sample Test	
Statistic	762.5000
Normal Approximation	
Z	0.8244
One-Sided Pr > Z	0.2048
Two-Sided Pr > Z	0.4097
t Approximation	
One-Sided Pr > Z	0.2067
Two-Sided Pr > Z	0.4134
Z includes a continuity correction of 0.5.	

Sample Test	
	726.0000
Normal Approximation	
Z	0.1846
Z	0.4268
Z	0.8536
Z	0.4271
Z	0.8543
Continuity correction of 0.5.	

Kruskal-Wallis Test	
Chi-Square	0.6942
DF	1
Pr > Chi-Square	0.4047

Wallis Test	
	0.0374
	1
re	0.8467

NOT enough evidence to indicate that EvoraPlus and PerioBalance changes the 'SM' or "Lacto" measurements differently

DNA-PCR and CRT Results in Children After Probiotic use

Reasons?

1. Selective agar complicated DNA extraction contaminating some samples.
2. *Streptococcus rattus* (included in EvoraPlus) was mis-identified as SM but is a mutans streptococci.
3. Other technical difficulties

The glucosyltransferase-I gene has previously been identified as a highly specific marker for *Streptococcus mutans* (Lett Appl Microbiol. 2006 Feb; 42(2):127-31). The primers and probe have 100% homology with all reference sequences for *Streptococcus mutans* in the NCBI database.

Conclusions:

A clinical trial to evaluate the effectiveness of DNA-PCR and CRT at measuring the salivary level of bacteria in caries prone children with PerioBalance or EvoraKids therapy.

Both EvoraKids and PerioBalance affected the CRT results.

The reduction in *S. mutans* and *Lactobacilli* was statistically significant.

Conclusions:

Both EvoraKids

Effectiveness of CRT at Measuring the Salivary Level of Bacteria in Caries Prone Children

Effectiveness of CRT at Measuring the Salivary Level of Bacteria in Caries Prone Children with Probiotic Therapy

Cannon M* / Trent B** / Vorachek A*** / Kramer S**** / Esterly R*****

Aim: This IRB approved clinical trial was to determine the effect of “over the counter” probiotic supplements on the Caries Risk Test- CRT- (Fosstar) results of the oral microflora in high caries risk children. **Study design:** Sixty subjects 6 to 12 years old with a caries risk assessment (CAMBRA) of moderate to high (caries prone) were evaluated by an analysis of the difference in the salivary levels of pathogenic bacteria (*mutans streptococci* and *Lactobacilli*). The subjects were randomly selected by randomizing software and assigned to two different Groups. Group A used PerioBalance (*Lactobacilli reuteri*-CFU of 200 million) lozenges for 28 days. Group B used the EvoraKids (*Streptococcus uberis* KJ2, *Streptococcus oralis* KJ3, *Streptococcus rattus* JH145, ≥ 100 million) probiotics chewable tablets for 30 days. Salivary samples were collected then incubated for 48 hours for colony counting and ranking. Follow up testing with the CRT was performed after 60 days at a follow up visit. **Results:** There was a statistically significant difference in the CRT results between the pre and post use of the probiotics. PerioBalance; SM results $t = -6.78$, $p < .0001$ Lactobacilli results $t = -5.762$, $p < .0001$, EvoraKids SM results $t = -7.33$, $p < .0001$, Lactobacilli results $t = -2.953$, $p = .0068$. **Conclusions:** The CRT values obtained with caries prone children may be significantly affected by probiotic use. Based on this study's results the following conclusions can be made: Both EvoraKids and PerioBalance affected the CRT results by significantly decreasing the number of *S. mutans* and *lactobacilli* present in the salivary samples.

Further Research



**Retrospective
Review of
Probiotic
Therapy.**

**ML Cannon DDS
MS**

A Vorachek DDS

K White DMD

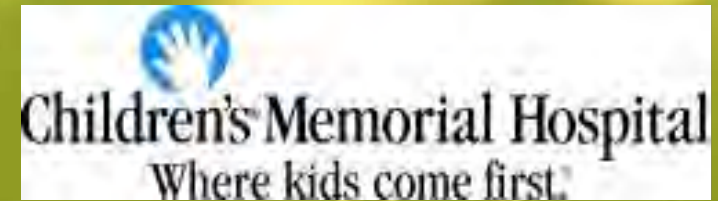
C Le DMD

**An IRB Approved
Study**

Does EvoraKids
and PerioBalance
affected the caries
proneness of the
subjects?

Is the reduction in
dental caries was
statistically
significant?

Further Research



Retrospective
Review of
Probiotic
Therapy.

ML Cannon DDS
MS

A Vorachek DDS

K White DMD

C Le DMD

An IRB Approved
Study

Results:

Of the **53 subjects** available for follow up, only 4 had remained caries active with a grand total of 17 caries lesions being detected and subsequently restored in this group. Of the original total of 60 patients with 292 initial carious lesions, after probiotic therapy and dental restoration, 36 total restorations were placed in the subject group over the following three years.

Approximately half of these restorations were required in teeth that had initially presented with smaller lesions and had been placed in a "watch" category. Two of the patients that developed further carious lesions had been randomly assigned to the probiotic PerioBalance, what the other two caries active patients were assigned EvoraKids probiotic.

Of the original group of caries active patients, 23 did not present with any further carious involvement. Another 26 could be categorized as Caries static, as the restorations required were substantially less than before probiotic therapy had been begun.

respect to published national norms.

Further Research



Retrospective Review of

Table 3. Caries History Compared to Nationally Reported Values.

Caries Experience	Pre Probiotic	National Average	Post Probiotic
Per patient-3 years	5.51	1.84	0.75

	Caries Active	Caries Resistant	Caries Static
PerioBalance	2	12	15
EvoraKids	2	11	11
Caries Count	17	0	36

Table 1. Caries active, Caries resistant and Caries static patients.

Conclusion:
Within the limitations of this retrospective IRB approved study, the tested probiotic supplements had a statistically significant effect on the caries experience of the enrolled subjects.

Current Research



Eur J Oral Sci. 2007 Aug;115(4):308-14.

Lactobacillus-mediated interference of mutans streptococci in caries-free vs. caries-active subjects.

Simark-Matsson C, Emilson CG, Håkansson J.

Arch Oral Biol. 2009 Jun;54(6):602-7. Epub 2009 May 15.

Final pH affects the interference

1420 SELECTION OF MUTANS

Location: Exhibit Hall D (Walter

E. PALMER, T. FINLAYSON, T. MAIER, and C. MACHIDA, Ore

Objectives: Dental caries are children. Mutans streptococci genetically define and assess

Methods: Using arbitrarily-primed PCR, we analyzed the bacterial flora of children undergoing caries preventive treatment (2-4 weeks), and identified genotypic groups, and charac

Results: Inter-patient variability in bacterial flora was observed in pre- and post-treatment collections. The proportion of mutans streptococci increased from 14% to 78% (SE=0.017) after 3 days of group treatment, and was highly acidogenic. The proportion of mutans streptococci surviving treatment was significantly higher in the post-treatment collection.

Conclusions: Caries preventive treatment has implications for caries prevention. The well-accepted practices for cari



that

Lactobacilli paracasei

 **BASF**
The Chemical Company

pasteurized bacteria



BASF set to commercialize pro-t-action™ eliminating caries causing bacteria from the mouth



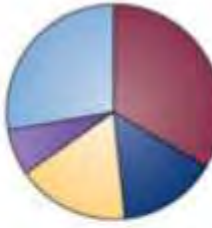
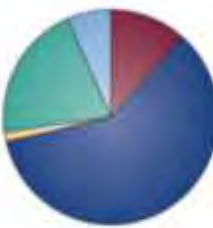
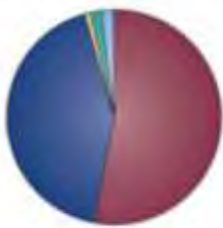
The a
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used.
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toxicological testing have been conducted in full.



External auditory canal

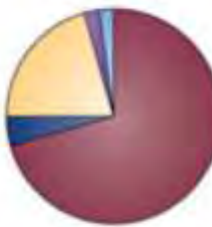
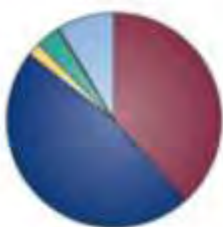
Hair on the head

Mouth



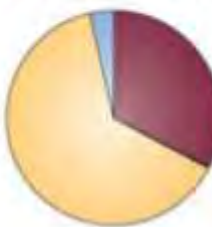
Nostril

Oesophagus



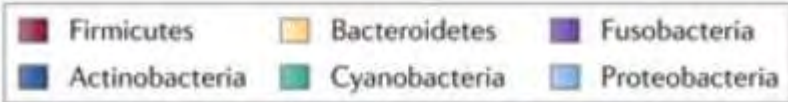
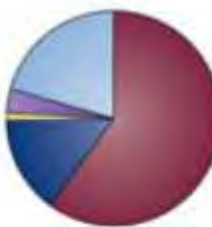
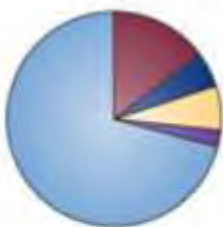
Skin

Gastrointestinal tract



Penis

Vagina



The wild very cherry flavor



Manufactured for:
Oreagene Inc.,
13700 Progress Blvd.,
Macon, GA 31206
For more information:
oreagene.com

THE
FOR

e



ANOTHER

Xylitol- Cancun Conference 2013



Xylitol- 5 carbon chain

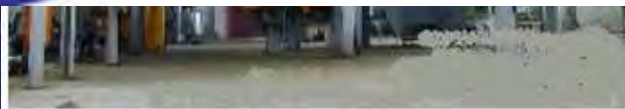


...ion (wood
alcohol). Xylitol is
many fruits and v
be extracted from
oats, and mushro
fibrous material s
and sugar cane b



Xylitol- from xylose

- Production starts from xylan (a hemicellulose) extracted from cane, or from wood, which is then hydrolyzed to xylose. Xylose is then hydrogenated to xylitol syrup, which is then purified and crystallized to produce xylitol.



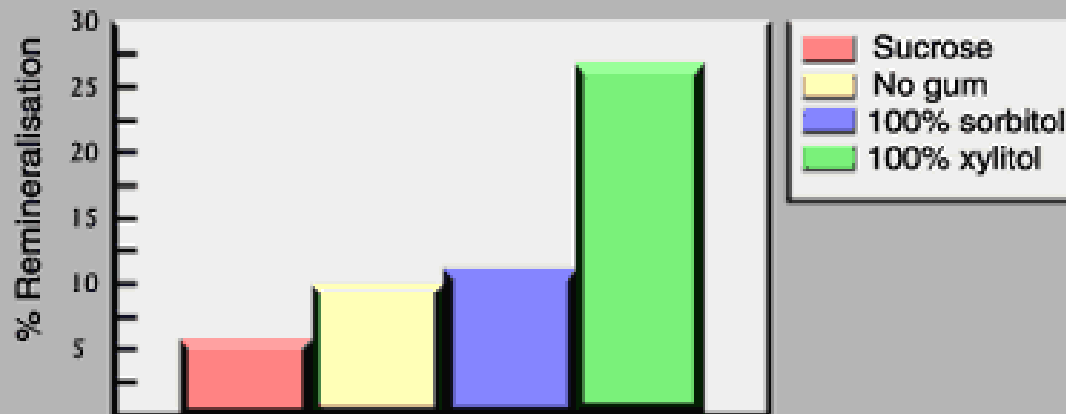
Xylitol- research



J Dent Res. 1995 Dec;74(12):1904-13.

Xylitol chewing gums and caries rates: a 40-month cohort study.

Mäkinen KK, Bennett CA, Huilini PP, Iskanakas PJ, Isotuna KP, Paine HR, Jr, Mäkinen PJ.



0.27; 95% confidence interval, 0.20 to 0.36; $p = 0.0001$). This gum was superior to any other tested. It was not significantly more effective than xylitol, but they reduced caries rates significantly compared with the no-gum group. The results suggest that systematic usage of polyol-based chewing gums may be more effective than sorbitol gums.



Belize Study

78 USA.

has considerable health care resources. The chewing of gum study has simultaneously investigated the effectiveness of a cohort study on the relationship between the use of chewing gum and thousand two hundred and seventy-seven subjects



Xylitol- research



Caries Res. 1996;30(6):408-17.

Polyol chewing gums and caries rates in primary dentition: a 24-month cohort study.

Mäkinen KK, Hujoel PP, Bennett CA, Isotupa KP, Mäkinen PL, Allen P.

Department of Biologic and Materials Sciences, School of Dentistry, University of Michigan, Ann Arbor, USA.

Abstract

The effect of 2-year chewing-gum use on the caries rates of primary teeth was studied in a combined school and home program in a sample of 510 initially 6-year-old subjects with high caries experience, low availability of fluoride, and difficult access to dental care. The gum, formed into either sticks or pellets, comprised either xylitol, sorbitol, or mixtures thereof. The gum was chewed for 5 min under supervision five times a day during the school year, and for variable times during non-school days. Seven groups were studied. One group received no gum; two xylitol gum groups received either pellet or stick gum; two sorbitol gum groups received either pellet or stick gum; and two mixture gum groups received either pellet or stick gum. The response variable was the development of carious lesions detectable by physical loss of enamel and probe penetration to the dentin on those surfaces of primary teeth that were not cavitated at baseline. Caries rates associated with the use of each of the gum types were compared to the caries rates in the no-gum group. The usage of all polyol gums resulted in a significant decrease of the caries onset rate ($p < 0.05$). The caries onset risk for a primary surface in the xylitol pellet and the sorbitol pellet groups was 35 and 44% of that in the no-gum group (relative risk, 0.35; 95% confidence interval, 0.21-0.59; relative risk, 0.44; 95% confidence interval, 0.30-0.63, respectively). The caries onset risk in the xylitol stick gum group was 53% of that in the no-gum group (relative risk, 0.53; 95% confidence interval, 0.39-0.72), which was marginally ($p = 0.1520$) lower than in the sorbitol stick gum group (relative risk, 0.70; 95% confidence interval, 0.52-0.94). The usage of both xylitol/sorbitol mixtures in pellet form was associated with a caries onset rate comparable with the usage of the xylitol stick gum. The largest caries risk reduction was observed in the group receiving xylitol pellet gum.

school program

Xylitol better than Sorbitol



Xylitol- research



J Dent Res. 2000 Mar;79(3):882-7.

Influence of maternal xylitol consumption on acquisition of mutans streptococci by infants.

Söderling E, Isokangas P, Pienihäkkinen K, Tenovou J.

Institute of Dentistry, University of Turku, Finland. eva.soderling@utu.fi

classic

2000

Abstract

Xylitol is effective as a non-cariogenic sugar substitute. Habitual xylitol consumption appears to select for mutans streptococci (MS) with impaired adhesion properties, i.e., they shed easily to saliva from plaque. One hundred sixty-nine mother-child pairs participated in a two-year study exploring whether the mothers' xylitol consumption could be used to prevent mother-child transmission of mutans streptococci. All mothers showed high salivary levels of mutans streptococci during pregnancy. The mothers in the xylitol group (n = 106) were requested to chew xylitol-sweetened gum (65% w/w) at least 2 or 3 times a day, starting three months after delivery. In the two control groups, the mothers received either chlorhexidine (n = 30) or fluoride (n = 33) varnish treatments at 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96, 102, 108, 114, 120, 126, 132, 138, 144, 150, 156, 162, 168, 174, 180, 186, 192, 198, 204, 210, 216, 222, 228, 234, 240, 246, 252, 258, 264, 270, 276, 282, 288, 294, 300, 306, 312, 318, 324, 330, 336, 342, 348, 354, 360, 366, 372, 378, 384, 390, 396, 402, 408, 414, 420, 426, 432, 438, 444, 450, 456, 462, 468, 474, 480, 486, 492, 498, 504, 510, 516, 522, 528, 534, 540, 546, 552, 558, 564, 570, 576, 582, 588, 594, 600, 606, 612, 618, 624, 630, 636, 642, 648, 654, 660, 666, 672, 678, 684, 690, 696, 702, 708, 714, 720, 726, 732, 738, 744, 750, 756, 762, 768, 774, 780, 786, 792, 798, 804, 810, 816, 822, 828, 834, 840, 846, 852, 858, 864, 870, 876, 882, 888, 894, 900, 906, 912, 918, 924, 930, 936, 942, 948, 954, 960, 966, 972, 978, 984, 990, 996, 1002, 1008, 1014, 1020, 1026, 1032, 1038, 1044, 1050, 1056, 1062, 1068, 1074, 1080, 1086, 1092, 1098, 1104, 1110, 1116, 1122, 1128, 1134, 1140, 1146, 1152, 1158, 1164, 1170, 1176, 1182, 1188, 1194, 1200, 1206, 1212, 1218, 1224, 1230, 1236, 1242, 1248, 1254, 1260, 1266, 1272, 1278, 1284, 1290, 1296, 1302, 1308, 1314, 1320, 1326, 1332, 1338, 1344, 1350, 1356, 1362, 1368, 1374, 1380, 1386, 1392, 1398, 1404, 1410, 1416, 1422, 1428, 1434, 1440, 1446, 1452, 1458, 1464, 1470, 1476, 1482, 1488, 1494, 1500, 1506, 1512, 1518, 1524, 1530, 1536, 1542, 1548, 1554, 1560, 1566, 1572, 1578, 1584, 1590, 1596, 1602, 1608, 1614, 1620, 1626, 1632, 1638, 1644, 1650, 1656, 1662, 1668, 1674, 1680, 1686, 1692, 1698, 1704, 1710, 1716, 1722, 1728, 1734, 1740, 1746, 1752, 1758, 1764, 1770, 1776, 1782, 1788, 1794, 1800, 1806, 1812, 1818, 1824, 1830, 1836, 1842, 1848, 1854, 1860, 1866, 1872, 1878, 1884, 1890, 1896, 1902, 1908, 1914, 1920, 1926, 1932, 1938, 1944, 1950, 1956, 1962, 1968, 1974, 1980, 1986, 1992, 1998, 2004, 2010, 2016, 2022, 2028, 2034, 2040, 2046, 2052, 2058, 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5052, 5058, 5064, 5070, 5076, 5082, 5088, 5094, 5100, 5106, 5112, 5118, 5124, 5130, 5136, 5142, 5148, 5154, 5160, 5166, 5172, 5178, 5184, 5190, 5196, 5202, 5208, 5214, 5220, 5226, 5232, 5238, 5244, 5250, 5256, 5262, 5268, 5274, 5280, 5286, 5292, 5298, 5304, 5310, 5316, 5322, 5328, 5334, 5340, 5346, 5352, 5358, 5364, 5370, 5376, 5382, 5388, 5394, 5400, 5406, 5412, 5418, 5424, 5430, 5436, 5442, 5448, 5454, 5460, 5466, 5472, 5478, 5484, 5490, 5496, 5502, 5508, 5514, 5520, 5526, 5532, 5538, 5544, 5550, 5556, 5562, 5568, 5574, 5580, 5586, 5592, 5598, 5604, 5610, 5616, 5622, 5628, 5634, 5640, 5646, 5652, 5658, 5664, 5670, 5676, 5682, 5688, 5694, 5700, 5706, 5712, 5718, 5724, 5730, 5736, 5742, 5748, 5754, 5760, 5766, 5772, 5778, 5784, 5790, 5796, 5802, 5808, 5814, 5820, 5826, 5832, 5838, 5844, 5850, 5856, 5862, 5868, 5874, 5880, 5886, 5892, 5898, 5904, 5910, 5916, 5922, 5928, 5934, 5940, 5946, 5952, 5958, 5964, 5970, 5976, 5982, 5988, 5994, 6000, 6006, 6012, 6018, 6024, 6030, 6036, 6042, 6048, 6054, 6060, 6066, 6072, 6078, 6084, 6090, 6096, 6102, 6108, 6114, 6120, 6126, 6132, 6138, 6144, 6150, 6156, 6162, 6168, 6174, 6180, 6186, 6192, 6198, 6204, 6210, 6216, 6222, 6228, 6234, 6240, 6246, 6252, 6258, 6264, 6270, 6276, 6282, 6288, 6294, 6300, 6306, 6312, 6318, 6324, 6330, 6336, 6342, 6348, 6354, 6360, 6366, 6372, 6378, 6384, 6390, 6396, 6402, 6408, 6414, 6420, 6426, 6432, 6438, 6444, 6450, 6456, 6462, 6468, 6474, 6480, 6486, 6492, 6498, 6504, 6510, 6516, 6522, 6528, 6534, 6540, 6546, 6552, 6558, 6564, 6570, 6576, 6582, 6588, 6594, 6600, 6606, 6612, 6618, 6624, 6630, 6636, 6642, 6648, 6654, 6660, 6666, 6672, 6678, 6684, 6690, 6696, 6702, 6708, 6714, 6720, 6726, 6732, 6738, 6744, 6750, 6756, 6762, 6768, 6774, 6780, 6786, 6792, 6798, 6804, 6810, 6816, 6822, 6828, 6834, 6840, 6846, 6852, 6858, 6864, 6870, 6876, 6882, 6888, 6894, 6900, 6906, 6912, 6918, 6924, 6930, 6936, 6942, 6948, 6954, 6960, 6966, 6972, 6978, 6984, 6990, 6996, 7002, 7008, 7014, 7020, 7026, 7032, 7038, 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9036, 9042, 9048, 9054, 9060, 9066, 9072, 9078, 9084, 9090, 9096, 9102, 9108, 9114, 9120, 9126, 9132, 9138, 9144, 9150, 9156, 9162, 9168, 9174, 9180, 9186, 9192, 9198, 9204, 9210, 9216, 9222, 9228, 9234, 9240, 9246, 9252, 9258, 9264, 9270, 9276, 9282, 9288, 9294, 9300, 9306, 9312, 9318, 9324, 9330, 9336, 9342, 9348, 9354, 9360, 9366, 9372, 9378, 9384, 9390, 9396, 9402, 9408, 9414, 9420, 9426, 9432, 9438, 9444, 9450, 9456, 9462, 9468, 9474, 9480, 9486, 9492, 9498, 9504, 9510, 9516, 9522, 9528, 9534, 9540, 9546, 9552, 9558, 9564, 9570, 9576, 9582, 9588, 9594, 9600, 9606, 9612, 9618, 9624, 9630, 9636, 9642, 9648, 9654, 9660, 9666, 9672, 9678, 9684, 9690, 9696, 9702, 9708, 9714, 9720, 9726, 9732, 9738, 9744, 9750, 9756, 9762, 9768, 9774, 9780, 9786, 9792, 9798, 9804, 9810, 9816, 9822, 9828, 9834, 9840, 9846, 9852, 9858, 9864, 9870, 9876, 9882, 9888, 9894, 9900, 9906, 9912, 9918, 9924, 9930, 9936, 9942, 9948, 9954, 9960, 9966, 9972, 9978, 9984, 9990, 9996, 10002, 10008, 10014, 10020, 10026, 10032, 10038, 10044, 10050, 10056, 10062, 10068, 10074, 10080, 10086, 10092, 10098, 10104, 10110, 10116, 10122, 10128, 10134, 10140, 10146, 10152, 10158, 10164, 10170, 10176, 10182, 10188, 10194, 10200, 10206, 10212, 10218, 10224, 10230, 10236, 10242, 10248, 10254, 10260, 10266, 10272, 10278, 10284, 10290, 10296, 10302, 10308, 10314, 10320, 10326, 10332, 10338, 10344, 10350, 10356, 10362, 10368, 10374, 10380, 10386, 10392, 10398, 10404, 10410, 10416, 10422, 10428, 10434, 10440, 10446, 10452, 10458, 10464, 10470, 10476, 10482, 10488, 10494, 10500, 10506, 10512, 10518, 10524, 10530, 10536, 10542, 10548, 10554, 10560, 10566, 10572, 10578, 10584, 10590, 10596, 10602, 10608, 10614, 10620, 10626, 10632, 10638, 10644, 10650, 10656, 10662, 10668, 10674, 10680, 10686, 10692, 10698, 10704, 10710, 10716, 10722, 10728, 10734, 10740, 10746, 10752, 10758, 10764, 10770, 10776, 10782, 10788, 10794, 10800, 10806, 10812, 10818, 10824, 10830, 10836, 10842, 10848, 10854, 10860, 10866, 10872, 10878, 10884, 10890, 10896, 10902, 10908, 10914, 10920, 10926, 10932, 10938, 10944, 10950, 10956, 10962, 10968, 10974, 10980, 10986, 10992, 10998, 11004, 11010, 11016, 11022, 11028, 11034, 11040, 11046, 11052, 11058, 11064, 11070, 11076, 11082, 11088, 11094, 11100, 11106, 11112, 11118, 11124, 11130, 11136, 11142, 11148, 11154, 11160, 11166, 11172, 11178, 11184, 11190, 11196, 11202, 11208, 11214, 11220, 11226, 11232, 11238, 11244, 11250, 11256, 11262, 11268, 11274, 11280, 11286, 11292, 11298, 11304, 11310, 11316, 11322, 11328, 11334, 11340, 11346, 11352, 11358, 11364, 11370, 11376, 11382, 11388, 11394, 11400, 11406, 11412, 11418, 11424, 11430, 11436, 11442, 11448, 11454, 11460, 11466, 11472, 11478, 11484, 11490, 11496, 11502, 11508, 11514, 11520, 11526, 11532, 11538, 11544, 11550, 11556, 11562, 11568, 11574, 11580, 11586, 11592, 11598, 11604, 11610, 11616, 11622, 11628, 11634, 11640, 11646, 11652, 11658, 11664, 11670, 11676

Xylitol- research

Reduces MS but not
probiotics

Eur J Dent. 2011 Jan;5(1):24-31.

The effect of xylitol on the composition of the oral flora: a pilot study.

Söderling E, Hirvonen A, Kariäläinen S, Fontana M, Catt D, Seppä L.

Adjunct Professor, Institute of Dentistry, University of Turku, Finland. eva.soderling@utu.fi

Abstract

OBJECTIVES: Our aim was to investigate the effect of short-term xylitol consumption on the microbial composition of plaque and saliva.

METHODS: Twelve volunteers (22-38 yrs) harboring mutans streptococci (MS) participated in the randomized, double-blind, cross-over study. The experimental chewing gum contained 65% xylitol while the control gum contained 63% sorbitol and 2% maltitol w/w. The polyol dose was approximately 6 g/day. Stimulated saliva and plaque samples were collected before and after the two four-week test periods. The samples were cultured for MS, total streptococci, lactobacilli, and total facultatives. A part of the samples were subjected to DNA-DNA hybridizations of 14 microbial plaque species: *Actinomyces naeslundii*, *A. viscosus*, *Fusobacterium nucleatum*, *Lactobacillus acidophilus*, *L. fermentum*, *L. paracasei*, *L. rhamnose*, *L. plantarum*, *Streptococcus gordonii*, *S. oralis*, *S. parasanguis*, *S. salivarius*, *S. sanguinis*, *Veillonella parvula*.

RESULTS: The MS counts of the plaque samples collected from "caries-prone" tooth sites decreased significantly ($P < .01$) in the xylitol gum group but not in the sorbitol gum group. Also the plaque MS percentage decreased significantly in the xylitol gum group ($P < .01$). The salivary MS counts did not decrease either in the xylitol or in the sorbitol gum groups. Nor were changes detected in the salivary levels of total streptococci or lactobacilli. The DNA-DNA hybridization assay revealed no study-induced changes in the microbial composition of the dental plaque.

CONCLUSIONS: Within the limitations of this pilot study, xylitol consumption reduced MS counts in plaque but appeared not to affect the microbial composition of plaque or saliva in general.

2011

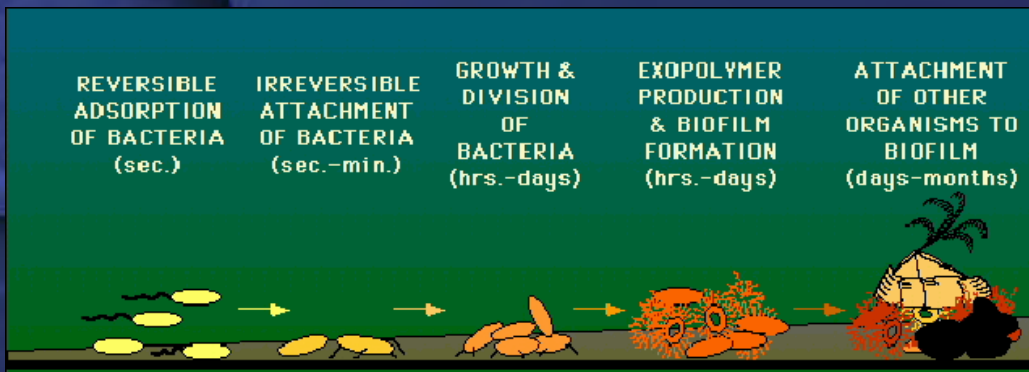
REVERSIBLE
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OF BACTERIA
(sec.)

IRREVERSIBLE
ATTACHMENT
OF BACTERIA
(sec.-min.)

GROWTH &
DIVISION
OF
BACTERIA
(hrs.-days)

EXOPOLYMER
PRODUCTION
& BIOFILM
FORMATION
(hrs.-days)

ATTACHMENT
OF OTHER
ORGANISMS TO
BIOFILM
(days-months)



Xylitol- research



Acta Odontol Scand. 2004 Oct;62(5):245-50.

Salivary mutans streptococci and dental caries in three-year-old children after maternal exposure to chewing gums containing combinations of xylitol, sorbitol, chlorhexidine, and fluoride.

Thorild I, Lindau B, Twetman S.

Public Dental Clinic, Varberg, Sweden.

How Risk kids ? ms levels



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... ts formed a
... ne gum for 5
... es were
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Proper Diagnosis
TANSTAAFL

Xylitol- research



Oral Microbiol Immunol. 2002 Apr;17(2):95-9.

Cariogenic traits in xylitol-resistant and xylitol-sensitive mutants streptococci.

Assef S, Stig S, Scheie AA.

Dept. of Oral Biology, University of Oslo, Norway.

Xylitol resistant MS

Abstract

Long-term xylitol consumption leads to the emergence of cariogenic traits in X-R and xylitol-sensitive (X-S) streptococci. Resistance and sensitivity were confirmed by growth initiated by adding (14)C-labelled glucose, fructose or xylitol. The major metabolite from glucose, whether the bacteria were X-R or X-S, was lactic acid. The unit was lower in X-S cells than in X-R cells. Fructose xylitol-5-P was detected in X-S cells only. Total polysaccharide [U(14)-C]-sucrose. No difference in polysaccharide content was found. The contention that X-R are less cariogenic than X-S is not supported.

not good



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Lactate was
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It was on a short-cut through the hospital kitchens that Albert was first approached by a member of the Antibiotic Resistance.



Xylitol- sugar substitute

- The roles of xylitol in maintaining dental health:
 - Inhibits the growth of cariogenic bacteria
 - Inhibits the formation of dental caries
 - Inhibits the growth of plaque
 - Suppresses the acidity of plaque
 - Accelerates enamel re-mineralization
 - Is not an ideal substrate for bacterial growth because of its difficult-to-ferment nature

Xylitol- sugar substitute

- Low glycemic index- safe for diabetics
- Reduces sinus and ear infections

Sugar	Sweetness (sucrose = 1)	Cooling Effect	Viscosity (cp) at 25°C	Hygroscopicity
Glycerol(92)	0.60	N/A	954	High
Erythritol(122)	0.53 – 0.70	Cool	Very low Insoluble at 70%	Very low
Xylitol(152)	0.87 – 1.00	Very cool	Very low	High
Mannitol(162)	0.50 – 0.52	Cool	Very low Insoluble at 70%	Low
Sorbitol(162)	0.60 – 0.70	Cool	Low 110 cp at 70% solution	Medium
Maltitol(344)	0.74 – 0.95	None	High	Medium
Isomalt(344)	0.35 – 0.60	None	High	Low
Lactitol(344)	0.35 – 0.40	Slightly cool	Very low	Medium
Sucrose(342)	1.00	None	Low High at 70% solution	Medium



Xylitol products



- Xlear (Clear)
- Established 2000 to launch the company's first commercially available product, Xlear® Nasal Spray.



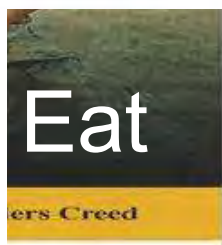
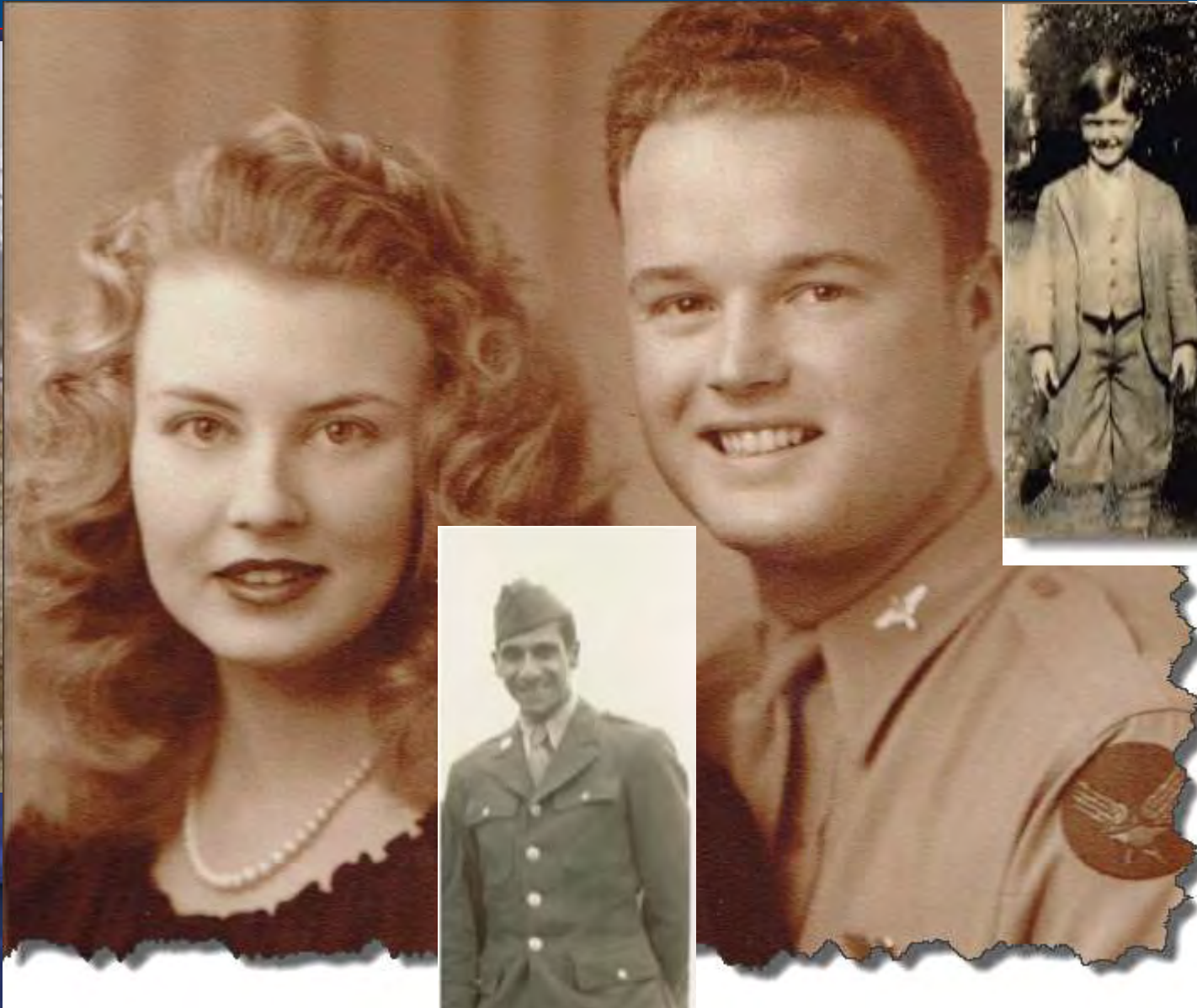
Dr. Alonzo H. Jones, D.O., a family physician in west Texas, now retired, was trying to find a solution for the people coming to see him for upper respiratory issues. He studied the research pointing to the benefits of xylitol for improving oral health and its effects on bacteria. He noted that upper respiratory problems had been steadily increasing since the early 1970s, owing to environmental factors that included poorly conceived drug therapy and growing antibiotic resistance..

Xylitol products

- Xlear (Clear)



MRE- xylitol gum- G.I. issue



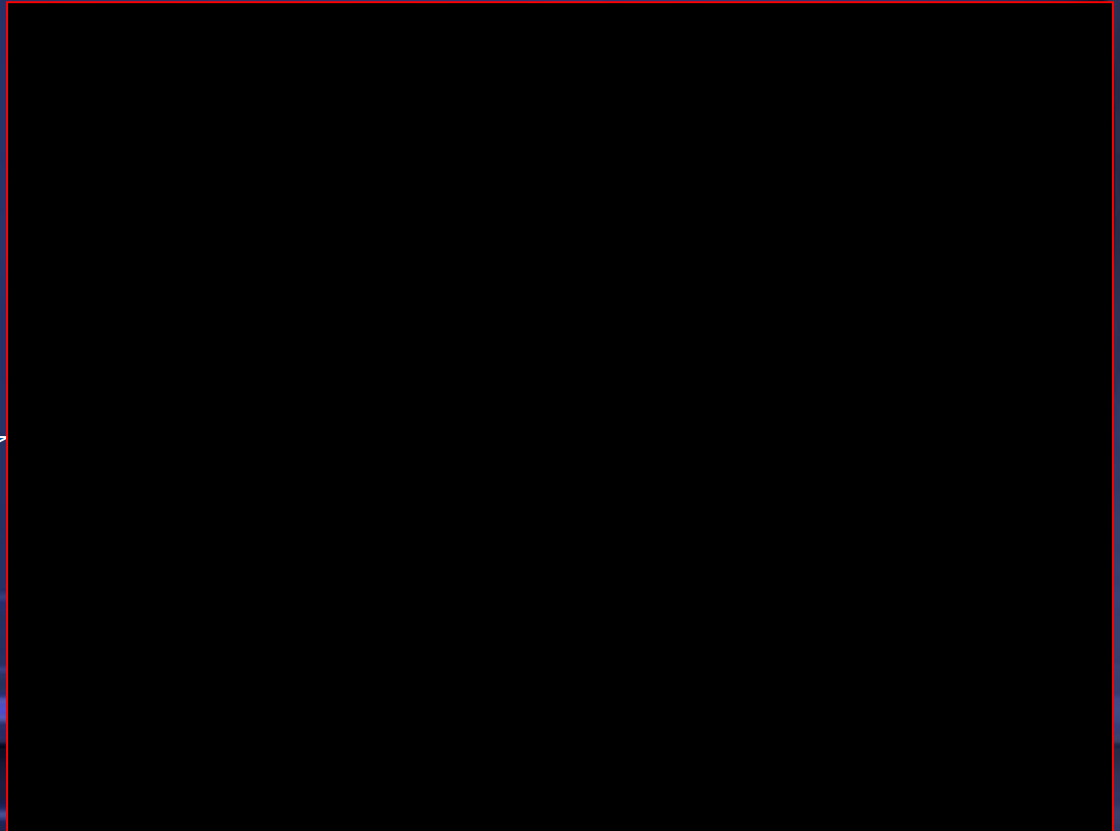
st food

Minimally Invasive Dentistry

- Going too far!

Preventive Care

Invasive dentistry
“bites”





Pediatric Protocols

New Concepts in Preventive Care

Susan Hagen RDH

Lisa Lange- DA

Megan Weirich- DA

Associated Dental Specialists of Long Grove
Grove Medical Center, Long Grove, IL USA



Protocols

Standardize Care
Minimizes Mistakes
Increase Efficiency

Education

Practitioner
Staff
Patients and Parents

Concepts

How things have changed!!!
Re-educate, that is the key.



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According to repeated nationwide surveys,

More Doctors Smoke **CAMELS** than any other cigarette!

Doctors in every
branch of medicine
were asked, "What
cigarette do you smoke?"
The brand named most
was Camel!

You'll enjoy Camels for the good reason
so many doctors enjoy them. Camels have
mild, just sufficient, just right taste, and
a flavor unmatched by any other cigarette.
Make this sensible test: Smoke only
Camels for 30 days and we know we'll Camels
prove your taste. Now tell they will
find them as your steady smokers. You'll
too have enjoyable a cigarette smoker!

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Illinois. "I smoke Camels. They make me feel
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DR. HENRY J. DODD, M.D., Chicago
Illinois. "I smoke Camels. They make me feel
refreshed and calm."



DR. HENRY J. DODD, M.D., Chicago
Illinois. "I smoke Camels. They make me feel
refreshed and calm."



For 30 days, test Camels in your "V-Zone" (V for Throat, V for Taste).



ier!



Is too soon?

story tests over the last few years
to start drinking soda during that
a much higher chance of gaining
during those awkward pre-teen
self a favor. Do your child a favor.
ion of sodas and other sugary
now, for a lifetime of guaranteed

Up Board of America

1515 W. Hart Ave. - Chicago, ILL.

How
Re-educate, that is

Pediatric Dental Care Protocols

Infant Examination

All infants to three years of age.

Detailed medical history obtained prior to appointment. **Maternal/child dental history obtained.**

Parental questions and concerns are extremely important and must be considered at the beginning of each appointment.

Child exam and prophylaxis as able with **MI fluoride** varnish application.

Inform and encourage the use of **xylitol** products for child and caregiver.

- Defined by:



Medical/Dental
history

Infant Oral Care

Pediatric Dental Care Protocols

- Treatment determined by Diagnosis and History
- Educate parent
- Parent education

Give positive advice on diet, decay prevention, bottle use, and sucking habits. Tooth brushing instructions given to parent/child.

Explain Importance of establishing dental home in case of trauma.

Regular recare visits stressed.

*Preventive products given as needed—
xylitol products, toothpaste, MIPaste,
probiotic drops*

Maternal intervention



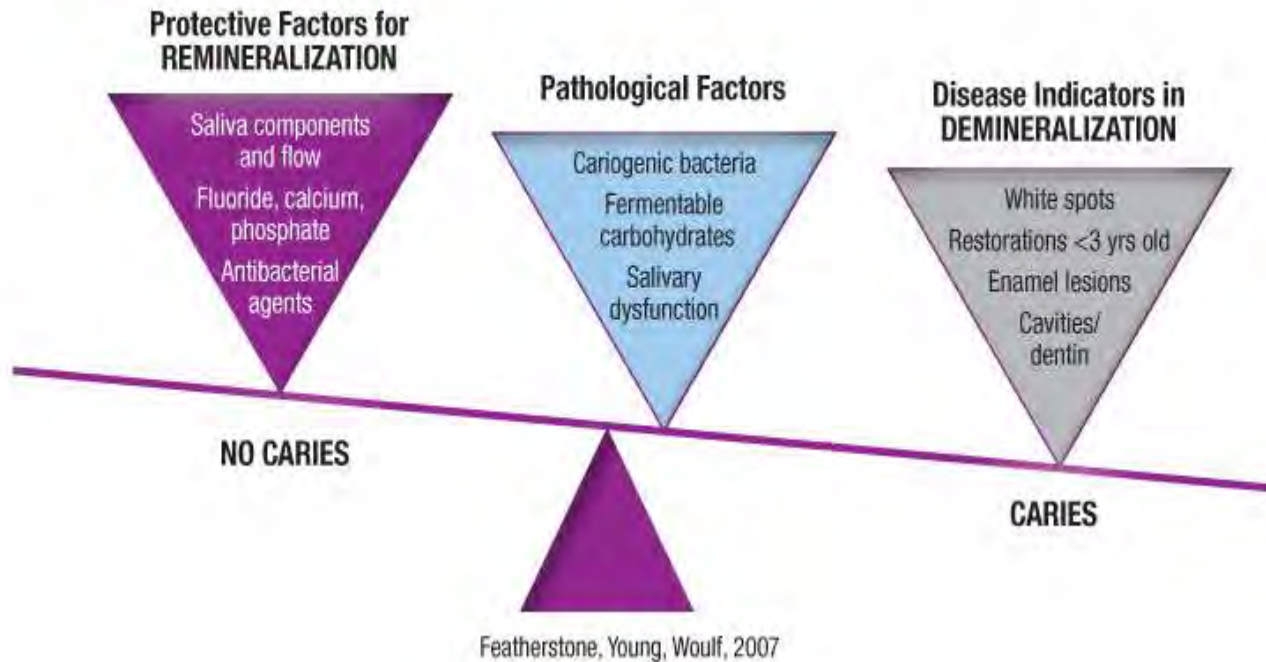
Infant Oral Care

Pediatric Dental Care Protocols

- CAMBRA
 - Patient treated as an individual and according to need

Caries Management By Risk Assessment

THE CARIES IMBALANCE⁵



Infant Oral Care

Pediatric Dental Care Protocols

- New Patient and Recare Evaluations

New Patient/Recare Examination Appointment

All new patients require an extensive evaluation and consultation. Whenever possible, new patients

with known medical/dental issues should be scheduled on the doctor's schedule to increase patient contact especially in preventive

should be available to present plus provide insurance

allow for E-Reports.



USE NEW Technology

Patient Evaluation

RESULTS: Attentional deficits have been reported in up to 95% of OSA patients. In full syndromal ADHD, a high incidence (20% to 30%) of OSA has been shown. All 6 interventional studies reported improvements in behavior, inattention, and overall ADHD after treatment of OSA.

Is obstructive sleep apnea associated with ADHD?

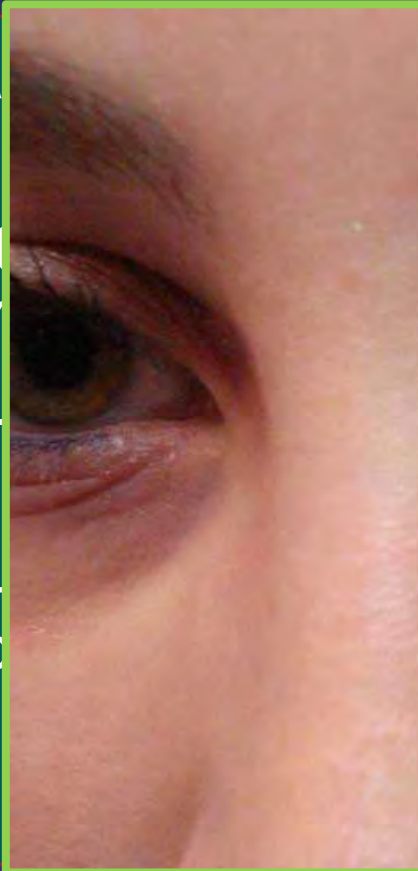
Nagy A. Youssef, MD
Margaret Ege, MD
Sohair S. Angly, MD
Jennifer L. Strauss, PhD
Christine E. Marx, MD, MA

BACKGROUND: It has been suggested that obstructive sleep apnea (OSA) may result in symptoms similar to those experienced in attention-deficit/hyperactivity disorder (ADHD). Because this may have important public health implications, we reviewed the literature regarding this association, with a focus on interventional studies examining the effect of OSA treatment on change in ADHD symptoms.

Patient Evaluation

Pediatric Dental Care Protocols

- Facial exam
 - Do they look healthy and function normally?
 - Allergies: Morgan, Dennie L., and vena pooling



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story

Patient Evaluation

Pediatric Dental Care Protocol

Obstructive Sleep

Sleep Medicine Center

The Sleep Medicine Center at Lurie Children's is the only comprehensive sleep center in Illinois dedicated solely to children. The center provides clinical evaluation, diagnosis and management of children with all forms of sleep disorders. Sleep disorders treated by our staff include sleep-disordered breathing, sleep apnea, nightmares, insomnia, parasomnias, narcolepsy and circadian rhythm disorders. Since its opening in 1995, the sleep specialists have seen more than 5,000 patients, and more than 14,000 patient studies have been conducted.

posterior
crossbites
•Maxillary
hypoplasia

Our Specialists

The center is directed by [Stephen H. Sheldon, DO](#). Dr. Sheldon is board-certified in both pediatrics and sleep disorders medicine. He has served as a member of the board of directors and was Secretary/Treasurer of the [American Academy of Sleep Medicine](#). He has been a faculty member of the National Sleep Medicine Course (sponsored by the AASM) and is course director of the Advanced Pediatric Sleep Medicine Program of the Atlanta School of Sleep Medicine, Northside Hospital, Atlanta, Georgia.

[Darius A. Loghmanee, MD](#), board-certified in internal medicine, pediatrics and sleep disorders medicine. Since 2008, Dr. Loghmanee has treated patients at Lurie Children's with sleep-disordered breathing, insomnia, parasomnias, narcolepsy, circadian rhythm disorders and other conditions in the spectrum of sleep disorders.



Pediatric Dental Care Protocols

- Wilson Quadhelix for maxillary arch development
- Expand both anterior and posterior segments



Pediatric Dental Care Protocols

- Post operative view with upper arch expansion evident
- Note molar bands and no snoring/sleep issues



Pediatric Dental Care Protocols

- Four year old girl with anterior crossbite and prognathic profile
- Patient bites edge to edge and slides anteriorly
- Parents concerned about profile
- No family history of Class III relationships
- OSA!! Sleep Study



Pediatric Dental Care Protocols

- Frontal view in full occlusion- pre-operative photo
- Sleep apnea reported- snoring/ sleep issues
- Wilson Quadhelix cemented and crossbite corrected



Pediatric Dental Care Protocols

- Child no longer appears prognathic and crossbite corrected, mother quite happy no snoring/OSA

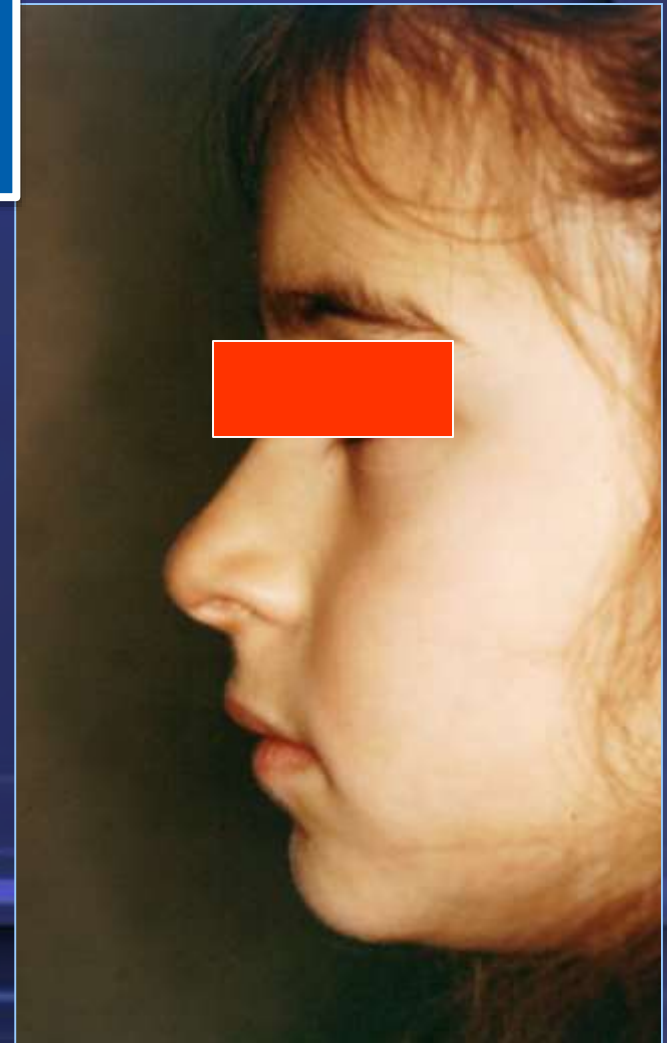


Pediatric Dental Care Protocols

Anterior crossbite with retrognathic profile

Treated with Wilson Quadhelix appliance

Snoring with sleep apnea episodes- ENT “normal”



Pediatric Dental Care Protocols

- Anterior crossbite corrected
- Molars bands left on for one year post treatment



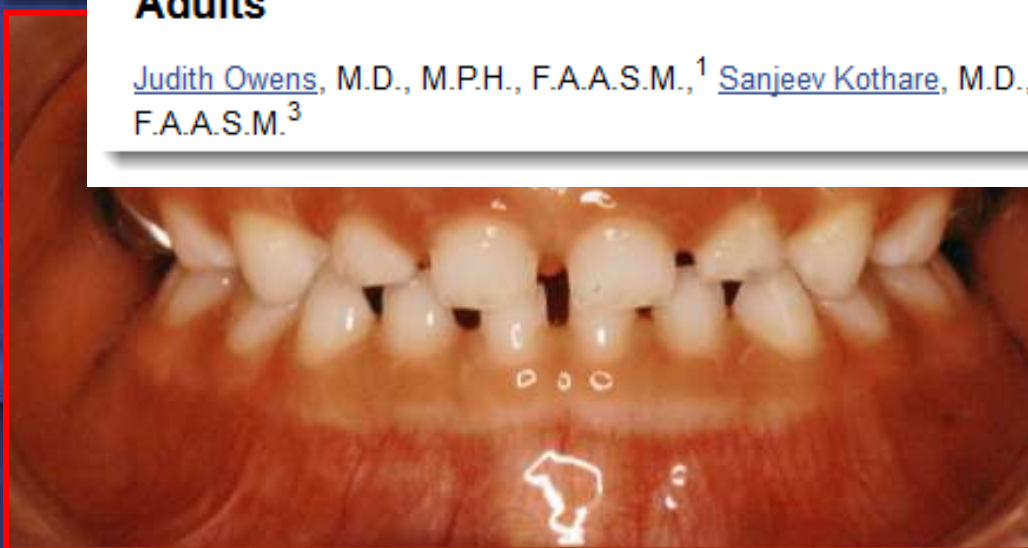
J Clin Sleep Med. Oct 15, 2012; 8(5): 473–476.

PMCID: PMC3459190

Published online Oct 15, 2012. doi: [10.5664/jcsm.2132](https://doi.org/10.5664/jcsm.2132)

PRO: “Not Just Little Adults”: AASM Should Require Pediatric Accreditation for Integrated Sleep Medicine Programs Serving Both Children (0-16 years) and Adults

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Pediatric Dental Care Protocols

- Cariscreen from Oral Biotech



Cariscreen- sample of plaque swabbed from two teeth of patient. Parents are instructed prior to appointment regarding food and drink restriction or brushing within an hour previous to testing. They should not be taking antibiotics for the test to be accurate. The test takes the least time, very reliable. **60** seconds to equilibrate, **15** seconds to run plaque sample.

Patient Evaluation

Pediatric Dental Care Protocols

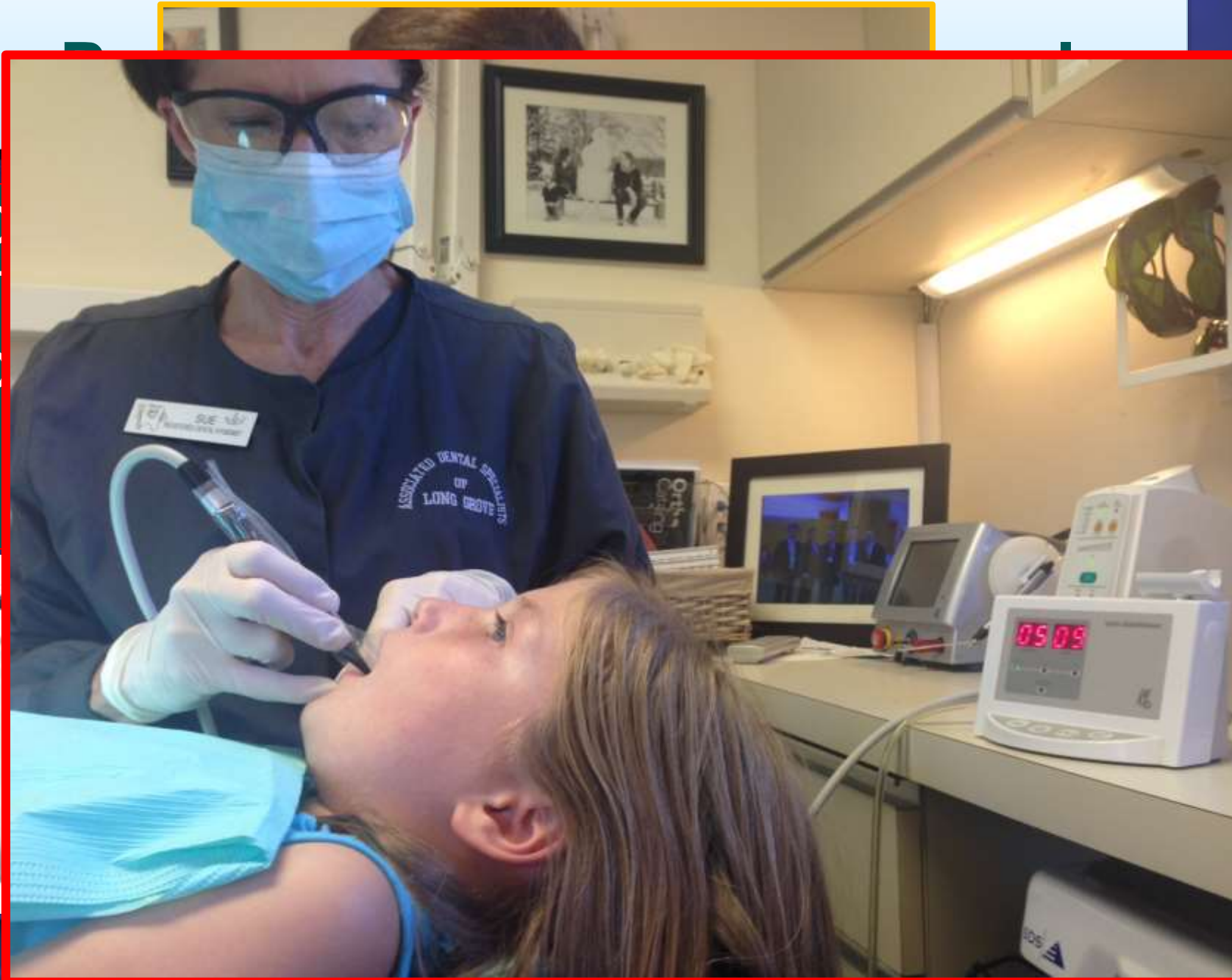
- Saliva check mutans
- GC America



Saliva check mutans- sample of saliva collected by chewing wax, specific only for *Streptococcus mutans*, uses antibody/antigen specificity, not as universal as it does not test for all pathogens, 15-20 minutes for test and results.

Patient Evaluation

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Pediatric Dental Care Preventive Care

- In P C P



Study Involving Children at High Risk of Experiencing Caries

Standard Mean Difference (95% CI)	No., Mean (SD) in Participant Group	Percentage Weight
	Treatment	Control

bioactive fluoride content > 1,000 ppm

Study Involving Children at Normal Risk of Experiencing Caries

Standard Mean Difference (95% CI)	No., Mean (SD) in Participant Group	
	Treatment	Control

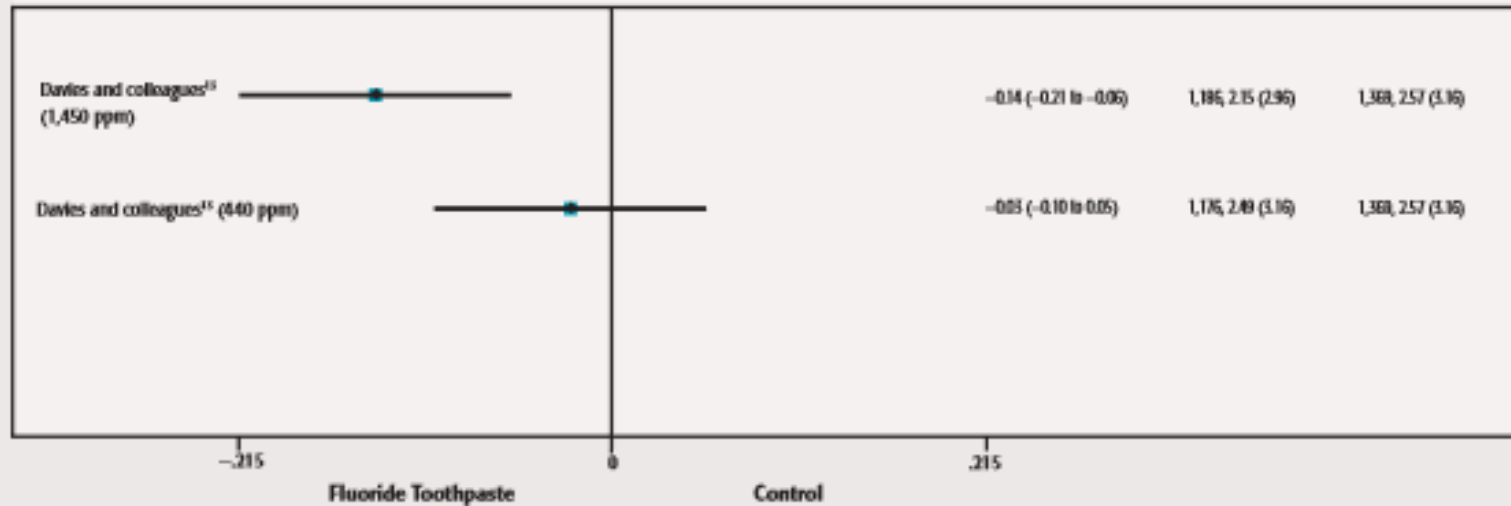


Figure 3. The effect of brushing with fluoride toothpastes (1,450 parts per million fluoride and 450 ppm fluoride) on caries (decayed, missing and filled primary teeth) in children younger than 6 years who are not at high risk of developing caries. CI: Confidence interval. SD: Standard deviation.

Preventive Care

young.

GC Saliva Check! Recognize

Quality/Quantity & Buffering Matters!



Are good saliva test results just as meaningful as bad results?



1409 medications cause dry mouth

Either tick the box or write in the result, as appropriate.

Product Code: 0210-100

Pediatric Dental Care Protocols

- Pre
Car
Pro



Dry Mouth
GC Dry
Biotene
OraMoist
Oasis

XyliMelts®
for dry mouth

Pharmacists can order and have it the next day with these item numbers:

Cardinal - 4334751
McKesson - 1146687
AmerisourceBergen - 095-815

Sold to dental professionals at best wholesale prices.
Call or e-mail OraHealth - www.orahealth.com



QUANTUM®
HEALTH

New for Dry Mouth

OraMoist®
Dry Mouth Patch

Works for Hours*

Increases Mouth Moisture

- Patch adheres easily to roof of mouth
- With xylitol and enzymes
- Sugar/alcohol-free
- Time released

The OraMoist patch adheres to the roof of the mouth or inside the cheek and helps relieve dry mouth for hours.

16 Patches
Net Wt. 492 mg, each

Preventive Care

Dental Products: Brushes and Flossies

- Soft bristle toothbrushes with rounded head and easy grips are best for Little patients- easier to manipulate



Dental Products: Floss

- Some will tolerate flossing well by using floss holders, such as, “Flossies”.
- Floss holders with large handles are easier to use
- Care must be taken not to “saw” back and forth with the floss.



Pediatric Dental Care Protocols

- Preventive Care Protocols



Maternal

Discuss with mother xylitol use.

Give copy of maternal research article. Ask mother about probiotic use to mother and oral **probiotics**, such as **PerioBalance**.
Twice yearly dental visits and home care practices.



and why, encourage

protection from decay by pediatrician. Explain use of Klaire Lab products, **PerioBalance**.
emphasize good



Pediatric Dental Care Protocols

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