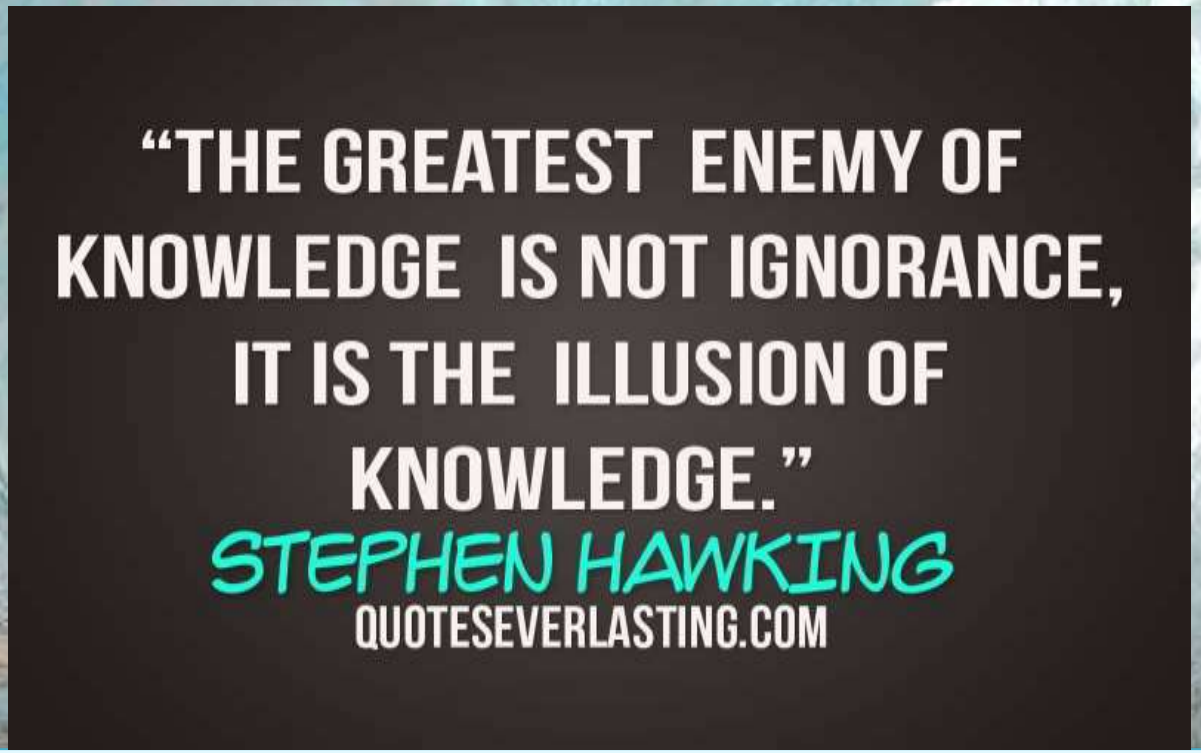
"Oral Health: From Pre-natal to Pre-adolescent"



Mark Cannon DDS MS
Professor Feinberg School of Medicine
Northwestern University, Ann and Robert Lurie Children's Hospital
(Children's Memorial Hospital)

NOT a new concept!!!!

- Slave inspection
- Romans checked teeth
- Egyptians

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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.

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*.

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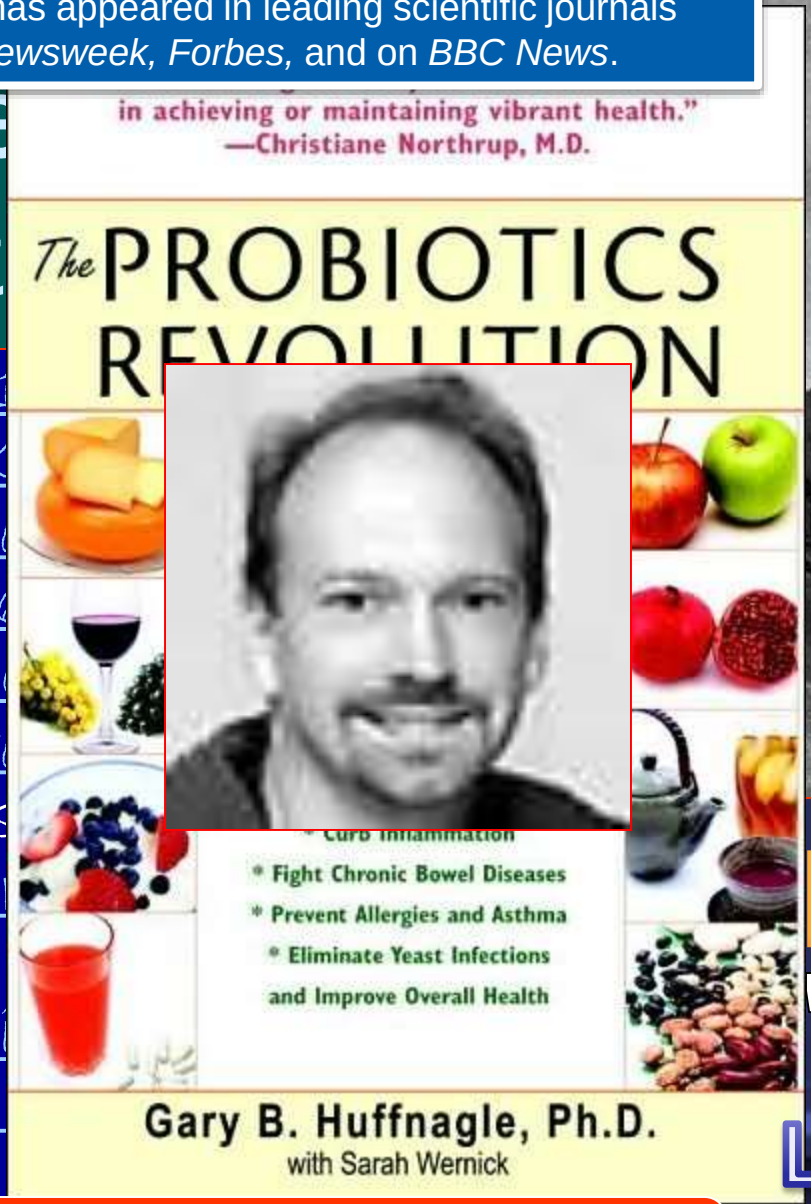
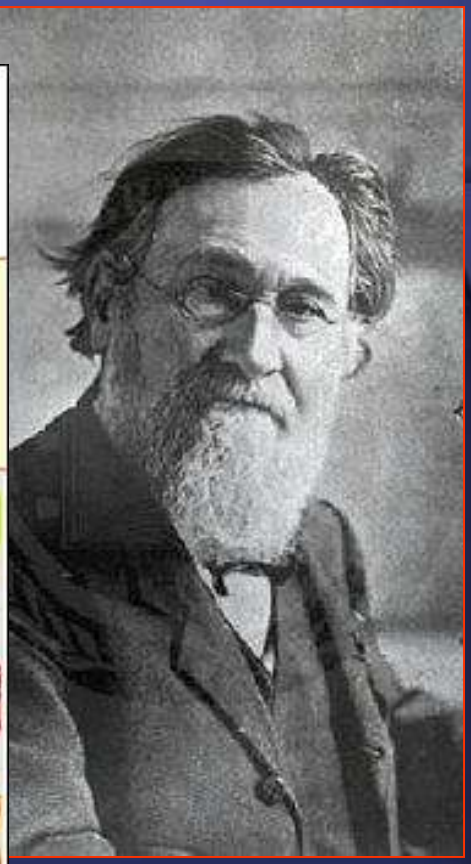


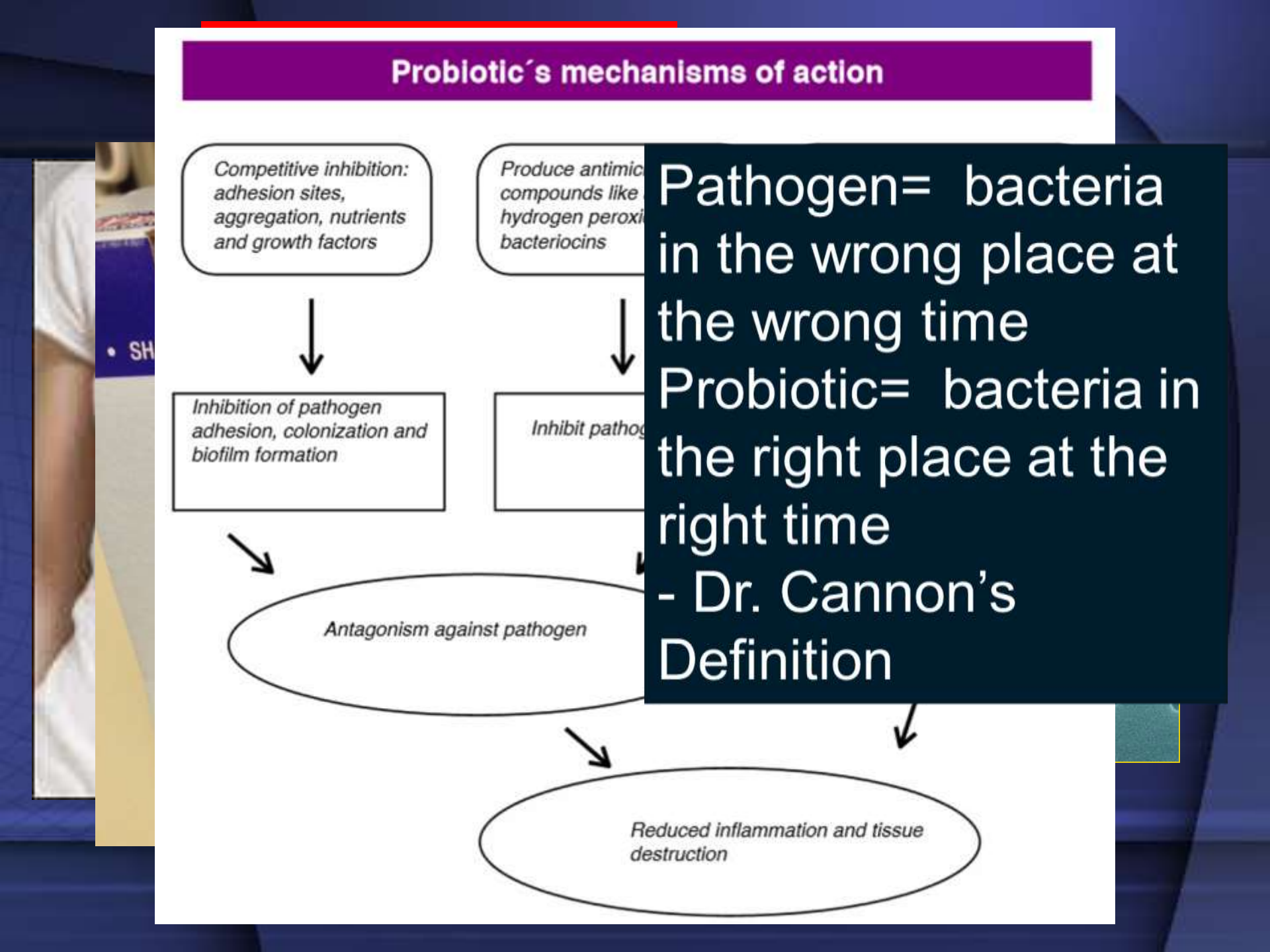


robiotics

"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
Competitive inhibition: adhesion sites, aggregation, nutrients and growth factors
Produce antimic
compounds like
hydrogen peroxi
bacteriocins
Inhibition of pathogen adhesion, colonization and biofilm formation
Inhibit pathog
Antagonism against pathogen
Reduced inflammation and tissue destruction
Pathogen= bacteria in the wrong place at the wrong time
Probiotic= bacteria in the right place at the right time
- Dr. Cannon's Definition

“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

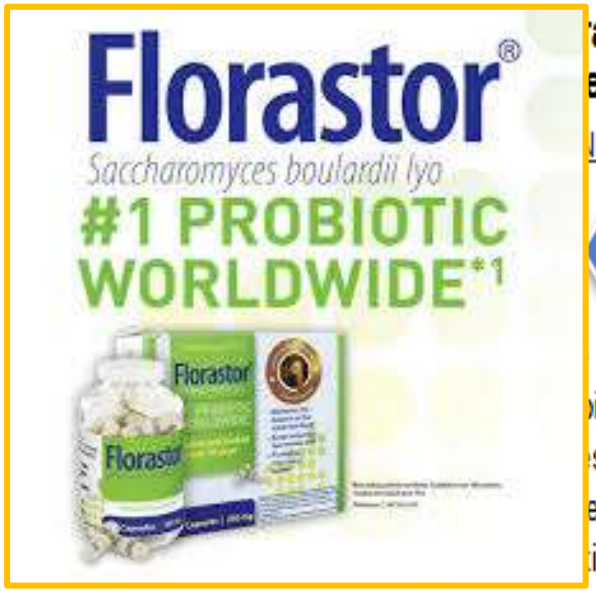
The numl … looks set to be a re …

An analys … cations featuring … biotics, today that figure is over 1200 per year or 100 publications per month.

- PubMed data base … “probiotic” 1985 – 20…
- Key word probiotic…
- Limits:
  - Appearance in abstract
  - English
- 2006: 528 hits
  - 47 human stu…
  - Now over 100 published a mor…
- **Preservation of Antibiotics for Medical Treatment** H.R. 1549/S. 619

Antibiotics and Weight Gain- Livestock

MBio. 2014 Jun 10;5(3):e01011-14. doi: 10.1128/mBio.01011-14.



ation changes gut microbiota and reduces hepatic steatosis, low-grade e and type 2 diabetic db/db mice.

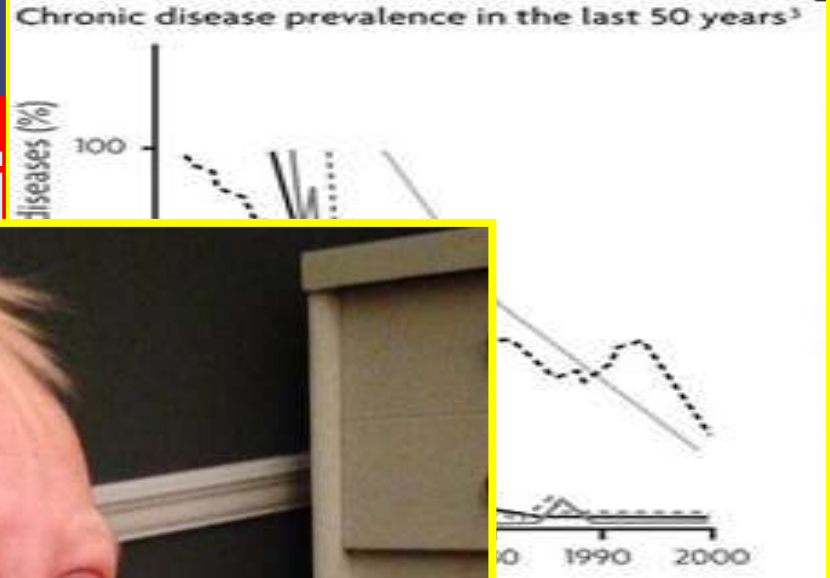
IM[1], Cani PD[2].

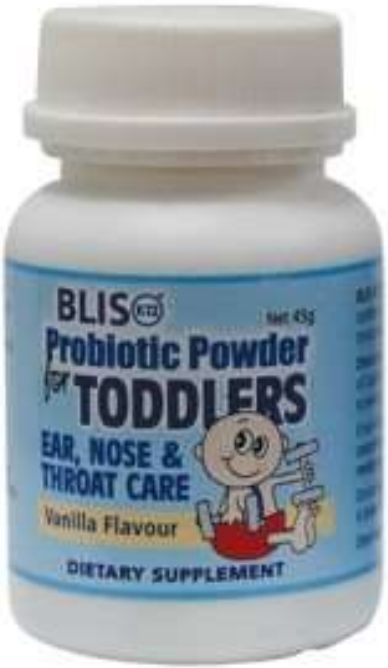
Florasto

lose weight, fat mass, hepatic steatosis and inflammation

key factors involved in the regulation of energy homeostasis, metabolic infla mation, lipid metabolism, iota modulations caused by selectively fermented oligosaccharides or probiotic bacteria constitute an sity. However, to date, no probiotic yeast has been investigated in this context. Therefore, our study ed probiotic yeast (i.e., Saccharomyces boulardii Biocodex) on obesity and associated metabolic ic steatosis, and low-grade inflammation, in obese mice. S. boulardii was administered daily by oral gavage to leptin-resistant obese and type 2 diabetic mice (db/db) for 4 weeks. We found that S. boulardii-treated mice exhibited reduced body weight, fat mass, hepatic steatosis, and inflammatory tone. Interestingly, these effects of S. boulardii on host metabolism were associated with local effects in the intestine. S. boulardii increased cecum weight and cecum tissue weight but also induced dramatic changes in the gut microbial composition at the phylum, family, and genus levels. These gut microbiota changes in response to S. boulardii may also be correlated with the host metabolism response. In conclusion, this study demonstrates for the first time that S. boulardii may act as a beneficial probiotic treatment in the context of obesity and type 2 diabetes. Importance: To date, no probiotic yeast have been investigated in the context of obesity and type 2 diabetes. Here we found that type 2 diabetic and obese mice (db/db) treated with Saccharomyces boulardii exhibited reduced body weight, fat mass, hepatic steatosis, and inflammatory tone. These effects on host metabolism were associated with local effects in the intestine. Importantly, by using pyrosequencing, we found that S. boulardii treatment induces changes of the gut microbiota composition at the phylum, family, and genus levels. Moreover, we found that gut microbiota changes in response to S. boulardii were correlated with several host metabolism responses.

How do probioti

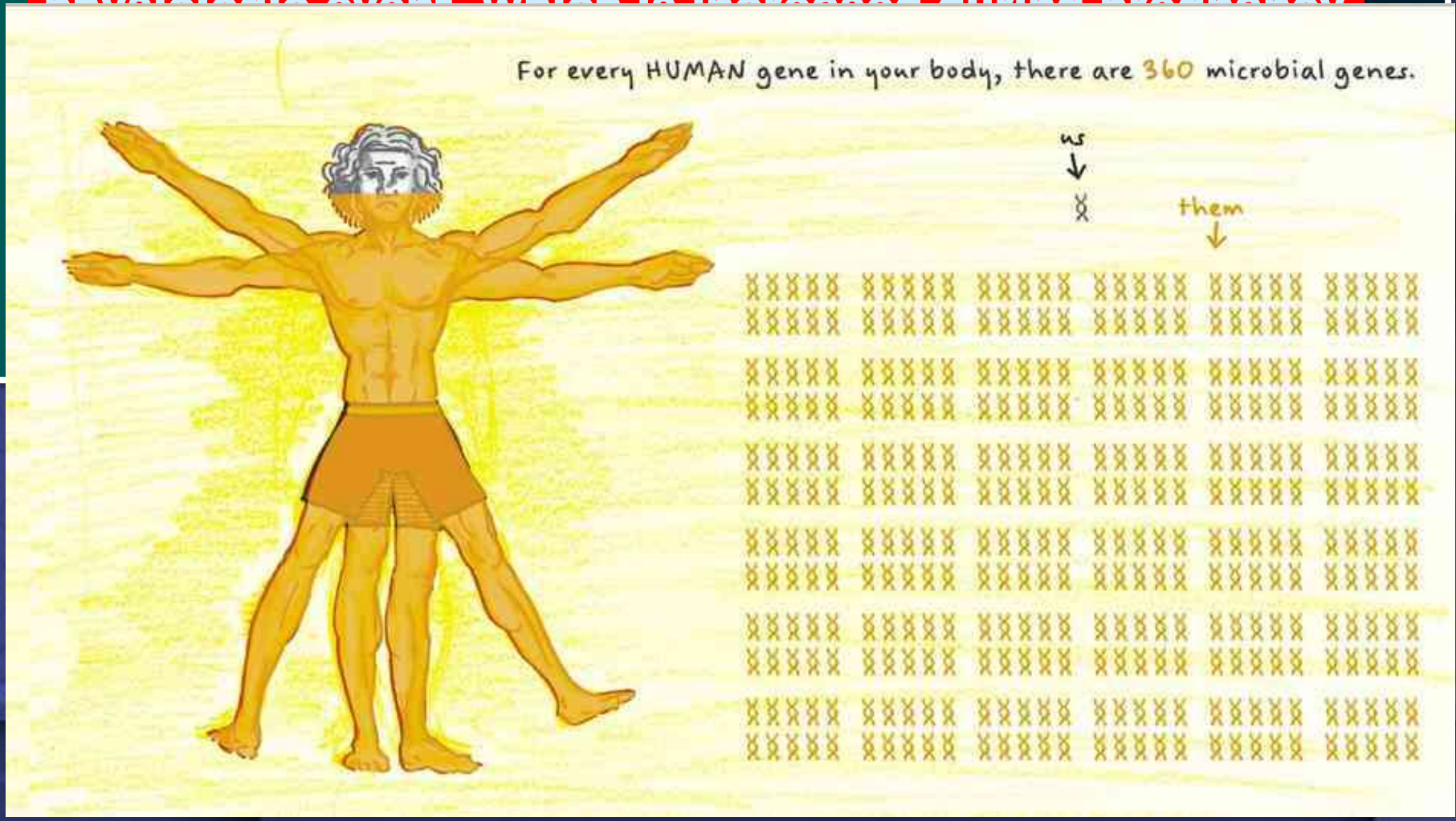




Gastrointestinal Diseases in Children: Hard and Not-
Evidence of Efficacy. *J Pediatr Gastroenterol Nutr* 2
75.

MATERNAL IMPRINTING

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



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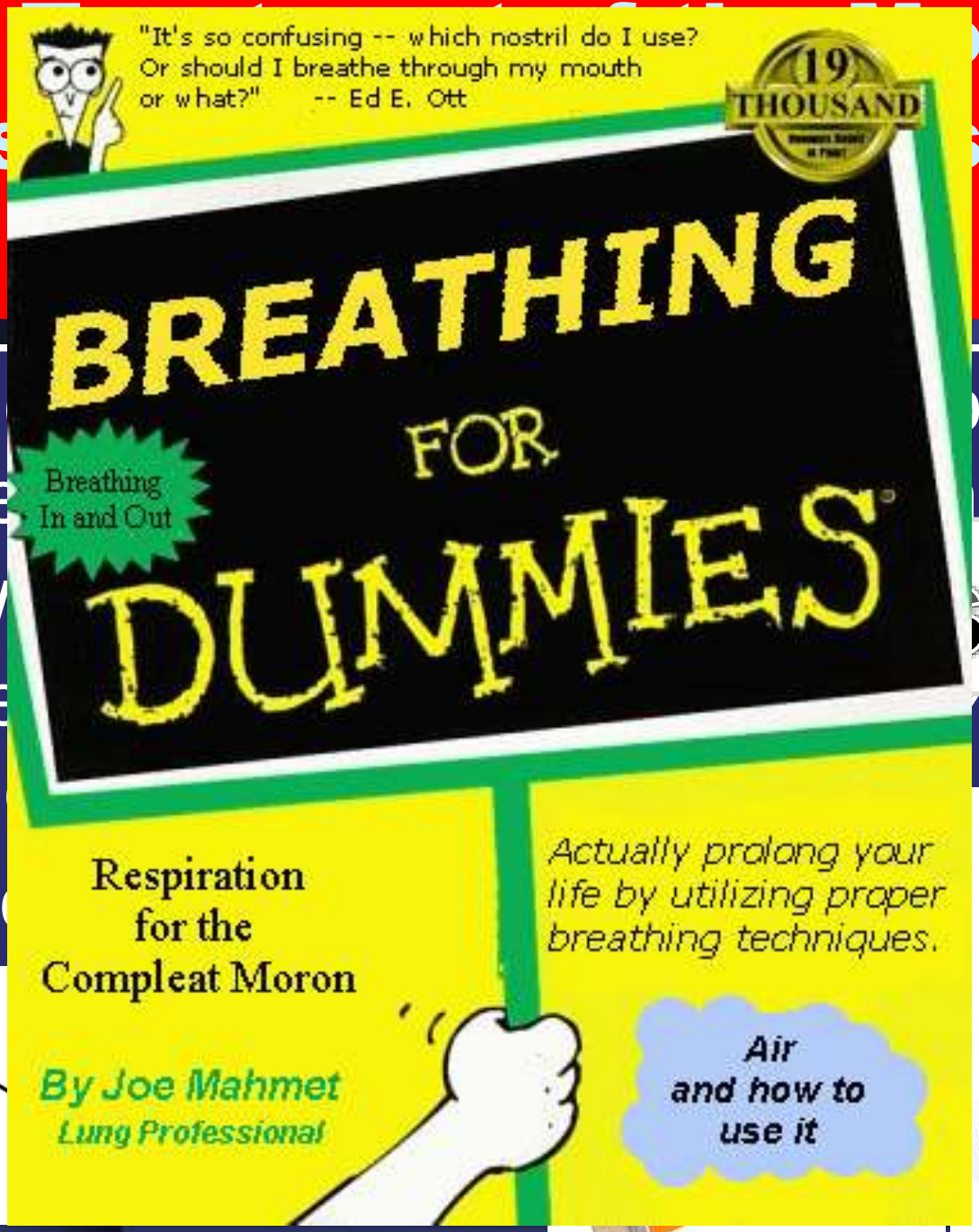
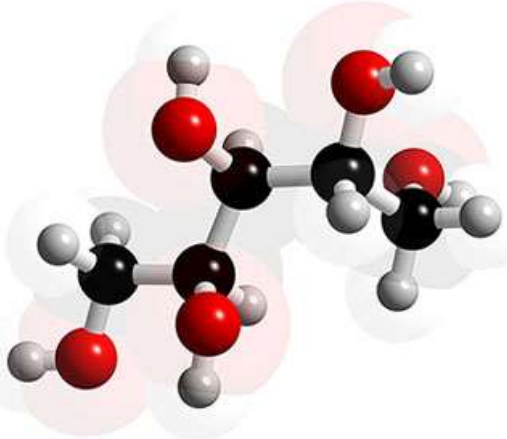




HO

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

Control

L. reuteri

NU study: Dirt's good for kids

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

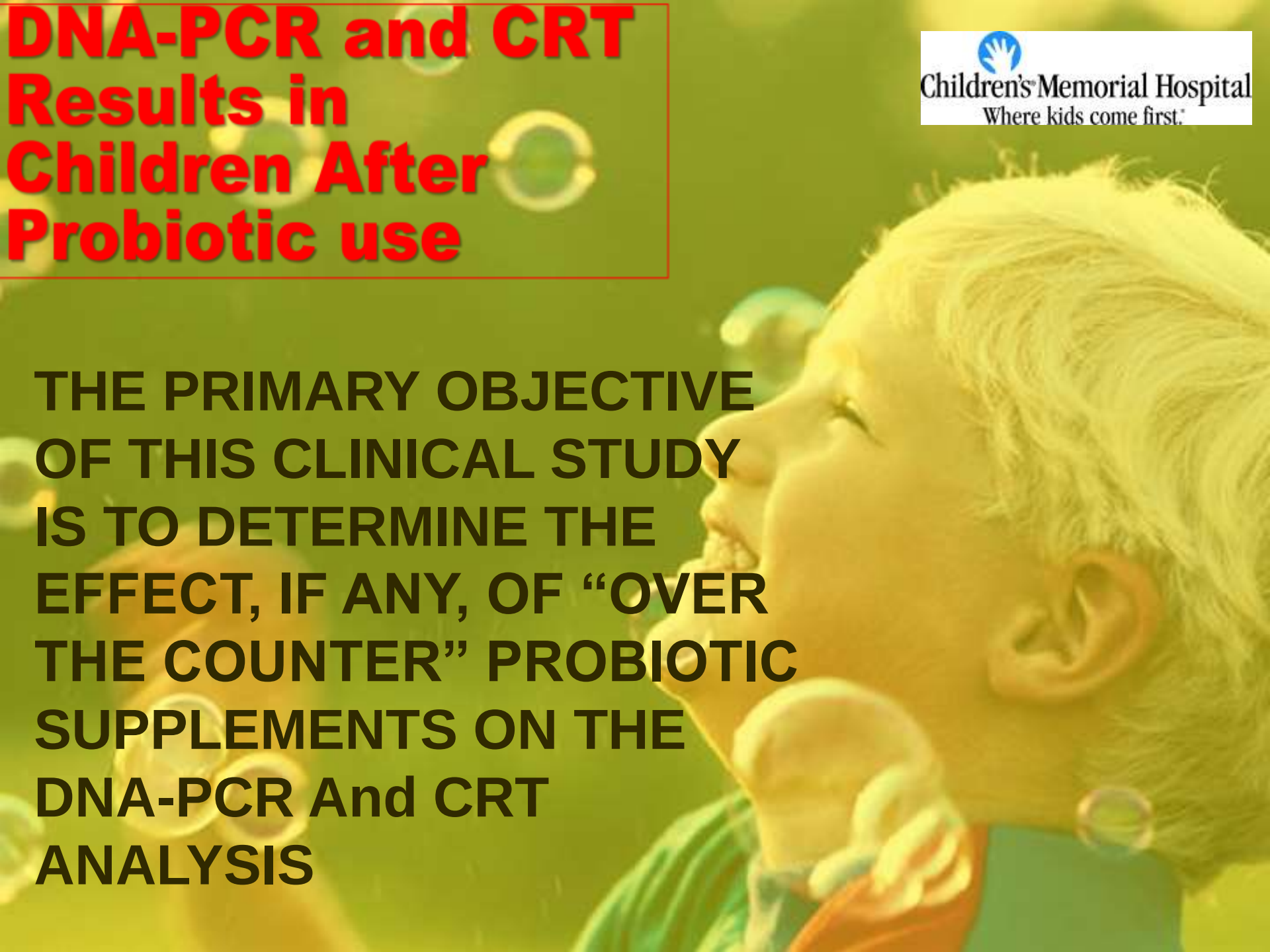
Thom McDade sorts plasma samples at Northwestern University in Evanston. McDade participated in research that shows that kids who are exposed to dirt and germs have healthier hearts. (Andrew A. Nelles, Chicago Tribune / March 7, 2010)

Symb ble

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

DNA-PCR and CRT Results in Children After Probiotic use

Children's Memorial Hospital
Where kids come first.



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

Children's Memorial Hospital
Where kids come first.

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

Conclusions:

Children's Memorial Hospital
Where kids come first.

Both EvoraKids

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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- (Ivoclar) 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= -2.952, 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

Children's Memorial Hospital
Where kids come first.

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

Children's Memorial Hospital
Where kids come first.

Retrospective Review of Probiotic Therapy.

ML Cannon DDS MS

A Vorachek DDS

K White DMD

C Le DMD

An IRB Approved Study

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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 place 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.

Further Research

Children's Memorial Hospital
Where kids come first.

Retrospective Review of

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.

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.

Oral Health Probiotics- what to use?

- Periobalance
- Evora Pro
- Evora Plus
- Biogaia
- ProlacSan
- BLIS K12
- Prodegin
- Gluten metabolizers

Probiotics- Antagonism and Inhibition

Ongoing Research

Working in the "probiotic"?

What causes gluten Sensitivity??

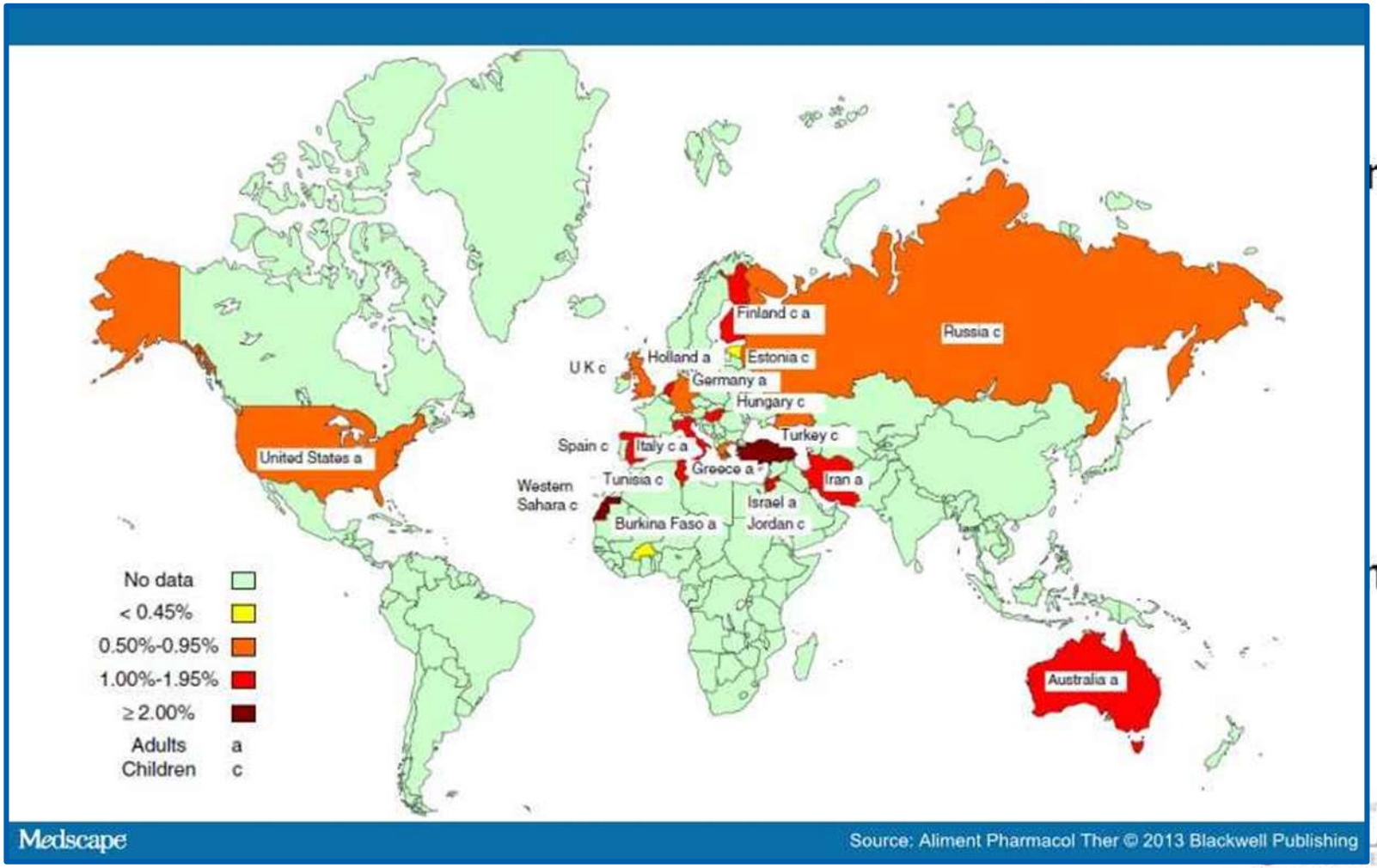
Is it an ORAL disease?????

Alimentary Pharmacology & Therapeutics

Systematic Review: Worldwide Variation in the Frequency of Coeliac Disease and Changes Over Time

J. Y. Kang, A. H. Y. Kang, A. Green, K. A. Gwee, K.Y. Ho | Disclosures

Aliment Pharmacol Ther. 2013;38(3):226-245.



Gluten sensitivity epidemic

Clin Nutr. 2013 Dec;32(6):1043-9. doi: 10.1016/j.clnu.2013.02.003. Epub 2013 Feb 14.

Evaluation of the safety of ancient strains of wheat in coeliac disease reveals heterogeneous small intestinal T cell responses suggestive of coeliac toxicity.

Šuligoj T[1], Gregorini A, Colomba M, Ellis HJ, Ciclitira PJ.

⊕ Author information

Ancient grains NO better!!

Abstract

BACKGROUND & AIMS: Coeliac disease is a chronic small intestinal immune-mediated enteropathy triggered by dietary gluten in genetically predisposed individuals. Since it is unknown if all wheat varieties are equally toxic to coeliac patients seven Triticum accessions showing different origin (ancient/modern) and ploidy (di-, tetra- hexaploid) were studied.

MATERIALS AND METHODS: Selected strains of wheat were ancient Triticum monococcum precoce (AA genome) and Triticum speltoides (BB genome), accessions of Triticum turgidum durum (AABB genome) including two ancient (Graziella Ra and Kamut) and two modern (Senatore Cappelli and Svevo) durum strains of wheat and Triticum aestivum compactum (AABBDD genome). Small intestinal gluten-specific T-cell lines generated from 13 coeliac patients were tested with wheat accessions by proliferation assays.

RESULTS: All strains of wheat independent of ploidy or ancient/modern origin triggered heterogeneous responses covering wide ranges of stimulation indices.

CONCLUSION: Ancient strains of wheat, although previously suggested to be low or devoid of coeliac toxicity, should be tested for immunogenicity using gluten-specific T-cell lines from multiple coeliac patients rather than gluten-specific clones to assess their potential toxicity. Our findings provide further evidence for the need for a strict gluten-free diet in coeliac patients, including avoidance of ancient strains of wheat.

2. Hybridized grains

3. Microflora changes

Gluten sensitivity epidemic

1745 Comprehensive Screening of Saliva and Dental Plaque for Gluten-Degrading Microorganisms

Friday, March 22, 2013: 10:45 a.m. - 12:15 p.m.
Location: Room 614 (Washington State Convention Center)
Presentation Type: Oral Session

M. FERNANDEZ-FEO[1], G. WEI[1], F.E. DEWHIRST[2], D. SCHUPPAN[3], F.G. OPPENHEIM[1], and **E.J. HELMERHORST**[1], [1]Dept. of Periodontology & Oral Biol, Boston University, Boston, MA, [2]Forsyth Institute, Cambridge, MA, [3]Harvard University, Boston, MA

3. Microflora changes

What causes oral microflora changes?

Gluten sensitivity epidemic

- Results: The culturing strategy yielded 87 aerobic and 63 anaerobic strains. Twenty one aerobic strains representing seven oral species showed activity in at least two of the four assays with two species being active in all four assays.

  Conclusions: New gluten-degrading microorganisms were identified that naturally colonize the upper gastro-intestinal tract. A cocktail of the most active oral bacteria, or their isolated enzymes, may offer promising new treatment modalities for celiac disease.

Gluten sensitivity epidemic

- Inhibition of Rothia Species by OTC Products and Bacterial Antagonists

Barstad D, Garcia K, Cannon M, Kabat B, Yogev R, Jantra L, Muhammad A, Vorachek A

Ann & Robert H. Lurie Children's Hospital of Chicago

The purpose of this study was to determine if there is any inhibition of beneficial oral biofilm species such as Rothia aeria, R. mucilaginosa and R. dentocariosa, Streptococcus mutans (pathogen- negative control)and also Lactobacillus reuteri strains (isolated from PERIO Probiotic) by over the counter (OTC) oral anti-microbials utilizing in vitro laboratory technique. The secondary objective was to determine the antagonism, if any, of the Rothia genus by Streptococcus species (mutans and salivarius) and known pathogens. Rothia aeria and mucilaginosa are believed to be important in the processing of gluten.

Probiotics- Antagonism and Inhibition

Rothia inhibition and antagonism

Rothia Aeria is inhibited by:
1. Chlorhexidine
2. Listerine Smartrinse™

TABLE 1a. Susceptibility Experiment: The Effect of Over the counter Oral Hygiene Products on Oral Bacteria

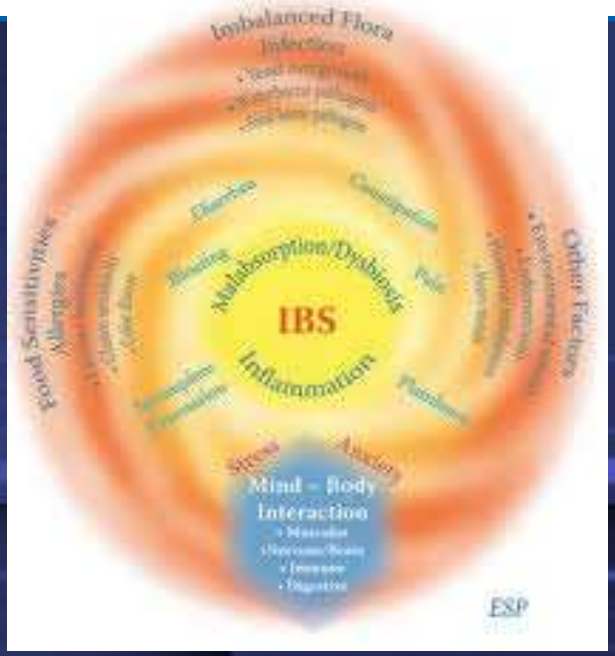
Reagent	*Rothia Aeria* on blood agar	*R. dentocariosa*		*R. mucilaginosa*		PERIO probiotic *(Lactobacillus)*		*S. Mutans* on blood agar
		on blood agar	on Brucella	on blood agar	on Brucella	on blood agar	on Rogosa	
Spry Xylitol Mouthwash™	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0	0, 0
Crest Prohealth™	9, 9	12, 12	11, 11	14,16	14, 10	15, 13	16, 13	12, 12
ACT fluoride rinse™	10, 10	11, 12	14	12, 14	16, 14	17, 15	16, 15	13
Listerine Smartrinse™	9, 9	10, 11	9, 9	14, 14	9, 8	14, 12	13, 12	11, 11
Chlorhexidine (11.6% alcohol)	13, 12	18, 18	13, 12	14, 14	11, 11	16, 15	15, 15	15, 14
Listerine™ (27% Alcohol)	0, 0	0, 0	0, 0	0, 0	0, 0	9, 9	0, 0	0, 0
Phosphate Buffered Saline (PBS)	0	0, 0	0	0, 0	0	0	0	0
27% Alcohol	0, 0	0, 0	10	0, 0	0	10	0	0
Embrace Varnish™ (has xylitol)	8, 9	0, 0	0, 0	12, 12	0, 0	0, 0	0, 0	0, 0
Spry™ Xylitol toothpaste gel	0, 0	0, 0	0, 0	10, 12	0, 0	0, 0	0, 0	0, 0
50% Spry™ Xylitol toothpaste gel in PBS		0, 0		0, 0				
Levoflaxacin (5 micrograms)	30	30	30	36	20	0	0	20

Note: All dimensions shown in millimeters

Gluten sensitivity epidemic

Conclusion:

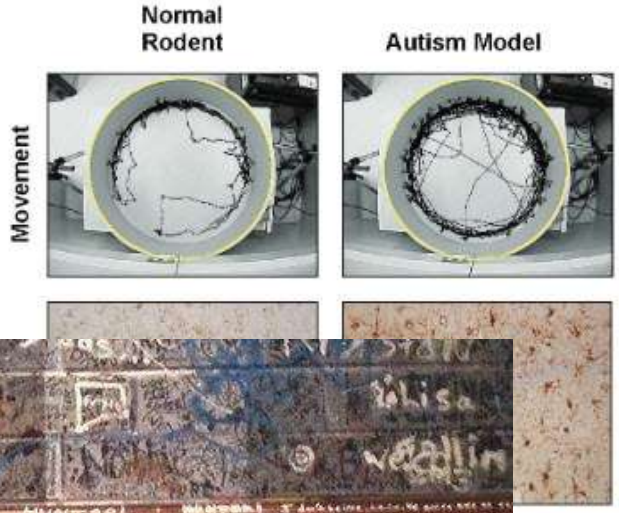
Rothia species, *S. mutans* and Lactobacillus species, are decreased in quantity by the over use of oral anti-microbials. OTC products may alter the oral microbiome creating a situation less conducive for the survival of essential beneficial bacteria. The use of OTC products may decrease the enzymatic degradation of gluten containing foods by Rothia bacteria resulting in gluten sensitivity, Irritable Bowels Syndrome, and exacerbating ulcerative colitis increasing Celiac disease clinical prevalence.



Probiotics- Neurologic Implications

- Autism
- "Autism Spectrum Disorder"
- Evidence mounts,

Short-chain fatty aci… products of the gut … implications in autis… disorders



Transl Psychiatry. 2013 Jan 22;3:e220. doi: 1

Unique acyl-carnitine profile… disorder.

Frye RE[1], Melnyk S, Macfabe DF.

⊕ Author information

Abstract

Autism spectrum disorder (ASD) has … a specific genetic mutation to explain … Acquired MD has been demonstrated … ASD-associated gut bacteria, is infus… neuropathologic and neurophysiologic… short-chain and long-chain acyl-carnit… abnormal fatty-acid metabolism are p… underwent screening for metabolic dis… reviewed. Acyl-carnitine panels were … these abnormalities were verified by repeated testing. Overall, 17% of individuals with ASD demonstrated consistently abnormal acyl-carnitine panels.

…ectrum …D do not have … ASD. … metabolic, …vations in …rkers of …) who …nic were …panel and

Probiotics- Neurologic Implications

- Autism
- "Autism Spectrum

Gut Pathog. 2013; 5: 32.
Published online Nov 4, 2013. doi: 10.1186/1757-4749-5-32

Possible ameliorative effects of antioxidants on propionic acid / clindamycin - induced neurotoxicity in Syrian hamsters

Afaf El-Ansary[1,4,5,6], Ghada Shaker[2], Nikhat J Siddiqi[1] and Laila Y Al-Ayadhi[3,4,5]

carnosine and carnitine

Gut Pathog. 2013 Apr 12;5(1):9. doi: 10.1186/1757-4749-5-9.

The neurotoxic effect of clindamycin - induced gut bacterial imbalance and orally administered propionic acid on DNA damage assessed by the comet assay: protective potency of carnosine and carnitine.

El-Ansary A[1], Shaker GH, El-Gezeery AR, Al-Ayadhi L.

Author information

oral administered or induced by clindamycin induced!
Protection by anti-oxidants, carnosine or carnitine

Abstract

BACKGROUND: Comet assay is a quick method for assessing DNA damage in individual cells. It allows the detection of single and double DNA strand breaks, which represent the direct effect of some damaging agents. This study uses standard comet quantification models to compare the neurotoxic effect of orally administered propionic acid (PA) to that produced as a metabolite of bacterial overgrowth induced by clindamycin. Additionally, the protective effect of carnosine and carnitine as natural dietary supplements is assessed.

METHODS: Single cell gel electrophoresis (comet assays) were performed on brain cortex and medulla samples after removal from nine groups of hamsters including: a control (untreated) group; PA-intoxicated group; clindamycin treated group; clindamycin-carnosine group and; clindamycin-carnitine group.

RESULTS: There were significant double strand breaks recorded as tail length, tail moment and % DNA damage in PA and clindamycin-treated groups for the cortex and medulla compared to the control group. Neuroprotective effects of carnosine and carnitine were observed. Receiver Operating Characteristics curve (ROC) analysis showed satisfactory values of sensitivity and specificity of the comet assay parameters.

CONCLUSION: Percentage DNA damage, tail length, and tail moment are adequate biomarkers of PA neurotoxicity due to oral administration or as a metabolite of induced enteric bacterial overgrowth. Establishing biomarkers of these two exposures is important for protecting children's health by documenting the role of the imbalance in gut microbiota in the etiology of autism through the gut-brain axis. These outcomes will help efforts directed at controlling the prevalence of autism, a disorder recently related to PA neurotoxicity.

Probiotics- Neurologic Implications

- Autism
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Abstract

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Probiotics- Neurologic Implications

- Obesity and the

EPMA J. 2014 Jan 13;5(1):2. doi: 10.1186/1878-5085-5-2.

The efficacy of probiotics for monosodium glutamate-induced obesity: dietology concerns and opportunities for prevention.

Savcheniuk OA, Virchenko OV, Falalyeyeva TM, Beregova TV, Babenko LP, Lazarenko LM, Demchenko OM, Bubnov RV[1], Spivak MY.

Author information

Probiotics prevented Weight gain!

Abstract

INTRODUCTION: Obesity becomes endemic today. Monosodium glutamate was proved as obesogenic food additive. Probiotics are discussed to impact on obesity development.

AIMS AND OBJECTIVES: The aim was to study the effects of probiotics on the development of monosodium glutamate (MSG)-induced obesity in rats.

MATERIAL AND METHODS: We included 45 Wistar male rats and divided into three groups (n = 15). Newborn rats of group 1 (control) received subcutaneously 8 μl/g saline. Group 2 received 3 to 4 mg/g MSG subcutaneously on the second, fourth, sixth, eighth and tenth day of life. Within 4 months after birth, rats were on a standard diet. Group 3 received an aqueous solution of probiotics mixture (2:1:1 Lactobacillus casei IMVB-7280, Bifidobacterium animalis VKL, B. animalis VKB) at the dose of 5 × 109 CFU/kg (50 mg/kg) intragastrically. Administration of probiotics was started at the age of 4 weeks just after weaning and continued for 3 months during 2-week courses. Group 2 received intragastrically 2.5 ml/kg water. Organometric and biochemical parameters in all groups of rats were analyzed over 4 months. The concentration of adiponectin was determined in serum, and leptin - in adipose tissue.

RESULTS: Administration of MSG led to the development of obesity in rats; body weight had increased by 7.9% vs controls ($p < 0.05$); body length had increased by 5.4% ($p < 0.05$). Body mass index and Lee index and visceral fat mass had increased ($p < 0.001$). Under the neonatal injection of MSG, the concentration of total cholesterol, triglycerides, VLDL cholesterol and LDL cholesterol significantly increased ($p < 0.001$), in comparison with controls. Adipose-derived hormones changed in MSG obesity rats: adiponectin decreased by 58.8% ($p < 0.01$), and leptin concentration in adipose tissue had increased by 74.7% ($p < 0.01$). The probiotic therapy of rats from group 3 prevented obesity development. Parameters of rats treated with probiotic mixture did not differ from that in the control.

CONCLUSIONS: The introduction of MSG to newborn rats caused the obesity in adulthood. Periodic administration of probiotic mixture to rat injected with MSG neonatally resulted in recovery of lipid metabolism and prevention of the obesity development.

microbiota is hypothesized to influence weight gain.

Probiotics- Neurologic Implications

There is growing evidence for a paradigm shift in our view on the pathogenesis of autoimmune diseases. In addition to genetic susceptibility, making the individual react abnormally to self antigens, the loss of the protective function of epithelial barriers that interact with the environment, not least the gastrointestinal mucosa, seems to be involved in the development of autoimmunity [1]. Recent observations in humans and in a variety of animal models indicate that an increased intestinal permeability (IP), often referred to as a "leaky gut", is playing a pathogenic role not only in development of gastrointestinal disorders like inflammatory bowel disease (IBD) and celiac disease, but also in systemic autoimmune diseases, like type 1 diabetes (T1D) [1], [2], [3], [4].

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Intestinal Barrier Dysfunction Develops at the Onset of Experimental Autoimmune Encephalomyelitis, and Can Be Induced by Adoptive Transfer of Auto-Reactive T Cells

Mehrnaz Nouri, Anders Bredberg, Björn Weström, Shahram Lavasani

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PLOS | ONE

Oral and gut bacteria are repeatedly reported in the research literature to be involved in:

- Aut
- Dia
- RA
- Rea
- All
- Agi
- Glu
- Cel

More U.S. Children Have Fo

Prevalence of food allergies has been

% U.S. Children with

6.0%
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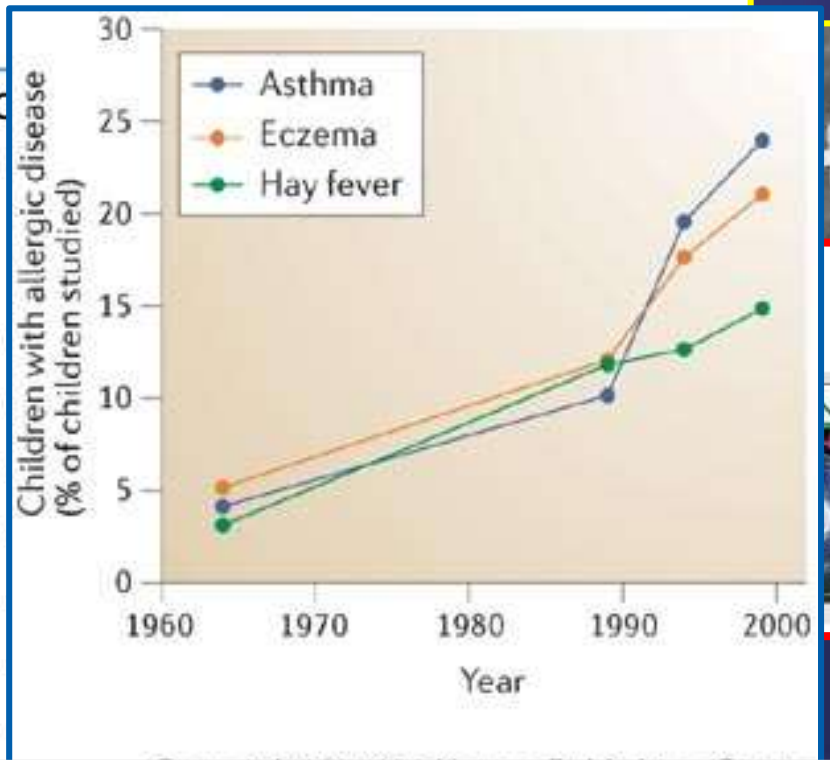

Bostock J. Case of a periodical affection of the eyes and chest. Med Chir Trans. 1819;10:161.

Investigation into Gluten Metabolizing Bacterial Species and their Inhibition

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Investigation into Gluten Metabolizing Bacterial Species and their Inhibition

- Standardized Inhibition study performed on 16 gluten metabolizing strains.
- Bacteriocin inhibition measured with forty standard bacteriocins

- Results: Oral medicaments, such as, Crest, Listerine, Act Fluoride rinse, Chlorhexidine and Smartrinse inhibited all 16 of the gluten bacterial strains (average 10 mms.). **One strain MLC 124** was more resistant to oral medicaments. Xylitol products only inhibited 9 strains, but not MLC 124. Forty standard bacteriocins were applied to agars with Rothia species and the newly isolated bacteria. **No zones of inhibition were detected with the strain MLC 124.**

Investigation into Gluten Metabolizing Bacterial Species and their Inhibition

- Statistical Analysis-
- Very statistically significant differences between the fifteen strains

Statistical Analysis:

Factor A: 15 Groups

A1, A2, A3, A4, A5, A6, A7, A8, A9, B1, B2, B3, B5, B6, B7

Analysis of Variance Results

Source	DF	SS	MS	F	P
Total	44	5060.9778	115.02222		
A	14	3348.9778	239.2127	4.1918113	0.00048
Error	30	1712	57.066667		

The 15 Groups demonstrated significant differences as to Sensitivity to Oral Medicaments (DF) 14, P=0.0005). The following groups presented with significant differences (Bonferroni pair testing); A1 vs B2, B1 vs B2, A1 vs B3, B1 vs B3, B3 vs B5, B3 vs B6, B2 vs B5, and B2 vs B6.

Investigation into Gluten Metabolizing Bacterial Species and their Inhibition

How will xylitol and erythritol help?

Abstract: This study examined the effects of xylitol on mouse intestinal microbiota and urinary isoflavonoids. Xylitol is classified as a sugar alcohol and used as a food additive. The intestinal microbiota seems to play an important role in isoflavone metabolism. Xylitol feeding appears to affect the gut microbiota. We hypothesized that dietary xylitol changes intestinal microbiota and, therefore, the metabolism of isoflavonoids in mice. Male mice were randomly divided into two groups: those fed a 0.05% daidzein with 5% xylitol diet (XD group) and those fed a 0.05% daidzein-containing control diet (CD group) for 28 days. Plasma total cholesterol concentrations were significantly lower in the XD group than in the CD group ($p < 0.05$). Urinary amounts of equol were significantly higher in the XD group than in the CD group ($p < 0.05$). The fecal lipid contents (% dry weight) were significantly greater in the XD group than in the CD group ($p < 0.01$). The cecal microbiota differed between the two dietary groups. The occupation ratios of *Bacteroides* were significantly greater in the CD than in the XD group ($p < 0.05$). This study suggests that xylitol has the potential to affect the metabolism of daidzein by altering the metabolic activity of the intestinal microbiota and/or gut environment. Given that equol affects bone health, dietary xylitol plus isoflavonoids may exert a favorable effect on bone health.

Xylitol Erythritol Inhibition Studies

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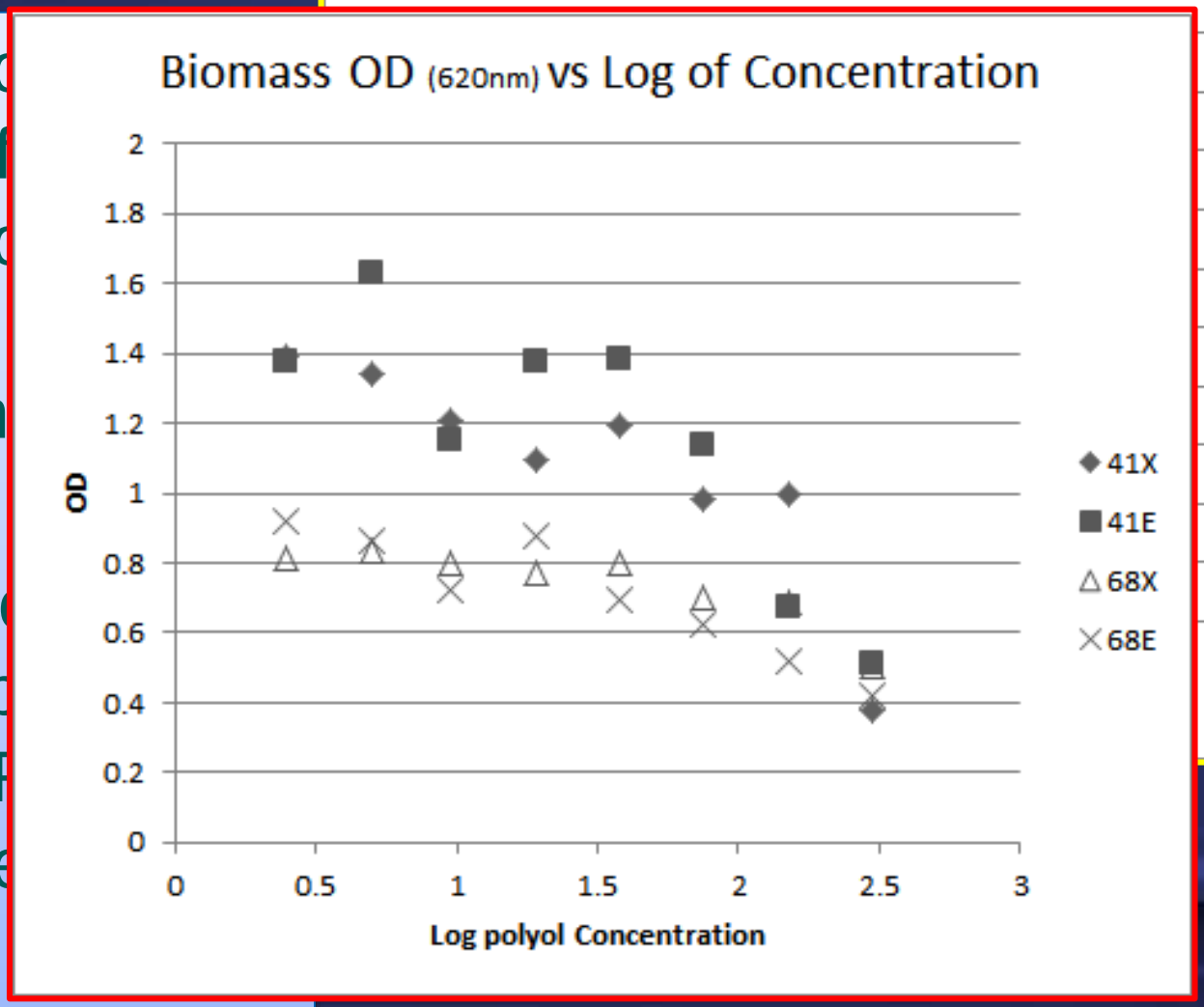


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