

The Many Myths of Pediatric Dentistry

or
why we do and follow research!
or
science rules!

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← Myth
Truth →

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Affirmation

- ▶ No financial ties to drug or equipment companies to disclose
- ▶ I have received supplies for workshops given at meetings
 - ▶ No direct payments to me



David L. Rothman DDS 2021

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4 out of 5 Dentists RECOMMEND Sugarfree Gum

- ▶ HUH???
- ▶ WHAT ABOUT THE ONE WHO DOESN'T???
- ▶ Where's the science?
- ▶ Perception versus Reality



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What is a Myth?



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The average attention span today is 8 seconds


- ▶ Microsoft Corporation/Canadian researchers 2015
 - ▶ Dropped from 12 seconds in 2000
 - ▶ The younger you are the shorter the span
 - ▶ Goldfish have a 9 second attention span



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What is a myth?

- ▶ A myth expresses and confirms society's religious values and norms, it provides a pattern of behavior to be imitated, testifies to the efficacy of ritual with its practical ends and establishes the sanctity of custom.
 - ▶ Hanks, Lauri (1984). *The Problems of Defining Myths*. In *Quonias, Alina. Sacred Narrative: Readings in the Theory of Myth*. University of California Press. p. 49.
- ▶ A popular belief or tradition that has grown up around something or someone
 - ▶ Meriam-Webster
- ▶ A widely held but false belief or idea.
 - ▶ Google



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What is science?




- ▶ Science is a **systematic** enterprise that builds and organizes knowledge in the form of **testable** explanations and predictions about the universe. The earliest roots of science can be traced to Ancient Egypt and Mesopotamia in around 3500 to 3000 BCE
 - ▶ Wikipedia
- ▶ A branch of knowledge or study dealing with a body of **facts or truths** **systematically** arranged and showing the operation of general laws; the **mathematical sciences**. Systematic knowledge of the physical or material world gained through **observation and experimentation**.
 - ▶ Dictionary.com

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Science

- ▶ Can be biased
- ▶ Can lead to false conclusions
- ▶ Not bulletproof
- ▶ Mechanisms set to limit the bias




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Were you taught myths in Dental School?

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You do what you were taught in dental school despite life and research passing you by

- ▶ Journals
- ▶ Throwaways
 - ▶ Check for the ads next to the articles
- ▶ Lay publications
- ▶ Internet
- ▶ Peer reviewed?
- ▶ Bias?



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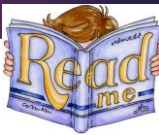
Oh No!!!



- ▶ Proceedings of the Symposium on Innovations in the Prevention and Management of Early Childhood Caries
 - ▶ Oct. 23-24, 2014 Ellicott, Md
- ▶ Evidence of Effectiveness of Current Therapies to Prevent and Treat Early Childhood Caries: S. Twetman, V. Dhar (2015)
 - ▶ 877 reports, 33 met criteria
 - ▶ Fluoride toothpaste and varnish; **limited evidence**
 - ▶ Fluoride tablets and drops; **insufficient evidence**
 - ▶ Silver Diamine Fluoride, Xylitol, Chlorhexidine varnish/gel, Povidone iodine, Probiotic Bacteria, Remineralizing agents (F-CF-CPP); **insufficient evidence**
 - ▶ Sealants, restorations, regular restorations; **insufficient evidence**
- ▶ **THERE IS NO GOOD QUALITY EVIDENCE THAT ANYTHING WE DO WORKS!!!**

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How to Read Research



- ▶ Peer reviewed?
- ▶ Reputable journal not a throwaway
 - ▶ Filled with ads or case reports
 - ▶ Who is paying for the journal?
- ▶ Do people pay to publish their research?
 - ▶ Many new journals take \$\$ to publish
 - ▶ Pressure to publish or perish leads to junk though peer reviewed work
- ▶ Resident research projects
 - ▶ Short term
 - ▶ Lit reviews

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How to Read Research



- ▶ Size of population
- ▶ CONTROL
 - ▶ All research is skewed to those with disease
- ▶ "No" results are rarely published
- ▶ P values v Confidence intervals
 - ▶ Determined by NNT (number needed to treat)
 - ▶ Can be significant at the 95% interval $p \leq 0.05$
 - ▶ Rejects the null hypothesis but doesn't tell you if **treatment makes sense**

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Is it significant?




- ▶ Formulas for determining size of study to make it valid
 - ▶ NNT
- ▶ Meta analysis
 - ▶ a **meta-analysis** uses a statistical approach to combine the results from multiple studies in an effort to increase power (over individual studies), improve estimates of the size of the effect and/or to resolve uncertainty when reports disagree.
 - ▶ Many studies from multiple sites following similar protocols
 - ▶ Inclusion?
 - ▶ Are results valid?
 - ▶ Few people publish if studies show no effect

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What is and how large is the population? Control?

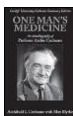
- ▶ If you don't get treatment what happens?
- ▶ Inclusion in study means you are seeking treatment but doesn't mean that people not seeking treatment are not doing well
- ▶ What's the control?
 - ▶ Is it people seeking treatment or the general population?
 - ▶ Demographics of the control population
 - ▶ Are you your own control?
 - ▶ R v L



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And in summary...

- ▶ The Cochrane Reviews/ Cochrane Library/ Cochrane Collaboration
 - ▶ Cochrane is a British charity formed to organize medical research findings so as to facilitate evidence-based choices about health interventions faced by health professionals, patients, and policy makers. Cochrane includes 53 review groups that are based at research institutions worldwide.
 - ▶ Archie Cochrane, visionary physician
 - ▶ Systematic extraction of data that defines a question
 - ▶ Inclusion criteria
 - ▶ Study size
 - ▶ Outcomes
 - ▶ Funding sources



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Evidence Based Medicine Evidence Based Dentistry

- ▶ ... an approach to medical practice intended to **optimize decision-making by emphasizing the use of evidence from well-designed and well-conducted research.**
 - ▶ Wikipedia
- ▶ ...conscientious, explicit, judicious and reasonable use of modern, best evidence in making decisions about the care of individual patients. EBM integrates clinical experience and patient values with the best available research information.
 - ▶ Swanson et al. *Plast Reconstr Surg* 2010 Jul; 126(1):286-294
- ▶ All in the name of creating practice guidelines

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Evidence Based Medicine

A central blue circle labeled 'EBM' is surrounded by three colored boxes: a red box 'Best Available Evidence' with an arrow pointing to EBM, a green box 'Clinical Acumen' with an arrow pointing to EBM, and a purple box 'Patient Values' with an arrow pointing to EBM.

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Evidence Based Medicine

- ▶ Quality of research
 - ▶ 1. Evidences obtained by meta-analysis of several randomized controlled research (RCR).
 - ▶ 1b. Evidences from only one RCR.
 - ▶ 2a. Evidences from well designed controlled research RCR.
 - ▶ 2b. Evidences from one quasi experimental research.
 - ▶ 3. Evidences from non experimental studies (comparative research, case study), according to some, for example Textbooks.
 - ▶ 4. Evidences from experts and clinical practice.

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Evidence Based Medicine

- ▶ GRADE: Grading of Recommendations Assessment (AAFP 2019)
 - ▶ i. High Quality (Level A): Further research is very unlikely to change our confidence in the estimate of effect.
 - ▶ ii. Moderate Quality (Level B): Further research is likely to have an important impact on our confidence in the estimate of effect, and may change the estimate.
 - ▶ iii. Low Quality (Level C): Further research is very likely to have an important impact on our confidence in the estimate of effect, and is likely to change the estimate.
 - ▶ iv. Very Low Quality (Level D): Any estimate of effect is very uncertain.

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Evidence Based Medicine

- ▶ Strength of Recommendation of Guidelines
 - ▶ Strong Recommendation
 - ▶ Net benefit to the patient
 - ▶ Weak Recommendation
 - ▶ Net benefit is inconsistent or based on lower quality evidence
 - ▶ Patient choices will vary based on their preferences
 - ▶ Good Practice Points
 - ▶ No direct evidence to support recommendation but may be standard of care
 - ▶ Unlikely to ever be studied

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The Antibiotic Conundrum

- ▶ Cost vs. efficacy
- ▶ GRAS
- ▶ OTC vs Rx
- ▶ Proprietary vs. Generic
 - ▶ Cost of development
 - ▶ Payoff
 - ▶ "X" no. of years exclusive rights
- ▶ What happens if older drugs that are cheaper are effective but new drugs much more expensive, and significantly (but slightly) more effective in research?
 - ▶ Does it make the original drug less effective or less desirable?
 - ▶ Uniqueness
- ▶ Azithromycin (Z-pac) v Amoxicillin
- ▶ Lidocaine v Articaine

A cartoon illustration of a cup of ice cream with a cherry on top, labeled 'PRO', and a glass of beer labeled 'ANTI'. The text '© 2013 The McGraw-Hill Companies' is visible below the cartoon.

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Rules of the Road

- ▶ Kids aren't scary but PARENTS are
- ▶ You are bigger/smarter/wilier/more manipulative than them
- ▶ Learn their language
- ▶ Learn their "heroes"
- ▶ Compliment them and their clothing
- ▶ Talk continuously/ Sing Often
- ▶ BE YOURSELF!

A photograph of a person wearing a large, clear, protective shield that covers their face and torso, leaving only their hands visible. The shield has a blue top edge.

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Common Sense isn't common and may not make sense

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Google University

- ▶ PhD in Googleology





by Unknown Author licensed under CC BY-SA

David L Hoffman 2005 2021

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Who is doing the talking?

- ▶ Sales reps with vested interest?
 - ▶ Their product is NEW, "significantly" better, faster acting
 - ▶ Proprietary v Generic
 - ▶ Sales incentives
 - ▶ Sunshine laws
- ▶ Researcher?
 - ▶ Industry v Academic
 - ▶ Who is funding?
 - ▶ Bias in outcome?
- ▶ Influencer
 - ▶ A private practitioner who receives product and funding from a dental company
 - ▶ Not uncommon on iPedo
 - ▶ Check <https://www.cms.gov/OpenPayments>
 - ▶ Sunshine law disclosures

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I'm gonna blow some smoke up your bottom

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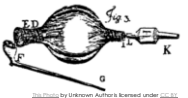


TO SPEAK DECEPTIVELY TO ONE, USUALLY IN AN ATTEMPT TO MASK TRUE FEELINGS OR THE REALITY OF A SITUATION.

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Early CPR Following Drowning

- ▶ John Wesley, *Advices with Respect to Health*, 1769
 - ▶ after S.A.A.D. Tissot, *Avis au peuple sur sa Sante*, 1761
- ▶ Strip the "sufferer"
- ▶ Rub the body with an abrasive cloth such as linen
- ▶ Put into heated bed
- ▶ Force warm breath with tobacco smoke into the patient's lungs
- ▶ Open the jugular vein and remove 10-12 oz of blood
- ▶ "The fumes of tobacco should be thrown up, as speedily and plentifully as possible, into the intestines by the fundament... using a pipe attached to a bladder"
 - ▶ AKA Dutch fumigation
- ▶ Societies were developed to spread this technique in Germany, France, Italy, Austria and London
 - ▶ The Society for the Recovery of Drowned Persons



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Seizures, Trismus and Lockjaw



- ▶ *Handbuch der Medizinischen Klinik* by Carl Friedrich Constatt, 1841
 - ▶ "If one holds the rump of a dove against the child's anus during paroxysm, the animal quickly dies and the attack ceases just as rapidly."
- ▶ Letter published by Dr. J.F. Weise in *Journal für Kinderkrankheiten*, 1851
 - ▶ One year 8-month-old suffering from dyspeptic disorders related to dental work
 - ▶ The anus of a young dove was held against the child's until the seizure was over or waning.
 - ▶ Sometimes it took 2 doves
- ▶ Critical review of the procedure in British and Foreign Medico-Chirurgical Review
 - ▶ Quoting Horace the philosopher: "Risum Teneatis" (can you help but laugh?)

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Sage Advice Still True Today

- ▶ "We mentally offered...the advice of an old French physician, who on being asked his opinion of a new remedy that was highly praised for its extraordinary virtues in a certain disease...replied:
 - ▶ "DEPECHEZ VOUS DE VOUS EN SERVER PENDANT QU'IL GUERIT!"
 - ▶ (translation: hurry up and give it to him while he's still getting better)



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And Let's Look at What We Have Used in Dentistry

- ▶ Urine to treat periodontal disease
 - ▶ Urea
- ▶ Sargenti Paste
 - ▶ Arsenic
- ▶ Formocresol
 - ▶ Creosote is a registered toxin and carcinogen
- ▶ Chloral Hydrate
 - ▶ Breakdown product is a carcinogen
 - ▶ Sensitizes the heart to circulating catecholamines
- ▶ Unscientific, and unsupported advice disseminated quickly by influencers on social media



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Tonsils and Tonsilectomies

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And Now,
the Myths!?!

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Children shouldn't cry

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Should Children Cry? (or should we ALLOW them to cry?)



- ▶ Normal human babies cry 2 hours/day
- ▶ Physically, neurologically and primarily intertwined with breathing
 - ▶ Linked by a cluster of cells in the hindbrain
 - ▶ Fast, active respiration
- ▶ Attracts adults to care for baby
 - ▶ All mammalian species respond
 - ▶ Cries are similar
 - ▶ Mammals that don't cry are ignored by parents
- ▶ Birchmeier, C., Hernandez-Miranda, L; Proceedings of the National Academy of Sciences 2017

NYTimes.com/ 2017/09/04/science/crying-babies-animals.html

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And What About That Cry? Or: What's my little darling saying?

- ▶ Related to the gene that controls stress reaction and cortisol release
 - ▶ Sheinkopf, S. Lester, B, Brown University
- ▶ Analyzed by Cholz, M, Spanish J of Psychology
 - ▶ Angry babies
 - ▶ Eyes half closed gazing off to the side
 - ▶ Crescendo
 - ▶ Frightened babies
 - ▶ Hesitation, tensing of facial muscles, explosive cry and eyes open
 - ▶ Pained babies
 - ▶ Cried out immediately, squeezed eyes shut



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And Finally: How and Why Do You React?

- ▶ Babies cries change tone and falls and rises unpredictably
- ▶ Adults are wired to respond
 - ▶ Infants depend on adults for survival
 - ▶ Response comes from periaqueductal gray matter in midbrain
 - ▶ 2X faster than any other response
 - ▶ Do or die response
 - ▶ Motor areas fire for quick movement



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Bubbly water is better
than soda

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Sugar doesn't cause cavities- acid does!

- ▶ Mutans strep and Lactobacillus make acid
- ▶ 5 fruits to an 8oz. glass of juice
- ▶ Approx. 1 tsp = 5 g sugar
- ▶ 12oz. Soda=39g. of sugar
- ▶ 12oz. JuiceBlast=40g. of sugar
- ▶ Carbonic acid/Phosphoric acid/Citric acid
- ▶ The two hour rule



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Saliva: the wonder drug




- ▶ Neutralizes acid with phosphate buffer returning oral cavity to basic environment
 - ▶ Stops demineralization
 - ▶ Promotes remineralization
- ▶ Contains Ca^{++} , PO_4^- , OH^- and F^- (exogenous)
 - ▶ Remineralizes early decalcification in a basic environment
- ▶ Antibiotic/antiviral
- ▶ Enzyme system that breaks down food especially carbs to simple sugars!
- ▶ Washes away food substances

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Erosion v Decay

- Erosion**
 - Demineralization or dissolution of the carbonated hydroxyapatite crystal of enamel/dentin of the tooth in an acidic environment reversed by a neutral or basic oral environment in which minerals redeposit on the tooth surface.
- Caries**
 - A bacterial mediated demineralization of the enamel/dentin in which a sugar substrate is metabolized by various bacteria. Their metabolic waste product demineralizes the tooth in a localized area protected by plaque.
 - Remineralization occurs at a rate slower than demineralization and the bacteria move into the cavitation that develops.



www.ncl.ac.uk

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Attrition, Abrasion and Erosion


- Attrition:** physiologic wear from mastication
 - Normal!
- Abrasion:** pathologic wear of teeth from mechanical rubbing
 - Brushing, toothbrush and toothpaste wear
 - Brush lightly not hard- bristles don't move!
- Erosion:** pathologic wear from chemical dissolution
 - Acidic foods/drinks. GERD

Grade 0	No erosion
Grade 1	Erosion into enamel only; no exposure of dentin
Grade 2	Less than one-third of surface has dentin exposed
Grade 3	One-third or more of surface has dentin exposed

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pH of Common Foods

- Beverages**
 - Coffee 2.4-3.3
 - Tea 4.2
 - Beer 4.0-5.0
 - Wine 2.3-3.8
 - Soda (sweetened or non-sweetened) 2.7-3.5
 - Including bubbly water, natural or man-made
 - Sports drinks 2.3-4.4
 - Saliva 7.4



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Salivary pH After Eating



Saliva Buffer
Potential tooth damage

Time → Morning Noon Evening

Regular Meals

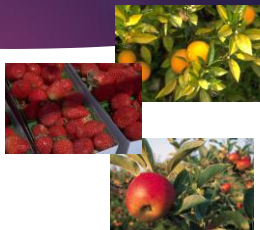
Time → Morning Noon Evening

Frequent Snacking

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pH of Common Foods

- Fruits and Vegetables**
 - Tomatoes 3.7-4.7
 - Apples 3.5-3.9
 - Plums 2.8-4.6
 - Strawberries 3.0-4.2
 - Vegetables 3.9-5.1 (+ sand/soil for an added measure of abrasion)




www.sciencedaily.com

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Soda: the tooth killer

- liquid candy
- high fructose corn syrup
- +/- caffeine
- Carbonic acid from CO₂
- Phosphoric acid
- prolonged exposure
- even non-sweetened, diet products
- Causes erosion and if sugar present, decay



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Soda: the tooth killer

- ▶ And we're not done yet!
 - ▶ Sweet soft drinks, fructose linked to gout
 - ▶ Children's salt intake is reduced when soda is out of their diet
 - ▶ Weight gain is recorded on people who drink diet sodas
- ▶ But, thankfully, sales are on the decline!?!?
 - ▶ Juice sales are up
 - ▶ Sports drink sales are up



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Soda: the kid killer

- ▶ Experts at ADA meeting debate the impact of sugary drinks
Nutrition researchers from the Baylor College of Medicine and the University of North Carolina debated during this week's ADA conference whether sugary drinks are behind rising obesity levels in the U.S. Baylor professor Dr. Theresa Nicklas argued that the percentage of energy coming from sugary drinks is decreasing, so it is difficult to link that to rising obesity rates, while UNC professor Dr. Barry Popkin said such drinks do not fill people up like solid food so people are at risk of consuming too many calories. [FoodNavigator](#) (9/28/2011)



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And You Thought Soda Was Bad...

- Juice
 - Liquid candy- no nutritional value other than what's added
 - 5 fruits to make 8oz.
 - Soda=39g sugar/12oz.
 - Juice esp. boxes=40g/12oz.
 - Fructose and high fructose corn syrup 3-5X sweet as table sugar
 - Breakdown to glycogen and stored as fat
 - Natural v unnatural sugar? Bacteria care?
 - May be a source of high levels of F⁻
 - Just give a glass of water and a multivitamin

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The Apple Juice Controversy

- ▶ Some juices are high in fluoride
- ▶ Processing plants may use fluoridated water
- ▶ Varying batches give inconsistent results
- ▶ Hurt the old/help the new
- ▶ JADA 1997



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Sports Drinks and Soda

- ▶ A. Milosevic, Brit J Sports Med, 3/97
- ▶ pH4.46-2.38
 - ▶ demineralization occurs at 5.5 or below
- ▶ High sugar and fructose corn syrup
- ▶ Citric acid
- ▶ Viscosity
- ▶ Temperature (cold is better)



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Sports Drinks v Energy Drinks


- Energy Drinks
 - Sports drinks + caffeine (methylxanthines) + Vit B
 - "herbs +/- carbonated water, guarana, yerba mate, acai + tauroxins, ginseng, maltodextrin, inositol, carnitine, creatine, gluconolactone and ginkgo biloba
 - Ginseng and guarine increase risk of intraoperative bleeding through decreased platelet aggregation
 - J Oral Maxillofac Surg 70:1439-1441, 2012
 - Others may contain alcohol
 - Highly toxic
 - Have caused hospitalization and death in children and adults
 - <http://pediatrics.aappublications.org/content/early/2011/05/25/peds.2011-0965>



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Sports Drinks v Chocolate Milk

- Chocolate Milk
- Low fat or non fat
- Better hydration
- Less salty
- Correct mineral balance
- Like drinking a glass of milk and 2 oreo cookies
- Similar to "energy milks"
- http://www.acsm.org/AM/Template.cfm?Section=About_ACSM&TEMPLATE=/CM/HTMLDisplay.cfm&CONTENTID=14752



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What About the Milk Substitutes?

- Soy Milk (100 calories)**
 - Isotones
 - Phytoestrogens
 - Genistein (promotes blood clot)
 - Gallocatechin which inhibits protein
 - Brown rice syrup or evaporated cane juice
 - At least 1g sugar/lb so far vanilla / 1 1/2g of sucrose
- Rice Milk (140 calories)**
 - Brown rice syrup
 - Total carbs 25 g (10 sugar)
- Almond Milk (40 calories)**
 - Omega 3 fatty acids
 - Antioxidant V E
 - Total carbs 2 g (0 sugar)
 - 1 g of protein
 - 19-29 g of carbs
 - 4.5-5 g of fat
- Coconut Water (40 cal/11 oz)**
 - 41mg K (4-bananas)
 - 5.45 mg Na
 - Not a good sports drink for rehydration
 - No clinical studies support the claims
- Yellow Pea Protein Milk**
 - 10g of protein
- Oat Milk (120 calories)**
 - enriched with nutrients — including calcium, potassium, iron, and vitamins A and D
 - Free of allergens
 - Contains beta glucans
 - Total carbs 16g

www.healthline.com/nutrition/best-milk-substitutes#section2



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And Now, Water Takes a Hit!

- Wright KF. Is Your Drinking Water Acidic? A Comparison of the Varied pH of Popular Bottled Waters. J Dent Hyg 2015 Jun;89 Suppl 2:6-12.
- The pH values for the tested beverages and bottled waters were found to be predominantly acidic. Ten out of the 14 beverages tested were acidic (pH<7), 2 municipal (or "tap") waters were neutral (pH=7) and 2 bottled waters were alkaline (pH>7). The majority of waters tested had a more acidic pH when tested in the lab than the value listed in their water quality reports.

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Brand	PH	Water Source & Treatment Notes
Vitaminwater	3.4	Demineralized with Minerals & Flavor Added
Propel Zero -determide	3.5	Demineralized with Minerals & Flavor Added
Propel Fitness Water	3.6	Demineralized with Minerals & Flavor Added
Pepsi	4.0	Demineral, Demineralized & Further Processed
Dasani	4.5	Filtered, RO, Minerals Added, Ozonated
Fancin	5.0	Distilled with Minerals Added
Hammer	5.5	Filtered, Chlorinated Water, Sterilized From Wells
Poland Spring	5.8	Demined From Springs & Distilled Water
Voss	6.0	Well Water from Norway
Ice Mountain	6.0	Demineralized, Filtered, Ozonated
Crystal Geyser	6.0	Filtered, Municipal Water
Deer Park	6.3	Demined From Springs & Distilled City Water
Smart Water	6.5	Filtered, Distilled & Mineralized
Great Value Wellwater	6.5	Filtered, RO, Minerals Added, Ozonated
Gerber Pure Water	6.5	Demineralized with Minerals Added
Armafresh	6.8	Demined From Springs & Distilled City Water
Evian	7.0	Demined From Springs in France
Ethelred	7.0	Filtered, Treated Spring Water
Valic	7.0	Filtered, Treated Spring Water
Zephyrhills	7.5	Filtered, Treated Spring Water
Alkagran	7.5	Filtered, Treated Spring Water
Fiji	7.5	Demined From Springs in Fiji
Sugar Chill	7.5	Filtered, Treated Spring Water
Essentur	8.0	Filtered Well Water
Real Water	8.0	Filtered, Distilled Water
Essentia	9.0	RO Filtered, Minerals Added, Distilled Water

<https://www.alkalinewaterplus.com/analyzing-comparing-brands-of-bottled-water/>



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Donut Crack




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Brown Sugar is Better than Refined White Sugar or Refined Sugar is Worse than Natural Organic Fruit Sugar

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Which sugar?



- A gram of sugar is a gram of sugar regardless of source
 - Brown, turbinado, powdered, corn syrup, dextrose, raw sugar, malt are refined sugars
 - All are simple sugars
 - All cause hyperlipidemia
 - Honey is a "refined" sugar
 - 96% are simple sugars: fructose, glucose, dextrose
 - Honey bear is only animal with tooth decay problem
 - Higher calorie count
 - 45g/1oz v 46g/1oz table sugar
 - Benefits of manuka honey
 - Fruit sugars?
 - Crushed or blended higher sugar than the fruit
 - Sugar released from the cell
- Differences are in glycemic index (GI 0-100)

Food	GI	GI	GI
White bread	71	71	71
White rice	69	69	69
White pasta	67	67	67
White flour	65	65	65
White sugar	64	64	64
White cornmeal	63	63	63
White flour	62	62	62
White flour	61	61	61
White flour	60	60	60
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White flour	11	11	11
White flour	10	10	10
White flour	9	9	9
White flour	8	8	8
White flour	7	7	7
White flour	6	6	6
White flour	5	5	5
White flour	4	4	4
White flour	3	3	3
White flour	2	2	2
White flour	1	1	1

www.verywellhealth.com/glycemic-index-chart-for-common-foods-128747

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Carbohydrates




- Very cariogenic (more so than sucrose)
 - 4X daily
 - >60 g per day
- Break down to simple sugars by salivary enzymes
- Adhere to teeth and gums
 - Glycans (a polysaccharide)
 - Make biofilms in mouth
 - plaque

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Good Plaque v Bad Plaque


- Good Plaque
 - Basic pH
 - Ca⁺⁺, PO₄⁻, F⁻
 - Casein (a protein which helps bond the minerals to the tooth)
- Bad Plaque
 - Fermentable Carbs
 - Sucrose
 - No proteins
 - Lots of bacteria



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Biofilms!

- 80% of infectious diseases are biofilm-mediated
- Multiple organisms interacting
 - Can be benign individually, together wreak havoc
 - F. gingivae
 - S. mutans and S. sobrius
- Traditional treatment
 - Antibiotics
 - Antibiofilm agents
 - Opens up avenue to other potentially pathogenic strains
- New treatment
 - Change environment and ecology
 - Interferes with adhesion
 - Prevent adhesion of bacteria
 - Starch
 - Hydrophobicity (the best part against biofilms)
 - Aluminum phosphate
 - Fluoride ionomer
 - Change pH
 - Hydroxymethyl ether
 - Arginine/Cl⁻



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The Miracle Sugar: Xylitol?

OCC(O)C(O)C(O)CO

- Low calorie, sugar-alcohol (polyol) that is not metabolized by bacteria (5 carbon v 6 carbon)
- Inhibits biofilm adhesion
- Short term use decreases S. mutans in saliva
- When used in place of sugar, stops caries progression by up to 70%
- Ablation therapy: Decreases transmission of S. mutans from mother to child
- Commercially available as gum, candy, toothpaste, energy bars
- Higher doses cause severe diarrhea (similar to fructose)

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Xylitol Gum Studies



- Finland
 - Original studies in '80s at Turku University
- Caries in 4 year old children after maternal chewing of gums containing combinations of xylitol, sorbitol, chlorhexidine and fluoride
 - EAPD, 2006
 - Fewer caries were observed in children whose mothers chewed xylitol only gum at the time of the eruption of the first primary teeth.
 - New studies (2015) show effective only with F-

66

Xylitol: Hype and Reality

- Must have >1.55g/serving TID
- Should be listed as first ingredient
- Sorbitol may also be effective
- Commercial and specialty availability
 - Gums: Altoids cinnamon, Koolerz, Starbucks peppermint and cinnamon, xylitol Beechies, TheraGum, Spry, Xylifresh, XylicheW
 - Toothpastes: Tom's mint with fluoride and apricot with fluoride, Crest multicare (sorbitol), Xylifresh, XylWhite, Squigle
 - Mints: TheraMint, Xlear, XylicheW, Clen-Dent

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And What Else Is New?

- Liquorice lollipops prevent tooth decay
 - UCLA researcher Shi
 - 15 mg of liquorice root extract, Glycyrrhiza uralensis, reduces 99.9% of Strep mutans
- Chlorhexedine rinses and gels ineffective against coronal caries formation



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And Try These!

- ▶ Rinse with Baking Soda after meals
 - ▶ pH 9.0
- ▶ Eat yogurt or cheese at end of meal
- ▶ Rinse with milk at end of meal



69

First dental visit?
Bah, humbug?

70

When and why?

- ▶ By year one or when first tooth erupts
- ▶ Provide guidance and instruction
- ▶ Evaluate growth and development
- ▶ Interceptive guidance
- ▶ 75% of parents miss it!
- ▶ 30% don't think dental pain is important
 - ▶ AAPD survey

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The Answers

- The AAPD recommends the first visit when the first tooth erupts or sooner
- Provide counseling via risk assessment
- Nutrition and diet review
- Safety check
- Note that the pediatrician may see a child 15 times before the child visits the dentist




72

CDC Report on Oral Health

- ▶ 2019
- ▶ Increase in caries rates in preschoolers
 - ▶ 28% will demonstrate ECC
 - ▶ Up 5 percentage points from 2014
- ▶ Stabilized rates in elementary and middle schoolers
- ▶ Increased rate in high schoolers
- ▶ <https://www.cdc.gov/oralhealth/publications/OHSR-2019-index.html>


ORAL HEALTH SURVEILLANCE REPORT

Trends in Dental Caries and Sealants, Tooth Retention, and Edentulism, United States 1999-2004 to 2011-2016



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Definitions



- ▶ Cavity: a hole in a tooth; may be developmental or bacterial
 - ▶ +/- surface cavitation
- ▶ Caries: a biofilm mediated transmissible, bacterial disease
- ▶ Early Childhood Caries: caries of infants, toddlers, and young children affecting one or more teeth

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Early Childhood Caries

- ▶ **Early childhood caries (ECC)** is the presence of 1 or more decayed (noncavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child **71 months of age or younger**.
- ▶ In children **younger than 3 years of age**, any sign of **smooth-surface caries** is indicative of **severe early childhood caries (S-ECC)**.
- ▶ From ages 3 through 5, 1 or more cavitated, missing (due to caries), or filled smooth surfaces in primary maxillary anterior teeth, or a decayed, missing, or filled score of >4 (age 3), >5 (age 4), or >6 (age 5) surfaces constitutes S-ECC.

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Pacifiers are OK to 3 (or maybe 2 or 5 or 6 or so or whenever the kid wants to give it up)

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Pacifier, Thumb and Bottle Habits Non-nutritive Sucking

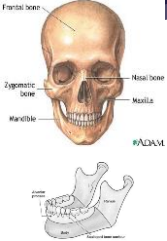
- ▶ Change the shape of the maxilla, alveolus and palate
- ▶ Cause tongue thrust speech and swallowing
- ▶ Displace teeth and change eruption patterns and cause crossbites
- ▶ Transfer bacteria and fungi
- ▶ May prevent SIDS
- ▶ Breastfed infants have better tooth alignment, facial musculature and jaw shape
 - ▶ Fewer open bites, crossbites, crowding
 - ▶ Squeezing milk vs. piston-like sucking



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All Bone is not the Same!

- ▶ Skeletal or basal bone
 - ▶ Intramembraneous or Endochondral
 - ▶ Thick cortical plate
 - ▶ Vascular with marrow spaces
 - ▶ Unyielding
- ▶ Alveolar bone
 - ▶ Develops embryologically with cementum/dentin
 - ▶ Exists only for the teeth
 - ▶ Porous
 - ▶ Allows orthodontic movement through rapid remodeling
 - ▶ ARF cycle



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Pacifier, Thumb and Bottle Habits

- ▶ Payak J. **Effects of pacifiers on early oral development.**, Int J Orthod 2006 Winter, 17(4) 13-16
- ▶ Zardetto CG, Rodrigues CB, Stefani FM. **Effects of different pacifiers on the primary dentition and oral myofunctional structures of preschool children.** Pediatr Dent, 2002 Nov-Dec;24(6):552-60.
- ▶ Melnik J, Vagner MW, Hovevar-Bolzeza J, Ovsenik M. **Posterior crossbite in the deciduous dentition period, its relation with sucking habits, irregular orofacial functions, and otolaryngological findings.** Am J Orthod Dentofacial Orthop. 2010 Jul;138(1):32-40. doi: 10.1016/j.ajodo.2008.09.029.

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Pacifier, Thumb and Bottle Habits

- ▶ When to stop:
 - ▶ Pacifier: 12-18 mo.
 - ▶ Thumb: before eruption of permanent teeth
 - ▶ Bottle:
 - ▶ With juice or formula: when 1st tooth erupts
 - ▶ With water: 12-18 mo.
- ▶ Recent research shows that permanent change can occur by 2-3 years of age

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Pacifier, Thumb and Bottle Habits

- ▶ How to stop
 - ▶ Cold Turkey
 - ▶ Trim the tip/ Open the crosshatch
 - ▶ Bury the thing
 - ▶ Make a star for the Tooth Fairy



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Pacifier, Thumb and Bottle Habits


- ▶ Appliance therapy
 - ▶ Intraoral
 - ▶ Thumb splint
- ▶ Behavior modification therapy
 - ▶ David Decides by Susan Heitler, Ph.D.
 - ▶ Reading Matters 303,757,3506
 - ▶ Modified Behavior Modification
- ▶ Reevaluate in 6 mo.
 - ▶ Stopped because of parent's attention, growing up, or your intervention?
- ▶ **Do bilateral appliances inhibit lateral growth?**



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And What About Breast Feeding?

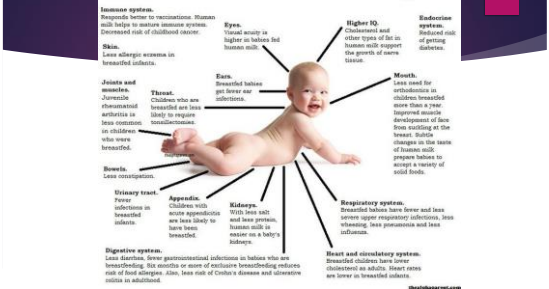
- ▶ Provides comfort, warmth, psychological well being, nutrition, maternal antibodies
- ▶ Better shaped jaw and positioned teeth with correct tongue position
- ▶ Milk thins from high fat to low fat around 1 yr of age
- ▶ Higher risk of caries in children breastfed after 24 mos
 - ▶ Usually on demand
 - ▶ Poorer OH and food removal
- ▶ Pediatrics(2017); doi:10.1542/peds.2016-2943



Owensboro Hospital

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The Breastfed Baby



- Immune system.** Breastfed babies are less susceptible to infections. Breast milk helps to ensure immune system. Decreased risk of childhood cancer.
- Skin.** Less allergic reactions in breastfed infants.
- Teeth and mouth.** Children who are breastfed are less likely to require orthodontic treatment.
- Respiratory system.** Less respiratory infections in babies who are breastfed. Risk asthma or other of exclusive breastfeeding reduces risk of their allergic skin, less risk of Crohn's disease and sensitive illness in adulthood.
- Brain.** Higher IQ. Children who are breastfed have higher IQ scores. Breast milk supports the growth of nerve tissue.
- Heart and circulatory system.** Breastfed children have lower cholesterol as adults. Breast milk is lower in breastfed infants.
- Respiratory system.** Breastfed babies have fewer and less severe upper respiratory infections, less wheezing, less pneumonia and less influenza.
- Heart and circulatory system.** Breastfed children have lower cholesterol as adults. Breast milk is lower in breastfed infants.
- Appendix.** Children with acute appendicitis are less likely to have been breastfed.
- Kidneys.** With less salt and less protein, breastfed milk is easier on a baby's kidneys.
- Respiratory system.** Breastfed babies have fewer and less severe upper respiratory infections, less wheezing, less pneumonia and less influenza.
- Heart and circulatory system.** Breastfed children have lower cholesterol as adults. Breast milk is lower in breastfed infants.
- Respiratory system.** Breastfed babies have fewer and less severe upper respiratory infections, less wheezing, less pneumonia and less influenza.
- Heart and circulatory system.** Breastfed children have lower cholesterol as adults. Breast milk is lower in breastfed infants.

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My baby is teething!!!

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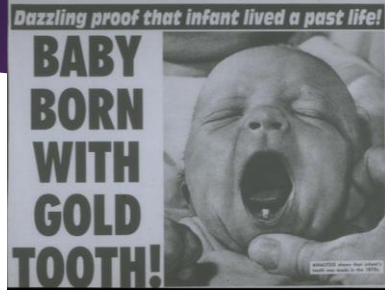
Teething – A Gnawing Problem

Thanks to Dr. Anil Goodman



“ADAM AND EVE HAD MANY ADVANTAGES, BUT THE PRINCIPAL ONE WAS THAT THEY ESCAPED TEETHING.”
MARK TWAIN

87



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Teething

- ▶ Discussed for last 5000 years, mentioned in Sumerian and Hindu and ancient Greek writings.
- ▶ Hippocrates wrote: *Teething children suffer from itching of the gums, fevers, convulsions and diarrhea, especially when they cut their eye teeth and when they are very corpulent and costive.* (25th Aphorism, 3rd book, 4th c. Bc)
- ▶ Long thought to be associated with infant illness.



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“What to expect...” Not Science but “Feel Good”

- ▶ Your baby's teeth will make their grand, gummy entrance between 6 and 12 months old or later. Here are some common signs your little one is teething, along with remedies that will ease baby's discomfort.
- ▶ When your baby's first tooth shows up, you might be taken by surprise ("Oh! Was that just a bump?"), or you might just finally understand what all those strange symptoms were about. Look out for these common signs your baby is teething:
 - **Teething Symptoms**
 - ▶ Irritability
 - ▶ Drooling
 - ▶ Fussiness
 - ▶ Swollen, red gums
 - ▶ Irritability
 - ▶ Irritability
 - ▶ Irritability
 - ▶ Irritability
 - ▶ Irritability
- ▶ Every baby experiences the start of teething differently. Some have virtually no symptoms, while others suffer through teething pain and fussiness for months. But if you know the signs to look out for, the strategy of baby teething, and home remedies you can use to alleviate teething discomfort, it can make it easier for your baby (and you) to get through the particular experience.
- ▶ **When Do Babies Start Teething?**
 - Teething symptoms can precede the actual appearance of a tooth by weeks, or last as three months. Most babies get their first tooth around 6 months old, though when those first tiny peeps appear, their appearance can vary quite a bit from baby to baby. Some erupt their teeth just as early as three months old, while others don't get there until after the first birthday. In other words, there's a wide range of normal in terms of when teething begins (ish).
 - <https://www.whattoexpect.com/tot-year/teething/>



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Eruption chart

Rough rule of thumb:
Age in months minus 6 = average number of teeth through 2 years

UPPER TEETH		
Teeth	Erupt	Shed
Central Incisor	8-12 mo	6-7 yr
Lateral Incisor	9-13 mo	7-8 yr
Canine (Cuspid)	14-22 mo	10-12 yr
First Molar	13-19 mo	9-11 yr
Second Molar	25-33 mo	10-12 yr

LOWER TEETH		
Teeth	Erupt	Shed
Second Molar	23-31 mo	10-12 yr
First Molar	14-18 mo	9-11 yr
Canine (Cuspid)	17-23 mo	9-12 yr
Lateral Incisor	10-16 mo	7-8 yr
Central Incisor	6-10 mo	6-7 yr

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An Alternative Eruption Chart

TOOTH ERUPTION CHART

Upper Teeth		Erupt
OMG, so cute	8-12 mos.	
WTF, no	9-13 mos.	
I need sleeeeeep	16-22 mos.	
Little bastards	13-19 mos.	
Just kill me	25-33 mos.	

Lower Teeth		Erupt
F*ck my life	23-31 mos.	
Please send mercy	14-18 mos.	
Please send wine	17-23 mos.	
Are you serious?	10-16 mos.	
Yay, first tooth!	6-10 mos.	

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Teething – timing from websites

- ▶ Eruption of primary teeth
 - ▶ Generally, one tooth erupts monthly between 6 to 24 months
 - ▶ Onset of teething symptoms: 3-4 days before eruption (SCIENCE?)
 - ▶ End of teething symptoms: 2-3 days after tooth eruption (SCIENCE?)
- ▶ Rough rule of thumb: Age in months - 6 = average number of teeth through 2 years
- ▶ Premies get 1st teeth at same corrected age as term infants
- ▶ Delayed eruption: hypothyroid, hypopit, Down's, among other conditions
- ▶ May appear as early 4 months and as late as 24 months.
 - ▶ Natal teeth 1/3000
 - ▶ Normal underdeveloped teeth that erupt into oral cavity

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Symptoms associated with tooth emergence

Mackinn, et al, Pediatrics 2000; 105: 747-752 – Prospective cohort study, 111 children

Symptom	Day
Biting	-2 to 2
Drooling	-2 to 2
Gum Rubbing	-2 to 2
irritability	-2 to 2
Sucking	-2 to 2
Flush-face	-2 to 2
Temp > mean+SD	-2 to 2
Warmth/redness	-2 to 2
Apertre/Swell	-2 to 2
Ear Rubbing	-2 to 2

Fig. 4. All days P values <.01 for the association between symptoms and tooth emergence on a given day 0.

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Symptoms associated with tooth emergence

- ▶ Another smaller study (prospective cohort, 21 children) the same year in Pediatrics showed teething was found not to be significantly associated with mood disturbance, sleep disturbance, drooling, or diarrhea—Wake, M et al, Pediatrics 2000;106;1374-1379
- ▶ self-confessed methodological flaws and limitations.

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Teething – Remedies and Potions

Poetic summary of ancient cures


'Now when your baby's teeth appear, you must of these take prudent care.
For teething comes with grievous pain, so to my word take heed again.
When now the teeth are pushing through, to rub the gums thou thus shalt do.
Take fat from chicken, brain from hare, and these full oft on gums shall smear.
If ulcers sore thereon should come, then thou shalt rub upon the gum.
Honey and salt and oil thereto, But one thing more I counsel you,
A salve of oil of violet, for neck and throat and gums to get.
And also bathe his head a while, with water boiled with chamomile.'

1429, Von Louffenberg (German priest)

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Tooth Eruption


- ▶ Early v. late
- ▶ Chance of trauma
- ▶ There is no such thing as teething!!!
 - ▶ Look for concurrent medical problems or physiologic growth changes
 - ▶ Associative not causative
 - ▶ Don't mistake a fever for getting teeth



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Remedies –Careful with:

- ▶ Orajel – Contains Benzocaine 10% and FD&C Red 40, Flavor, Glycerin, Polyethylene Glycols, Water Purified, Sodium Saccharin, Sorbic Acid, Sorbitol; rare cases of benzocaine toxicity with overuse.
- ▶ Teething biscuits – may contain unnecessary sugar – dentists warn against caries promotion
- ▶ Frozen mini-bagel halves – popular, but same caveat as above.
- ▶ Hyland's Homeopathic Teething Tablets
 - ▶ Off the market?
 - ▶ Contains:
 - ▶ Calcarea Phosphorica (Calcium Phosphate), 3X HFUS Chamomilla (Chamomile) 3X
 - ▶ Rhus Toxica Cruda (Cafeine) 3X HFUS Belladonna 3X HFUS (Atropa belladonna)
 - ▶ Almost imperceptible amounts of these toxins, but drug is not regulated, potential toxicity with overdose from the Belladonna alkaloids.
 - ▶ In common use – ask if being used – many parents swear by them!



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References

- ▶ Shusterman, S. Pediatric Dental Update. *Pediatr. Rev.* 1994; 15:311-318.
- ▶ Macknin, ML et al. Symptoms Associated with Infant Teething. *Pediatrics* 2000;105:747-752.
- ▶ Ashley, MP. It's Only Teething – A Report of the myths and modern approaches to teething. *British Dental Journal* 2001;191:4-8.
- ▶ Wake, M. Teething and Tooth Eruption in Infants. *Pediatrics* 2000;106(6):1374-9.

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Bennet, HJ, et al. The Teething Virus. *Pediatr Infect Dis.* 5:399-401, 1986. [April 1, 1986]

- ▶ Method: prospective study, 500 teething infants to see if new "human teething virus, or HTV" could be isolated from baby's saliva.
- ▶ Triple blinded study – patients weren't sure why they were in study, technicians did not know what was being tested, and authors didn't care – but hoped to get published anyway.



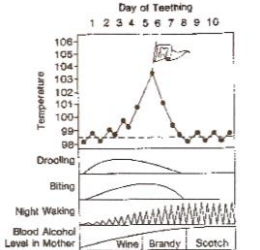
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Results

- ▶ Teeth erupted at a rate of 10/year, providing 5000 tooth-years of data.
- ▶ 84% of patients became febrile during the teething process, attributable to the HT virus.
- ▶ 15 divorces were attributed to "irreconcilable differences" on how to manage a teething baby at 3 am.
- ▶ HT virus appears to remain dormant in the alveolar ridge once the primary infection subsides, and is revitalized with future teething episodes.

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Clinical findings over 10 days of teething

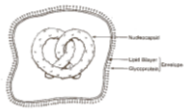


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The HT Virus

- ▶ The envelope surrounds a helical nucleocapsid covered with spherical studs. Though superficially resembling a slice of white bread, the HT virus is actually the first recognized family of RNA viruses to be named *masticoviridae*
 - ▶ Reference: Unicorn's Guide to Teething


Figure 5. Schematic representation of the human teething virus.



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Teething treatment recommended in this paper

Figure 3. The modern treatment of teething: an ice and alcohol bath.




104

References

1. Radbill SX: Teething as a medical problem: Changing viewpoints through the centuries. *Clin Pediatr* 4:556-559, 1965
2. Skinner RF: The tooth rascal: Are today's children holding out for too much money? *J Pediatr* 86:314-316, 1980
3. Westheimer R: Is 50 cents per tooth enough to get children to sleep in their own beds at night? *J Parental Cellbiocy* 69:123-128, 1982
4. McCartney PL, Flinstone F, Rubble B. et al: Do teething infants need a CBC and blood culture? *J Dahious Invest* 59:463-468, 1977
5. Shorts RH: Teething and fever: Another myth debunked. *PMD Bull* 21:459-463, 1982
6. Munchausen BV: Factitious teething as a means to visit the pediatrician. *Acta Medica Scand* 70:212-213, 1978
7. Leech LA: The clinical application of breastfeeding reflexes: "Let-down" means the milk is in, "Let Go!" means the teeth are coming. *The Breast* 36:24-34, 1982
8. Bennett HJ, Bradno DS: The masticoviruses: Have we bitten off more than we can chew? *Popular Virol*, in press, 1986
9. Weisman MI: Tootharchia, menarche, and anarchy: Three developmental milestones of childhood and adolescence. *Curr Prob Nightcall* 12:1-7, 1983

105

All literature refers to treatment of teething!




106

No studies support teething as a medical entity!

- ▶ Pubmed search
 - ▶ ZERO results, nada, zip!
 - ▶ Growth hormone and estrogen levels?
 - ▶ No blood studies confirm any changes
 - ▶ One case report about a child dying in NYS from teething
 - ▶ 1947 NY State Dental Journal
 - ▶ Child had rash and high fevers
 - ▶ Sounds like herpes to me!

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So What's Going On?



- ▶ All children go through physical and behavioral changes between 6 months and 18-24 months
- ▶ These changes are NOT correlated with when the actual tooth erupts
- ▶ Teething or getting teeth is associative not causative i.e. it occurs at the same time as other physiologic issues
- ▶ Between 12 and 14 months maternal antibodies are less effective and child develops own immune system based on exposure to antigens (bacterial and viral) and allergens
- ▶ 1st line of defense is mast cell and histamine release for antigenic and allergen insults

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How Do Teeth Erupt?



- ▶ Passive growth from deposition at Hertwig's epithelial root sheath
- ▶ Apoptosis (programmed cell death) at the incisal edge/cusp tips
 - ▶ Blood supply cut off by hormonal transmitter
- ▶ May lead to pain as tooth comes in contact with thin overlying mucosa from trauma
- ▶ Tooth erupts and gingiva evaginates with collar of non keratinized tissue
 - ▶ Food may get stuck in gingival pocket
- ▶ May get bleeding in between the tooth sac and the mucosa
 - ▶ Eruption hematoma
 - ▶ benign




109

And This Also...


- ▶ Fever from allergic or bacterial response
 - ▶ <102 viral
 - ▶ >102-104.5 bacterial
 - ▶ Dehydration
 - ▶ Allergic also increases temperature slightly
- ▶ Hand in Mouth
 - ▶ Itching/burning gums
 - ▶ Viral infections
 - ▶ Herpes simplex and Herpes stomatitis/Primary Herpetic Gingivostomatitis
 - ▶ Echo, Rhino are others

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Primary Herpetic Gingivostomatitis

- ▶ Hx:
 - ▶ Prodromal signs
 - ▶ URI/flu symptoms
 - ▶ Irritability and loss of appetite
- ▶ Exam:
 - ▶ Generalized swollen and bleeding gums
 - ▶ Low grade fever <101
 - ▶ Sunken cloudy eyes (SLUX)
- ▶ Dx:
 - ▶ Viral Stomatitis
 - ▶ Echo, rhino, coxsackie, herpes viruses
- ▶ Tx:
 - ▶ Antivirals if early enough
 - ▶ Palliative topicals/systemics
 - ▶ Fluids
 - ▶ Dehydration is major complication
 - ▶ Time limited
 - ▶ Heals in 10 days with med; 1 1/2 weeks without
 - ▶ Is this "teething"?

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And Some More

- ▶ Drooling
 - ▶ Esacrine gland maturity
 - ▶ Liquid diet requires less saliva; solid diet requires lubrication and food breakdown
 - ▶ Closing lips when swallowing is learned response
- ▶ Changes in sleep and eating patterns
 - ▶ Child exploring
 - ▶ Not maternal centric
- ▶ GI Distress
 - ▶ Sensitivities/allergens
 - ▶ Bacterial or viral



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Wave Bye Bye



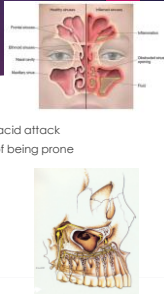
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My kid grinds all night long- is he stressed?

114

Bruxing and Grinding


- ▶ Pediatric bruxing may not be related to adult bruxing
- ▶ Occurs more during cold and allergy season
- ▶ May increase wear on teeth if they are already weakened by acid attack
- ▶ ENT literature discusses sinuses congesting after 15-30 minutes of being prone
 - ▶ Increased blood flow to mucus membranes
 - ▶ Sinuses can't drain through middle meatus below the turbinates
 - ▶ Mucus plugs the outlet
 - ▶ Drainage is for head down position
 - ▶ Pressure builds up and places pressure on the maxillary nerves
 - ▶ Numbness and fullness
- ▶ GERD also promotes sinus congestion



115

Grinding and Bruxism


- ▶ Causes?
 - ▶ Anxiety?
 - ▶ Congestion
 - ▶ Multiple studies in ENT literature
- ▶ Can it be treated?
 - ▶ The pros and cons of each
 - ▶ ANY mouthguard/toothguard changes mandibular angle and opens it
 - ▶ Opening bite increases grinding



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And Cochrane Says

- ▶ Splint therapy
 - ▶ There is not sufficient evidence to state that the occlusal splint is effective for treating sleep bruxism. Indication of its use is questionable with regard to sleep outcomes, but it may be that there is some benefit with regard to tooth wear.
- ▶ Pharmacotherapy
 - ▶ There was insufficient evidence on the effectiveness of pharmacotherapy for the treatment of sleep bruxism.



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Treatment

- ▶ Antibiotics if infection
- ▶ Steam mist
- ▶ Antihistamine ±decongestant
- ▶ Nasal sprays
 - ▶ Warm saline
 - ▶ Saline+Xylitol+Grapefruit Seed Extract (XLEAR by Spry)
 - ▶ Steroids
- ▶ **NO NEED FOR PSYCHOTHERAPY**




118

My Baby Can't Feed: Let's do a Frenectomy! or Maybe a Frenotomy or Maybe a Frenoplasty or ????

119

Frenotomy for Tongue-tie in Newborn Infants Cochrane Review

- ▶ Tongue-tie, or ankyloglossia, is a condition whereby the lingual frenulum attaches near the tip of the tongue and may be short, tight and thick.
- ▶ Tongue-tie is present in 7% to 11% of newborns.
 - ▶ Drops to 3% by 10 without intervention
 - ▶ JADA Dec 2022
- ▶ Tongue-tie has been cited as a cause of poor breastfeeding and maternal pain.
- ▶ Frenotomy, which is commonly performed, may correct the restriction to tongue movement and allow more effective breastfeeding with less maternal nipple pain.
- ▶ This is not about speech or periodontal issues treated later in life caused by tongue movement issues



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Do these actually cause a feeding problem or just look funky?
What's normal? What about in functional not photographic state?



121

And, again, how frequently?

- Prevalence of ankyloglossia according to different assessment tools. Cruz PV et al. <https://doi.org/10.1016/j.adao.2022.07.011>
- Variations in assessment yield different numbers
 - Visual v functional classification?
 - It all depends on who is looking
- Approximately 7-8% in infants and drops in children and adolescents to 3%
- Moreover, we raise the question whether ankyloglossia is a condition that remains as a person becomes older or whether the tongue frenulum undergoes a change in its position with craniofacial development*

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Tongue Ties

- No **Diagnostic Criteria** other than subjective reports of difficult feeding and an open mouthed clinical exam
- If children were **dying** at the same rate that they were receiving frenuloplasties (forget the rate at which they are diagnosed) for feeding problems the population would be dying off and there would be a public health epidemic declared
 - Show a control population that has a higher morbidity and mortality rate without treatment
- Is it a disease of people who can afford a lactation specialist?
 - Or a disease of dentists with lasers?

123

Tongue Ties: Cochrane Review

Surgical release of tongue-tie for the treatment of tongue-tie in young babies

- **Review question:** Tongue-tie is a potentially treatable cause of breastfeeding problems - if a baby is tongue-tied and is having feeding difficulties, does releasing the tongue-tie help?
- **Background:** Tongue-tie is a condition whereby the membrane between the tongue and the floor of the mouth is too tight or too short. This may cause feeding problems for the baby and/or nipple pain for a breastfeeding mother.
- **Study characteristics:** Five randomised controlled trials enrolling 302 infants met the inclusion criteria.
- **Key results:** In an infant with tongue-tie and feeding difficulties, surgical release of the tongue-tie does not consistently improve infant feeding but is likely to improve maternal nipple pain. Further research is needed to clarify and confirm this effect.
- **Quality of evidence:** The quality of the evidence is very low to moderate because overall only a small number of studies have looked at this condition, the total number of babies included in these studies was low and some studies could have been better designed.

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Cochrane: Why it is important to do this review

- Diagnosis and management of tongue-tie remain **controversial**. It is uncertain whether ankyloglossia is a **congenital oral anomaly requiring treatment or a normal variant**.
- One survey (Messner 2000b) found that most **lactation consultants** believe tongue-tie to be a frequent **cause of infant breastfeeding difficulties** that could be solved by frenotomy.
- In marked contrast, **90% of paediatricians and 70% of otolaryngologists** believe that tongue-tie **never, or rarely, causes a feeding problem** (Messner 2000a).
- Medical organisations such as the **American Academy of Pediatrics** (Coryllos 2004) and the **National Institute for Health and Care Excellence** (NICE 2005) now acknowledge that tongue-tie, or ankyloglossia, is a **significant clinical entity** that should be treated as **early as possible** to minimize breastfeeding problems.
- Given that breastfeeding benefits both infants and mothers, it is important for the clinician to address any condition that may impair breastfeeding (Edmunds 2011).

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Tongue Tie Cochrane Review

- 497 studies reviewed
- 209 remained after duplicates removed
- 182 excluded because didn't meet quality or inclusion criteria
- 27 assessed for eligibility
- 1 study included for qualitative synthesis
- 5 studies in meta analysis

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The 5 Big Boys!

(and look who's names are not on there)

- **Berry 2012:** Berry J, Griffiths M, Westcott C. A double-blind, randomized, controlled trial of tongue-tie division and its immediate effect on breastfeeding. *Breastfeeding Medicine* 2012;7(3):189–93. PMID:21994761
- **Buryk 2011:** Buryk M, Bloom D, Shapiro T. Efficacy of neonatal release of ankyloglossia. *Pediatrics* 2011;128(2):280–8. PMID:21768318
- **Dallberg 2006:** Dallberg S, Botzler E, Grunis E, Mimouni FB. Immediate nipple pain relief after frenotomy in breast-fed infants with ankyloglossia: a randomized, prospective study. *Journal of Pediatric Surgery* 2006;41(19):1998–1600. PMID:16952698
- **Emond 2013:** Emond A, Ingram J, Johnson D, Plair P, Whitelaw A, Copeland M, et al. Randomised controlled trial of early frenotomy in breastfed infants with mild-moderate tongue tie. *Archives of Disease in Childhood Fetal and Neonatal Edition* 2013;99(3):F189–95. PMID:24249695
- **Hogan 2005:** Hogan M, Westcott C, Griffiths M. Randomized, controlled trial of division of tongue-tie in infants with feeding problems. *Journal of Paediatrics and Child Health* 2005;41(5-6):246–50. PMID:15953322

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Cochrane Review on Tongue Tie The Conclusions

- The effect of frenotomy on tongue-tied preterm infants has **yet to be studied**.
- The optimal age to perform frenotomy in infants remains **unclear**.
- The effect of tongue-tie on early infant weight gain and on maternal difficulties in establishing a breast milk supply **remains to be clarified**.
- It has **yet to be demonstrated** whether frenotomy in breastfeeding infants with tongue-tie and feeding difficulty leads to a longer duration of breastfeeding.
- Whether frenotomy is a **painful procedure** that requires analgesia or anaesthesia has **yet to be established**, as no study to date has quantified infant pain during and after frenotomy.
- There is **NO** increase in weight gain between a child who has undergone the procedure and one who has not

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Cochrane Review Implications for practice

- Frenotomy causes a short-term reduction in nipple pain among breastfeeding mothers and an inconsistent positive effect on infant breastfeeding. Owing to the small number of studies and the high incidence of methodological issues, definitive benefit **has not been proven**.



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That being said...

- In older children, may lead to stripping of attached gingiva lingual to the lower incisors
 - No studies done on this
 - May be valid procedure?
 - Could it have been prevented?
- Does it lead to sleep apnea?
 - Quite the reach especially because the tongue is tethered and can't fall back in the airway



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And the Mass Media is Talking...

The Atlantic

Tongue Posture Is a Big Business With Little Evidence

Treatments to address improper tongue position have been hyped as a health remedy, but they may be doing more harm than good.

By Christina Stashki and Ulfack

<https://www.theatlantic.com/health/archive/2021/09/tongue-exercise-little-evidence/620053/>

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Policy on the Management of the Frenulum in Pediatric Dental Patients

- Recognizing evidence is **limited**, the American Academy of Pediatric Dentistry supports **additional research** on the causative association between ankyloglossia and breastfeeding difficulties or speech articulation problems and between hyperplastic labial frenulum and increased risk of caries or periodontal disease due to interference with adequate oral hygiene. **Further randomized controlled trials and other prospective studies of high methodological quality are necessary to determine the effects of frenotomy/frenectomy.** With all surgical procedures, an informed consent is necessary. Informed consent includes relevant information regarding assessment, diagnosis, nature and purpose of proposed treatment, and potential benefits and risks of the proposed treatment, along with professionally-recognized or evidence-based alternative treatment options – including no treatment – and their risks.³¹



AMERICA'S PEDIATRIC DENTISTS
THE BIG AUTHORITY on little teeth®

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What about safety?

- ▶ Safety and efficacy of maxillary labial frenectomy in children: a retrospective comparative cohort study. Baxter RT, Zoghi S, Lashley A. International orthodontics. 2, June 2022
 - ▶ Authors are from the Alabama Tongue Tie Center, AL and The Breathe Institute, CA
 - ▶ 109 pt, 95 primary dentition, 14 mixed dentition
 - ▶ Complications of minor pain, swelling and bleeding for a few seconds
 - ▶ **DID THE PROCEDURE NEED TO BE DONE IN THE FIRST PLACE!?**

133

My Kid Looks Like a Shark: Can't You Just Take Out Those Teeth?

134

Ralph at the Dentist



135

Bonus Question

- ▶ "Shouldn't you just take out those extra baby teeth?"
- ▶ or: my child looks like a shark



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The Answers

- ▶ Though it may appear necessary and may look uncomfortable, it is not necessary
- ▶ The teeth will exfoliate
- ▶ During normal swallowing the tongue pushes the teeth forwards and outwards and the lips and cheeks hold them back in- normal functional matrix
- ▶ Does not mean the child is predisposed to crowding
- ▶ And severe crowding requires early orthodontic referral
- ▶ One big caveat!



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And the Caveats

- ▶ Prime over permanent may cause deflection of the permanent tooth into crossbite
- ▶ Maxillary tooth erupting into crossbite
- ▶ Ectopic eruption into non attached mucosa
 - ▶ Significant loss of periodontal attachment
 - ▶ Difficult orthodontic correction



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She's got some crowding there. Let's send her to the orthodontist for 2 phase, maybe 3 phase, maybe continuous, treatment

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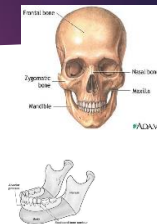
How We See Kids: a day in our life



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All Bone is not the Same!

- ▶ Skeletal or basal bone
 - ▶ Intramembraneous or Endochondral
 - ▶ Thick cortical plate
 - ▶ Vascular with marrow spaces
 - ▶ Unyielding
- ▶ Alveolar bone
 - ▶ Develops embryologically with cementum
 - ▶ Exists only for the teeth
 - ▶ Porous
 - ▶ Allows orthodontic movement



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What's the purpose of 2+phase ortho?

- ▶ Proposed to be
 - ▶ Increased stability
 - ▶ Increased and simpler movement
 - ▶ Increased bone development
 - ▶ Less need for ph 2
- ▶ What it is
 - ▶ More expensive
 - ▶ Increased treatment time and burnout
 - ▶ No increase in stability
 - ▶ ? Increase in bony development or just alveolar bone adjustment



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What does the research show?

- ▶ **Data source:** the Cochrane Central Register of Controlled Trials, the Cochrane Library, MEDLINE Ovid and Embase Ovid), The US National Institutes of Health Ongoing Trials Registry (ClinicalTrials.gov) and the World Health Organization International Clinical Trials.
- ▶ **Selection Criteria:**
 - ▶ Correction of CII Div 1 with prominent anterior teeth through adolescence
 - ▶ Compared early tx 2 phase with ANY type of ortho (removable, fixed, fxl) or headgear v. late (one phase) tx in adolescents with any type of braces
- ▶ **Inclusion:**
 - ▶ only 27 studies were deemed valid
 - ▶ Only 3 compared early 2 functional appliance tx v. late 2 pb tx
 - ▶ Low to moderate quality evidence
- ▶ **Assessment:**
 - ▶ Changes in OI, Cephalometric changes (antero-posterior relationship of the mandible to the maxilla or ANB angle) and incisal trauma in the upper anterior teeth

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And the results!

- ▶ OJ and ANB angle
 - ▶ Reduction in the overjet and ANB angle after phase one of early treatment in patients using functional appliances (before tx of other group)
 - ▶ When both groups underwent tx, non-statistical difference between groups in final overjet
 - ▶ Incisal trauma incidence was reduced in early treatment (moderate quality evidence)
- ▶ HG v. late tx
 - ▶ The use of headgear reduced overjet and ANB, however, when both groups finalised the treatment, there was no statistically significant difference between groups in overjet
- ▶ Fixed Fxl Appliances v no tx:
 - ▶ of seven trials that compared late treatment with functional appliances versus no treatment concluded that there was a reduction in final overjet with fixed functional appliances

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And finally, the conclusion

- ▶ **Conclusions** Evidence classified as **low to moderate quality** suggests that providing early orthodontic treatment/two stages for children with prominent upper front teeth is more **effective for reducing the incidence of upper front teeth trauma** (incisal trauma) than providing one course of orthodontic treatment in adolescence. However, it appears that there is **no other benefit** of providing early treatment when compared to late treatment. Low-quality evidence proposes that, compared to no treatment, late treatment in adolescence with functional appliances, is effective for reducing the prominence of upper front teeth
- ▶ **Analia Veitz-Keenan, Nicole Liu**. One phase or two-phase orthodontic treatment for Class II division 1 malocclusion. Rev Evid Based Dent, 2019 Sep;20(3):72-73

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The Classicists Weigh In

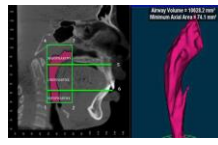
- ▶ "Early phase of functional appliance treatment prior to fixed appliance therapy was of no measurable benefit whatsoever. They also stated that there was little or no objective support for those who claim that early functional appliance treatment somehow reduces both the need for extractions and the length and complexity of the subsequent fixed appliance phase of treatment."
 - ▶ Livieratos, F, Johnston L. A comparison of one-stage and two-stage nonextraction alternatives in matched Class II samples. AJODO 1995; 108:118-131.
- ▶ "There are few, if any, benefits that are unique to and dependent on earlier treatment. For more than 90 percent of patients, all treatment goals can be accomplished in one phase of treatment started in the very late mixed dentition."
 - ▶ Gianelly, A. One-phase versus two-phase treatment. AJODO 1995; 108:556-559.
- ▶ "For children with moderate to severe Class II problems, early treatment followed by later comprehensive treatment does not produce major differences in jaw relationship or dental occlusion compared with later one-stage treatment."
 - ▶ Tulloch, C., Phillips, C and Proffit, W. Benefit of early Class II treatment: Progress report of a two-phase randomized clinical trial. AJODO 1998; 113: 62-71.



146


So When to Treat with 2 Phase Orthodontics?

- ▶ Evidence based!
 - ▶ Extremes of crowding
 - ▶ Extremes of spacing
 - ▶ Severe skeletal discrepancies in which the incisors are at risk
 - ▶ Crossbites in which there is a shift of the midline
 - ▶ New **but as yet not proven** idea: early widening of maxillary arch opens the nasal base and improves nasal airway patency
 - ▶ Surprise: there is no evidence of those CBCT scans of airway size have any relevancy to actual airflow or breathing patterns (but they sure are party)



147

To Treat or Not to Treat? that is the question



Orthodontic emergency:
Time to treat before nature can self correct

148

Oh, dang. He kicked off the lead apron and now he'll have kids with 3 ears

149


The Answers

- ▶ We do many things to minimize exposure
 - ▶ ALARA (as low as reasonably achievable)
- ▶ Don't have routine
 - ▶ Customized for the child
 - ▶ If I've determined they're necessary for complete diagnosis and treatment planning and you refuse, I am unable to treat your child

150

The Subquestion

- ▶ "But what if I sign a waiver?"
 - ▶ Or "Just go ahead without the x-rays, I know my kid doesn't have cavities."



151

The Subanswer

- ▶ Parents may not sign away their child's rights to appropriate health care
- ▶ If disease occurs and you failed to diagnose, you are still liable
- ▶ You may choose to postpone because of low risk factors or uncooperative behavior but *document, document, document*



152

Radiography in Children

- ▶ NO set series
- ▶ NO set frequency
- ▶ Dependent on risk assessment
 - ▶ Age and dental development
 - ▶ Tooth morphology
 - ▶ Fluoride exposure
 - ▶ Diet
 - ▶ Caries experience
 - ▶ Trauma and anomalies
- ▶ NOT FOR RECORD KEEPING: RISK/TREATMENT BASED!



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Image Gently Alliance

- ▶ Pledge to restrict radiation exposure in children and adults
- ▶ Use highest speed/minimal dose/least number of images/collimation
- ▶ Refers to FDA for many questions especially about CBCT exposure in young patients and orthodontic patients
- ▶ Many resources on website including dose records recommended by FDA



The Image Gently Alliance

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And what about shielding?

- ▶ What are they protecting against?
 - ▶ Lead (not really) aprons are difficult to position and slip off "sensitive" areas
 - ▶ Original fruit fly studies from the 70s led to FDA recommendation
 - ▶ Do not prevent against SCATTER: radiation ricochets inside the body and under the apron
 - ▶ Use of collimated radiation limits divergent rays
 - ▶ Radiation dose 1/20 of 1950 level
- ▶ National Council on Radiation Protection and Measurements
 - ▶ Supports a HALT to leaded barriers except in employees
 - ▶ Canada, Australia, Britain support this



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And what about dental organizations?


- ▶ ADA
 - ▶ Abdominal shielding may not be necessary
 - ▶ Recommends thyroid collar (may obscure images)
- ▶ Removal of lead aprons supported by
 - ▶ American Association of Physicists in Medicine
 - ▶ National Council on Radiation Protection and Measurements
 - ▶ American College of Radiology
 - ▶ Image Gently Alliance
- ▶ Barriers to implementation



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And what x-rays do you need for ortho?

- ▶ Same orthodontic outcomes from bitewings and pano v full series and cephalometrics
- ▶ Do you need a CBCT?
 - ▶ Risk based and needs decision-Image Gently
- ▶ Treating the lawyers not the patients



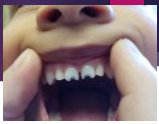
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He's got cavities

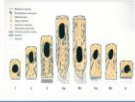
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Not all Cavities are Caries

- ▶ Cavities v Dysplasia v Caries
 - ▶ Unique pattern that doesn't match traditional decay patterns
 - ▶ GERD and second molars
 - ▶ Life cycle of an ameloblast is the key (fever/dehydration/pH change)
 - ▶ In Utero
 - ▶ Anesthasia
 - ▶ Pre-eclampsia
 - ▶ Maternal infections
 - ▶ N/V
 - ▶ Post Partum
 - ▶ MID
 - ▶ Fever
 - ▶ Dehydration
 - ▶ Fluoride
 - ▶ Drugs that lead to malabsorption or death to rapidly reproducing cells
 - ▶ PPI blocks Ca uptake in GERD

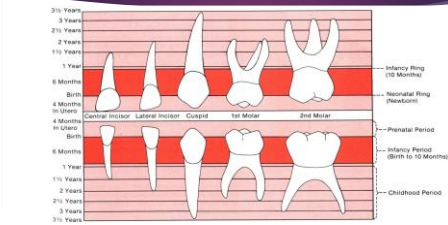


Life cycle of ameloblasts consists of six stages :



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Tooth Development Times +/-



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Treatment v Restorative Dentistry

- ▶ Treatment
 - ▶ Arrest caries
 - ▶ Strengthen dentin and enamel
 - ▶ May retain plaque and biofilm
 - ▶ Motivational training
 - ▶ Temporization
 - ▶ Pain and sensitivity relief
- ▶ Restorative dentistry is a treatment
 - ▶ Return tooth to health, form and function
 - ▶ Arrest caries
 - ▶ Strengthen tooth
 - ▶ Minimize plaque and biofilm retention




161

All Teeth with Decay Have to Be Restored?

- ▶ Form and function
- ▶ G.V. Black
- ▶ Alternatives- but for how long?
 - ▶ SDF
 - ▶ The new messiah or just another silver in the quest?
 - ▶ Produces hard outer shell of hyperfluoridated enamel but must underneath
 - ▶ Diagnostic criteria
 - ▶ Varnishes
 - ▶ Fluoride
 - ▶ CPM-ACPM superior and deeper penetration
 - ▶ ART (ART)
 - ▶ Ci pallatives

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Minimally Invasive Dentistry



Does not mean painless dentistry!
Does not mean you don't have to remove tooth tissue
Does not mean you don't have to go in and prevent future issues
Consider an ongoing process of prevention and treatment

What are the goals?
temporization?
Relief of Pain
Restore the teeth to form and function?

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Treatment Modalities

- Habit/Diet/frequency of eating
- Decrease fermentable carbohydrate and sugar content
- Remove/disrupt biofilm
- Alternative Medicine Therapies- not tested/approved
 - Ozone
 - Oil Pulling (coconut oil)
- Chemotherapy
 - Xylitol topical application
 - Gums/candy/wafers
- Topical fluoride use
 - Calcio phosphate
 - Chlorhexidine use does not decrease incidence of coronal cavities
 - Silver diamine fluoride
- Interim restorative materials (pulpaliva)
 - Glass ionomers (fluoride releasing)
 - Lipocine pops
- Definitive treatment



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Treatment v Restorative Dentistry

- Treatment
 - Anesthetics
 - Strengthen dentin and enamel
 - May retain plaque and biofilm
 - Individualized training
 - Temporization
 - Pain and sensitivity relief
 - Restorations
- Restorative dentistry
 - Repair tooth to form and function
 - Anesthetics
 - Strengthen tooth
 - Minimize plaque and biofilm retention



165

Evidence-Based Clinical Practice Guideline on Nonrestorative Treatments for Carious Lesions: A Report from the American Dental Association

Summary of the recommendations for the nonrestorative treatment of caries in primary teeth

GRADE Certainty in the Evidence	GRADE Interpretation of Strength of Recommendations	Recommendation	Strength of Recommendation
High We are very confident that the evidence is sufficient to support a recommendation for or against a particular intervention.	High The magnitude of benefits is the greatest magnitude for a suggested class of action, but may be small.	For/Against We recommend (or do not recommend) this intervention for patients in this population.	Strong
Low We have low confidence in the evidence that supports a recommendation for or against a particular intervention.	Low The magnitude of benefits is the greatest magnitude for a suggested class of action, but may be small.	For/Against We recommend (or do not recommend) this intervention for patients in this population.	Conditional
Very Low We have very low confidence in the evidence that supports a recommendation for or against a particular intervention.	Very Low The magnitude of benefits is the greatest magnitude for a suggested class of action, but may be small.	For/Against We recommend (or do not recommend) this intervention for patients in this population.	Conditional

ADA Center for Evidence-Based Dentistry®

166

Pulpotomies and Pulpectomies v Extraction

- Old Science:
 - Pulpotomies if clin but no radio signs
 - Treat based on pulp bleeding and control of hemorrhage
 - Cytokines are indication of inflammation
 - Mullow M, Aronson V, Sam S, Fasa JN. Does Achievement of Hemostasis After Pulp Capping Provide an Accurate Assessment of Pulp Inflammation? *Dental Pract*. 2018; Jan 1;40(1):37-42.
 - NO!!!
 - So what are we to do?
 - Pulpectomize each tooth?
 - Extraction and space maintainers if symptomatic or draining fistula
 - Pulpectomies are successful if limited root resorption
 - No difference in success rates between pulpotomy, pulpectomy, IPC, Hall crowns
 - Hilton TJ. Keys to Clinical Success with Pulp Capping: A Review of the Literature. *Oper Dent*. 2009; 34(5): 615-625.

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Pulpotomies and Pulpectomies v Extraction

- New Science:
 - Hemostasis is not indicative of pulp health
 - IPC
 - Leave some decay
 - GI/MTA/single silicate cement
 - DPC
 - MTA/single silicate cement/CaOH2/ternary/fluoride/citric/bacterial
 - Vitapex sterilization
 - Chlorhexidine
- Pulpotomy
 - Vital infected
 - Hemostasis
 - No pharmacological
 - Sterilize chamber
 - SB infected canal and PDL
 - IRM/MTA/Vitapex
- Pulpectomy
 - Resorbable
 - Sterilize root system
 - Vitapex/ zincOe
 - LSTR

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Primary Tooth Pulp Therapy

- ▶ Pulpotomy
 - ▶ Lesion Sterilization and Tissue Repair (LSTR) AKA Non-Instrumental Endodontic Treatment (NIET)
 - ▶ Niigata University, Japan, 1988
 - ▶ Triple antibiotic: Ciprofloxacin, Metranidazole, Minocycline in propylene glycol paste
 - ▶ Alternative combo:
 - ▶ Placed in teeth with necrotic pulps without instrumenting, sealed with GIC, final restoration placed
 - ▶ Problems
 - ▶ Exposure and sensitivity
 - ▶ Overuse of antibiotic, and resistance as well as emergence of other bacteria
 - ▶ Systemic toxicity and side effect on GIAD and tendons/joints
 - ▶ Efficacy
 - ▶ No greater than standard pulpotomy techniques
 - ▶ Duarte, M.L., Pires, P.M., Ferreira, D.M. et al. Is there evidence for the use of lesion sterilization and tissue repair therapy in the endodontic treatment of primary teeth? a systematic review and meta-analysis. *Can Oral Invel* 24, 2929-2932 (2020). <https://doi.org/10.1007/s00784-020-03415-0>



169


Primary Tooth Pulp Therapy

- ▶ Use of Non-Vital Pulp Therapies in Primary Teeth
 - ▶ Success rates were not impacted by method of obturation or root length determination, type of tooth, number of visits, irrigants, smear layer removal, or timing/type of final restoration.
 - ▶ Pulpotomy 18-month success rates supported ZOI/iodoform/CH (Endoflas) and ZOE pulpectomy over iodoform/CH (Vitatapex). LSTR had limited indication for teeth with resorbed roots and requires close monitoring.
 - ▶ *Pediatr Dent* 2020;42(5):337-49

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Stainless Steel Crowns following Pulp Therapy

- ▶ Engineering science
 - ▶ Cross structural bracing violated
- ▶ Treatment options
 - ▶ SSC
 - ▶ Esthetic Zirconia Crowns
 - ▶ Bonded restoration after minimal tooth and decay removal
- ▶ Bonding science
 - ▶ Chemical v mechanical




171

You can't give an injection to a kid because it hurts and they'll scream

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Pain Control in Children

- ▶ Necessary for successful treatment
- ▶ Poor pain control often misinterpreted for disruptive behavior
- ▶ Requires special understanding of physiology and psychology of children



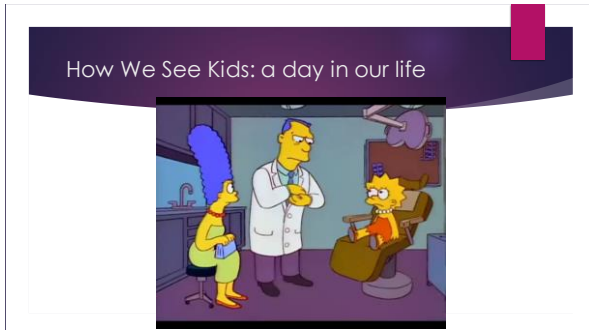
173

Pain in Children



- ▶ The response to the sensation of pain is often confused for disruptive behaviors
- ▶ May be socialized but is real
- ▶ Must be recognized as an important entity
- ▶ Changes in physiologic parameters
- ▶ Difficult to assess in children under 6
 - ▶ Use observation
- ▶ Self reporting in children over 6
 - ▶ Pain scales
- ▶ *It is the key to a successful treatment (child and parent)!*

174



How We See Kids: a day in our life

175

Use topical and make it red


- ▶ Ester anesthetic
- ▶ Hides the color of blood
- ▶ Numbs mucosa but not much deeper
- ▶ Still requires distraction and clenching
- ▶ Optimum time 1-3 minutes
- ▶ Don't use too much
 - ▶ Risk of methemoglobinemia
- ▶ **Do not use compounded topicals**
 - ▶ FDA warning re OD and death




176

Don't waste your money on expensive anesthetics


- ▶ 2% Lidocaine with 1:100000 epi
 - ▶ Wide margin of safety
 - ▶ Full mouth with two carpules
 - ▶ Lasts too long?
 - ▶ Amide anesthetic
 - ▶ Metabolized in the liver
 - ▶ High pKa therefore slower dissociation to free base
 - ▶ Infection has lower pH; limits free base
 - ▶ Buffer with 0.2 ml NaHCO₃/carp
- ▶ 6000X bioavailable nonionized molecules
- ▶ 4% Articaine with 1:100000 epi
 - ▶ Amide/ester
 - ▶ Transient methemoglobinemia



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Success of injections

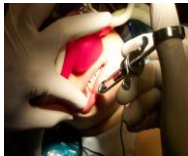
- ▶ PDL>Infiltration>IANB
- ▶ pH of area
- ▶ pH of carpule



178

Don't block children under 8 or use a full carpule

- ▶ Porous bone
- ▶ Teeth clenched
- ▶ Move needle along alveolar bone
- ▶ Interdental
- ▶ Never do a "long buccal"
- ▶ 1 hour anesthesia time
 - ▶ Controlled by volume



179

Commonly Used Local Anesthetic Agents
Dose Recommendations from AAP/AAPD

Drug	Maximum dose with epinephrine (mg/kg)	
	Medical Use	Dental Use
Lidocaine	7.0	4.4
Mepivacaine	7.0	4.4
Articaine	7.0	7.0

■ Determined by relative vascularity of injection area
Guideline for Monitoring and Managing Pediatric Patients During and After Sedation for Diagnostic and Therapeutic Procedures. AAPD Reference Manual 2006-2007
 David L. Rothman 2005 2010

180

Moore's Rule of 25

- ▶ One cartridge/25 lbs (11 kg) body weight
- ▶ Any marketed local anesthetic used in dentistry
- ▶ Establishes a conservative dose
- ▶ Examples:
 - ▶ 50 lbs. (22 kg) 2 carpules
 - ▶ 75 lbs. (33 kg) 3 carpules
 - ▶ 100 lbs. (44 kg) 4 carpules
- ▶ May be too conservative in preschool child
 - ▶ More accurately 1 carpule/22 lbs (10 kg)
- ▶ mg/kg calculation provides greater accuracy

■ Moore P., Manual of Local Anesthesia, 4th ed. Eastman-Kodak Co., Rochester, NY, 1996

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Local Anesthetic Volume Administered

"For children under 10 years of age, it is rarely necessary to administer more than one-half cartridge (20 mg), even for mandibular blocks."

Astra Pharmaceuticals Package Insert, 1997

182

Anesthesia Techniques in Children

- ▶ Short needle
- ▶ Smaller amount
 - ▶ Diffuses over a larger relative area
 - ▶ Less myelination
- ▶ As few teeth and soft tissue areas affected as possible!



183

Infiltration Technique



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The First Shot Didn't Work:
let's give another- hey
that didn't work either

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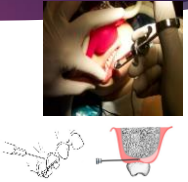
pKa

- ▶ pKa: the pH where the nonionized and ionized molecules are equal in number
- ▶ Carpules with epi: pH 3.2
- ▶ What happens when you add more acid to the mix?
- ▶ What happens to the bicarb in the tissue?

186

Don't block children under 8 or use a full carpule

- ▶ Porous bone
- ▶ Teeth clenched
- ▶ Move needle along alveolar bone
- ▶ Interdental infiltration
- ▶ Never do a "long buccal"
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 - ▶ Controlled by volume



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Commonly Used Local Anesthetic Agents Dose Recommendations from AAP/AAPD

Drug	Maximum dose with epinephrine (mg/kg)	
	Medical Use	Dental Use
Lidocaine	7.0	4.4
Mepivacaine	7.0	4.4
Articaine	7.0	7.0

■ Determined by relative vascularity of injection area
Guideline for Monitoring and Managing Pediatric Patients During and After Sedation for Diagnostic and Therapeutic Procedures, AAPD Reference Manual

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Moore's Rule of 25

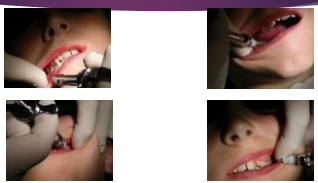
- ▶ One cartridge/25 lbs. body weight
- ▶ Any marketed local anesthetic used in dentistry
- ▶ Establishes a conservative dose
- ▶ Examples:
 - ▶ 50 lbs. 2 carpules
 - ▶ 75 lbs. 3 carpules
 - ▶ 100 lbs. 4 carpules
- ▶ May be too conservative in preschool child (approx. 1 carp per 22 #)
- ▶ mg/kg calculation provides greater accuracy

■ Moore P., Manual of Local Anesthesia, 4th ed. Eastman-Kodak Co., Rochester, NY, 1996

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Infiltration Technique



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Influence of pH

- ▶ Most LAs are weak bases
 - ▶ pK_a , 7.5-9.5
- ▶ Only the base form can diffuse rapidly into nerve
- ▶ A high pK_a means slower dissociation to free base
- ▶ Clinical result in onset of anesthesia?
- ▶ Tissue acidity lowers pH locally
 - ▶ Limits formation of free base
 - ▶ Leads to ionic entrapment in extracellular space

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Local Anesthetics Problems

- ▶ Pain from the pH incompatibility of local anesthetic and vasopressor with local tissue pH
 - ▶ LA: pH 5-9
 - ▶ Vasopressor: pH 3.5
- ▶ Tissue injury
- ▶ Latent uptake until pH "normalizes"
 - ▶ At acidic pH LA exists in non lipid soluble ionized form therefore unavailable to cross to nerve
- ▶ Infection lowers tissue pH

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Buffering Local Anesthetics Benefits


- ▶ Increases amount of lipid soluble active non ionized form
 - ▶ From pH 3.5 to buffered 7.4 there is a 6000 fold increase in lipid soluble form
- ▶ Patient comfort
- ▶ More rapid onset
- ▶ Decreased injury to tissue
- ▶ CO₂ release from HCl interaction with NaHCO₃ may potentiate action of LA and have its own anesthetic effect

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Buffering Local Anesthesia Armamentarium

- ▶ 8.4% NaHCO₃ available as 4.2g/50ml H₂O
- ▶ Tuberculin Syringe
- ▶ Alcohol wipes
- ▶ LA. carpule: 1.7ml with epi 1:100000 or 1:200000
- ▶ 2% lidocaine dosage: 1.1-1.8ml:10ml (0.2ml:1.7ml)
- ▶ Lasts about 2 weeks when stored at 32-40 F
 - ▶ Do before use



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Buffering References

- ▶ Larson PO¹, Ragi G, Swandby M, Darcey B, Polzin G, Carey P. Stability of buffered lidocaine and epinephrine used for local anesthesia. *J Dermatol Surg Oncol.* 1991 May;17(5):411-4.
- ▶ Murakami CS¹, Odland PB, Ross BK. Buffered local anesthetics and epinephrine degradation. *J Dermatol Surg Oncol.* 1994 Mar;20(3):192-5.
- ▶ Simon G, Frank, MD¹ and Donald H Lalonde, MD FRCSC². How acidic is the lidocaine we are injecting, and how much bicarbonate should we add? *Int J Obstet Anesth.* 2007 Apr;16(2):116-21. *Epub* 2007 Feb 5.
- ▶ Molamed SF, Tavano S, Folkel M. Faster onset and more comfortable injection with alkalized 2% lidocaine with epinephrine 1:100,000. *Compend Contin Educ Dent.* 2013;34(1):10-20.

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Buffering Local Anesthetics Technique




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So, a second shot?

- ▶ Bolus of acidic local anesthetic in a compartmentalized area
- ▶ 3D expansion to get to 3 mm of nerve
- ▶ Giving 2nd into same spot only increases acidity of area with limited NaHCO₃
 - ▶ Compartmentalization
- ▶ Use alternative technique



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What About Those Wisdom Teeth?

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3rd molars and "lack of wisdom" teeth

- ▶ Necessary or Preventive procedure?
 - ▶ What's the disease?
- ▶ Criteria
- ▶ All or some




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What About Those Third Molars?

- ▶ Not pathosis
- ▶ Do not cause crowding
- ▶ Disease of middle class children with insurance?
- ▶ Think tonsils and evidence based medicine
- ▶ #'s = to removing fingers for future chance of having hangnail
- ▶ More recent research discusses periodontal pocketing on distal of 2nd molars and chronic inflammation as cause for extraction



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AAOMS White Paper on Third Molars

- ▶ Discusses periodontal issues relating to 3rd molar eruption and partial eruption
- ▶ Does not offer chemotherapeutic options to treat pericoronitis
- ▶ Does not discuss gingivectomy to expose third molar crown
- ▶ Does not discuss asymptomatic disease free third molars
- ▶ Determines disease by pocket depth
 - ▶ 4 mm or greater
- ▶ What is the control group?
 - ▶ Europeans who don't have them removed?
 - ▶ Is disease acuity greater?
 - ▶ Lifespans shorter?

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Speaking of Europeans

- ▶ Removal of wisdom teeth that may remain disease-free indefinitely is costly (Benton 2012)
- ▶ National Institute for Health and Care Excellence (NICE) (NICE 2009) and Scottish Intercollegiate Guideline Network (SIGN) (SIGN 1992) clinical practice guidelines (CPGs) support conservative management of wisdom teeth
 - ▶ removal of wisdom teeth has declined in recent years (McArdle 2017)
 - ▶ requires individuals to have regular dental reviews or 'checkups', so that the status of the wisdom teeth can be monitored.



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Cochrane Reviews




- ▶ **Surgical removal versus retention for the management of asymptomatic, disease-free impacted wisdom teeth 2016**
- ▶ To evaluate the effects of removal compared with retention (conservative management) of asymptomatic disease-free impacted wisdom teeth in adolescents and adults.
- ▶ Impacted: An impacted wisdom tooth is called asymptomatic and disease-free in the absence of signs and symptoms of disease affecting the wisdom tooth or nearby structures.
- ▶ General agreement exists that removal of wisdom teeth is appropriate if signs or symptoms of disease related to the wisdom teeth are present.
- ▶ Less agreement exists about the appropriate management of asymptomatic disease-free impacted wisdom teeth.

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Cochrane Review

- ▶ 3696 records yielding 2472 discrete articles
- ▶ 25 met screening criteria
- ▶ 23 excluded because of failures in bias, cohort, follow up, study population or controls
- ▶ 2 articles included in review
 - ▶ Haradine 1998
 - ▶ RCT
 - ▶ Nunn 2013
 - ▶ prospective cohort study




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Cochrane Reviews

- ▶ And the results and conclusions...
 - ▶ Quality of evidence is low or very low re removal or retention
 - ▶ Insufficient evidence is available to support the surgical removal or retention of asymptomatic disease-free impacted wisdom teeth.
 - ▶ If the decision is made to retain asymptomatic disease-free impacted wisdom teeth, clinical assessment at regular intervals to prevent undue discomfort is advisable.



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Indications for Third Molar Removal

- ▶ Chronic periodontal disease/ pericoronitis
 - ▶ Recent research discusses periodontal pocketing on distal of 2nd molars
- ▶ Resorption of distal root of 2nd molar
- ▶ Nonrestorability
- ▶ Orthodontic concerns during distalization and uprighting
 - ▶ Ectopic eruption
- ▶ Cyst or abscess formation
- ▶ No association between third molars and lower incisor crowding (lack of stability)

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Options to extraction

- ▶ Follow q2yrs with PA radiograph
- ▶ Remove only when symptomatic
- ▶ Only 1-2% greater risk factor in older patients
- ▶ SO DON'T TAKE THEM OUT UNLESS NEED BE!!!
- ▶ Friedman, S, the Prophylactic Extraction of Third Molars: a Public Health Hazard; AJPH97:9, pp1556-1559 (Also on the NIH website)




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Options to Extraction

- ▶ Coronectomy
 - ▶ Removing crown of tooth that has roots around IAN
 - ▶ Roots may self erupt
- ▶ Removing symptomatic teeth only
 - ▶ European technique because of lack of access to GA and cost!



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Oh, one more...

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Discolored anterior teeth are necrotic

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Discolored Anterior Teeth

- ▶ Do not require intervention unless other signs and symptoms appear
- ▶ Mobility
- ▶ Spontaneous or elicited pain
- ▶ Fistula formation
- ▶ Radiographic changes



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Why do you think they call it "Dental Practice"?

- ▶ Because we are always learning



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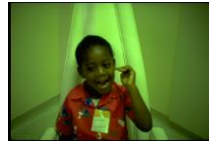
“ DEPECHEZ VOUS DE VOUS
EN SERVER PENDANT
QU'IL GUERIT! ”

And there are many more

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Thank You for Listening

- ▶ Any questions?



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