

1

2  **Do Unicorns Exist in Pediatric Dentistry?**

**Facts, Fantasy and Frivoloty**

**or**

**why we do and follow research!**

**or**

***science rules!***

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3  **Affirmation**

▶ No financial ties to drug or equipment companies to disclose

▶ Personal or family

▶ I have received supplies for workshops given at meetings

▶ No direct payments to me

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5  **4 out of 5 Dentists RECOMMEND Sugarfree Gum**

▶ HUH???

▶ WHAT ABOUT THE ONE WHO DOESN'T???

▶ Where's the science?

▶ Perception versus Reality

6  **What is a Myth?**

7  **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

8  **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 cult.

▶ *Honko, Lauri (1984). "The Problem of Defining Myth". In Dundes, Alan. 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
- ▶

9  **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

10  **Science**

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

11  **Were you taught myths in Dental School?**

12  **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?
- ▶

13  **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, Povidine Iodine, Probiotic Bacteria, Remineralizing agents (ACP-CPP): *insufficient evidence*
  - ▶ Sealants, restorations, regular restorations: *insufficient evidence*
- ▶ **THERE IS NO GOOD QUALITY EVIDENCE THAT ANYTHING WE DO WORKS!!!**

14  **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
- ▶

15  **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*
- ▶

16  **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

17  **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
  - ▶ N.A. v Europe v Asia???
- ▶

18  **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

19  **Placebo Effect**

- ▶ A sham intervention, medically or surgically, thought by the recipient to have a therapeutic effect
- ▶ Used in clinical trials to test efficacy of a treatment
  - ▶ Ethical?
- ▶ May produce relief through psychological mechanisms
  - ▶ Affect perception of the problem and trigger bodily changes
    - ▶ pain
  - ▶ Does not affect the underlying disease

20  **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

21  **Evidence Based Medicine**

22  **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.

23  **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.

24  **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

25  **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

26  **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
      - ▶ 65g/tsp v 48g/tsp 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)
  - ▶

27  **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

28  **Good Plaque v Bad Plaque**

- ▶ Good Plaque
  - ▶ Basic pH
  - ▶ Ca<sup>++</sup>, PO<sub>4</sub><sup>-</sup>, F<sup>-</sup>
  - ▶ Casein ( a protein which helps bond the minerals to the tooth)
- ▶ Bad Plaque
  - ▶ Fermentable Carbs
  - ▶ Sucrose
  - ▶ No proteins
  - ▶ Lots of bacteria

29  **First dental visit?  
Bah, humbug?**

30  **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
- ▶

31  **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

32  **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>

▶

33  **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

34  **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.

▶

35  **Because I want fluoride left in my water, I'll use a reverse osmosis filter**

36  **What is a water filter?**

▶ Charcoal filtration

▶ Traps pollutants et al in microporosities of charcoal

▶ Not selective

▶ Micropore filtration

▶ Membrane with micropores that prevent particles of a specific size from passing through usually down to  $5\mu$ - $0.001\mu$

▶ Not selective

▶ Reverse osmosis filtration

▶ To overcome osmotic pressure, pressure applied to a fluid passing through a semipermeable membrane to increase yield of clear affluent

▶ Dependent on size of micropores on the membrane

▶

37  **Reverse Osmosis Filter**

▶ 3 stages

▶ Sediment pre-filter for larger contaminant particles

▶  $5\mu$

▶ Activated Carbon pre-filter

▶ Absorbs pollutants in pore structure

▶ Removes taste, odors and chemicals such as chlorine



- ▶ Semi-Permeable membrane
    - ▶ Fluid forced through this membrane to overcome osmotic pressure
    - ▶ Thin film composite
    - ▶ Removes 98% of dissolved solids
  - ▶ Does not remove bacteria, parasites or viruses
  - ▶ May remove salt, magnesium and calcium
- 38  **Does Reverse Osmosis Spare F<sup>-</sup>**
- ▶ Yes and No
    - ▶ Depends on the prefiltering
  - ▶ But if it spares chlorine and iodine...
    - ▶ EPA registered toxins
    - ▶ Fluoride is not, therefore companies do not have to test for it
- 39  **Pacifiers are OK to 3  
(or maybe 2 or 5 or 6 or so or whenever the kid wants to give it up)**
- 40  **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
- 41  **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
- 42  **Pacifier, Thumb and Bottle Habits**
- ▶ Poyak J. Effects of pacifiers on early oral development,. Int J Orthod 2006 Winter,

17(4)13-16

- ▶ Zardetto CG<sup>1</sup>, Rodrigues CR, 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.
- ▶ Melink S<sup>1</sup>, Vagner MV, Hocevar-Boltezar I, 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.

▶

▶

43  **Pacifier, Thumb and Bottle Habits**

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

44  **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

45  **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?*

46  **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

47

48

49  **My baby is teething!!!**

50  **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, 4<sup>th</sup> c. bc)
- ▶ Long thought to be associated with infant illness.
- ▶

51  **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 1<sup>st</sup> 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

52  **Symptoms associated with tooth emergence**  
**Macknin, et al, *Pediatrics* 2000; 105; 747-752 – Prospective cohort study, 111 children)**

53  **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.

54  **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

55  **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?
    - ▶ Contain:
      - ▶ Calcearia Phosphorica (Calcium Phosphate), 3X HPUS Chamomilla (Chamomile) 3X HPUS Coffea Cruda (Caffeine) 3X HPUS Belladonna 3X HPUS (Alkaloids 0.0003%).
      - ▶ 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!

56  **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.
- ▶
- ▶

57  **All literature refers to treatment of teething!**

58  **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!

59  **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
- ▶ 1<sup>st</sup> line of defense is mast cell and histamine release for antigenic and allergen insults
- ▶

60  **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

61  **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

62  **Primary Herpetic Gingivostomatitis**

1 ▶ Hx:

- ▶ Prodromal signs
- ▶ URI/flu symptoms
- ▶ Irritability and loss of appetite

▶ Exam:

- ▶ Generalized swollen and bleeding gums
- ▶ Low grade fever < 101
- ▶ Sunken cloudy eyes (SLK)

▶ Dx:

- ▶ Viral Stomatitis
- ▶ Echo, rhino, coxsackie, herpes viruses

2 ▶ Tx:

- ▶ Antivirals if early enough
- ▶ Palliative topicals/systemics
- ▶ Fluids
  - ▶ Dehydration is major complication
- ▶ Time limited
  - ▶ Heals in 10 days with meds; 1½ weeks without
- ▶ Is this "teething"?



63  **And Some More**

- ▶ Drooling
  - ▶ Exocrine 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

64  **My kid grinds all night long- is he stressed?**

65  **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
  - ▶

66  **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

67  **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.

68  **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*
  - ▶

69  **My Baby Can't Feed:**

**Let's do a Frenectomy!**

**or**

**Maybe a Frenotomy**

**or**

**Maybe a Frenuloplasty**

**or ???**

70  **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

71  **Or about sleep disordered breathing**

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

73  **LATCH (maternal report)**

74  **Tabby**

75  **Hazelbaker**

76  **Assessment?**

- ▶ Effectiveness of tongue-tie assessment tools in diagnosing and fulfilling lingual frenectomy criteria: a systematic review
  - ▶ Hatami A, Dreyer CW, Meade MJ, Kaur S
  - ▶ [Aust Dent J](#). 2022 Sep; 67(3): 212–219.
  - ▶ Reviewed >200 studies, only 14 valid for inclusion
  - ▶ Significant heterogeneity was evident across all studies. No statistical correlation between the two variables could be determined. Although tongue-tie division procedures appear to provide benefits in breastfeeding and speech, there are no data to suggest a statistically significant association between the severity of tongue-tie, and the correct identification of patients who would benefit from tongue-tie division.

77  **And, again, how frequently?**

- ▶ Prevalence of ankyloglossia according to different assessment tools. Cruz PV et al.



<https://doi.org/10.1016/j.adaj.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"
- ▶ One 2017 study found an 834 percent increase in reported diagnoses of tongue tie in babies from 1997 to 2012
  - ▶ 866 percent increase in frenotomies during that time as inpatients
    - ▶ *doesn't count those treated as outpatient*
- ▶

78  **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?
  - ▶ Or a post on social media

79  **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.

80  **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).

81  **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

82  **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. PUBMED: 21999476]
- ▶ Buryk 2011: Buryk M, Bloom D, Shope T. Efficacy of neonatal release of ankyloglossia. *Pediatrics* 2011;128(2):280–8. PUBMED:21768318]
- ▶ Dollberg 2006: Dollberg S, Botzer 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(9):1598–1600. PUBMED:16952598]
- ▶ 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 Diseases in Childhood Fetal and Neonatal Edition* 2014;99(3):F189–95. PUBMED: 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. PUBMED: 15953322]

83  **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

84  **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.

85  **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
  - ▶ Is a tongue tie a natural preventer of SIDS or airway obstruction in newborns
    - ▶ Recommended preventive treatment is using a pacifier to bring the tongue forwards
    - ▶ AAP sleep recommendations for newborns to 6 mo
    - ▶ Walsh F, Kelly D. Partial airway obstruction after lingual frenotomy. *Anesth Analg.* 1995;80(5):1066-1067.

86  **And the Mass Media is Talking...**

87  **And again**

88  **And The New York Times**

89  **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.<sup>51</sup>

▶

90  **What about safety?**

▶ Safety and efficacy of maxillary labial frenectomy in children: a retrospective comparative cohort study. Baxter RT, Zaghi S, Lashley A. International orthodontics, 2, June 2022

▶ Authors are from the Alabama Tongue tie Center, AL and The Breathe Institute, CA

▶ Quality journal???

▶ 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?!?*

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

92  **Bonus Question**

▶ "Shouldn't you just take out those extra baby teeth?"

▶ or: my child looks like a shark

93  **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!

94  **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
- ▶

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

96  **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

97  **What's the purpose of 2+phase ortho?**

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

98  **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 CI II 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 ph tx
    - ▶ Low to moderate quality evidence
- ▶ Assessment:
  - ▶ Changes in OJ, Cephalometric changes (antero-posterior relationship of the mandible to the maxilla or ANB angle) and incisal trauma in the upper anterior teeth

99  **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

100  **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

101  **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.
- ▶
- ▶

102  **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 pretty)

103  **Oh, we'll just do clear aligners because they are easier to use and more cosmetic**

104  **Cosmetic? Better or Worse?**

- ▶ Reduces but may not eliminate the need for classic orthodontics
- ▶ Lost trays
  - ▶ Must wear >20 hours per day
- ▶ Periodontal and dental effects
  - ▶ Increased caries and decalcification
  - ▶ Impact food
  - ▶ Saliva flow
- ▶ Affect mandibular growth
  - ▶ Opens mandibular angle
- ▶ Occlusal disharmony
- ▶ Posterior open bites
- ▶ Good or great results?

- ▶ Do you have the resources and training?

105  **I was told to wear my retainers at night but my teeth are moving**

106  **The Mystery of Retention**

- ▶ Why do I need a retainer? Won't my teeth stay where they were moved?
- ▶ How many hours a day should a retainer be worn?
- ▶ How many years should a retainer be worn?
- ▶ Can I take off the wire retainer behind the front teeth and what will happen?
- ▶ Why aren't the teeth stable enough that you shouldn't need retention?



107  **And the Literature Shows**

- ▶ Variations describing effectiveness, cost factors, survival times, oral hygiene status, and regimen for wear
- ▶ No statistically significant studies
- ▶ Patient satisfaction and speech articulation: Vacuum formed retainers(VFR)
- ▶ Occlusal contacts and bite: Hawley retainers
- ▶ Need for high-quality evidence in support of a particular retention device and protocol following orthodontic treatment
- ▶ Clinical significance: Irrespective of the appliance, the patients should be prepared for a long-term or indefinite retention phase following orthodontic treatment to prevent relapse.

▶ Ahmed M Allassiry. Orthodontic Retainers: A Contemporary Overview. J Contemp Dent Pract. 2019 Jul 1;20(7):857-862.



108  **Oh, dang. He kicked off the lead apron and now he'll have kids with 3 ears and they'll run for parliament/president**

109  **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

110  **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.”

111  **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*

112  **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!

113  **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

114  **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
  - ▶

115  **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
    - ▶ Check your local state laws
  - ▶ Barriers to implementation
- 116  **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
- 117  **He's got cavities**
- 118  **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
        - ▶ Anteriors
        - ▶ Pre-eclampsia
        - ▶ Maternal infections
        - ▶ N/V
      - ▶ Post Partum
        - ▶ MID
        - ▶ Fever
        - ▶ Dehydration
        - ▶ Fluorosis
        - ▶ Drugs that lead to malabsorption or death to rapidly reproducing cells
          - ▶ PPI blocks Ca uptake in GERD
- 119  **Tooth Development Times +/-**
- 120  **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

121  **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 arrow in the quill?
    - ▶ Produces hard outer shell of hyperfluoridated enamel but mush underneath
  - ▶ Diagnostic criteria
- ▶ Varnishes
  - ▶ Frequency
  - ▶ CPP-ACPF superior and deeper penetration
- ▶ ART/IRT/ITR
  - ▶ GI palliatives

122  **Minimally Invasive Dentistry**

123  **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/wipes
- Topical fluoride use
  - Gels/pastes/varnish
- Chlorhexidine use does not decrease incidence of coronal caries
- Silver diamine fluoride
- Interim restorative/ART/ITR/palliative
  - Glass ionomers (fluoride releasing)

- Licorice pops
- Definitive treatment

124  **Treatment v Restorative Dentistry**

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

125

126  **SDF**

- ▶Arrests caries! Stops them dead in their tracks!
  - ▶Heavy duty marketing
- ▶Multiple applications over varying periods of time
- ▶Many articles and case studies but not much "research"
  - ▶Low to very low quality of recommendation
- ▶Holds kids until old enough to behave without GA or until age of three
- ▶Cosmetically poor: Turns everything black in its path
  - ▶2 step products add KI over to diminish color change
- ▶Interim treatment not restoration or repair
- ▶Remineralizes the decalcified dentin
- ▶Antibacterial
- ▶Has a place: occlusal surfaces of cavitated teeth NOT proximal surfaces
- ▶Be sure to get consent for color and staining
- ▶

127  **So What Could Go Bad with SDF?**

- ▶38% SDF was cytotoxic to hDPSC at a dilution of 10<sup>-3</sup> but not at 10<sup>-4</sup> or 10<sup>-5</sup>
  - ▶Exposure of 38% SDF directly to the pulp should be avoided
  - ▶Oropeza R et al. Cytotoxicity Analysis of Human Dental Pulp Cells After Silver Diamine Fluoride Application. *Pediatr Dent* 2022;44(6):440-4
- ▶Rat pulpal cells exposed to 38% SDF showed signs of severely impaired viability, mineralization instability and change in morphology

- ▶ Kim S et al. The effect of reduced glutathione on the toxicity of silver diamine fluoride in rat pulpal cells. J Appl Oral Sci 2021; 29e20200859
- ▶ And the good news
  - ▶ Toxic levels of silver or fluoride in the blood stream were not reached following administration of SDF

128  **Is SDF better than RMGI for indirect pulp capping?**

- ▶ Is ART better or what?
- ▶ No clinical difference between 38% SDF, 38% SDF covered with KI or RMGIC
  - ▶ In pulp health and pain
  - ▶ RMGIC better color, and better marginal staining
    - ▶ Baraka M et al. Twelve month randomized controlled trial of 38% silver diamine fluoride with or without potassium iodide in indirect pulp capping of young permanent molars. JADA2022:153(12):1121-1133

129  **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
    - ▶ Mutluay M<sup>1</sup>, Arıkan V<sup>2</sup>, Sarı S<sup>3</sup>, Kısa Ü<sup>4</sup>. Does Achievement of Hemostasis After Pulp Exposure Provide an Accurate Assessment of Pulp Inflammation? Pediatr Dent. 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.
  - ▶
  - ▶
  - ▶

130  **Pulpotomies and Pulpectomies v Extraction**

- 1  ▶ New Science:
  - ▶ Hemostasis is not indicative of pulp health
  - ▶ IPC
    - ▶ Leave some decay
    - ▶ GI/MTA/single silicate cement

- ▶ DPC
  - ▶ MTA/single silicate cement/CaOH<sub>2</sub> remineralization/antibacterial
  - ▶ Vitapex sterilization
  - ▶ Chlorhexedine
- ▶
- 2 ▶ Pulpotomy
  - ▶ Vital v infected
    - ▶ Hemostasis
  - ▶ No formocresol
  - ▶ Sterilize chamber
    - ▶ Still infected canal and PDL
  - ▶ IRM/MTA/Vitapex
- ▶ Pulpectomy
  - ▶ Resorbable
  - ▶ Sterilize root system
  - ▶ Vitapex/ZnOE
  - ▶ LSTR

### 131 Primary Tooth Pulp Therapy

- ▶ Pulpectomy
  - ▶ Lesion Sterilization and Tissue Repair (LSTR) AKA Non-Instrumental Endodontic Treatment (NIET)
    - ▶ Nigata University, Japan, 1988
    - ▶ Triple antibiotic: Ciproflaxin, 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 antibiotics and resistance as well as emergence of other bacteria
    - ▶ Systemic toxicity and side effects on G&D and tendons/joints
  - ▶ Efficacy
    - ▶ No greater than standard pulpectomy 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-analyses. *Clin Oral Invest* 24, 2959–2972 (2020). <https://doi.org/10.1007/s00784-020-03415-0>
- ▶
- ▶

132  **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.
  - ▶ Pulpectomy 18-month success rates supported ZO/iodoform/CH (Endoflas) and ZOE pulpectomy over iodoform/CH (Vitapex). LSTR had limited indication for teeth with resorbed roots and requires close monitoring.
    - ▶ *Pediatr Dent* 2020;42(5):337-49

133  **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
- ▶

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

135  **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

136  **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)!*

137  **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

138  **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 NaHCO<sub>3</sub>/carp
    - ▶ 6000X bioavailable nonionized molecules
- ▶ 4% Articaine with 1:100000 epi
  - ▶ Amide/ester
  - ▶ Transient methemoglobinemia

139  **Success of injections**

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

140  **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

141  **Commonly Used Local Anesthetic Agents Dose Recommendations from AAP/AAPD**

142  **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

143  **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

144  **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!

145  **Infiltration Technique**

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

147  **So, a second shot?**

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

148  **Let's give them a little acetaminophen for the pain**

149  **Analgesics for Kids**

- ▶ No Aspirin
  - ▶ Reyes syndrome
  - ▶ Autoimmune
- ▶ No acetaminophen

- ▶Asthma!?!
  - ▶6-7 yo
  - ▶1/yr: 70>
  - ▶1/mo: 540>
    - ▶Gonzalez-Barcala FJ, Pertega S, Castro TP. Exposure to paracetamol and asthma symptoms. Euro J Pub Health 2013;23:706-710
  - ▶Liver destruction
- ▶NSAIDS
  - ▶Bleeding and clotting issues
- ▶Narcotics
  - ▶Respiratory and cardiac depression
  - ▶Abuse
- ▶Combined therapy
  - ▶NSAID/Acetaminophen/NSAID/Acetaminophen

150  **Give an antibiotic?**

- ▶Sensitivity
  - ▶Of bacteria
  - ▶Of patient
- ▶Drainage
- ▶Swelling and airway obstruction
- ▶Systemic effect
- ▶Can the problem be treated by other methods?
  - ▶Anti-inflammatories
  - ▶Pain meds
- ▶

151  **When Not to Give an Antibiotic**

152  **What About Those Wisdom Teeth?**

153  **3<sup>rd</sup> molars and “lack of wisdom” teeth**

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

154  **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 2<sup>nd</sup> molars and chronic inflammation as cause for extraction

155  **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?
- ▶
- ▶

156  **Speaking of Europeans**

- ▶ Removal of wisdom teeth that may remain disease-free indefinitely is costly ([Renton 2012](#))
- ▶ National Institute for Health and Care Excellence (NICE) ([NICE 2000](#)) and Scottish Intercollegiate Guideline Network (SIGN) ([SIGN 1999](#)) clinical practice guidelines (CPGs) support conservative management of wisdom teeth
  - ▶ removal of wisdom teeth has declined in recent years ([McArdle 2012](#))
  - ▶ requires individuals to have regular dental reviews or 'checkups', so that the status of the wisdom teeth can be monitored.
- ▶

157  **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.

158  **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
  - ▶ Harradine 1998
    - ▶ RCT
  - ▶ Nunn 2013
    - ▶ prospective cohort study

159  **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 undesirable outcomes is advisable.

160  **Indications for Third Molar Removal**

- ▶ Chronic periodontal disease/ pericoronitis
  - ▶ Recent research discusses periodontal pocketing on distal of 2<sup>nd</sup> molars
- ▶ Resorption of distal root of 2<sup>nd</sup> 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)

161  **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)

162  **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
- ▶

163  **Depechez vous de vous en server pendant qu'il guerit!**

1 *And there are many more*

164  **Thank You for Listening**

- ▶ Any questions?