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A Pediatrician's Guide to Infant Dental Hygiene: Focus on Fluoride and Nutrition

As future pediatricians some of us will be asked seemingly benign questions, the answers to which are not simple and are mired in current public health controversy. One of these questions will be about dental hygiene for infants. Our first priority is to our patients and their families, so we need the best answers to the most common questions. Second, we need to be aware of the classic and current research findings in order to feel confident in these answers and to help influence public policy regarding issues such as water fluoridation. This paper poses some common questions parents may ask, and attempts to provide the information necessary to provide the best answers possible. Many parents will respond best to the handy American Academy of Pediatrics table below, while others will want more detailed answers.

Parent's Question: I remember the commercials with Crest toothpaste vanquishing the "cavity creeps". They hated Fluoride. What is fluoride and why did they hate it so?

Information to Help You Answer This Question: Fluoride is a trace element that has been demonstrated to be effective in preventing and fighting dental caries. The "creeps" were actually bacteria in plaque that build up on teeth. These bacteria produce acid as a byproduct of sugar metabolism and this acid demineralizes the tooth's enamel (12). When fluoride is present in the oral cavity, along with calcium and phosphate, the tooth can use it to engage in remineralization of enamel. Development of caries into cavities is dependent on the relative rates of demineralization and remineralization (12; 1; 10; 4). Parents of an infant must consider both preeruptive and posteruptive effects; during the first year of life, infants' primary and permanent teeth will be developing (preeruptive), and some teeth will be erupting (posteruptive). Fluoride is administered by two methods accordingly: systemically and topically. Systemic administration of fluoride assists in development of teeth; in addition, systemic fluoride is released from salivary glands following stimulation by sugars, bathing the oral cavity in saliva containing fluoride (15).

In order to demonstrate the efficacy of fluoride in preventing dental caries, many types of studies have been conducted. Many studies (over 113 studies in 23 countries; 11) have established a clear causal link between fluoride and caries prevention. Some studies established test communities with optimally fluoridated water and control communities without water fluoridation. Other studies used an ABA design in which a community's dental health is evaluated before fluoridation, after fluoridation, and after cessation of fluoridation. While there are some methodological problems, such as communities being able to decide whether they are test or control communities, in general the findings are quite conclusive. Optimal caries protection by fluoride occurs between 1 and 2 ppm (1-2 mg/L water) (12, 1, 10; for excellent reviews).

Q: Sounds like fluoride is pretty important, but why do I have to worry about it for my child. Don't they put fluoride in the water these days?

A: In light of the discovery of Fluoride's protective effect, public health officials recommended adding fluoride to water supplies (3). However, these officials found that when water levels exceeded 1.5 ppm (1.5mg/L) there were significant increases in a mottling of the teeth, called fluorosis. Thus, optimal levels of fluoridation were set at 1 ppm.

Los Angeles' water is not optimally fluoridated, with levels often far lower than recommended. In fact, there are only seven of the 50 largest US cities without optimally fluoridated water ([12](#)). Many cities have reduced their fluoride content for several reasons, some political (people believe fluoridation violates their rights to 'pure water'; e.g., the landmark "Strathclyde Fluoridation Case"), and others scientific (evidence of fluorosis now that most people are receiving fluoride from other sources, such as fluoride toothpastes).

Water in Los Angeles comes from a variety of sources. The majority of West Los Angeles, the San Fernando Valley, and South Bay receive water from the Los Angeles Filtration Plant and the MWD Jensen Treatment Plant. Downtown and South Central Los Angeles receive water from all four sources below. The DWP monthly monitors the sources, reservoirs, tanks, and distribution mains to determine water contents. Fluoride content in 1997 from these sources were:

Fluoride Content

Source Range Average

Los Angeles Filtration Plant 0.4-0.6 0.5

MWD Jensen Treatment Plant 0.2 0.2

MWD Weymouth Treatment Plant 0.2-0.3 0.3

River Supply Conduit 0.3-0.5 0.4

Thus it can be concluded that children in Los Angeles are not receiving optimal levels of fluoride from their drinking water, and some may be getting significantly less than this amount.

Q: I've heard of Fluoride supplements. If my child isn't getting Fluoride from the water, should I be giving her these supplements? And if so, how much?

A. There are many types of supplements that children can take (see [10](#); [1](#); [12](#); for reviews). These include tablets, drops, rinses, and gels topically, and fluoridated milk and salt systemically. These supplements arose at the same time as water fluoridation, in response to significant community-wide dental problems. Some measures were taken in schools, such as having all children take tablets or rinses each day in school. Some infant formulas were also supplemented with fluoride in the hope of reducing "baby bottle mouth" (rampant caries from constant suckling on bottles filled with sweet solutions).

While these measures were effective at the time, today supplementation is problematic. Children now receive fluoride from many sources. Parents and physicians need to estimate the amount of fluoride children receive from all sources before deciding to implement supplementation in order to prevent fluorosis (mottling of the teeth) and fluoride overdose([14](#)). Decisions about supplementation need to consider (a) all sources of fluoride, (b) child's age and size, and (c) child's caries risk status. Recently, the American Academy of Pediatrics developed the following guidelines on supplementation ([7](#)):

American Academy of Pediatrics Fluoride Supplementation Recommendations

Water Fluoride Content (in ppm)

Age <0.3 0.3-0.6 >0.6

Birth-6 mo 0 0 0

6 mo - 3 yr 0.25 0 0

3 - 6 yr 0.50 0.25 0

6 - 16 yr 1.00 0.50 0

This table provides a helpful rule of thumb for a practitioner in many cases. However, it is clear that it is problematic. First, the water fluoride content used in this table may not be helpful for the community in question. For example, in Los Angeles' Westside, water comes from two sources, which have average fluoride contents of 0.5 and 0.2. The proportion of the water that comes from each of these sources varies day to day, depending on the availability of water that day (2). In addition, the range of water from a site may vary week to week and month to month. For example, the aqueduct's water sometimes has levels as high as 0.6. This makes determination of "water fluoride content" very complex. Depending on the day of the week, a child may fall into any of the three categories above. Second, the table does not consider other sources of fluoride, such as swallowed toothpaste, and fluoridated products. Some infant foods, especially those high in chicken, have been found to have high fluoride content and should be considered (Heilman et al., 1997). Finally, the table does not consider caries risk status, which some researchers consider a function of previous caries, diet, and socioeconomic status. Despite the difficulty of using this table, it is clear that for parents of infants who are not believed to be at particular risk of caries, no supplementation is recommended, regardless of the level of water fluoridation.

Q: Can I brush his teeth with my own toothpaste?

A: Early research suggested that systemic ingestion of fluoride was most helpful in preventing caries. The most current research is suggesting that post-eruptive effects of fluoride in balancing the levels of demineralization and remineralization are most crucial. Thus, teeth should be brushed carefully as soon as they erupt. To prevent fluorosis and accidental overdose (14), children should use either a low fluoride paste (500mg) if possible and should be taught not to swallow as soon as they are old enough. Currently only between 2% and 39% of parents reported brushing their infant's teeth with fluoride dentifrice (9). In addition, some research has shown that teeth should not be rinsed after brushing in order to maximize the effectiveness of fluoride application. Tooth brushing and establishing a routine of brushing daily is likely to be one of the most effective dental preventive habits a parent can teach a child. This may be difficult and parents may need lots of reinforcement for helping their child establish good dental hygiene practices.

Q: What about my child's diet? Are there foods that are better or worse?

A: Nutrition is an important factor in controlling dental caries in children and adults. The most cariogenic foods are those high in sugars (particularly glucose, sucrose, and fructose), especially foods that are sticky and will remain in the mouth, such as raisins and toffee. Plaque pH falls below demineralization levels within 10 minutes of eating sugars, and pH levels do not return to baseline for 40 minutes after consumption (12). Thus, frequent eating of sugars places teeth at higher risk. Eating sweets with meals can be considered safe because this limits the amount of time the sugars are available to the microorganisms, and it also encourages the flow of saliva. Fast flow saliva is alkaline and can help balance the pH flux. This is thought to be the basis for some of the protective effects of foods that stimulate salivation (e.g., sugarless gum).

The presence of fluoride during and after meals can have several beneficial effects. In addition to aiding in remineralization, the presence of fluoride also has been shown to reduce the metabolic acid production rate of the plaque, resulting in smaller pH shifts (8).

The following table reviews foods that are cariogenic, non-cariogenic, and protective:

Cariogenicity Food

High Sugars (sucrose, glucose, fructose, maltose)

Fine processed grains with sugars (e.g., cookies, sweet breads)

Sugared, fruit-flavored drinks (e.g., Hi-C, Kool-Aid)

Sweetened fruit juices

Extremely high consumption of fruit (especially bananas and apples)

Very Low/Non Cooked, staple starchy foods (i.e., whole grain breads, rice, pasta, potatoes)

Artificial Sweeteners

Fresh fruit (especially citrus)

Protective FLUORIDE!!!!

Milk (Calcium, Phosphorus, Casein, Fat)

Cheese (possibly, not a lot of studies)

Plants (phosphate/phytate, still under clinical investigation)

Fibrous Foods (possibly, due to intense chewing stimulating salivary flow)

Sugar-free chewing gum

Summary

In summary, when parents of infants under one year ask for advice about dental hygiene, a simple clear response often works best in terms of adherence to recommendations:

1. **Diet:** Limit sweets to mealtimes; includes sweetened beverages and sweeteners on pacifiers
2. **Toothbrushing:** Brush your children's teeth as soon as they erupt with a small (pea-sized) amount of fluoridated children's toothpaste (500mg). Do not allow them to swallow this toothpaste if possible.
3. **No supplementation:** Do not supplement infants with fluoride
4. **Public health efforts:** Consider purchasing fluoridated water or writing policymakers in support of public health efforts to optimally fluoridate your community's water source.
5. **Ask again next year.** Guidelines are different for older children and there is some evidence in support of fluoride-containing implants, fissure and pit sealants, and unique combinations of fluoride with other chemicals ([10](#); [5](#)) that may enhance its effectiveness. Currently these are problematic and expensive, but future developments may make them more practical.

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