

Control of Caries and Periodontal Disease

Controlling plaque reduces the risk of both dental caries and periodontal disease. If allowed to build up on teeth, plaque “matures” and can cause serious damage to oral tissues.

Dental plaque is the soft mass or film that accumulates on the teeth and is associated with both dental caries and gum disease. As explained earlier, caries results when bacteria in the mouth use certain carbohydrates to produce acids that destroy the tooth structure. The periodontal structures can also be damaged by these toxins. Decay-causing bacteria, particularly the mutans streptococci, metabolize sugars and starches from food and form complexes that bind and expand the plaque and produce acids that remove minerals from the teeth. When plaque has matured (after about a day), it can convert carbohydrate to acid in just a few minutes. When a large amount of plaque is present, it acts as a reservoir for acid and prolongs its damaging effect on teeth.

Preventing plaque is difficult because bacteria are always present in the mouth. Oral hygiene efforts, combined with fluoride, are probably most effective in reducing plaque. Dental sealants are effective on teeth that oral hygiene and fluoride cannot protect. In addition, limiting the frequency of carbohydrate consumption can control bacterial exposure to plaque-producing nutrients. For children under two years of age, it may be possible to delay the activity of plaque-producing bacteria or keep the bacteria count low by limiting the child’s exposure to saliva from adults or other children on utensils or pacifiers. Newer techniques such as the chemical rinse chlorhexidine are also available to control plaque, but these are not recommended for children unless their caries risk is very high.

children liked to brush but weren't doing it correctly and that it would be helpful to show the families and children the proper way to remove plaque from their teeth. Dr. Tom had brought with him several copies of a videotape on brushing and flossing, which he left with Ella. She thought the videotapes were helpful and decided to show them at the next community health meeting and to lend them to the schools for use in the classrooms.

That afternoon, Dr. Tom visited the Head Start center and met with the children, staff, and parents. He talked about the importance of good oral hygiene, including brushing 2–3 times a day with a pea-size amount of fluoridated toothpaste. Dr. Tom then demonstrated how the portable dental equipment worked. The children sat in the chair and put on some of the disposable gloves that the dental team wears to keep any germs from spreading from one patient to the next. Vicky, one of the dental assistants, lives in the village and the children all know her family and trust her. The children enjoyed a puppet show with Happy Tooth and Sad Tooth, who helped illustrate the importance of tooth-brushing, eating healthy kinds of foods, and avoiding too much soda pop.

Oral Hygiene

Tooth brushing and flossing are needed to remove plaque, but these efforts alone do not prevent tooth decay. Fluoride in toothpaste is the key to suppressing caries activity while strengthening the tooth.

Disrupting and removing as much plaque as possible through oral hygiene practices is the simplest approach to plaque control. Brushing teeth at least once a day disrupts and removes plaque. Parents must brush very young children's teeth, and, in later years, must supervise as the child learns this process. Brushing applies fluoride-containing toothpaste, which helps fight caries.

Flossing removes plaque in niches between teeth which are inaccessible to the bristles of the toothbrush. Flossing should be used if a child has teeth that are in contact with each other. Flossing should be done for the young child; as the child grows, the parents should continue to supervise until the child demonstrates the dexterity to floss without injuring the gums.

Oral hygiene techniques for plaque removal are recommended for children of all ages, from the time the first tooth erupts. Controlling plaque keeps the tissues clean and healthy and improves a child's breath and sense of taste, making the child more comfortable.



Fluoride

Regular and frequent exposure to low doses of fluoride is the best way to protect against dental caries.

The primary factor in reducing the prevalence of dental caries among children in the United States has been the widespread availability of fluoride. Mechanisms by which fluoride reduces decay include:

- Increased resistance of the tooth structure to demineralization;
- Enhanced remineralization of early carious lesions;
- Reduced cariogenic activity of dental plaque, through disruption of bacterial metabolism and function.

The dental professional should determine the appropriate fluoride program, based upon the child's age, history of caries, current level of exposure to fluoride, and apparent susceptibility to develop caries in the future.

Children receive fluoride in two ways—systemically and topically. Systemic fluoride reaches the developing teeth through the child's metabolic system. Only fluoride ingested during the tooth-forming years has the systemic effect of enhancing resistance to later acid demineralization. Systemic fluorides include fluoridated water and fluoride supplements (drops, swallowed liquids, and tablets). Topical fluoride reaches the teeth directly in the mouth. It inhibits the metabolism of the decay-producing bacteria in plaque and stabilizes minerals in the teeth, thus slowing down the caries process. Topical fluorides include fluoridated water, fluoride-containing toothpaste, over-the-counter fluoride rinses, and professionally applied fluoride treatments.

Systemic fluorides—either in the form of fluoridated water or fluoride supplements—are very important. Water fluoridation is one of the best examples of a public health preventive intervention at the community level. All children who drink fluoridated water benefit from systemic ingestion by incorporating fluoride into their developing teeth. Additionally, all people who drink fluoridated water, even adults and adolescents whose teeth are already formed, benefit from the topical effect of fluoride on their teeth.

Today, many families still do not have fluoridated water supplies and many families use multiple or alternative sources of water, complicating

The teacher explained that the children brush after each meal while at Head Start and that the parents are encouraged to help their children brush at home, too. The teacher showed Dr. Tom where the children keep their toothbrushes, which are air-dried, protected from other brushes, and replaced every three months.

Later that afternoon, Dr. Tom visited Ella, the community health aide who conducts the fluoride mouthrinse programs in the schools for all children in grades K–12. Dr. Tom explained to Ella why it is important for the children to receive fluoride on their teeth and how it protects the surfaces in between the teeth from caries. Ella took Dr. Tom to Arnie Larsen, the water plant operator. Together, they tested the

level of fluoride in the water system. The fluoride tested in the correct range and Dr. Tom thanked the operator for doing such a good job. "By adding fluoride to the water you are helping to



the delivery of fluoride to children. Commercially bottled water and water processed by home systems used in providing water for drinking and cooking may not be optimally fluoridated. It is no longer sufficient for the health professional to ask families whether they live in a fluoridated community; it is more appropriate to ask about the source of their drinking and cooking water. If the water is bottled and/or processed, it must be analyzed to determine whether the level of fluoride is optimal. Reports also suggest that commercial distributors of bottled water use multiple water sources with varying fluoride levels, making assessment of a child's actual fluoride exposure complex. Many children today spend a great deal of time outside of the home and drink a mixture of waters, further complicating the delivery of fluoride. Fluoride supplements are recommended only when a child's systemic fluoride ingestion is less than optimal.

Fluoride supplement dosage schedules have undergone extensive scrutiny and reassessment in recent years. Excess ingested fluorides may cause fluorosis,⁷ particularly in the permanent teeth. Through careful regulation of the amount of fluoride ingested by young children, the prevalence of fluorosis may be reduced. Once the drinking water is analyzed and other fluoride sources considered, dental and other health professionals can use the fluoride supplementation dosage table to determine the appropriate supplementation for the child. Appropriate fluoride supplementation for all children, including those being breastfed, is important (see Appendix B).

In addition to systemic fluoride, topical fluoride is also very important. Almost all toothpaste manufactured in the United States provides topical fluoride. Topical fluoride is most effective when delivered at very low doses many times a day through water, foods containing fluoride, and fluoridated toothpaste. For children who are old enough and at risk for dental caries, an over-the-counter, low-concentration fluoride mouthrinse or prescription home fluoride treatment protocol may be recommended by the dental professional.

Another common form of topical fluoride is professionally applied fluoride, which renews the high levels of fluoride in superficial enamel. Topical fluoride treatments may be especially effective for those children at higher risk for caries because they lack fluoridated water, have a history of caries, snack frequently, or have an eating disorder or medical problem that decreases caries resistance. These treatments also enhance

remineralization of early carious lesions. The frequency of these office-based topical fluoride treatments should be tailored to individual risk levels.

Toothpaste often becomes an unintended source of systemic fluoride (rather than an intended source of topical fluoride) when it is swallowed. A fully coated toothbrush contains about 1 milligram of fluoride. If unsupervised during brushing, young children could swallow two milligrams of fluoride a day—four times the daily recommended dose for children. To prevent this, the toothpaste should be dispensed in pea-size amounts. In addition, parents should be advised to teach their children to spit out the toothpaste during and after brushing. Parents should supervise the dispensing of toothpaste and the practice of brushing with children under six years of age. When children are capable of spitting the toothpaste foam residue effectively, they need less supervision.

keep the children's and the adults' teeth healthy—much healthier than they'd be if I had to fill them or remove them," explained Dr. Tom.



The next day, Dr. Tom met with his assistants to begin screening all the children in the first, second, sixth, and seventh grade classrooms to see how many needed dental sealants. Dr. Tom explained that sealants are a high priority, since about 90 percent of carious lesions occur on the biting surfaces of the back teeth.

Using model teeth, the dental assistants showed the children how sealants are applied. "The sealants protect the tooth like a raincoat protects you from the rain," explained Vicky and Ramona. All the children received a toothbrush and some fluoridated toothpaste and brushed their teeth before the sealants were applied. They liked the white sealants.

Dental Sealants

Dental sealants protect against caries on the biting surfaces of the back teeth. Sealants can be very effective, since approximately 90 percent of carious lesions occur in the fissures of the back teeth.

The dental caries process often originates in the pits and grooves normally found on the occlusal (biting) aspects of back teeth because these areas trap food and bacterial debris and are difficult to clean with a toothbrush. The enamel layer is often thinner in these areas than on other areas of the tooth and fluoride is less effective in the pits and grooves of teeth than on the more exposed smooth surfaces.

Dental sealants are plastic coatings applied to teeth to prevent dental caries by creating a physical barrier against bacterial plaque and food retention. Sealants can be applied to both primary and permanent teeth, but are not usually applied to primary teeth unless the child is at high risk for caries and has particularly pronounced fissures (grooves). Most children will benefit from dental sealants as soon as their first permanent molars erupt, around age six. Sealant placement needs to be done by trained dental professionals to ensure that the teeth are kept dry during placement. If applied carefully, dental sealants can protect against dental caries for many years.

Dietary Habits and Oral Health

Eating regular nutritious meals, with infrequent between-meal snacks, helps prevent caries and forms a lifelong foundation for oral health and overall health.

The role of diet in oral health is twofold. First, foods consumed contribute to the health of the mouth as well as to overall health. Calcium and vitamin D are vital for strong bones and teeth and vitamin C is necessary for healthy gums, though it is difficult to quantify the optimal level needed by each child. Eating a balanced diet as recommended by the child's health professional, the Dietary Guidelines for Americans, and the Food Guide Pyramid will provide the foundation for healthy dietary choices and eating practices.

Second, eating habits have a direct effect on dental caries. When food is consumed, mutans streptococci are able to break down carbohydrates (sugars) in the mouth, creating the acid that is responsible for tooth decay. The ability of a specific food to contribute to caries depends on how well it adheres to the tooth surface and how frequently it is consumed.⁸ If carbohydrates are consumed frequently and adhere to the teeth, sugars are not quickly cleared from the mouth and acid can be produced.

Since carbohydrates should make up more than half of the total energy requirement beyond infancy (to avoid the breakdown of dietary and tissue protein), it is both unrealistic and undesirable to suggest that sugars be eliminated from the diet. The *frequency* of carbohydrate consumption can be reduced, however, by limiting the frequency of between-meal snacks.

Snacks of healthy, less cariogenic foods such as carrots, slices of cheese, or air-popped popcorn should be encouraged over sticky, long-lasting carbohydrates such as lollipops and sodas. In general, complex carbohydrates such as grains, fruits, and vegetables should be encouraged over simple carbohydrates like table sugar. Fats and proteins may have a protective effect on enamel, making it less susceptible to acid attack by coating the teeth and increasing the buffering ability of saliva.⁹ Carbohydrates in combination with fats and proteins may therefore inhibit caries activity. Rinsing following snacking may also curtail the caries process.

Gradually introducing children to a regular pattern of eating three meals a day, with infrequent snacks, will reduce the risk of developing dental caries.

After applying the sealants, Dr. Tom and Vicky met with the school cook who helps plan the students' meals. Together, they discussed frequent snacking habits and talked about ways to distribute information throughout the village about the importance of limiting frequent snacking and eating a balanced, healthy diet for good oral health and overall health. The cook told Dr. Tom and Vicky about several meetings on using Native foods in healthy meal planning and preparation, and suggested they might discuss oral health issues as a special focus during one of the meetings.