Dental damage, sequelae, and prevention

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TOOTH DAMAGE
Teeth may be damaged by dental caries, trauma, erosion, attrition, and abrasion or lost through periodontal disease.

DISEASE
Caries and inflammatory periodontal disease are the most prevalent oral diseases, and both result from the activity of dental bacterial plaque. Plaque is a complex biofilm that contains various microorganisms and forms mainly on teeth and particularly between them, along the gingival margin, and in fissures and pits (figure 1). This biofilm adheres by a variety of mechanisms. If plaque is not removed regularly, the flora evolve, and plaque may calcify, forming calculus (tartar) (figure 2).

Fermentation of sucrose and other non-milk extrinsic sugars to lactic and other acids causes tooth decalcification and, with proteolysis, results in caries (decay) (figure 3). The main organism involved in this process is Streptococcus mutans.

Caries is seen less commonly because of the protective effect of fluoride, but it is still prevalent in disadvantaged and deprived people, especially in preschool-aged children.

Accumulation of plaque and a change in the microflora may also cause gingival inflammation (gingivitis). Gingivitis may progress to damage the periodontal membrane (chronic periodontitis) and lead to tooth loss.

OTHER DAMAGE
Trauma
Trauma is common in sport, road accidents, violence, and epilepsy. It occurs mainly in men and boys and usually affects the maxillary incisors.

Tooth erosion
This problem is increasingly common with greater consumption of carbonated and fruit drinks and, occasionally, from gastric regurgitation or repeated vomiting (as in bulimia, alcoholism, and gastroesophageal reflux) (figure 4). Typically, the effect is little more than a loss of normal enamel contour. When erosion is severe, dentine or pulp may be damaged.

SEQUELAE
Most dental pain occurs as a result of caries. Initially, caries presents as a painless white spot (decalcification of the enamel, which may be reversible), followed by cavitation and brownish discoloration. Once caries reaches the dentine (figure 5), pain may result from thermal stimulation or from sour or sweet foods.
PREVENTION
Diet and lifestyle

Sugars, particularly nonmilk sugars in items other than fresh fruits and vegetables, are the major dietary causes of caries. Frequency of intake is more important than the amount consumed.

Dietary advice should start with recommending appropriate infant feeding and weaning practice. Only milk and water should be given in feeding bottles and consumption of other drinks should be confined to main meals. Children should be introduced to a cup at about 6 months of age and should have ceased using bottles by about 1 year. Weaning foods should be free of or very low in sugars other than those present in fresh milk and raw fruits or vegetables.

For older children and adults, snack foods and drinks should be free of sugars. Because of the risk of erosion as well as of caries, frequent consumption of carbonated and cola drinks should be discouraged. Fruit juices can also cause tooth erosion. Water and milk are the preferred options for children.

Saliva buffers may counter plaque acids. Therefore, chewing sugar-free gum or cheese after meals may be of value. Fresh fruit and vegetables can also confer some protection against oral cancer. Other habits, principally smoking or chewing tobacco, may contribute against oral cancer. Other habits, principally smoking or chewing tobacco, may contribute to periodontal disease and oral malignancy. Some chewed products contain sugars that may predispose to caries.

Fluorides

Fluorides protect against caries by inhibiting mineral loss, promoting remineralization of decalcified enamel, and reducing formation of plaque acids. Water fluoridation is considered the most effective, safe, and equitable means to prevent caries; it can reduce the prevalence of caries by about one-half.

Where the water supply contains less than 700 µg per liter of fluoride (0.7 ppm), children older than 6 months who are at high risk of caries may be given daily fluoride supplements as drops or tablets (see table). However, many toothpastes contain fluoride, and it is probably use of these products that has led to the decline in caries in many countries. Children younger than 6 years may ingest toothpaste. To reduce the risk of fluorosis (excess fluoride in developing teeth), children should use only a pea-sized amount of toothpaste, and their brushing should be supervised.

Fluoride rinses or gels are useful mainly for patients with special needs or those at high risk of caries, such as people with dry mouths.

Fissure sealants

Plastic coatings placed by a dental professional in the pits and fissures of the permanent teeth can help reduce caries.

Oral hygiene

Good oral hygiene can prevent periodontal disease and oral malodor (halitosis). The most important means of maintaining oral hygiene is using a toothbrush. Many types of toothbrush are available, and most are effective at removing plaque. Electric brushes may be useful for individuals with poor manual dexterity. Tooth brushing at least twice daily using a fluoride toothpaste and a small-headed brush with medium-hard bristles will help to reduce caries.

Fluoride in water supply (ppm)* | Age of child |
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<td>&lt;6 mos</td>
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<td>0.3-0.7</td>
<td>0</td>
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<td>&gt;0.7</td>
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*Local district dental officer, or equivalent, or water company should be able to supply this information.
contention. Many are advertised heavily, and although legal constraints ensure that the claims are never untrue, the impression gained may be overly optimistic. Many mouthwashes have only a transient antiseptic activity, some can be harmful by causing mucosal reactions, and these products can be dangerous to children who may ingest them. Most effective antiplaque mouthwashes have prolonged retention on oral surfaces by adsorption then slow desorption with continued antiplaque activity.

Chlorhexidine helps control plaque and periodontal disease but binds tannins, thereby causing dental staining if the user drinks coffee, tea, or red wine. Such staining can be removed by dental professionals. Listerine, which achieves its antiplaque effect from essential oils, does not stain teeth, but it contains alcohol. Triclosan also has an antiplaque effect.

**Vaccination against oral disease**

Acceptable, reliably successful vaccines against caries or periodontal disease are not available.

**Mouth protection**

Soft plastic mouth guards, or occlusal splints, may be needed to prevent damage from trauma, as in sports injuries or bruxism. For patients with acid reflux, bulimia, or alcoholism, use of antacids or acid-reducing agents may help to reduce tooth erosion.

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**Further reading**