

# Managing Oral Malodor

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**H**alitosis, or bad breath, is an ancient problem. The development of rinses and potions to eliminate oral malodor dates back to as early as 400 BC when Hippocrates developed a mouthwash of unadulterated wine, anise, dill seed, and myrtle<sup>1</sup> for this purpose. Another Roman, Cosmus, became immensely wealthy by producing and selling aromatic pastilles to remove malodor from the mouth and converting it into the fragrance of violets.<sup>1</sup> Today, the production of rinses, pastes, and sprays is a billion-dollar industry, with each manufacturer claiming to effectively produce the sweetest breath.

There is general agreement that the principal components of oral malodor are volatile sulfur compounds (VSCs). These compounds are primarily hydrogen sulfide and methyl mercaptan and, to a lesser extent, dimethyl sulfide and dimethyl disulfide.<sup>2</sup> Other compounds that may be offensive are organic acids, most common of which are butyric and propionic,<sup>3</sup> as well as compounds such as indole, skatole,<sup>4</sup> and cadaverine.<sup>5</sup> In addition to the disagreeable odor that emanates from the oral cavity when these compounds are present, methyl mercaptan contributes to tissue destruction directly through its interaction with connective tissue fibroblasts.<sup>6</sup> Both hydrogen sulfide and methyl mercaptan increase the permeability of nonkeratinized mucosa to prostaglandin molecules and endotoxins.<sup>7</sup> Permeability depends on exposure and concentration of these gases; an increase of over 50% can be attained in a matter of 1 to 2 hours with a relatively small concentration.<sup>7</sup>

The severity of halitosis is also associated with the level of bacterial degeneration of the epithelial debris on the tongue surface.<sup>8</sup> The addition of tongue cleaning

with a brush or a special tongue cleaner improves the oral environment and according to one study, decreases bacteria including *Streptococcus mutans* (*S. mutans*) and lactobacilli, as well as those microorganisms associated with oral malodor.<sup>9</sup> Another study reported that decreasing the tongue coating can improve taste sensation and reduce the cells for putrefaction, but not the actual bacterial load.<sup>10</sup>

In addition to tongue cleaning, a variety of methods are used for the reduction of bad breath. Agents that inhibit the production of VSC are zinc ions, chlorhexidine, and cetylpyridinium chloride.<sup>11</sup> The ability to be effective is dependent on the concentration of the agent in the mouth rinse.

## Management of Oral Malodor with Xylitol Products

Manufacturers of xylitol-containing mouthrinses claim that the active ingredients (cetylpyridinium chloride, essential oils, or chlorine dioxide) decrease mouth odors and that the xylitol component is effective in caries prevention.<sup>12,13</sup> Xylitol in chewing gum showed a superior effect in plaque reduction when compared to sorbitol.<sup>14</sup> In addition, xylitol products stimulate salivary flow without increasing the acid levels associated with carbohydrate consumption. Increasing salivary flow also reduces the effects of xerostomia, flushes dental biofilm, and removes food debris—factors which contribute to oral malodor.

In a study to assess the adherence ability of *S. mutans*, there was significant inhibition of *S. mutans* growth as a biofilm<sup>15,16</sup> and a reduction of salivary *S. mutans*<sup>17</sup> after a staggered exposure regimen to chlorhexidine initially followed by exposure to xylitol. Xylitol-associated reduction in transmission of

# Oral Rinses Containing Xylitol

Product	Manufacturer	Web Site
Biotène® Alcohol-Free Mouthwash	Laclede	www.laclede.com
Biotène® Mouthwash		
Oxyfresh Fresh Mint Mouthrinse	Oxyfresh	www.oxyfreshwww.com
Rembrandt® Naturals Mouthwash	Oral-B	www.oralb.com
BreathRx™	Discus Dental	www.discusdental.com
Spry™ Coolmint Oral Rinse	Xlear, Inc	www.xlear.com
Epic™ Mouthrinse	Epic Dental	www.epicdental.com

\*Not an all-inclusive listing, but merely a representative sample of available product options.

*S. mutans* between mother and child was demonstrated in a randomized clinical trial over a period of several years.<sup>18</sup>

Although *S. mutans* is not directly responsible for odor production, it is a primary agent for biofilm formation, thus reduction of biofilm would include reduction of those oral bacteria that are capable of VSC production. The mouthrinses that use antimicrobial agents sweetened with xylitol may be effective vehicles for the reduction of mouth odor by maintaining long-term *S. mutans* suppression and controlling biofilm formation in the oral cavity. □

## Conclusion

Dental professionals should make recommendations to treat oral malodor based on their patients' individual condition. Xylitol-containing products provide a host of benefits when incorporated into a dental hygiene treatment regimen.

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“Increasing salivary flow also reduces the effects of xerostomia, flushes dental biofilm, and oral malodor.”

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