

## A Review of Oral Products for the Treatment of Mouth Odor



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Hippocrates prepared the first documented rinse for oral freshness in the form of a mouthwash of unadulterated wine, anise, dill seed, and myrtle that was deemed essential for every young girl circa 400 BC.<sup>1</sup> Some decades later, Cosmus, a Roman cosmetics manufacturer, became immensely wealthy by producing and selling aromatic pastilles, which he claimed would turn unpleasant breath into the fragrance of violets.<sup>1</sup> Neither rinse delivered what was promised. Today, millions of consumer dollars are spent on mouthwashes, mints, and gums in the search for relief from the age-old problem of bad breath. As during the time of Hippocrates and Cosmus, modern products are still only partially effective and relief remains temporary.

### **Mouth Rinse Formulations**

Oral malodor can be either a short-term, transient problem that includes morning breath or food odors, or it can be a long-term, chronic problem. Commercial products support the short-term problem, but the duration of relief varies with the active ingredient.

### **Chlorhexidine**

Long-term, chronic problems are difficult to eliminate and require a more aggressive treatment with antimicrobial rinses such as chlorhexidine (eg. Peridex, Zia Pharmaceuticals, Phoenix AZ). Rinsing with 0.2% chlorhexidine effectively controls plaque and oral

bacteria.<sup>2</sup> Studies utilizing a chlorhexidine rinse for the reduction of oral malodor have reported significant reductions in volatile sulphur compound (VSC) levels and organoleptic scores<sup>3,4</sup> without encouraging the growth of opportunist pathogens.<sup>2</sup> Chlorhexidine is an effective antimicrobial for a broad spectrum of microbes, but certain gram-negative rods and gram-negative cocci have some resistance to this intervention.<sup>5</sup> If these resistant microbes are present in substantial numbers, then rinsing with chlorhexidine will be less effective. Adverse effects (eg, mild bitter taste, accumulation of a light-brown stain on tooth enamel, lost taste-sensitivity to sodium chloride) may be a deterrent; although, only some individuals experience these effects.<sup>6,7</sup>

### **Zinc**

Another very effective active ingredient for the prevention of mouth odor is zinc.<sup>8</sup> Zinc was first examined in the 1970's and was found to significantly reduce in VSCs. Depending on the preparation, there are several routes attributed to zinc for this reduction. Zinc ions can: react with the thiol groups in the VSC's and convert them to nonodorous compounds such as zinc sulfides,<sup>9</sup> decrease the level of oral microorganisms through its antimicrobial activity,<sup>10</sup> or reduce the degradation of salivary cellular elements through the inhibition of thiol proteinase activity.<sup>11</sup> In addition, zinc ions have a protective role in the

oral cavity where action on the extracellular matrix decreases the permeability of the mucosa.<sup>12</sup>

### Chlorine Dioxide

Chlorine dioxide and/or chlorite anion are incorporated into mouth rinses (eg: xygene, Oxyfresh Worldwide Inc, Spokane, Washington), gels, and toothpastes for control of oral malodor. Chlorine dioxide is a chemically reactive oxidant with bactericidal<sup>13</sup> and organoleptic effects through the destruction of VSCs by oxidation of sulfide bonds.<sup>14</sup> In addition to oxidation of VSCs, chlorine dioxide increases salivary and plaque-oxygen tensions, and inhibits bacterial proteolytic enzymes.<sup>15</sup> It is most effective when the pH in the oral cavity is acidic, as this releases more active chlorine dioxide and increases the bactericidal activity.<sup>16</sup> A recent study reported that a stabilized form of chlorine dioxide was less effective than zinc chloride for the short-term effect, but that the chlorine dioxide resulted in a more favorable long-term reduction of VSCs.<sup>17</sup>

### Cetylpyridinium

Cetylpyridinium chloride (CPC) has demonstrated a 30% statistically significant inhibition of oral malodor that lasts 3 hours posttreatment.<sup>18</sup> Recently, a new formulation that combined zinc acetate and CPC (Breath Rx, Discus Dental, Culver City, CA) resulted in a mouthrinse that exhibits a substantial decrease of 72.5% in mouth odor for as long as 3 hours following rinsing.<sup>19</sup> The duration and percentage of reduction of mouth odor is dependent on the concentration of zinc compound in the rinse. Higher concentrations are more effective;<sup>20</sup> however, very high concentrations result in an unpleasant and lingering metallic taste.

### Essential Oils

Essential oils (in particular, phenolic and thymol and eugenol), are known to have an antibacterial effect that provides a significant clinical effect with 45% reduction in VSCs.<sup>18</sup> These compounds have been recognized as capable of reducing oral odor through a sustained reduction in microbial levels that is longer than would be expected of a masking agent.<sup>21</sup> Since the Food and Drug Administration (FDA) has ruled that there is no evidence to support the removal of alcohol from over-the-counter products, commercial products containing a combination of phenolic compounds and alcohol are acceptable for the treatment of mild mouth odor.<sup>22</sup>

### Herbal Rinses and Toothpastes

Herbal rinses and toothpastes are available and popular. Their ability to decrease VSCs depends on which herbs and essential oils are incorporated into the rinse or paste since each component has different antimicrobial

properties. One practitioner claims a 60% decrease in bacterial levels utilizing Tooth & Gum Tonic and Irrigant (Dental Herb Company, Boca Rattan, Florida).<sup>23</sup> Recently, a study of 14 natural herbal dentifrices demonstrated that antimicrobial activity varied greatly among these herbal products, and one of the test products showed substantial contamination with microbes.<sup>24</sup> It is necessary to be selective in which products one uses and to make certain that these products come from a reputable source.

Dental professionals know that rinsing with water will make little difference to the breath problem after the first 15 minutes.<sup>25</sup> MintASURE capsules (HealthASURE, Inc, Westlake Village, CA) claim to reduce garlic and other food odors but, there is no published data to support their assertion. No detectable decreases have been reported with rinses or toothpastes containing sanguinaria.<sup>26</sup>

### Treatment Options

Once the location and extent of the odor has been determined and discussed with the client, treatment with some antihalitosis products should follow. Once the odor is under control, a maintenance program is important. Zinc chloride and zinc ion products are readily available in several preparations. A relatively new product that combines, just prior to use, a mixture of zinc chloride and sodium chlorite has some good long-term effects (TriOral, Triumph Pharmaceuticals Inc, St. Louis, Missouri). More research to validate the efficacy of this rinse is required but client feedback has been positive. In addition to the zinc preparations, both chlorine dioxide and herbal rinses provide protection with varying degrees of success. When mouth odor and oral dryness are both present, a moisturizing mouthwash is suitable and could be utilized to complement the antimicrobial rinse. Products that are suitable and effective should be discussed with the client. It is always prudent to suggest that the client purchase a trial size of the product rather than a large amount.



## Case Study

A forty-eight year old female client presented with the complaint of a bitter and unpleasant taste that persisted throughout the day. Her breath odor was assessed as slight with some mild to moderate odors present on the tongue base, tongue dorsum, and between the dentition. Samples of plaque taken from her teeth and tongue showed, in addition to the normal gram-positive flora, some gram-negative rods, fusiforms, and yeast cells. Since microbial metabolic byproducts are the most likely source of the bitter taste and odor, treatment consisted of rinsing with 0.2% chlorhexidine twice daily (morning and night), for a period of two weeks to reduce the microbial load. At the end of the two-week period the bitter taste had disappeared and a only slight and fleeting odor remained in between the teeth. The client was asked to continue rinsing with chlorhexidine, once a day and to return in 6 months for reevaluation. The client returned one year later. She was now brushing, flossing, and rinsing with chlorhexidine daily. The examination revealed that there were 4-mm pockets in all molar areas as well as bleeding on probing. Since there was an increase in spirochetes and yeast microorganisms, the client was instructed to continue rinsing with 0.2% chlorhexidine once a day. When the client returned 6 months later she was still free of the bitter taste but was experiencing mild breath odor. Bleeding on probing was reduced to two points. Pocket depth was normal with the exception of two 5-mm pockets in the area of bleeding. Spirochetes and yeast were eliminated, but numerous gram-negative bacilli and some fusiforms remained along with the gram-positive microorganisms. To further reduce the microbial count and eliminate the breath odor, the client was asked to increase chlorhexidine rinsing to twice a day for a few weeks and then decrease to once a day. Twice daily rinsing effectively eliminated all breath odors and the client is not experiencing any adverse effects from the chlorhexidine.<sup>27</sup> Further evaluation will follow in 6 months. If the odors and microorganisms have been sufficiently decreased at this evaluation, it will be appropriate to prescribe a zinc product as a maintenance rinse.

## Summary

This case study illustrates the use of chlorhexidine gluconate as a treatment for chronic oral malodor and shows how difficult it is to decrease the oral bacteria. Although chlorhexidine has strong antimicrobial properties, oral bacteria can remain in relatively large numbers.

If the odor is mild or transient, most over-the-counter antimicrobial mouth rinses are effective. Proper tongue cleaning methods and flossing techniques must be implemented for rinsing to be effective. Chewing a small sprig of fresh parsley or cloves is a natural deodorizing mechanism to freshen the mouth.<sup>27</sup> In addition, clients must be reminded that a nutritionally sound diet, which includes drinking an adequate amount of water, is necessary to good physical and oral health.

*The mandate of The Fresh Breath Clinic is the assessment and treatment of halitosis. Specific periodontal treatment including scaling and/or root planing are not carried out in the clinic. Clients are informed of their periodontal status and referred to their dental hygienist or dentist for periodontal treatment. As illustrated in the case study clients are not always fully compliant with following up on the referral and the periodontal pocketing may not decrease and in some cases the pocket depth may increase.*

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