

# Tongue brushing and mouth rinsing as basic treatment measures for halitosis

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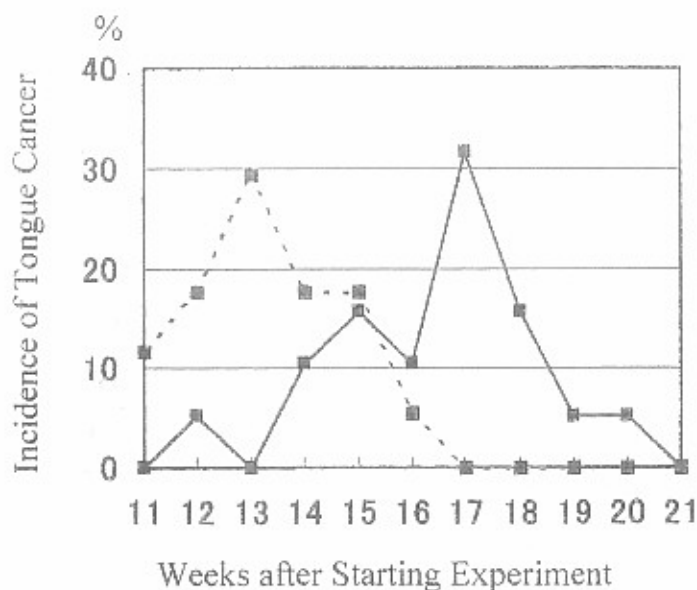
Tongue brushing and mouth rinsing are basic treatment measures for halitosis, and as such are categorised as treatment needs (TN)-1. Although TN-1 is used for treatment of physiologic halitosis treatment, pseudo-, extra oral pathologic or halitophobic patients must also be managed with TN-1 as well as other treatments. Since the origin of physiological halitosis is mainly the dorso-posterior region of the tongue, tongue cleaning is more effective than mouth rinsing. However, practitioners should always instruct their patients on how to brush their tongues to prevent harmful effects. Another approach using a chlorhexidine mouthwash is most effective in reducing oral malodour. However, chlorhexidine should not be used routinely; therefore, zinc-containing mouthwashes have been recommended for use. People can also use chewing gum to reduce oral malodour. Surprisingly, however, it has been noted that sugarless chewing gum increased methyl mercaptan, one of the principal components of oral malodour. Mint did not reduce the concentration of methyl mercaptan either, although these products are widely used for their ability to mask oral malodour. There is a need for the development of a novel food or chewing gum that could considerably reduce VSC levels in mouth air to complement TN-1.

*Key words:* Tongue coating, mint, chewing gum

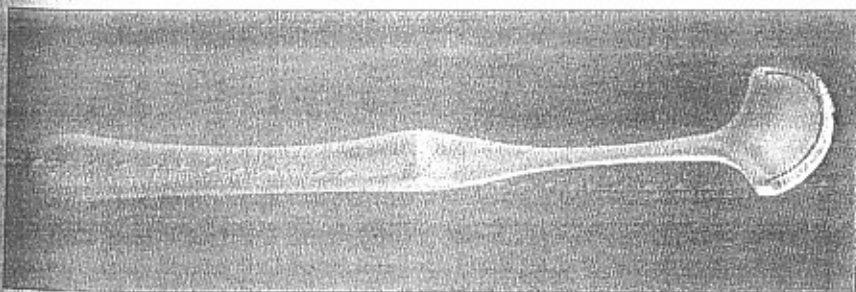
Halitosis can be caused by oral systemic or psychological conditions<sup>1</sup>. The complexity of halitosis required the development of a system of treatment needs (TN) corresponding to the causes of halitosis<sup>2-4</sup>. Treatment for halitosis patients with a psychological or systemic condition is complicated and may involve medical or psychological therapy<sup>5,6</sup>. TN-1 is a specific remedy for halitosis of physiological origin, but it is also applicable to all the cases requiring TN-2 through TN-5. Therefore, all halitosis patients including those diagnosed with extra oral pathologic or halitophobic halitosis must also be managed with TN-1, administered by a dental professional, to encourage their self-care in order to improve their oral hygiene. Accordingly, TN-1 is considered to be the most important treatment need in the treatment of halitosis. This paper discusses the clinician's precise management role in using TN-1 for treating halitosis patients.

## Tongue cleaning

Since the origin of physiological halitosis is mainly the dorso-posterior region of the tongue, practical



**Figure 1.** Tongue carcinogenesis related to mechanical stimulation of hamsters' tongue surface after treatment with 7,12-dimethylbenz[a]anthracene (DMBA)<sup>8</sup>. Solid line: 0.5% DMBA treatment group (n=20). Broken line: 0.5% DMBA + mechanical stimulation treatment group (n=20). One stroke of a dental broach was given on the tongue surface with a very light force that did not cause bleeding.



**Figure 2.** Tongue Brush (Freshmate™, Dentcare, Neyagawa, Japan and Zetu-Fresh™, GC Co, Tokyo, Japan).

treatment of halitosis requires tongue cleaning, which is more effective than mouth rinsing. Tongue coating is comprised of desquamated epithelial cells, blood cells and bacteria which combine to produce volatile sulphur compounds (VSC)<sup>1</sup>. Approximately 60 per cent of total VSC was produced from the tongue surface in both healthy and periodontally involved patients<sup>7,8</sup>. Therefore, it would be expected that cleaning the tongue would reduce VSC. Tongue brushing has been found to be more effective in reducing oral malodour than tongue scraping<sup>9</sup>; it has been postulated that brush bristles sweep between papillae and remove microorgan-

isms. It has also been reported that extreme mechanical stimulation of the tongue can promote tongue cancer in experimental animals (Figure 1)<sup>8</sup>. Patients generally prefer tongue brushing to tongue scraping.

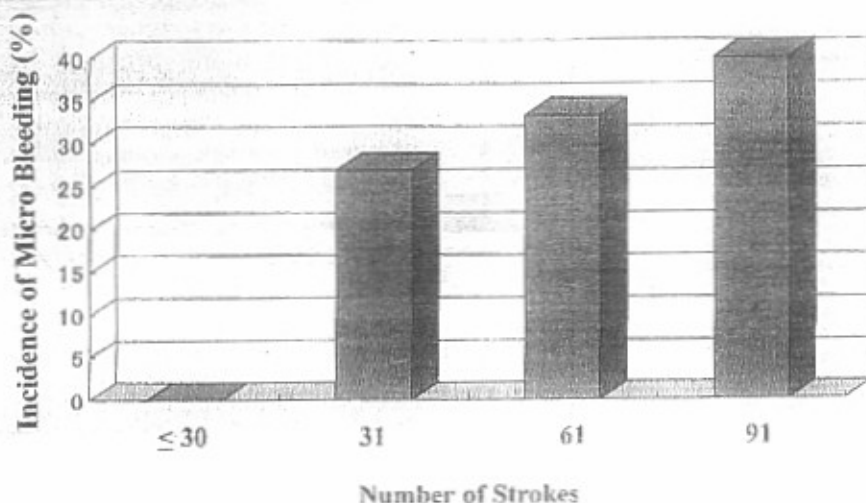
In a study in which subjects (n=30) brushed the dorsal surface of their tongues with a regular toothbrush and 100g force, haemoglobin was detected in saliva after three strokes<sup>9</sup>. These results indicated that tongue brushing by a regular toothbrush can cause microbleeding and damage the dorsal tongue surface. Hence, we recommend to patients that rather than using a scraper or a hard-bristled toothbrush, a soft-bristled brush

designed for the tongue, such as the two tongue brushes by Freshmate™ (Dentcare, Neyagawa, Japan) and Zetu-Fresh™ (GC Co. Tokyo, Japan), be used. These two brushes are exactly identical products (Figure 2). These tongue brushes have never been observed to cause any microbleeding (even bleeding invisible to naked eye) by less than 30 strokes with 100–150g force (Figure 3). It was assumed that on average fewer than 30 strokes are needed to clean the tongue.

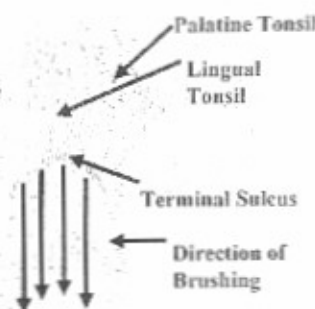
Patients were instructed to clean the posterior tongue as far back as they could and as a result may sometimes brush the tongue tonsil<sup>11</sup>, although the instructions also noted that brushing must always be performed from the terminal sulcus to the front of the tongue to avoid brushing the tonsil and causing infection of the respiratory system (Figure 4). The practitioner must demonstrate to patients the position of the terminal sulcus of the tongue, in order to familiarise them with the anatomical limits for cleaning. When a patient protrudes their tongue as far out as they can, the tongue makes a 'hill', and the terminal sulcus is located on the top of the 'hill' (Figure 5). To prevent the gag reflex during tongue cleaning, the patient must also momentarily stop breathing. If mint flavour in toothpaste sensitises the oro-pharynx to an elevated gag reflex, patients are recommended to clean the tongue before tooth brushing.

### Mouth rinse

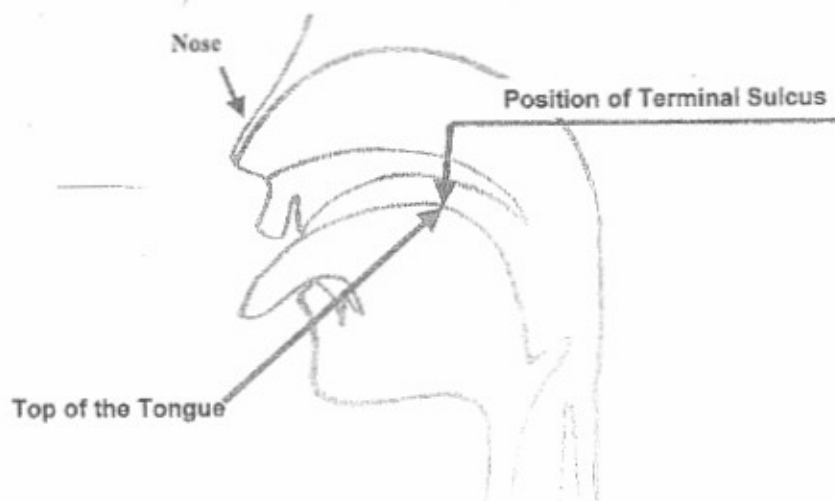
TN-1 also includes mouth rinsing. Chlorhexidine (>0.12 per cent) mouthwash is a very effective means of reducing oral malodour<sup>12</sup> and has been routinely prescribed for halitosis patients. However, Loesche<sup>13</sup> suggested that chlorhexidine rinse is not an agent that should be used routinely, because many side effects have been reported<sup>14,15</sup>, including tooth stain-



**Figure 3.** The relationship between the number of strokes in tongue brushing and microbleeding. Brushing force was measured by a device used to measure the force of brushing (Komatsu Co., Toda, Japan). Haemoglobin in saliva was determined with *Salivaster*<sup>17,18</sup> (Showa Yakuhin Kako, Tokyo, Japan) at every 10 strokes. To avoid the effect of menstruation, only male subjects ( $n=15$ ) were employed. A standard type tongue brush was utilised.



**Figure 4.** Direction of brushing. Brushing must be carried out always from the back to the front of the tongue.



**Figure 5.** Position of Terminal Sulcus. When the patient protrudes the tongue as far out as possible, the tongue makes a 'hill', and the terminal sulcus is located on the top of the hill.

ing, burning sensation of the mouth, desquamation of mucosa, loss of taste, and occasionally a fatal allergic reaction<sup>15</sup>. The use of hydrogen peroxide mouthwash in reducing oral malodour has also proven effective, but the oxidative activity of hydrogen peroxide might be harmful to the oral soft tissues<sup>16</sup>. Highly concentrated alcohol mouthwash has been in common use for approximately the past 100 years. However, despite the lack of evidence, a mouthwash with a high concentration of alcohol is suspected of predisposing patients to oral carcinogenesis<sup>15</sup>.

Yaegaki *et al.*<sup>17</sup>, Kleinberg *et al.*<sup>18</sup> and Tonzetich<sup>19</sup> demonstrated that a zinc-containing mouthwash reduced mouth air VSC by 80–90 per cent for up to three hours after rinsing (Figure 6). Zinc ions strongly inhibit bacterial cysteine proteinases and thereby the destruction of dead epithelial cells and blood cells<sup>17</sup>, and VSC production is accordingly reduced.

It has not yet been demonstrated that a toothpaste reduces VSC in mouth air as dramatically as reported with some mouthwashes<sup>12,16–19</sup>. However, baking soda- and/or zinc-containing toothpaste greatly reduced VSC in mouth air<sup>20,21</sup>.

### Chewing gum

Seventy per cent of people who are concerned with halitosis use chewing gum in order to reduce their malodour<sup>22</sup>. Chewing gum containing sugar was shown to reduce VSC in mouth air by altering the pH of the oral cavity<sup>23,24</sup>. However, it has also been suggested that sugarless chewing gum has only a short-term effect and works by masking halitosis with its flavours<sup>25</sup>. Accordingly, we decided to examine the effects of sugarless chewing gum and mints on VSC concentration in mouth air. Mint did not change the concentration of methyl mercaptan, and sugarless chewing gum increased it slightly, although

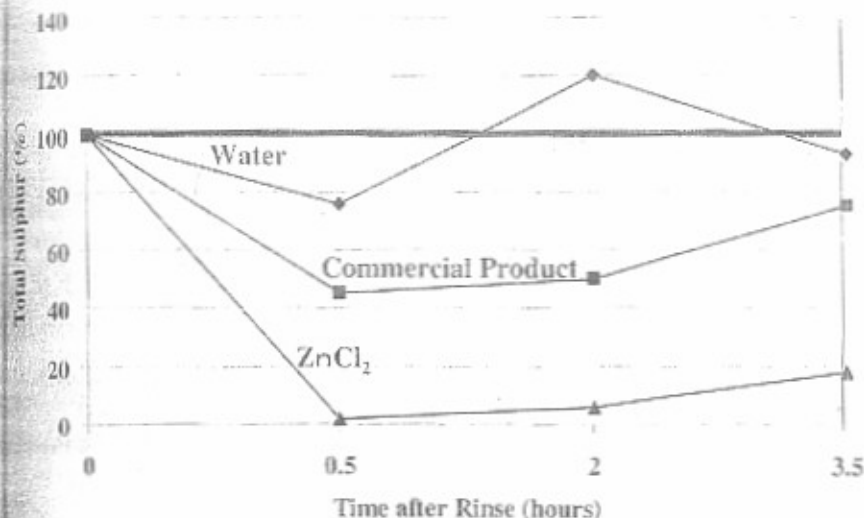


Figure 6. A crossover study demonstrating that a zinc mouthwash (0.5% ZnCl<sub>2</sub>) strongly inhibits VSC production in human mouth air when compared to a commercial product and water (n=5).

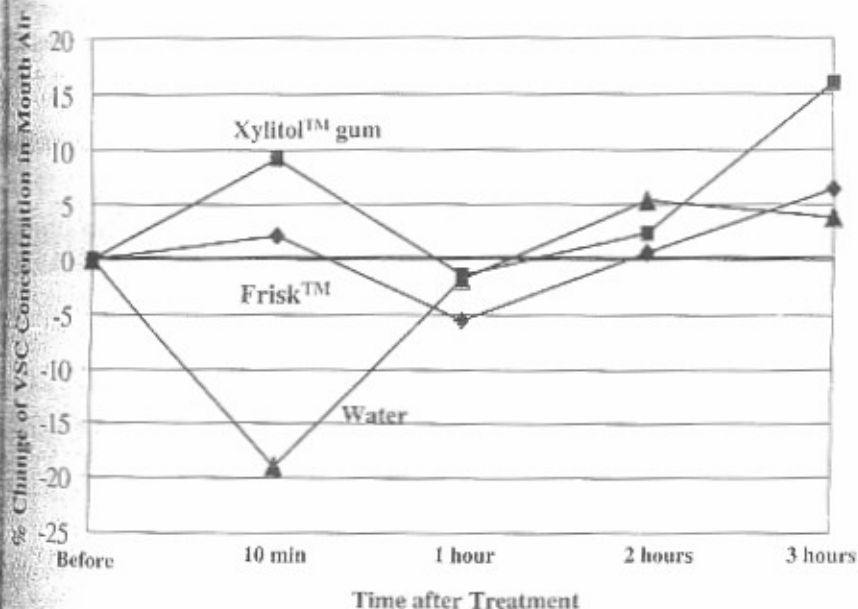


Figure 7. The effect of chewing gum and mints on oral malodour. Immediately after chewing a piece of chewing gum (Xylitol™ gum, Lotte Co., Tokyo, Japan) for 3 minutes or 2 pills of mint (Frisk™, Frisk International, Leuven, Belgium) for 2 minutes respectively, methyl mercaptan in mouth air was measured by gas chromatography. The measurement was continued over a span of 3 hours. Mint did not change the concentration of methyl mercaptan, but sugarless chewing gum increased it slightly.

people experienced a reduction in oral malodour (Figure 7).

## Conclusion

TN-1 is very important in the treatment of halitosis. The most effective measure of TN-1 was tongue brushing, which is recommended under the guidance of a dental practitioner.

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