Bad Breath: What’s The Story?

Abstract
Bad breath or “Oral halitosis” is a frequent or persistent unpleasant odor of breath. It is a common and multi-factorial condition. In around 85 percent of cases, halitosis is the result of microbial activity in the mouth. In patients with healthy periodontal tissue, causative bacteria deposit on the dorsal tongue. The basic psychopathological process is manifested by the release of substances caused by degradation due to bacterial activity, such as volatile sulfur compounds (VSC), organic acids, and products of metabolic activity. Factors contributing to the overgrowth of causative bacteria include decreased salivary flow and stress. This presentation reviews the current knowledge of etiology and measurement methods of halitosis, as well as the different aspects of its diagnosis and treatment.

Key words: Halitosis, Volatile sulfur compounds, tongue coating.

Introduction
Have you ever tried to smell your own breath? It’s a common myth people use, but deprived of any truth. It is impossible to smell your own breath by cupping your hand up to your nose and smelling. Because our nose and mouth are not separate organs, and because our nose tends to filter out our own smells, smelling our own breath is practically impossible... Every day, while many develop faulty perceptions about having bad breath that affect their entire lives, others who have halitosis are unaware of their condition: this is called the “Bad breath Paradox”.

Mouth malodor, an extremely common disease affects one out of four adults. 25 to 85 million Americans suffer from chronic bad breath, depending on who supplies the data.1,2,3 Mouth odor has negative connotations; it does not only affect the patient’s self image, but it also affects others attitudes towards the patient. That’s why “bad breath therapy” has become an increasing business, especially with commercials reinforcing existing attitudes: Over ten billion dollars are made every year out of mouthwashes, drops, mints, gums and toothpastes; dentists, being the authors of active marketing of breath treatment clinic franchises, are being more and more sought for advice and treatment.

What is bad breath? What is the etiology of bad breath? What kinds of treatments are available to patients suffering from bad breath, and how effective are all those halitosis kits which claim to treat bad breath? All these questions will be answered in our short review about halitosis.

History
Also called “fetor oris”, “mauvaise haleine”, the universal medical term “halitosis” used since 1930 comes from “Halitus” meaning “breath”, and “-osis” meaning “chronic disorder”.

Now if the term “halitosis” is relatively recent, its negative effects go way back to the most ancient times of humanity. In Talmudic Law (2000 years old), mouth malodor of the partner may constitute a founded motive for divorce. Chinese emperors in Old China used to ask their visitors to chew clove before personal meetings.4

Since the beginning of times, wizards, wise men, and doctors had tried to find recipes and cocktails to treat halitosis: Ebert’s Papyrus (around 1700 before J-C) mentions a medication used in Old Egypt to alleviate bad breath: the tablets are made out of a cocktail based on incense, cinnamon, myrrh, and honey. Hippocrates (460-377 before J-C) had an exotic recipe based on marble powder for women suffering from bad breath.5 Old traditional treatments used Guava leaves in Thailand, eggshells in China, parsley in Italy, and urine-based mouth rinse in some European cultures. In the era of “Renaissance”, Laurent Joubert (1529-1582), the medical doctor...
quantifying oral malodor: organoleptic measurement, gas chromatography (GC), and sulfide monitoring:

**Organoleptic Measurement**
A subjective test dependent on the examiner’s perception of patient’s oral malodor. Different scales have been used. However, at the International Workshop on Oral Haltiosis of 1999, there was a consensus on using a scale ranging from 0 to 5. Before the assessment, patients are instructed to abstain from eating strong foods and drinks (ex. garlic, onion, coffee, alcohol, etc.) at least 48 hours before the assessment and to avoid using scented cosmetics for 24 hours before the assessment. Patients must also abstain from ingesting any food or drink, or smoking, omit their usual oral hygiene practices, and abstain from using oral rinse and breath fresheners for 12 hours before the assessment.14,15

**Gas Chromatography (GC)**
GC is considered the gold standard for measuring oral malodor since it is specific for VSCs, the main cause of oral malodor. The GC equipment is expensive, bulky, and the procedure requires a skillful operator. Therefore, this technology has been confined to research and not to clinical use.14,16

**Sulfide Monitoring**
Sulfide monitors measure the concentration of Sulfide molecules in one’s breath and/or saliva. The borderline for fresh breath vs. bad breath is about 75 ppb (parts per billion). Although compact sulfide monitors are inexpensive, portable, and easy to use, most of them are not able to distinguish among the VSCs.

For example, the Halimeter® (Interscan Co., Chatsworth, CA) has high sensitivity for hydrogen sulfide but low sensitivity for methyl mercaptan which is a significant contributor to halitosis caused by periodontal disease.1,15,17

Therefore, the use of sulfide monitoring device in conjunction with the organoleptic method proved to be an effective and accurate strategy for diagnosing bad breath.14 A dental clinician may also evaluate tongue coating in order to assess the level of malodor and the treatment need for halitosis. Since different tongue coating indexes have been reported in the literature, it is recommended to use one method to quantify changes in the amount of coating: One of the most reliable methods is the tongue coating index reported by Delanghe and col.,18 ranging from 0 to 3: 0: no tongue coating, 1: thin coating over 1/3 of the tongue dorsum, 2: thin coating over 2/3 of the tongue dorsum or thick coating of 1/3, 3: thick coating over 2/3 of the tongue dorsum).

**Treatment**
Recent studies implicate the dorsum of the tongue as the primary source of VSC production both in periodontally healthy and diseased populations.11 These studies demonstrate that removal of the tongue coating reduces VSC production and when comparisons are performed among samples of mouth air collected following tongue scraping, tooth brushing, and rinsing with water in subjects with malodor, the longer lasting reductions in VSC levels are followed after tongue scraping. Therefore, hygiene improvement is the main key to treat oral halitosis.

In physiological halitosis, treatment should focus on patient’s self-care and oral hygiene: explanation of halitosis and oral hygiene instructions including appropriate instructions for tongue and interdental cleaning. For oral pathological malodor, dental treatment should additionally include periodontal health assessment, Oral prophylaxis, professional cleaning, and treatment of oral diseases especially periodontal diseases, caries and faulty restorations. In cases of extra-oral pathologic halitosis where patients exhibit breath malodor with no oral origin, referral to an appropriate medical specialist should take place. Some patients are convinced of not having halitosis after they can see the lack of objective signs of malodor for themselves (pseudo-halitosis): these patients need to be counseled by educating them that their problem is psychological through an explanation of their results of diagnostic assessment. Others will remain completely obsessed about their perceived problem in spite of any counseling (halitophobia). Those patients should be referred to a psychological specialist.1,2,13,20

Halitosis kits and “bad breath” treatment products are available in the middle-eastern Over-the-counter pharmacies.

Masking fragrances (drops, mints, gums and mouth rinses) are the least effective because of their short-term effect.

More useful products include those which contain chemicals interacting with VSCs, such as oxidizing agents and zinc (Therabreath, California). Other effective products would be the antimicrobial ones; chlorhexidine and/or cetylpyridinium chloride (BreathRX/ Discus Dental, USA and Halita/Dentaid, Spain).

**Conclusion**
Despite promoting new cures for one of society’s oldest and most troublesome social maladies, “bad breath” is still a prevalent affliction and therefore a major oral health concern.

On the other hand, bad breath also merits concern since all individuals may occasionally experience episodes of malodour at some point in their lives. Halitosis is not only an esthetic issue, but has also negative implications on psychological, social and systemic health.1 There is now evidence to suggest that even low concentrations of VSCs may be toxic. Increased VSC levels also may play a role in the link between oral infection and systemic diseases such as heart disease and preterm low
of King Henri III states that bad breath is caused by dangerous miasma that fall into the lungs and through the heart, causing severe damages. Miswak (a traditional chewing stick), particularly used in Saudi Arabia, is a natural toothbrush made from twigs of the Salvadora Persica tree. In 1993, in Tel Aviv, the first international workshop on halitosis led to the creation, in 1996, of the ISBOR (International Society for Breath Odor Research).

Etiology

Oral halitosis usually affects about one of four adults and is mostly caused by bacteria infecting the dorsal surface of the tongue and producing volatile sulfur compounds (VSC). 60% of bacteria are present on the dorsum of the tongue, in which fissures create a low oxygen micro-environment protected from the flushing action of saliva, and especially worsen with dry mouth while sleeping. Among the species capable of VSC production are Peptostreptococcus, Eubacterium, Selenomonas, Centipeda, Bacteroides, and Fusobacterium.

Oral breath contains VSCs (Volatile Sulfur Compounds), namely methyl mercaptan (CH₃SH) and hydrogen sulfide (H₂S), dimethylsulfur, diamines (putrescine, cadaverine), volatile aromatic compounds (indole, skatole), and organic acids (acetic and propionic). VSCs are normally present in very low concentrations, but in case of halitosis, a considerable increase of their concentrations is noted. The main putative bacteria producing VSCs are the Gram-negative anaerobic bacteria, mostly affected by pH, saliva, and oxygen pressure; their main nutrient sources are proteins, peptides, or amino acids.

Physic-chemical conditions, such as a neutral or alkaline pH allow anaerobic bacterial growth, degradation of proteins, and therefore the synthesis of VSCs and other odoriferous substances. In contrary, fermentation of carbon hydrates lowers the oral pH; an acidic pH inhibits VSCs formation and consequently halitosis but also consists as a cariogenic risk factor. Moreover, an oxygen-depleted environment will allow growth of anaerobic microorganisms which do not need oxygen to degrade proteins into VSCs.

A recent study suggests that there's greater bacterial diversity in subjects with halitosis. More importantly, those halitosis subjects are infected with specific species such as Solobacterium moorei that are not found in subjects without halitosis. S.moorei is a Gram-positive bacteria originally isolated from human feces associated with bacteremia, septicemia, and refractory cases of endodontic infections.

Periodontal disease also proved to be an enhancing factor of putrefaction of saliva and production of malodor. Another important factor is salivary flow: “morning breath” is due to minimal salivary flow, favoring stagnation and the initiation of putrefaction processes.

What you eat also affects the air you exhale: Types of food known to encourage halitosis are dairy products, protein-rich diets, garlic and onion, coffee, alcohol and tobacco. Fasting, lack of sugar and stress are also responsible for halitosis.

Less frequently (20-25% of cases), halitosis is related to extra-oral causes, such as: Gastrointestinal tract disturbances, some metabolic disorders such as diabetes mellitus and renal failure. It may also manifest among heavy smokers, and as a side-effect of some medications that reduce salivary flow, such as antihistamines, diuretics, narcotics, antidepressants, decongestants, antihypertensives, and antipsychotics.

Therefore, halitosis should not be treated simply as a cosmetic problem, but it may be amenable to specific and nonspecific antimicrobial therapies.

Diagnosing Smells

When diagnosing halitosis, a dentist should focus on his investigation when examining the patient: History of halitosis, its onset and duration are key factors for a good diagnosis; is the bad breath constant or intermittent? Is it only in the morning? How long does it take place after meals? Is it self reported or reported by others? The dentist should also consider non-oral factors such as tobacco, alcohol use, as well as dietary factors, neurological problems, upper respiratory tract problems, gastrointestinal tract disturbances and some metabolic disorders such as diabetes mellitus. Therefore, a comprehensive oral examination is necessary for a proper diagnosis of oral halitosis. There are three main methods of
birth weight. With few exceptions, dental schools don’t emphasize on the treatment of bad breath. It’s time to put more time and focus on this rising affliction, and incorporate bad breath treatment into oral health care providers’ agenda.

References