Burning Mouth Syndrome

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Introduction
Three primary causes have been identified as possible contributors of Burning Mouth Syndrome (BMS): (1) neurologic, (2) psychogenic or (3) hormonal. This course gives the participant a working knowledge of the key factors related to BMS and the psychological components, possible etiologies, pathogenesis, treatment protocol, as well as patient education related to BMS.

Conflict of Interest Disclosure Statement
• The authors report no conflicts of interest associated with this course.

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Overview

Three primary causes have been identified as possible contributors of Burning Mouth Syndrome (BMS): (1) neurologic, (2) psychogenic or (3) hormonal. This course gives the participant a working knowledge of the key factors related to BMS and the psychological components, possible etiologies, pathogenesis, treatment protocol, as well as patient education related to BMS.

Learning Objectives

Upon completion of this course, the dental professional should be able to:

• List three possible etiologies for Burning Mouth Syndrome (BMS).
• Understand the mechanisms involved in the nerve supply to the oral tissues and the association with BMS.
• Determine the possibility of a diagnosis of BMS by ruling out other disease processes that may mimic BMS.
• List five products, techniques or medications that may assist the patient in controlling the symptoms of BMS.
• Identify five key oral symptoms of BMS.
• Provide a one-page patient education handout to a patient who is diagnosed with BMS or develop your own for distribution.

Glossary

atypical odontalgia - Toothache-like pain for which no dental cause can be found.

arthromyalgia - Temporomandibular joint pain dysfunction syndrome (TMD).

burning mouth - A condition that elicits a burning sensation in the oral cavity.

burning mouth syndrome (BMS) - The International Association for the Study of Pain in 1994, defined pain as an “unpleasant sensory and emotional experience associated with actual or potential tissue damage.” Synonyms for oral pain include: dysesthesia, burning oral pain, glossodynia (painful tongue), glossophyrosis (burning tongue) orodynia (painful, burning mouth) and stomatodynia (burning mouth).

dysgeusia - Alteration or distortion in taste perception.

gustation - Taste which is a chemical sense and involves taste sensations of sour, sweet, bitter, salty and umami (a pleasant savory taste). All other flavors are combinations of the five primary taste sensations but also involve olfactory and sensory sensations.

hypogeusia - Gustatory hyposensitivity - reduced ability to taste.

mucocutaneous dysesthesias - A heterogeneous group of disorders including unexplained cutaneous pain and other sensory syndromes that can affect any body region but tend to be localized to the scalp, face and perineum.

neuropathic pain - Complex, chronic pain that usually is accompanied by tissue injury. The nerve fibers may be damaged, dysfunctional or injured.
nociceptors - Specialized peripheral sensory neurons. These nociceptors alert us to potentially damaging stimuli on the skin or mucous membranes by detecting extremes in temperature, pressure and injury related chemicals and transducing these stimuli into long-ranging electrical signals that are relayed to the higher brain centers.\textsuperscript{11}

olfaction - A sense of smell.

oral pruritic sensation - A feeling of “itchy” irritations in the oral tissues.

pruritis - A peculiar irritating sensation in the skin that arouses the desire to scratch.

somatosensory sensations - Subjective oral sensations of sandiness, roughness or dryness.

supertasters - Patients who have a heightened sense of taste and of smell. \textsuperscript{4} Supertasters have a propensity toward BMS.

syndrome - The combination of several simultaneous signs and symptoms of varying intensities associated with a particular morbid process-which together constitute the picture of a disease or inherited anomaly.

taste phantom - Changes in taste and/or taste perception possibly due to temporary or permanent damage to the chorda tympani-the branch of cranial nerve VII that carries taste sensation from the taste buds of the anterior tongue to the brain.\textsuperscript{45}

Introduction

Burning discomfort in the oral cavity is a common complaint associated with many local or systemic disorders. Intraoral causes may include mechanical factors such as tongue thrusting, subtle trauma to the cheeks, lips or tongue resulting from bruxing or other parafunctional habits. Ill-fitting dentures may be a common source of oral burning discomfort. Bacterial, viral or fungal intraoral infections often induce oral burning as can contact with mouthrinses, toothpastes, mints, chewing gum or candies, dental restorations, or dentures to which an individual is allergic.\textsuperscript{12}

Many individuals with oral burning complaints prove to have significant reduction in their salivary output, which may predispose them to oral infections and an increased tendency to traumatize oral soft tissues.\textsuperscript{19,52} Endocrine disorders (diabetes, thyroid diseases), autoimmune diseases (lupus erythematosus, Sjogren's syndrome) and esophageal reflux are associated with decreased salivary flow and burning oral discomfort as are nutritional deficiencies (vitamin B12, folic acid, zinc and others). It is of utmost importance to identify and manage these conditions when a patient presents with oral burning discomfort.\textsuperscript{27,37}

However, between 0.6% to 15% of older patients may present with oral burning despite the absence of these exclusion factors, and this is currently classified as burning mouth syndrome (BMS). This condition may be most perplexing for the patient and for the dental practitioner since there is no visible evidence of the existence and cause of the condition. Psychological problems, such as emotional stress, anxiety, depression, cancer phobia or psychosocial disorders, are commonly noted in association with oral burning as are hormonal deficiency in post-menopausal women and neurological abnormalities. Often patients have visited multiple medical and dental offices in an effort to identify the cause of their burning pain.\textsuperscript{31,39} They may have been given a variety of unsuccessful treatments, which increased their sense of frustration and concern. As a result, fear of oral cancer is quite common in this patient group.\textsuperscript{28}

Three primary causes have been identified as possible contributors of BMS: (1) neurologic, (2) psychogenic or (3) hormonal. This course gives the participant a working knowledge of the key factors related to BMS and the psychological components, possible etiologies, pathogenesis, treatment protocol, as well as patient education related to BMS.

Recognizing Burning Mouth Syndrome

BMS patients are often seen by a variety of healthcare professionals such as ear, nose and throat specialists, acupuncturists, nutritionists, gastroenterologists, psychologists, general physicians, general dentists, oral surgeons, periodontists, oral medicine specialists or others. Bottomley, et al. reported numerous
referrals to oral medicine specialists from both dental and medical practitioners, and data from the Stomatology Center at Texas A&M University, College of Dentistry, Dallas, Texas indicate that approximately 5% of patients visiting that facility suffer from BMS while many others report burning oral discomfort as their chief complaint in association with a variety of other causes. A recent study by Lee, et al. reports a delay in diagnosis of Sjogren’s syndrome patients of 3 to 11 years in obtaining a diagnosis. Burning occurred in this group of patients when salivary flow was one half of normal flow. Reports of oral burning discomfort appear to be increasing as medical science increases life expectancy resulting in more individuals surviving with systemic conditions that may contribute to this oral dysfunction. Since BMS is defined as a specific disorder by exclusion of other factors that may initiate oral burning, it is very important that dentists and dental hygienists be familiar with systemic and local factors that may be associated with oral burning. In larger populated areas, in developed countries, it is usually possible to refer patients suspected of having BMS to an oral pathology or oral medicine specialist for diagnosis and management. However, in less populated areas of the country, general dental health care providers may be expected to diagnose and manage affected patients.

Epidemiology
It is difficult to confirm BMS epidemiological data because of a lack of universally accepted diagnostic criteria. Various international studies suggest the syndrome may affect between 0.6% to 15% of the population, but the prevalence may be considerably higher in middle-aged and elderly individuals with a significant female predilection and a higher rate found in peri- and post-menopausal women. However, the prevalence increases markedly with age in both sexes.

The disorder may last for months or years, often without a definitive diagnosis, and it may have a profound effect on the patient’s perceived quality of life. The patient may complain of burning pain in the tongue, hard palate, other mucosal sites and even combinations of oral sites. Often the oral burning, pain, numbness, scalding, tingling, puritic sensations or changes in taste, force the patient to search for answers and assume the problem is best treated by a general dentist.

Thoppay, et al. states there is often no differentiation between BMS and oral burning. Since the variations of symptoms occur and each patient reports very subjective complaints, the diagnostic process becomes even more complicated. Thoppay also points out the methodology of research is varied with many studies using subjective surveys and others reporting documented clinical findings. These factors complicate the clear consensus, and these stated problems have added to the variation of reported statistics and treatment modalities.

See Table 1 for more information on classifications. The disorder may last for months or years, often without a definitive diagnosis, and it may have a profound effect on the patient’s perceived quality of life and the level of frustration in not being able to obtain a definitive diagnosis. The patient may complain of burning pain in the tongue, hard palate, other mucosal sites and even combinations of oral sites.

Local Factors Causing Oral Burning
It often may be difficult to identify local or systemic factors that may mimic BMS. Patients often complain of oral burning with various stomatological disorders such as oral lichen planus, mucous membrane pemphigoid, traumatic ulcers, recurrent aphthous stomatitis, oral herpes simplex infection, candidiasis, benign or malignant neoplasms, ill-fitting dentures, orthodontic appliances, contact allergic reactions to dental restorative materials, partial and complete denture materials, dental hygiene products (toothpastes, mouthrinses, gels, etc.), allergy to foods, wines, candies, mints, chewing gum, traumatogenic oral parafunctional habits and many others. Other less common oral neurological conditions such as atypical facial pain, atypical odontalgia, idiopathic facial arthromyalgias or traumatic intraoral nerve injuries may require consultation with a neurologist. Xerostomia is a very
common complaint in individuals with BMS. It is difficult to determine whether the dryness is a contributing etiologic factor or a secondary BMS factor possibly associated with psychological factors such as stress, anxiety or depression initiated by prolonged chronic disease. In a recent study by Acharya, et al. the researchers reported a strong association with BMS, skin diseases and xerostomia. The BMS group of patients had more allergies and complained of dry mouth issues. Additionally, medications often used to treat BMS are usually among those drugs reported to cause xerostomia as an adverse side effect. Xerostomia is also a common adverse side effect of various medications often used by older individuals for control of systemic diseases or disorders. Clinical experiences indicate dry mouth may significantly influence the subtle tongue discomfort often associated with BMS in patients who develop tongue thrust habits. It is certainly possible that xerostomia may partially explain the common BMS complaint of altered taste sensation such as a bitter or metallic taste. Taste alteration was also discussed in recent data from Jaaskelainen. The author distinguishes between Central Nervous System BMS and Peripheral BMS. The Peripheral type may respond positively to lidocaine blocks and topical Clonazepam and Capsaicin.

An investigation of the possible local causes of intraoral burning sensations should be conducted and every effort made to eliminate potential contributing factors prior to defining the patient’s complaint as BMS.

### Systemic Factors Causing Reversible Intraoral Burning Sensations

Several systemic disorders have been associated with causing secondary oral burning. These may include neuropathy of undiagnosed, poorly controlled or even well-controlled diabetic patients. Burning discomfort caused by peripheral neuropathy (nerve damage) can affect any peripheral nerve including those that innervate the tongue. Neuropathy can also be initiated by chronic liver or kidney diseases, by HIV infection, by oral candidiasis, by vitamin B

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**Table 1. Primary and Secondary BMS**

**Primary:**
- Considered a diagnosis of exclusion of other entities.
- Characterized by burning sensations of the oral and perioral tissues.
- Absence of relevant clinical or psychological abnormalities.
- A neuropathological cause is likely.

**Secondary:**
- Characterized by clinical abnormalities such as mechanical and chemical irritants.
- Allergic contact-environmental, foods and oral products.
- Possible parafunctional habits such as bruxism, clenching and tongue placement causing a frictional reaction.
- Fungal, bacterial or viral infections such as *Candida* and *Helicobacter pylori* infection on the tongue surface.
- Systemic problems such as mucosal disease states, e.g., lichen planus and stomatitis.
- *Candida* infection.
- Psychological conditions.
- Hormonal imbalance.
- Vitamin B deficiency, folate, iron or zinc deficiency.
deficiency and some other systemic diseases. To date, however, only diabetic neuropathy has been reported as a possibly controllable cause of tongue burning sensations.\(^7\)

Hypothyroidism has also been associated with burning in the oral cavity, especially the tongue. Although the cause of this association is unclear, the diagnosis and treatment of this endocrine disorder may reverse the burning discomfort. One oral side effect of hypothyroidism is tongue enlargement, and it is theoretically possible the enlargement increases tongue irritation from excessive contact with the teeth and possible tongue thrusting or bruxing.\(^56,62\) Gastroesophageal reflux disease (GERD) is sometimes associated with oral burning probably due to regurgitation of stomach acids into the oral cavity. This too is reversible with successful treatment.\(^38,62\)

Burning mouth is more common in peri-menopausal or post-menopausal women suggesting a hormonal deficiency as an etiologic factor. However, ironically although hormonal supplementation may markedly relieve menopausal symptoms, it does not always alleviate all burning discomfort.\(^53\)

Other associated systemic conditions may include, autoimmune connective tissue diseases, trigeminal neuralgia, multiple sclerosis and Parkinson’s disease.\(^62,66\) Several case reports have described oral burning sensations in drugs falling into the categories of antiretrovirals, antiseizure agents, antidepressants and several antihypertensives. The antiseizure drug clonazepam and the antidepressant drugs fluoxetine, sertraline and venlafaxine are of special interest since these two drug groups have paradoxically been used in treatment of BMS. Clonazepam is reported to be one of the most effective agents in controlling BMS. Among the antihypertensive drugs, angiotensin converting enzyme inhibitors appear most likely to induce burning

Table 2: Possible Contributing Factors Associated with Oral Burning.

- Tongue thrusting.
- Bruxism and clenching.
- Endocrine disorders including diabetes and thyroid disease.
- Allergies-environmental and dental/oral allergies.
- Ill-fitting dentures and appliances-mechanical irritation.
- Intolerance or allergy to denture materials or materials used in restorative dentistry causing tissue irritation.
- Mucosal diseases such as lichen planus, pemphigus vulgaris, benign mucous membrane pemphigoid, etc.
- Supertasters are often prone to BMS as well as those individuals with taste perception disorders.
- Xerostomia (may be caused by medications or actual disease states such as Sjogren’s disease).
- Certain medications, e.g., diuretics, angiotensin converting enzyme inhibitors.
- Deficiency of vitamins B1, 2, 6 or 12, folic acid or zinc.
- Iron deficiency anemia.
- Fungal (Candidiasis), bacterial and viral infections.
- Migratory glossitis.
- Systemic diseases: gastroesophageal reflux (GERD), diabetes, hypothyroidism.\(^7\)
- Smoking cessation (a rise in the incidence of BMS has been noted upon quitting).
- Psychological factors: cancer phobia, severe stress, obsessive compulsive disorder (OCD), general anxiety and depression.
If burning mouth is a symptom of other local, systemic, or psychogenic diseases, then this is referred to as oral burning disorder; otherwise, the term BMS is used, making it a diagnosis of exclusion. Therefore, the etiology of existing symptoms becomes important in narrowing down the current pain the patient is experiencing. Several studies have identified psychological or psychiatric disorders in BMS patients. Bergdahl and Anneroth found a higher rate of both depression and anxiety in a group of patients within a large study of 2,000 subjects in Sweden. Zur and others have noted that psychological factors appear to play a role in the etiology of BMS, but it is probable that prolonged episodes of BMS can have significant psychological impact as is true of any painful chronic disease. Zur comments it is unclear whether "psychological factors are a cause or a consequence, or whether they both play a role and exacerbate each other." BMS may interfere with the sleep patterns of these patients and cause them to become more irritated and affect their health. A study by Cavalcanti found patients (67.7%) associated their burning with oral cancer. The authors suggest the clinician’s role in patient education and allaying fears is very important as a part of overall treatment.

### The Etiology of BMS

The etiology of BMS remains an enigma since there is no clear consensus as to what constitutes BMS. Generally, the etiology is believed to represent a psychological, a neurologic or a neuropathic disorder. As previously discussed, burning mouth disorder mimics BMS but the actual diagnosis of BMS is one of exclusion of all reversible secondary contributing factors. However, it has been suggested that all oral burning pain be classified as either primary or secondary BMS. By doing so, secondary BMS is representative of those burning mouth conditions that are potentially reversible. Primary BMS, therefore, is likely caused by idiopathic or neuropathological mechanisms. Three theoretical neurologic factors are proposed: (1) peripheral small diameter fiber neuropathy, (2) trigeminal system pathology and (3) central system hypofunction. Not everyone agrees with this proposed new classification and the issue remains unresolved. For example, Klasser, et al. made a distinction between the terms “Syndrome” and “Disorder” with regard to the classification of BMS. If burning mouth is a symptom of other local, systemic, or psychogenic diseases, then this is referred to as oral burning disorder; otherwise, the term BMS is used, making it a diagnosis of exclusion. Therefore, the etiology of existing symptoms becomes important in narrowing down the current pain the patient is experiencing. Several studies have identified psychological or psychiatric disorders in BMS patients. Bergdahl and Anneroth found a higher rate of both depression and anxiety in a group of patients within a large study of 2,000 subjects in Sweden. Zur and others have noted that psychological factors appear to play a role in the etiology of BMS, but it is probable that prolonged episodes of BMS can have significant psychological impact as is true of any painful chronic disease. Zur comments it is unclear whether "psychological factors are a cause or a consequence, or whether they both play a role and exacerbate each other." BMS may interfere with the sleep patterns of these patients and cause them to become more irritated and affect their health. A study by Cavalcanti found patients (67.7%) associated their burning with oral cancer. The authors suggest the clinician’s role in patient education and allaying fears is very important as a part of overall treatment.

### Table 3. Therapy

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<th>Non-pharmacologic:</th>
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<td>Reduction of parafunctional issues.</td>
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<td>Use of appliances-mouth guards.</td>
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<tr>
<td>Minimize flavoring agents.</td>
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<tr>
<td>Stress management, yoga, tai chi, psychotherapy, exercise, acupuncture and biofeedback.</td>
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<th>Topical approaches:</th>
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<tr>
<td>Capsaicin (Capsium frutescens L).</td>
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<td>Clonazepam.</td>
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<td>Lidocaine.</td>
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<tr>
<td>Benzydamine hydrochlorate 0.15% (used as a mouthrinse).</td>
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<tr>
<td>Aloe vera used in conjunction with a tongue protector.</td>
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<tr>
<td>Increase saliva flow, e.g., sugarless gum, sugarless lemon drops.</td>
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<tr>
<td>Anti-xerostomic mouthrinses.</td>
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<tr>
<td>Prescriptions such as cevimeline or pilocarpine.</td>
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Studies by Adamo, et al. evaluated 28 patients who were diagnosed with reticular oral lichen planus and signs of burning mouth syndrome. The researchers reported that a subset of OLP patients with oral symptoms similar to those seen in patients with BMS and non-responders to conventional therapy for OLP may be treated with the use of antidepressants and benzodiazepines. They reiterated the importance of screening this type of patients’ population for mood disorders and sleep disturbances.67

**Characteristic Features of BMS**

Several years ago, Lamy and Lewis classified BMS into 3 types based on the pattern of pain that the patient experienced. Type I BMS features no significant disruption of sleep, no pain on waking but gradual onset and increase in burning sensation throughout the day. In their study, about 35% of BMS patients had this type and it was linked to systemic diseases, nutritional deficiencies or vitamin deficiencies. They believed that type 1 patients were likely to experience improvement with treatment. Type 2 BMS features essentially unremitting pain that disrupts sleep and persists throughout the day. Fifty-five percent of patients fell into this category and it is more likely related to psychological disorders. Type 3 BMS is characterized by intermittent burning pain throughout the day and occasional pain-free days. Only about 10% of patients fell into this category, which they believe represents an allergic reaction. Pain usually peaks in the early afternoon or evening, but it can be constant and severe enough to cause one to awaken during the night.23,58 Others who adhere to Scala’s concept of primary and secondary BMS addressed neuropathic pain subgroups in primary BMS. Group 1 had peripheral small-diameter fiber neuropathy (50-65%), group 2 had subclinical lingual, mandibular or trigeminal neuropathies (20-25%), while group 3 had central pain hypofunction (20-40%).56,61 Jaaskelainen classifies this as a Central Type and a Peripheral Type. With the peripheral type responding to Capsaicin and topical Clonazepam.65

In classic BMS (primary BMS), the pain is usually bilateral and symmetrical on the anterior two-thirds of the tongue. In others the tongue dorsum and posterior lateral borders are involved followed by the anterior hard palate, the labial mucosa and other sites, e.g., (floor of the mouth, soft palate, oropharynx and rarely the buccal mucosa).18 Burning of the lips as a single entity has been described featuring a thinned labial mucosa and inactive minor labial salivary glands.5

**BMS Classifications**

Pain is a major symptom of BMS and will vary with each patient. Lamey and Lewis divide the patterns of oral pain into:23

- **Type 1**: Pain absent on waking and developing during the day.
- **Type 2**: Pain present day and night.
- **Type 3**: Intermittent pain, with pain-free days.

Type 1 and Type 2 are unremitting and present every day. Type 3 is also noted as having unusual sites that are localized such as the floor of the mouth or the throat.23

Two types of BMS are reported by Sun, et al.38

*The primary form* - Presents with complaints of burning, pain free waking, leading to a continuous burning sensation as the day progresses. The pain reaches intensity at night. However, other patients report a more continuous pain with varying intensity.

*The secondary form* - A secondary form of BMS is associated with thyroid disease, psychiatric conditions, oral infections, drug use, dental treatment, vitamin/mineral deficiencies. The secondary form may be caused by local, systemic and or psychological factors.17,21,38

Taste abnormalities often associated with BMS has led some authorities to suggest that an interaction exists between taste and oral pain in the central and peripheral nervous system.45,57 This concept is strengthened by the observation the BMS is more likely to occur in “supertasters” who have more fungiform papilla per area on their tongue.
than usually noted. Supertasters with BMS are noted to have dense innervation of nociceptors in the taste buds. Taste and smell are intertwined. Supertasters with BMS are noted to have dense innervation of nociceptors in the taste buds. Taste and smell are intertwined.

Forabosco, et al. correlated the loss of estrogen receptors in the fungiform papillae of the tongue in symptomatic postmenopausal symptoms with relief from hormonal replacement, but other studies have not found similar results. However, it has been reported that fungiform papillae are more numerous and dense, with innervation of nociceptors in the fungiform papillae taste buds of patients with BMS, and this has also been reported in supertasters who also have a higher rate of BMS. See Figure 1 for the clinical appearance of a supertaster.

A young adult may have approximately 10,000 taste buds within the total papillae. Taste is classified as sweet, sour, bitter, salty and savory (Umami). When mixed with saliva, taste occurs throughout the mouth with a mixture of taste.

Three cranial nerves are involved in taste (Figure 2):

1. The facial nerve innervates the anterior two-thirds of the tongue.
2. The glossopharyngeal nerve innervates the posterior third of the tongue.
3. The vagus nerve carries information to the posterior part of the mouth. The vagus nerve serves the throat and epiglottis.

Karrer, et al. believe damage to the nerve, the loss of estrogen, or viral insult may play a role in the perception of pain and explain some of the complaints of patients with BMS. The glossopharyngeal nerve, the ninth cranial nerve, supplies the tongue, throat and the parotid gland and difficulties in swallowing and tasting occur when this nerve is damaged or affected in some way. It is suggested there is a central loss of inhibition to pain and this produces pain “phantoms” as observed in BMS. Supertasters have an increased sense of perceived taste phantoms as well. Patients with BMS also report a metallic taste and sometimes a bitter taste and even a combination of these tastes as well as pain. A large percentage of patients with BMS are women who are in the age range of menopause. It is known that the perception of bitter recognition is decreased in menopause. Researchers believe atypical odontalgia or toothache pain, for which no explanation can be found, is higher in this group as well. Supertasters have more pronounced fungiform papillae that are also very dense in number (see Figure 1) and taste and smell are intertwined. Odors are sensed retro-nasally through the dispersion of airflow molecules into the nasopharynx and contribute to the sensation of taste. It is believed there is dense innervation of nociceptors that are associated within supertaster taste buds (Figure 3). There is a further suggestion that the loss of bitter taste sensations that occurs in some women, especially supertasters, at the time of menopause, may promote the development of oral pain. Usually the patients with BMS may not be aware of specific heightened taste function or the loss of specific types of taste. BMS is usually chronic with increasing taste changes that may not make it easy for the patient to differentiate those changes that have occurred over time. Specific taste in various locations may serve to also document loss of taste in specific areas of the mouth.

BMS may be accompanied by subjective xerostomia. Grushka, et al. make the case that alterations in taste can also lead to alterations in parasympathetic/sympathetic output to the salivary glands resulting in dry mouth. The symptoms appear better in the morning, worsen during the day and subside at night. However, some patients report a constant discomfort without any relief. Interestingly, the pain, in most cases, subsides when eating. Other mucocutaneous disorders such as lichen planus, mucous membrane pemphigoid, contact mucositis, oral allergies and candidiasis may cause the person to complain of a burning sensation orally as well. Therefore, differentiation and exclusion of other disease states is paramount.

Diagnosis of BMS
BMS is thought to be multifactorial in nature (See Table 2). A careful health assessment with laboratory tests may facilitate the diagnosis but
**Figure 1.** Tongue of a supertaster. Note the numerous fungiform papillae.

**Figure 2.** Nerve Diagram.
laboratory findings are often non-contributory. The clinician should begin with a careful review of the patient's complaints and medical/dental history. Mignogna, et al. cited three patients who had been seen by 8, 10 and 12 different healthcare providers for assistance in an initial diagnosis. The reason for this professional delay and patient delay is that patients may have varying complaints, and the symptoms voiced by one patient may not fit a clear pattern for a diagnosis of BMS. There may be mixed etiologies related to oral pain as well within the same patient.

A diagnosis is made by excluding all other causes of the burning tissues that have been described by the patient through observation and testing. Mignogna, et al. describe the typical display of products a patient will bring with them because they have been to multiple practitioners over long periods of time searching for answers. Items include mouthwashes, antifungal medications, antibiotics, vitamins, topical steroids and a long written medical history of complaints relating to pain. The previous misdiagnosis of patients within the study were, candidiasis, depression, allergic reaction to a prosthesis, hypovitaminosis, hyposalivation/xerostomia, trigeminal neuralgia, viral hepatitis, gastroesophageal reflux disease, bruxism, tracheitis and food intolerances. Recent studies by Farah, et al. found no association with candida load and BMS dysesthesia.

Notations should be made of clinical dental findings. Careful questioning of the patient is needed since the patient may not be aware of the time elements of occurrences such as pain worsening in mid-day or the absence of pain during eating. Keeping a log of events is helpful in establishing patterns. Muzyka and DeRossi noted food and drink may relieve the symptoms. Those in group 3 with possible contact allergies sometimes may experience worsening with food and drink. Salivary flow is best assessed by both stimulated and unstimulated flow. However, as described earlier, in BMS, unstimulated saliva may be found to be diminished while stimulated remains within normal limits. Parafunctional habits such as tongue thrust and bruxism are evaluated. Assessing systemic and psychological implications is also performed to rule out systemic factors.

Medications should be identified and reviewed since they may or may not contribute to the
burning discomfort. After other causes are ruled out, and depending on the findings, some BMS patients should be informed that a solution to their problems may or may not be solved readily. Treatment is often prolonged over several weeks to months as the clinician strives to eliminate all reversible etiologic factors and successfully treat irreversible factors. Patients appreciate your honesty, interest and concern with their well-being and usually express an interest in undergoing whatever treatment you may have to offer.

Al Quran reported results from a group of 32 patients with matched controls on several personality factors. The researcher suggested the patients with BMS had increased levels of neuroticism, depression, hostility and anxiety. However, disease states that may produce similar characteristics of BMS are iron deficiency, deficiency in the B vitamins, diabetes, thyroid diseases, hormonal disorders, autoimmune diseases, esophageal reflux, taste disturbances such as those of supertasters, and drugs producing dryness of the tissues such as diuretics. Medications may also produce oral conditions such as xerostomia and candidiasis. Zur comments that it is unclear whether "psychological factors are a cause or a consequence, or whether they both play a role and exacerbate each other." After other causes are ruled out, Spanemberg, et al. makes the point "the patient needs to admit to the presence of this disorder and learn to live with it, being aware that a solution may not be found." Ultimately, the problem could be lifelong in nature. Lamey, et al. report that people who experience adverse life events may be vulnerable for BMS later in life.

Mignogna, et al. conducted a prospective study with a group of patients and concluded that "The great majority of BMS patients presented with several additional unexplained extraoral comorbidities, indicating that various medical disciplines should be involved in the BMS diagnostic process. Furthermore, the results suggest that BMS may be classified as a complex somatoform disorder rather than a neuropathic pain entity." Acharga, et al. reported that study participants with BMS felt "dissatisfied to very dissatisfied" with their life. They also reported more arthritis, fibromyalgia, allergies and back pain.

**Treatment and Patient Education Protocol**

The literature currently available suggests removal of any local contributing factors as the first step in treating patients with BMS. These considerations may be mechanical irritation, galvanic current, infections, oral products, highly flavored dental products or spicy foods that burn. And adding to the mixture of problems, dryness is a commonly observed complaint and can involve current medications the patient is using. All these factors may be contributing to perceived dryness and need to be assessed. Grushka, et al. 2002 state that BMS is often not a sole symptom, but is frequently associated with two other complaints - dry mouth and altered taste.

Recommending dental products that have low additives and minimal flavoring agents without whitening agents or anti-calculus ingredients is optimal since these patients may be reacting to some of the additives that may make the condition much worse. Flavoring agents such as cinnamic aldehyde have been found to cause reactions for many patients with mucosal diseases. Other products may include mints, gum or other breath aids. Problems related to bruxing should be managed with acrylic occlusal bite guards, while discomfort associated with a tongue thrust or tongue rubbing habit often benefits from fabrication of soft, clear, 1 or 2mm thick full arch protective appliances that extend into the vestibule, palate and to the floor of the mouth to assist in preventing the patient from rubbing their soft tissues against teeth.

Many patients with BMS report sleep disturbances because of the pain and burning sensations. Sleep is extremely important in total body health, and when sound sleep is experienced, many patients notice an improvement in their overall well-being, pain or discomfort.

Some medications that are used to treat anxiety such as the tricyclic antidepressants also promote sound sleep. When the patient is rested, the body may respond to symptoms in a much stronger and healthier way. These medications have seen favorable results in patients with BMS but again, many patients
do not like the way certain medications make them feel and may fail to use them consistently. The medications help to reduce the activity of nerve fibers that are believed to be involved in the pain of BMS. Clonazepam, in doses of 0.25-1.0mg once or twice daily acts as a tranquilizer and produces muscular relaxation and slight inhibition of the central nervous system. Amitriptyline, a tricyclic antidepressant, may sooth neural inflammation when used at a dosage of 10-40mg daily. The side effect of grogginess with these medications has been a complaint of many patients. Savage suggests using the lowest dose possible for the shortest amount of time. Some selective serotonin inhibitors appear to provide good results with some patients. Experts in the treatment of BMS may use various treatment modalities or combinations in order to find one that will assist with the individual patient.

Alpha-lipoic acid has been used in trials with good results. Fermiano and Scully observed improvement in patients, but other studies have not seen any significance using alpha-lipoic acid. Alpha-lipoic acid may act as a neuroprotective agent and assist with repair of neural damage. A combination of approaches is often the best course of action. Zinc, vitamin therapy and hormonal replacement are sometimes used with success depending upon the needs of the patient. Complete blood analyses to determine any vitamin deficiency is necessary, and blood analysis is crucial to rule out diabetes, anemia and other disorders.

Ironically, most medicaments that are beneficial in managing BMS may cause increased oral dryness which may sometimes interfere with patient acceptance. Whenever oral dryness is a component of the patient’s condition, efforts should be made to increase salivary flow. This can be improved with anti-xerostomic mouthrinses and gels, by chewing sugarless gum or using sugar free lemon flavored mints in small quantity. Two drugs, cevimaline and pilocarpine, can be prescribed in an effort to stimulate the patient’s basic salivary gland output. However, due to the medical maladies of many BMS patients the drugs may be contraindiected. Medical consultation may be advised.

See Table 4 for a listing of drugs often used in BMS treatment.

In 2012 de Moraes et al provided an evidence based review of published randomized clinical trials (RTC) regarding therapy for BMS. They found 12 RTC that met the Cochran Reviewers Guidelines criteria for critical analysis. In these studies, BMS patients were treated with systemic alpha-lipoic acid (8 groups), while 1 group was treated with alpha-lipoic acid and gabapentin in combination. Three groups were treated with capsaicin, 1 systemically and 2 topically applied. One group was treated with gabapentin while, as previously described, 1 group received gabapentin combined with alpha-lipoic acid. One group each used topical Benzydamne, Trazadne, systemic Bethanecol, lysozyme-lactoperoxidase oral solution (naturally occurring antibiotics in saliva) and Hipericin (St John’s Wort). Statically significant improvement were reported with topical clonazepam, systemic alpha-lipoic acid and systemic and topical capsaicin. However, all RTCs evaluated were flawed in one way or another. To date, no definitive cure for BMS has been found but some agents may offer improvement in symptoms and quality of life.

Non-pharmacologic approaches such as reducing parafunctional issues may be used with appliances such as mouth guards. Oral care products that minimize flavoring agents, alcohol-free mouth rinses and contact allergy elimination may produce good results. Sugar-free candies or gum, sialagogues, non-caffeinated beverages have been suggested.

Table 4. Commonly used therapy for primary (established) BMS.

<table>
<thead>
<tr>
<th>Therapy Type</th>
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<tbody>
<tr>
<td>Antidepressants</td>
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<tr>
<td>Anticonvulsants</td>
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<tr>
<td>Antidepressants</td>
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<tr>
<td>Analgesics</td>
</tr>
<tr>
<td>Alphalipoic acid</td>
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<tr>
<td>Benzodiazepines</td>
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<tr>
<td>Hormone replacement therapy</td>
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<tr>
<td>Topical or systemic capsaicin</td>
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to stimulate the saliva flow and decrease the dryness. When used alone or in combination with systemic medications, other adjunct therapies with favorable results are stress management, yoga, tai chi, psychotherapy, moderate exercise and biofeedback. Cognitive behavioral therapy has been used with good results to decrease pain intensity.

Acupuncture is cited as obtaining good results in a group of patients by altering the microcirculation, resulting in a significant variation of the vascular pattern. Scardina, et al. studied a group of patients and conducted an in vivo study using video capillaroscopy over a six-month period to document the vascular changes in 30 patients. The burning sensation reduction benefits lasted for 18 months. Follow up and further research is needed to evaluate whether there was a psychological component from just administering the acupuncture or whether there is a reduction in pro-inflammatory metabolites. 35

Topical approaches such as capsaicin (Capsicum frutescens L) have shown usefulness with some patients; although the capsaicin is very strong and not tolerated by many patients. Using lidocaine initially and then applying the capsaicin to diminish the initial pain of the product have also lessened local pain. 30 Capsaicin has also been used systemically, but with long-term use patients reported gastric pain. Clonazepam used topically reduces burning in some patients, lidocaine and benzylamine hydrochloride 0.15% used as a mouth rinse have produced favorable results. 38 Aloe vera has been used in the treatment of BMS in conjunction with the use of a tongue protector with favorable results in reducing pain and burning tongue, but further study is needed. 26

Medicaments that are beneficial in managing BMS may cause increased oral dryness which may sometimes interfere with patient acceptance.

Whenever oral dryness is a component of the patient’s condition, efforts should be made to increase salivary flow if possible. This can be improved with anti-xerostomic mouthrinses and gels, by chewing sugarless gum or using sugar free lemon flavored mints in small quantity. Two drugs, cevimeline and pilocarpine, can be prescribed in an effort to stimulate the patient’s salivary gland output.

A few relatively recent studies have indicated that low level laser therapy may sometimes be of benefit for patients afflicted with BMS. However, at present there does not appear to be enough data to validate the usefulness of this therapeutic approach. 68-70

**BMS Patient Education Resources**

Patient education sheets may be downloaded and given to patients who are diagnosed with BMS. Supplying patient educational material is affective in providing some information that the patient can review after leaving the dental office. Patient anxiety is usually reduced when the patient has material to read after an initial diagnosis has been rendered. Patients tend to only hear the actual diagnosis and “White Coat Syndrome” is known to occur. The patient may not remember what is heard after the initial shock of a diagnosis. Having printed material and instructions written for the individual patient is optimal. Below are links to two downloadable patient education sheets on BMS:

- **Burning Mouth Syndrome, AAOM.** 41
- **Burning Mouth Syndrome, American Family Physician.** 42

**Conclusion**

This course on BMS has been introduced to provide additional knowledge of what is known with regard to this disorder. It is believed BMS is a multifaceted disorder and further complicated by the multiple approaches that appear to be beneficial for a variety of patients. There are patients who appear to struggle with BMS for many years without any relief. The dentist and the hygienist should have an understanding of the complicated symptoms and complaints voiced by these patients and refer patients to those knowledgeable in the treatment of BMS. Those individuals may be oral medicine specialists, pain center specialists, some psychologists who work with pain disorders, biofeedback specialists and some medical/dental schools-stomatolology centers that offer treatment in BMS.

Recognition of the disorder is the first step in assisting the patient with treatment. Patients
in general office practices may continue to be patients of record and suffer from the symptoms of BMS for several years - so the more support an office can provide to these patients, the more successful the treatment may be. Patients are often served by just having someone listen to their complaints since they have been shuffled from one practice to another. As stated in the course, sometimes the problem is not BMS and may be solved by taking steps to modify behavior or lifestyle changes. The process is often time consuming but understanding is greatly appreciated by someone who is suffering with BMS.
Course Test Preview
To receive Continuing Education credit for this course, you must complete the online test. Please go to: www.dentalcare.com/en-us/professional-education/ce-courses/ce434/start-test

1. Which of the following is NOT considered a synonym for oral pain:
   A. dysgeusia
   B. glossodynia
   C. glossophyrosis
   D. orodynia
   E. stomatodynia

2. Three primary causes have been identified as possible contributors of BMS: Which one is not a possible contributor?
   A. neurologic
   B. psychogenic
   C. hormonal
   D. genetic abnormality
   E. flavoring agents

3. All of the following systemic diseases are associated with BMS except:
   A. connective tissue diseases
   B. Crohn's disease
   C. trigeminal neuralgia
   D. multiple sclerosis
   E. GERD

4. Somatosensory sensations refer to:
   A. pain or burning sensations
   B. numbness
   C. sandiness or dryness
   D. a sense of hanging structures in the mouth such as strings
   E. a sense of “cold” or “warmth”

5. Taste phantom is referred to:
   A. sensitivity to spicy foods
   B. always having a sense of hunger
   C. a sweet taste
   D. void of taste sensations
   E. taste or taste perception changes

6. BMS is described by patients as a burning sensation that is:
   A. continuous
   B. intermittent
   C. localized
   D. generalized
   E. may be all of the above

7. All of the following may be described by a patient with BMS, except:
   A. pain
   B. tingling
   C. swelling
   D. scalding
   E. numbness
8. **A secondary form of BMS is associated with:**
   A. thyroid disease
   B. psychiatric conditions
   C. oral infections
   D. vitamin/mineral deficiencies
   E. All of the above.

9. **Which of the following disease states may produce similar characteristics of BMS?**
   A. iron deficiency
   B. deficiency in the B vitamins
   C. diabetes
   D. autoimmune diseases
   E. All of the above.

10. **Bruxing by patients with BMS may be managed by which of the following:**
    A. anti-anxiety medications
    B. night guard on a single arch at least 4mm thick
    C. cupping
    D. soft, clear acrylic occlusal bite guards that are 1 to 2mm thick
    E. medications for sleep

11. **Many patients with BMS notice the development of the symptoms after:**
    A. parafunctional habits
    B. dental products
    C. developing another disease state
    D. long-term problems with GERD
    E. All are correct.

12. **All of the following may place a patient at risk for BMS EXCEPT:**
    A. menopause
    B. psychogenic problems
    C. mild sensory problems
    D. anxiety related disorders
    E. inner ear problems

13. **BMS is often misdiagnosed because:**
    A. other disease states may have similar symptoms
    B. the tests used often produce false results
    C. patients do not adequately describe their complaints
    D. the patients delay treatment
    E. the patient may seek treatment with the wrong provider

14. **A patient with BMS, typically has seen multiple practitioners while searching for a diagnosis. The delay in a diagnosis is due to:**
    A. poor diagnostic skills
    B. laboratory tests that are not suggested
    C. varying patient complaints that do not fit a clear pattern
    D. the lack of specialists in this field
    E. the patient description of perceived pain
15. **A high rate of BMS is found in:**
   A. patients with liver disease  
   B. individuals who have severe allergies  
   C. individuals who have food sensitivity  
   D. supertasters  
   E. patient with aphthous ulcers

16. **In the Lamey/Lewis Study, the researchers classified Type 2 BMS as having which of the following characteristics:**
   A. gradual Increased burning throughout the day  
   B. intermittent burning pain  
   C. pain only at night  
   D. unremitting pain persisting throughout the day  
   E. pain/burning free most of the day

17. **Burning lips usually involve:**
   A. inactive minor labial salivary glands  
   B. thinned mucosal appearance of the labial mucosa  
   C. exudate affecting the lips  
   D. varicosities within the lips  
   E. Both A and B are correct.

18. **All taste sensation is perceived:**
   A. on the tongue  
   B. on the buccal mucosa and the tongue  
   C. on the tip of the tongue  
   D. on the tip of the tongue, pharyngeal area of the mouth  
   E. throughout the mouth

19. **In classic BMS, the pain is usually found to be:**
   A. unilateral  
   B. in posterior tongue region  
   C. bilateral and symmetrical  
   D. in soft palate  
   E. in buccal mucosa

20. **BMS is found primarily in which age group:**
   A. under age 30  
   B. 30-50 years of age  
   C. 50-70 years of age  
   D. 70+ years of age  
   E. Both C and D are correct.

21. **Medications used to manage BMS may also cause:**
   A. increased oral dryness  
   B. ulcerations  
   C. agitation  
   D. increased saliva thickness  
   E. nausea
22. The first step in assisting a patient with BMS is:
   A. a referral
   B. limiting food items
   C. recognition
   D. nerve testing
   E. anti-depression medications

23. Tricyclic antidepressant medications are helpful in some cases because:
   A. the medications have an affect on taste
   B. the medication stimulates nerve fibers
   C. the medication promotes a euphoric state
   D. the medication alters pain perception
   E. the medication promotes sound sleep

24. An enlarged, burning tongue could be associated with:
   A. hypothyroidism
   B. vitamin A deficiency
   C. anemia
   D. blood disorders
   E. fungal infections

25. Acupuncture may assist in BMS by altering which of the following?
   A. pathogens
   B. vascular strength
   C. microcirculation and pro-inflammatory metabolites
   D. capillary strength
   E. overall muscle strength
References


About the Authors

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Dr. Burkhart received a Bachelor of Science degree in dental hygiene from Fairleigh Dickinson University School of Dentistry, a Master of Education degree from North Carolina State University in Occupational Health Education, a Doctor of Education Degree from North Carolina State University in Adult Education/Interdisciplinary studies. Nancy conducted a one-year postdoctoral fellowship in the section of Oral Pathology at the University of North Carolina School of Dentistry in Chapel Hill in the section of oral pathology. Her dissertation topic was “Oral Lichen Planus Commonalities: Educational and Psychological Implications.” Dr. Burkhart is an Adjunct Associate Professor and Educational Consultant in the Department of Periodontics/Stomatology at The Baylor College of Dentistry where she has been a faculty member since 1997. She is founder and faculty Co-Host of the International Oral Lichen Planus Support Group established in 1997.

Dr. Burkhart has presented papers both nationally and internationally on Oral Lichen Planus/Mucosal Diseases and has published articles in national dental journals. She is co-author of “General and Oral Pathology for the Dental Hygienist” published through Lippincott, Williams & Wilkins and the book is soon to be in its 3rd edition 2017. She was a 2006 recipient of the ADHA Crest Award through Proctor & Gamble and The Philips Consumer Lifestyle and PennWell Corporation “Mentor of Distinction Award” in 2012. She is an Academic Affiliate Fellow of The American Academy of the Oral Medicine Association-awarded fellowship in 2016. Nancy is a 2017 recipient of the “Award of Distinction” through SUNSTAR and PennWell Corporation and a 2017 “Dental Professional of the Year” recipient through The International Pemphigus and Pemphigoid Foundation. As a columnist for RDH since 2007, she writes a monthly column titled, “Oral Exams” for the PennWell publication that appears in both dental and dental hygiene literature. To date, she has written more than 120 columns for the publication on oral pathology/oral medicine topics. She is a reviewer for several national dental journals and a representative on the JCDE.

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