



## ALTERED TASTE – AN INSIGHT

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### ABSTRACT

This review article mainly aims in highlighting the importance of taste and its alteration due to various diseases that occur in the body. Taste is a sensation which is perceived due to the presence of taste buds on the dorsum of the tongue and sometimes in other parts of the oral cavity. The normal mechanism is hampered when neurological, endocrine, nutritional disorders like Bell's palsy, cancer, epilepsy, hypothyroidism etc. occur in the body. In this article we are attempting to discuss the common causes of taste alteration in patients seen by the dentists and the adverse effects that the patients experience and lay emphasis on the importance of these disorders and the patients' perception about taste alteration or loss.

**KEYWORDS:** Taste, Taste disorders, Taste sensation, Taste Loss, Taste tests.



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## INTRODUCTION

Eating is a basic premise for any living being and with eating comes the thought of good taste which many of us take our sense of taste for granted. The ability to taste occurs when the molecules released during chewing, drinking or digesting the food stimulate the special sensory cells in the mouth and throat. These sensory cells are clustered within the taste buds of the tongue and roof of the mouth. Smell also plays an important role in appreciating flavors in eating like common tastes such as chocolate, coffee, strawberry, apple, peach, etc<sup>1</sup>. There are high chances that loss of taste can occur due to poor oral hygiene, head injuries, radiation therapies for cancers of head and neck, upper respiratory or middle ear infections, dental problems etc. Impairment in taste sensation may change a person's feeling towards his eating habits and further worsen the already existing systemic disorder<sup>2</sup>. Diagnosis would include identification of the underlying cause of the disorder<sup>2</sup>. A chance of reversal of this abnormality is high if the cause is treated.

## DISCUSSION

### MECHANISM OF TASTE SENSATION

Taste buds are found in the oral cavity, primarily on the tongue and sometimes can be found on the palate, pharynx, epiglottis, and larynx. The first event in the sensation of taste is the contact between a substance to be tasted (the "tastant") and a site on the microvillus that extends from the taste receptor cell. The signal that is generated by this contact is called a "transduction<sup>1</sup>." When the taste cells are stimulated, they send messages through three specialized taste nerves to the brain, which are chorda tympani nerve, glossopharyngeal nerve and vagus nerve, where specific tastes are identified. Each taste cell expresses a receptor, which responds to at least one of the five basic taste qualities which are sweet, sour, bitter, salt, and umami<sup>2</sup>. There are four types of taste cells namely basal, dark, intermediate and light cells. Also, there are two types of fibers present in relation to taste buds, intragemmal fibers and

perigemmal fibers. Intragemmal fibers are those within the taste bud, and perigemmal fibers are those around the taste bud. The intragemmal nerve fibers are the fibers which receive synaptic contacts from all four types of taste cells<sup>3</sup>. The perigemmal fibers are generally found outside of the taste buds. Interruptions of these nerve fibers either by cut or crush injury results in the disappearance of the taste buds<sup>4</sup>.

### LOSS OF TASTE SENSATION

Taste loss occurs as a natural phenomenon of aging and also in response to normal changes such as pregnancy and menopause<sup>5</sup>. Taste disorders can be of three types, ageusia (taste loss) and hypogeusia (decrease in taste) and dysgeusia (abnormal taste)<sup>3</sup>. Poor dentition and hygiene are common oral conditions that affect taste. Patients with xerostomia (dry mouth), Sjögren syndrome (inflammation of the salivary glands resulting in a dry mouth), and zinc deficiency may also experience taste loss. Other conditions in which taste loss may occur include liver and kidney disorders, diabetes mellitus, depression, surgical procedures around the chorda tympani or glossopharyngeal nerve<sup>3</sup>, head trauma and epilepsy.

Hence, altered taste perception can occur because of five main reasons.

(a) Transport problems of tastants to the taste buds (e.g., secondary to excessive chronic oral dryness or taste pore damage from inflammation or burns),

(b) The release of bad-tasting materials from the oral or nasal cavities (e.g., sialadenitis, gingivitis, oral infections, sinus infections),

(c) Destruction of taste receptors (e.g., from radiotherapy),

(d) Damage to nerves that innervate the taste buds (e.g., Bell's palsy, third molar extraction, tonsillectomy), and

(e) Central neural disorders (e.g., epilepsy, tumor, stroke, multiple sclerosis)<sup>6</sup>.

It is rarely appreciated that taste dysfunction can result from dental and other oral iatric interventions which may lead to the nerve damage. The lingual branch of the glossopharyngeal nerve can be damaged by tonsillectomy, bronchoscopy, or laryngoscopy, given its close proximity to the muscle layer of the palatine tonsillar bed<sup>7,8</sup>. The chorda tympani

nerve can be damaged by tympanoplasty, mastoidectomy, or stapedectomy<sup>9,10</sup>. The nerve fibers which may be damaged due to various causes lead to taste loss<sup>11,12</sup>. Injury to the nucleus tractus solitarius can produce ipsilateral hypogeusia or ageusia, whereas injury to the pontine tegmentum that involves both gustatory lemnisci can produce bilateral hypogeusia or ageusia<sup>13</sup>.

**Table 1**  
**Medical conditions associated with taste loss.**

Medical Conditions Associated With Taste Loss <sup>14</sup>	
<b>Neurological causes</b>	Alzheimer's disease, Bell's palsy, Damage to the chorda tympani, Epilepsy, Head trauma, Korsakoff's syndrome, Multiple sclerosis, Parkinson's disease, Tumours and lesions.
<b>Nutritional causes</b>	Cancer, Chronic renal failure, Liver disease, Niacin deficiency, Vitamin B12 deficiency.
<b>Endocrine</b>	Adrenal cortical insufficiency, Congenital adrenal hyperplasia, Pan hypopituitarism, Cushing's syndrome, Diabetes mellitus, Hypothyroidism, Kallman's syndrome, Pseudo hypoparathyroidism, Turner's syndrome.
<b>Local causes</b>	Allergic rhinitis, atopy, and bronchial asthma, Sinusitis and polyposis, Xerostomic conditions including Sjogren's syndrome.
<b>Viral infections</b>	Acute viral hepatitis, Influenza-like infections.
<b>Others</b>	Myasthenia gravis <sup>15</sup> , Guillain-Barre syndrome <sup>16</sup> .

### **EFFECT OF DRUGS AND RADIATION ON TASTE**

Chemotherapy employs drugs associated with taste loss. A few examples include methotrexate and dexamethasone, antihypertensives, antimicrobial agents, and antiproliferative agents<sup>17</sup>. In cases of taste loss secondary to hypothyroidism, thyroxin replacement reportedly normalizes taste sensitivity<sup>18</sup>. The principal nutrient deficiency that has been associated with taste loss is zinc<sup>19</sup>. The taste buds degenerate six to seven days after irradiation, but taste alteration is seen as early as two to three days after irradiation. The number of taste buds that degenerate is related to the size of the dose of radiation. Taste loss that occurs with the administration of

radiation therapy is known as post irradiation gustatory dysfunction.

### **ASSESSMENT OF TASTE SENSATION**

Taste loss can be assessed via chemical (threshold or suprathreshold) or electrogustometric measures. The taste can also be assessed by various tongue tests which include the following.

#### **(i) The tongue tip taste test<sup>1</sup>**

In this test, we assess the taste sensation at the tip of the tongue and know the type of taste and rate how strong the taste is. This test is done by using a cotton-tipped applicator which is glided smoothly across the surface of the tongue without any resistance. Later the tastant is gently applied with the applicator tip in one slow continuous motion from the left side of the

tongue, across the tip and finishing on the right side of the tongue. Later the subject is asked various questions regarding the taste sensation and the taste is assessed.

### **(ii) Whole mouth taste test<sup>1</sup>**

This test is similar to the “tongue tip taste test” test in which we assess the type of taste and the intensity of the taste in the whole mouth.

This test consists of two solutions namely,

- a) 1 M NaCl (orange), 1 mM quinine (blue) and 0.32 M NaCl (yellow); and
- b) 0.32 M NaCl (yellow), 1 mM quinine (blue) and 1 M NaCl (orange).

The study subject should take the solution into the mouth and gently swish it around for about 3 seconds and to be spit out. Following this, the subject will be given a questionnaire regarding the taste sensation and based on this the taste is assessed.

### **(iii) Modified pocket smell test (M-PST)<sup>1</sup>**

The M-PST is a self-administered “scratch and sniff” test which is mainly done for the assessment of smell. The purpose of this test is

to see how well the subject can identify some of the common smells.

### **(iv) Whole mouth solution replicate taste test<sup>1</sup>**

This test is done to cross check the results of the above tests and to see how close this test results are with in accordance to the above mentioned main tests.

## **CONCLUSION**

Patients having loss of taste sensation experience greater weight loss than those with a normal taste sensation<sup>20</sup>. These patients with loss of taste sensation have a worse prognosis than the patients who do not lose their sense of taste and are able to maintain their food intake and nutritional support<sup>21</sup>. We dentists should take care regarding the minor changes in taste sensations of the patient as these taste sensation changes can lead us to diagnose various other diseases that have been discussed before. Hence importance to assessment of taste should be given while examining the patient.

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