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Review

Taste Alterations in Cancer Patients Causes, Effects, and Clinical Implications

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Abstract

Taste alterations are among the most frequently reported yet often underrecognized complications experienced by cancer patients during the course of their disease and treatment. Manifesting as dysgeusia, hypogeusia, ageusia, or phantogeusia, these sensory disturbances can arise from the direct effects of malignancy as well as from chemotherapy, radiotherapy, targeted therapies, and immunotherapies. The prevalence and severity of taste dysfunction vary depending on cancer type, treatment modality, individual patient characteristics, and assessment methods, but evidence consistently indicates a substantial burden across diverse oncology populations. The mechanisms underlying taste alterations are multifactorial and involve damage to taste receptor cells, impaired taste bud regeneration, salivary gland dysfunction, oral mucosal injury, inflammation, nutritional deficiencies, and neurotoxic effects associated with anticancer therapies. Interactions between gustatory and olfactory pathways further influence flavor perception and contribute to the complexity of symptom presentation. Head and neck cancer patients are particularly susceptible because treatment often affects structures directly involved in taste sensation and salivary function. The consequences of altered taste perception extend beyond sensory discomfort. Distorted or diminished taste can reduce appetite, change food preferences, decrease dietary variety, and impair nutritional intake. These effects may contribute to weight loss, malnutrition, reduced physical functioning, and poorer treatment tolerance. The impact is also evident in psychosocial domains, as eating plays a central role in social interaction, cultural practices, and emotional well-being. Persistent taste disturbances may therefore lead to frustration, social withdrawal, and diminished quality of life. Clinical management requires early recognition, routine assessment, and multidisciplinary intervention. Nutritional counseling, dietary modifications, oral care measures, and management of associated conditions such as xerostomia and mucositis are commonly employed to alleviate symptoms and support adequate nutrition. Despite growing awareness, standardized assessment tools and evidence-based treatment strategies remain limited. Greater understanding of the biological pathways involved in taste dysfunction and the development of targeted interventions may enhance supportive cancer care and improve outcomes for patients affected by these challenging sensory changes.

Keywords: *taste alterations, dysgeusia, cancer patients, nutritional status, quality of life*

Introduction

Cancer remains a major global health challenge and is associated with a wide range of symptoms and treatment-related adverse effects that can significantly affect patients' well-being. Among these complications, taste alterations are increasingly recognized as a common yet frequently underappreciated problem in oncology care. Taste disturbances may be presented as dysgeusia (distorted taste perception), hypogeusia (reduced taste sensitivity), ageusia (complete loss of taste), or phantogeusia (perception of taste in the absence of a stimulus). These disorders can occur as a result of the cancer itself, anticancer treatments, or a combination of biological and psychosocial factors that influence sensory perception (1, 2).

The sense of taste plays a fundamental role in food selection, appetite regulation, nutrient intake, and overall enjoyment of eating. Alterations in taste perception can therefore have profound consequences for patients undergoing cancer treatment. Chemotherapy, radiotherapy, targeted therapies, and immunotherapies have all been associated with changes in taste function. The prevalence of taste alterations varies considerably across studies because of differences in cancer type, treatment modality, assessment methods, and patient characteristics. Nevertheless, evidence suggests that a substantial proportion of patients experience some degree of taste dysfunction during the course of their disease and treatment (1, 3).

The mechanisms underlying taste alterations in cancer patients are complex and multifactorial. Direct damage to taste receptor cells, impaired regeneration of taste buds, salivary gland dysfunction, oral mucosal injury, inflammation, zinc deficiency, and neurotoxicity have all been implicated in the development of these symptoms. In addition, interactions between taste and smell pathways contribute to the subjective experience of flavor, meaning that olfactory disturbances can further exacerbate perceived taste abnormalities. The effects of cancer treatments on these sensory systems may persist for months or even years after therapy, particularly among patients receiving treatment for head and neck malignancies (1, 4).

Taste alterations can have significant nutritional and clinical consequences. Changes in food preferences, aversion to certain foods, metallic or bitter tastes, and reduced enjoyment of eating often lead to decreased dietary intake and inadequate nutrient consumption. These effects may contribute to weight loss, malnutrition, reduced physical functioning, and poorer quality of life. Furthermore, eating difficulties can increase emotional distress and negatively affect social interactions, as meals often play an important role in family and cultural settings. The cumulative impact of these factors may compromise treatment adherence and recovery, highlighting the importance of recognizing taste dysfunction as a meaningful component of supportive cancer care (1, 3).

Despite growing awareness of taste disturbances in oncology, challenges remain in their assessment and management. Variability in terminology, subjective reporting, and limited standardized evaluation methods have hindered consistent diagnosis and comparison across studies. Greater understanding of the biological mechanisms, prevalence, and clinical significance of taste alterations is essential for improving patient-centered care and minimizing the burden of this often overlooked symptom in individuals living with cancer (1, 3, 4).

Review

Taste alterations in cancer patients represent a clinically significant complication that extends beyond sensory discomfort and may substantially influence nutritional status, treatment experience, and overall quality of life. Evidence suggests that these disturbances arise through multiple mechanisms, including damage to taste receptor cells, inflammatory responses, salivary dysfunction, and neurotoxic effects associated with anticancer therapies. The multifactorial nature of dysgeusia explains the variability in symptom severity observed among different patient populations and treatment regimens (5).

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The consequences of altered taste perception are particularly important because they can affect dietary intake and food preferences. Patients frequently report aversion to previously enjoyed foods, increased perception of bitter or metallic tastes, and reduced enjoyment of meals. These changes may contribute to inadequate nutritional intake, weight loss, and a decline in physical functioning. Such outcomes are especially concerning in patients already vulnerable to malnutrition due to the metabolic demands of cancer and its treatment. In addition, taste disturbances can negatively affect social interactions and emotional well-being, as eating is closely linked to cultural practices and daily quality of life (6).

Causes and Mechanisms of Taste Alterations

Taste alterations in cancer patients arise through a complex interplay of disease-related factors and treatment-induced changes affecting the gustatory system. Chemotherapy remains one of the most frequently implicated causes of dysgeusia, hypogeusia, and ageusia. Many cytotoxic agents interfere with the rapid turnover of taste receptor cells, which normally regenerate every 10–14 days. Damage to these cells can disrupt the detection and transmission of taste stimuli, resulting in distorted or diminished taste perception. Certain chemotherapeutic drugs are also excreted into saliva, creating persistent metallic, bitter, or unpleasant sensations that patients may perceive even in the absence of food intake (7).

Radiotherapy, particularly when directed toward the head and neck region, has profound effects on taste function. Exposure of the oral cavity and surrounding tissues to ionizing radiation can damage taste buds, alter sensory nerve pathways, and impair the regenerative capacity of gustatory epithelial cells. Radiation-induced injury to the salivary glands further contributes to taste dysfunction by reducing saliva production and changing salivary composition. Since saliva is essential for dissolving tastants and transporting them to taste receptors, xerostomia frequently exacerbates sensory disturbances. The severity of taste impairment is often related to radiation dose, treatment duration, and the specific anatomical structures included within the radiation field (8).

Cancer itself may contribute to altered taste perception through systemic biological processes. Chronic inflammation associated with malignancy leads to the release of cytokines such as tumor necrosis factor-α, interleukin-1, and interleukin-6, which can influence neural signaling pathways involved in taste perception. Elevated inflammatory activity has been linked to reduced appetite and sensory dysfunction, suggesting that taste alterations may reflect broader physiological changes occurring during cancer progression. Nutritional deficiencies, particularly zinc deficiency, have also been associated with impaired taste acuity because zinc plays a critical role in the maintenance and regeneration of taste bud cells (9).

Recent investigations have highlighted molecular mechanisms that may explain the persistence of taste disturbances in some patients. Anticancer therapies can modify the expression of genes involved in taste receptor signaling and cellular communication within gustatory tissues. Alterations in receptor sensitivity, neurotransmitter activity, and neural processing may produce long-lasting changes in sensory perception even after treatment cessation. Interactions between taste and olfactory pathways further complicate the clinical presentation, as smell dysfunction frequently accompanies taste disorders and contributes substantially to perceived flavor abnormalities. Variations in age, treatment modality, cancer type, and individual genetic susceptibility may influence the extent and duration of these sensory changes, accounting for the heterogeneity observed across patient populations (10).

Effects on Nutrition and Quality of Life

Taste alterations have substantial implications for dietary behavior and daily functioning among individuals undergoing cancer treatment. The ability to perceive and enjoy food is closely linked to appetite, meal satisfaction, and adequate nutritional intake. When taste perception becomes distorted, many patients experience difficulty maintaining their usual eating patterns. Foods that

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were previously enjoyable may acquire bitter, metallic, or otherwise unpleasant characteristics, while certain flavors become muted or undetectable. These sensory changes often lead to reduced food consumption, avoidance of specific food groups, and decreased dietary variety. As a result, patients may struggle to meet their energy and nutrient requirements during a period when optimal nutrition is essential for maintaining strength and supporting recovery (11).

Evidence has shown a strong relationship between taste disturbances and nutritional decline in cancer populations. Reduced oral intake associated with dysgeusia can contribute to unintended weight loss, decreased muscle mass, and increased risk of malnutrition. Such outcomes are particularly concerning in patients receiving chemotherapy or radiotherapy, where treatment-related metabolic demands are already elevated. Studies have reported that individuals experiencing taste dysfunction frequently exhibit poorer nutritional status compared with those who do not report sensory changes. The combination of altered taste perception, treatment-related nausea, oral discomfort, and reduced appetite may further compound these challenges, creating barriers to adequate nutritional support (12).

The impact of taste alterations extends beyond physical health and affects multiple dimensions of quality of life. Eating serves important social, cultural, and emotional functions, making disruptions in food enjoyment especially distressing. Patients often report frustration when meals no longer provide pleasure or when dietary restrictions emerge as a consequence of sensory changes. Family gatherings, celebrations, and social events centered around food may become less enjoyable, contributing to feelings of isolation and reduced social participation. Persistent taste disturbances have also been associated with emotional distress, anxiety, and lower overall satisfaction with daily life, particularly when symptoms continue long after treatment completion (13).

Head and neck cancer patients appear especially vulnerable because treatment frequently affects structures directly involved in taste perception and salivary function. Severe taste impairment in this population has been linked to difficulties in maintaining adequate oral intake and preserving nutritional status throughout treatment. The prevalence and intensity of these symptoms may vary according to cancer type, therapeutic modality, and individual patient characteristics, yet their influence on food-related behaviors remains consistently evident across studies. Clinical observations indicate that patients often adapt by modifying food preparation methods, selecting stronger flavors, or altering meal frequency in response to changing sensory experiences (3).

Clinical Management and Implications

The management of taste alterations in cancer patients remains challenging because symptoms vary considerably in severity, duration, and underlying cause. Effective care requires recognition that taste dysfunction is not merely a minor treatment-related complaint but a symptom capable of influencing nutritional status, treatment tolerance, and overall patient well-being. Routine screening during oncology visits is therefore important, particularly for individuals receiving chemotherapy, radiotherapy to the head and neck region, or multimodal treatment regimens. Early identification allows healthcare professionals to address sensory changes before substantial dietary decline or weight loss develops (14).

Assessment approaches include patient-reported outcome measures, dietary evaluations, symptom questionnaires, and objective taste testing when available. Standardized assessment remains inconsistent across clinical settings, creating difficulties in comparing outcomes between studies and monitoring symptom progression over time. Variations in terminology and measurement tools have contributed to gaps in understanding the true prevalence and severity of dysgeusia. Greater incorporation of validated assessment methods into routine oncology practice may improve symptom recognition and facilitate more individualized interventions (15).

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Current management strategies primarily focus on supportive care and symptom reduction. Nutritional counseling is frequently recommended to help patients adapt to changing taste perceptions. Practical modifications such as enhancing flavors with herbs and seasonings, consuming foods at cooler temperatures, selecting alternative protein sources, and maintaining good oral hygiene may improve food acceptance. Management of xerostomia, oral infections, and mucositis is also relevant because these conditions can worsen taste disturbances. Pharmacological interventions have been investigated, including zinc supplementation and other agents aimed at supporting taste bud function; however, findings remain mixed and evidence supporting routine use is limited. The effectiveness of any intervention often depends on the underlying mechanism responsible for the sensory change (14, 15).

The clinical implications of taste dysfunction extend beyond symptom control. Persistent alterations in taste can affect adherence to dietary recommendations and may contribute to treatment interruptions when nutritional compromise becomes severe. Healthcare providers increasingly recognize the importance of multidisciplinary involvement, including oncologists, dietitians, nurses, speech and swallowing specialists, and oral health professionals. Such collaboration supports comprehensive symptom management and addresses the diverse factors influencing food intake and quality of life. Emerging research has also drawn attention to the biological pathways involved in treatment-induced dysgeusia, including alterations in taste receptor signaling and sensory processing. Improved understanding of these mechanisms may support the development of targeted therapies and more personalized supportive care approaches. Ongoing efforts to standardize assessment methods and evaluate intervention effectiveness continue to shape the evolving management landscape for taste alterations in oncology populations (4, 8).

Conclusion

Taste alterations are common among cancer patients and result from complex interactions between the disease process and anticancer treatments. These sensory disturbances can negatively affect nutritional intake, quality of life, and treatment experiences. Early recognition and appropriate supportive care strategies are essential to minimize their clinical impact. Continued research is needed to improve assessment methods and develop more effective interventions for managing taste dysfunction in oncology settings.

Disclosure

Conflict of interest

There is no conflict of interest.

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Data availability

All data is available within the manuscript.

Author contribution

All authors contributed to conceptualizing, data drafting, collection and final writing of the manuscript.

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