Abstract
Disturbances caused by lesions of the oral cavity play an important part in the alteration of the quality of life of cancer patients. The main complications affecting the oral cavity are infections (fungal, viral, bacterial), neutropenic ulcers, drug-induced stomatitis, dry mouth, and taste alteration. Most of the information available about these entities has been acquired in the cancer patient without advanced disease. The little knowledge about the epidemiology and physiopathology of such lesions in the advanced phase of cancer is presented, and approaches to management are suggested. J Pain Symptom Manage 1989;4:20-30.

Key Words
Advanced cancer, oral lesions, infections, neutropenic ulcers, stomatitis, dry mouth, taste alterations

Introduction
The control of symptoms is the most important aspect of palliative care. In this context, lesions of the oral cavity have a great impact on the quality of life of patients with advanced cancer. Such lesions have considerable morbidity and interfere a great deal with both physical and psychological function. Perhaps most important, these complications impair oral nutrition, with a variety of consequences: malnutrition, anorexia, and cachexia. In addition, psychological disturbances relate to the role that the oral cavity plays in communication, social life, and the pleasures associated with eating.

Although there are yet no specific clinical studies, our experience suggests that the main complications in the oral cavity of the patient with advanced cancer are as follows:
- Infections (fungal, viral, bacterial)
- Neutropenic ulcers
- Drug-induced stomatitis
- Dry mouth (radiotherapy, drug, dehydration)
- Taste alteration

Infections

Fungal Infection
The most frequent fungal infection in cancer patients is candidiasis. Twenty-nine to fifty
percent of healthy adults are asymptomatic carriers of candida, usually candida albicans.2-6 In healthy subjects, candida is typically present as a blastospore; when pathogenic, it can also exist in a hyphal form.

Cultures for candida are positive in 52% to 57% of all cancer patients.27,28 In hospitalized cases, a positive culture is found in about 75%; this percentage can reach 89% if repeated cultures are obtained over a period of time.9,10 It has been observed that admission to an oncology ward can result in the development of symptomatic oral candidiasis in 27% of patients, half of whom require treatment.5 It is also evident that oral candidiasis can be a starting point for a disseminated form, which is an important cause of death from cancer, particularly acute leukemia.11,12

The candida albicans infection can be present in the classical form, with white lesions on an inflamed mucosa, or as symmetrical perleche, superficial erosions of the lips with cheilosis; the latter may also be related to an associated riboflavin deficiency. A chronic form also exists, characterized by a hyperemic inflamed oral cavity and an edematous, shiny and fissured tongue. The variable presentation of this infection may complicate diagnosis. It is often necessary to perform a cytologic diagnosis with a wet-mounted potassium hydroxide preparation or gram stain; immunofluorescent techniques are less useful in these patients.3

The classical treatment of oral candidiasis, nystatin, can be criticized on several grounds. Most important, there has been no adequate demonstration of its capacity to treat or prevent oropharyngeal candidiasis. Furthermore, the elevated sugar level contained in this product may adversely affect the teeth, and the taste is not always well accepted by patients.5,11

Clotrimazole seems an effective alternative. It can both prevent and treat candidiasis in the oropharyngeal area.2,5,7,8,15-15 Side effects may be less frequent, with nausea and anorexia reported in 5% to 10% of cases. With prolonged use, induction of hepatic enzymes can occur, leading to reduced efficacy. This outcome may be avoidable by the use of intermittent dosing schedules.15,15

Ketoconazole is another valid alternative. It is particularly indicated in a disseminated infection or where resistance is shown to clotrimazole.5,16,18 It must be taken on a full stomach to enhance absorption, and must not be ingested in the presence of antacids, which reduce bioavailability. Three to five percent of patients develop nausea and vomiting or increases in transaminase level (rarely hepatitis).3,5

In carefully selected and evaluated patients in whom the risk/benefit ratio favors the use of a drug with potential toxicity, intravenous amphotericin B can be used. This drug is indicated in systemic candidiasis.11,19 Side effects are many and may be severe.6,19-21

**Viral Infection**

The oral cavity is affected principally by four viruses: herpes simplex virus (HSV), cytomegalovirus, zoster varicella virus, and Epstein–Barr virus.22 The HSV is most common, although the incidence in different studies varies widely: whereas one retrospective study of 1000 leukemia patients reported an incidence of 6.2% mucocutaneous and 0.3% intraoral infection,23 more recent smaller studies of similar patients noted an incidence of 40% mucocutaneous and 50% to 65% intraoral infection.22,24 Another survey found that HSV culture was positive in 85% of patients who developed stomatitis while undergoing chemotherapy.25 It is possible that the incidence of HSV infection is underestimated clinically, owing to the variety of clinical syndromes in which it can be present.22,26 There are no data on HSV incidence in patients with advanced disease.

Herpetic infection, particularly HSV, is manifested by the presence of yellowish membranes that are easily removed from the mucosa and are extremely painful; vesicles can also appear on the lips.22,23 Herpetic infection can give noticeable morbidity and can have a chronic course. Systemic spread, which can have grave consequences, is fortunately infrequent and usually reported in autopsy series.27-30

The diagnosis of HSV is mainly based on clinical presentation. The role of viral cultures is limited. Exfoliative cytology, using a simple smear with a Papanicolaou stain, permits an accurate cytologic diagnosis (95%) in a brief period of time.31

Specific treatment of the herpes infection is provided by intravenous acyclovir. This drug has few side effects. Patients must be well-hydrated and the dose may need to be diminished if the creatinine clearance is low.25,25,25,32 Local ulceration can occur in cases of venous extravasation.
Bacterial Infection

The incidence of intraoral bacterial infection in the advanced cancer patient is difficult to determine due to the scarcity of available data. In the healthy population, it is believed that approximately 75% carry chronic periodontal infection. This disturbance must be differentiated from acute bacterial disease in cancer patients. Studies in patients with acute nonlymphocytic leukemia suggest that these periodental bacteria may be an important cause of death during myelosuppression. It is therefore likely that many acute infections represent the development of an acute phase of a chronic periodontal disease. Indeed, acute periodontal infection may be the cause of the 25% of the fatal infections that develop during a period of myelosuppression.

The microbiology of intraoral bacterial disease includes staphylococcus epidermitis, pseudomonas aeruginosa, various gram-negative bacilli, and actinomyces. An increase in the typical oral flora, above all veilonella, streptococcus mutans, and bacteroides is also common, and as noted, candida albicans is usually present.

Bacterial infection, especially during chemotherapy, presents with small hemorrhages, pain localized in the periodontium, and fever. Other signs of inflammation are often missing. Evidence of secondary infection in nearby structures may be present, and radiographic signs of periapical abscess may exist.

The frequent presence of anaerobes makes it difficult to interpret bacterial cultures of chronic intraoral infections. Cultures are extremely important in acute infections, however, where they may permit a more precise microbiological diagnosis and guide antibiotic therapy.

The treatment of bacterial infection depends first on adequate hygiene. In cases of pulpitis, root canal or extraction combined with antibiotics may be indicated. In acute periodontal infection, broad spectrum antibiotic therapy is usually initiated, followed by a more precise therapy based on the bacterial cultures, if possible.

Neutropenic Ulcers

Mouth ulcers are a characteristic complication of severe neutropenia, usually occurring with neutrophil counts of less than 100 per mm³. They can be found in up to 50% of the admissions to cancer wards for treatment of acute leukemia; they appear to be more frequent among patients with myelogenous leukemia. Their epidemiology in advanced solid tumors is unknown.

Extraoral areas are involved by neutropenic ulcers in about 34% of cases. In 36%, ulcers can be traced to local factors, such as trauma, drug toxicity, HSV infection, hemorrhages, or leukemic infiltration; the remainder have no identifiable precipitating cause. Pathogens are uncommonly isolated. Neutropenia plays a role in the development of these ulcers by an unknown mechanism, and it is a common observation that regression of the ulcer indicates recovery of the myelopoietic tissue.

Neutropenic ulcers typically present as one or more lesions characterized by regular margins, a yellow/white background that is not easily removed, and few signs of inflammation. All regions of the oral cavity can be involved, whether keratinized or not.

Drug-Induced Stomatitis

There are no data available on chemotherapy-induced stomatitis in advanced cancer. The coexistence of other pathogenetic factors, such as viral or bacterial infections, complicates the diagnosis of such a process in these patients.

In patients undergoing conventional chemotherapy for acute leukemia, the incidence of drug-induced stomatitis is 7% to 10%. There are no evident predisposing factors. This incidence can be compared with the development of oral bruising and bleeding, which occurs in about 80% of cases. In most patients, the buccal and labial mucosa, and the floor of the mouth are involved.

Other damaging chemotherapies belong to the antimetabolites and antibiotics. In patients undergoing treatment with 5-fluorouracil, stomatitis of varying severity develops in 48% to 75% of cases. Forty percent of patients who undergo bone marrow transplantation are affected.

The appearance of drug-induced stomatitis can be very varied. Infection of the ulcers, particularly with candida, further alters the appearance and complicates diagnosis. Nonkeratinized mucosa is more susceptible to lesions and ulcerization.
The etiology of these oral ulcers can be traced to a direct action on the mucosa, as well as to an indirect action on myeloid and lymphoid tissue, which may lead to neutropenic ulceration. Local bleeding can also occur as a result of thrombocytopenia. Other physiopathologic factors, such as the high cell turnover may also be involved in the chemotherapeutic lesions.

Other pathologies of the oral cavity, such as recurring aphthous ulcers and the graft versus host disease (GVHD) in bone marrow transplantation, will not be discussed, as they seldom occur in patients with advanced cancer. One must note, however, that GVHD can progress chronically for long periods of time.

Specific treatment of the lesions in the oral cavity induced by chemotherapy is almost nonexistent (see Table 1); folic acid has been used to treat ulcers caused by methotrexate with contradictory results. Despite the cost, this approach seems indicated in severe lesions. Other aspects of therapy include close monitoring and preventative oral care. In the settings of severe neutropenia and/or thrombocytopenia, treatment of associated disorders such as viral and fungal infections, and continued efforts at good oral hygiene are essential.

Poor oral hygiene (Table 2) may predispose to all of these pathologies, and should be improved as much as possible. Other palliative therapies for associated symptoms like dry mouth (see Table 5) may be necessary, and indeed, may be the only treatment that can be used in the advanced cancer patient.

**Dry Mouth**

Unfortunately, few data are available on the incidence of dry mouth in patients with advanced cancer. This symptom was present in 40% of patients at the time of admission to a hospice; possibly 100% of patients suffer from dry mouth at some point during terminal stage of the disease. Causes of dry mouth are enumerated in Table 3.

Dry mouth causes an oral burning sensation, ulceration, or soreness. The corners of the mouth can become fissured, and the tongue becomes red and smooth. These consequences are due to both the diminished lubrication and the lack of the saliva barrier. Discomfort, difficulty in swallowing and speaking, loss or alteration of taste sensation, and therefore, anorexia, loss of weight, and cachexia, may all follow. Patients with a dental prosthesis may find it difficult to use because of frequent traumatic lesions; this also produces difficulty in mastication, which leads to a reduced intake of food.

**Dry Mouth Due to Radiotherapy**

About 50% of patients with tumors of the oral cavity or oropharynx are given radiotherapy as part of the oncologic treatment. Radiation directed at such areas can involve one or

<table>
<thead>
<tr>
<th>Infection</th>
<th>Therapy</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Candidiasis</td>
<td>Clotrimazole</td>
<td>Prevention</td>
</tr>
<tr>
<td></td>
<td>10 mg × 3 day</td>
<td>Treatment</td>
</tr>
<tr>
<td></td>
<td>10 mg × 5 day</td>
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</tr>
<tr>
<td></td>
<td>Ketoconazole</td>
<td>Principal side-effects:</td>
</tr>
<tr>
<td></td>
<td>200-400 mg/day</td>
<td>nausea and vomiting; shivers,</td>
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<tr>
<td></td>
<td>Amphotericin B</td>
<td>phlebitis, pancytopenia, hypomagnese fever,</td>
</tr>
<tr>
<td></td>
<td>0.3-1 mg/kg/day or on alternate days one dose per day</td>
<td>hypertension, hypokalemia</td>
</tr>
<tr>
<td>HSV infection</td>
<td>Acyclovir</td>
<td>Parenteral hydration needed</td>
</tr>
<tr>
<td></td>
<td>5 mg/kg × 3 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>slow infusion for 5-10 days</td>
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<tr>
<td>Bacterial infection</td>
<td>Evaluation and treatment on the concomitant causes (e.g., neutropenia); specific dental treatment; specific or broad spectrum antibiotic therapy disinfectants for oral use: povidone iodine 1% every 2-4 hr, pure or diluted, hexetidine 0.1% 15 mL undiluted 2-3 × daily, cetylpyridinium chloride 0.05% pure or diluted in hot water</td>
<td></td>
</tr>
</tbody>
</table>
Table 2
Causes of Poor Oral Hygiene and Treatment

| Pain | If possible, treat the basic cause  
Good titration of systemic analgesic drugs  
Analgesic gargles with:  
hydrochloric benzydamine 0.15%, 15 mL every 2 hr (generally not for more than 7 days)  
xylocaine viscous 2%, 5-15 mL every 4 hr  
xylocaine spray 10%, every 4 hr  
diphenhydramine hydrochloride elixir 12.5 mg/5 mL and aluminum hydroxide in equal parts up to 30 mL every 2 hr  
dyclonine hydrochloride 0.5%, 5-10 mL every 2 hr  
aluminum hydroxide and lidocaine 2% in equal parts  
choline salicylate dental paste 8.7%, every 3-4 hr on the oral and perioral lesions |
| Hemorrhages | Treat the basic cause (e.g., thrombopenia)  
Avoid using a toothbrush; use a dental jet with a low pressure  
Gargles with:  
saline solution  
povidone iodine 1%  
sodium perborate  
hexetidine 0.1%  
bicarbonate of soda  
cetylpiridinium  
H₂O₂ 5%-6%, diluted in water 1:4  
chlorhexidine gluconate 0.2%  
Gargles with antihemorrhagic drugs:  
thrombine 1-2 g per day  
tranexamic acid 5-4 g per day |
| Debility | Assisted oral hygiene, by using a brush, gargles, spray, dental jet, cotton swabs, gauze |
| Trismus | If due to pain:  
systemic analgesics, muscle relaxants (e.g., benzodiazepines), infiltration with local anesthetic  
If due to neoplastic infiltration:  
specific therapy  
dental jet  
spray  
cotton swabs |

both parotid glands or the submandibular salivary glands, resulting in a marked diminution in the normal salivary flow. This is a consequence of radiation-induced inflammation and degeneration of the acini and ducts, and vascular components of the salivary glands. The dosage of radiation required to produce the subjective sensation of dry mouth varies among patients; symptoms usually appear in 3 to 36 days following dosages between 450 and 4050 rad. The symptom usually persists. Although one study noted a partial return of the salivary flow 8 mo after the termination of the radiation therapy others found minimal, if any, improvement years after radiotherapy.

After irradiation of the salivary glands, there are also qualitative alterations of the saliva. Saliva becomes more viscous and loses organic and inorganic components. These changes compromise the lubricating protective function of saliva, reducing its capacity to act as a barrier against irritating substances or remove bacterial and cellular debris. The amount of bicarbonates also diminishes which further impairs the cleaning action of saliva. There is, on the other hand, an increase in the salivary content of Na⁺, Cl⁻, Mg²⁺, and protein. The reduction in the salivary flow, together with

Table 3
Causes of Dry Mouth

1. Reduced secretion of saliva caused by:  
Obstruction, infection, aplasia, malignant destruction of salivary glands  
Surgery in the buccal and submandibular regions  
Radiotherapy in the head and neck regions  
Drugs  
Psychological factors  
Encephalitis, brain tumors, neurosurgical operations, accidents that can destroy the autonomic pathways |
2. Widespread erosion of buccal mucosa caused by:  
Cancer  
Chemotherapy, radiotherapy, immunodeficiency  
Stomatitis with granulocytopenia  
Viral, bacterial, and fungal oral infections |
3. Dehydration caused by:  
Anorexia  
Vomiting  
Diarrhea  
Polyuria  
Fever  
Hemorrhage  
Bedsores  
Breathing by mouth, O₂ therapy  
Diabetes insipidus  
Uremia  
Cardiac failure  
Difficulty in swallowing  
4. Depression, anxiety
these qualitative changes, can alter the oral microbial flora and result in increased growth of streptococcus lactobacillus and candida organisms.

These often irreversible alterations can rapidly damage dental structures and augment tooth decay.67,78 In patients undergoing radiotherapy, the tooth decaying process can be rapid and lesions can be manifest within 3 to 6 mo.70 The decaying process also may provoke pain in the oral cavity, thereby adding to the suffering of the patient. Loss of already decaying teeth causes further difficulty in mastication, which together with reduced salivary flow, may cause difficulty in swallowing and digestion.

Drug-Induced Dry Mouth

Many drug classes affect the salivary secretion, including antihypertensives, anticonvulsants, antiparkinsonian drugs, psychotropics, and sedatives.89 Some of these drugs induce xerostomia through parasympatholytic effects. Treatment with antidepressants and phenothiazines, for example, has been associated with xerostomia complicated by oral moniliasis.90,91 Similarly, treatment with drugs such as morphine or methadone alone or with adjuvant medicines can result in dryness of the fauces; one study observed a significantly higher incidence of dry mouth following treatment with oral aqueous morphine than with methadone or controlled-release morphine tablets.92 Another study, which assessed a 2-mo period after initial treatment, noted that dry mouth was present 35% of the time during treatment with oral aqueous morphine than with methadone92 or controlled-release morphine tablets.93 Another study, which assessed a 2-mo period after initial treatment, noted that dry mouth was present 35% of the time during treatment with oral aqueous morphine than with methadone92 or controlled-release morphine tablets.93 Another study, which assessed a 2-mo period after initial treatment, noted that dry mouth was present 35% of the time during treatment with oral aqueous morphine than with methadone92 or controlled-release morphine tablets.93 Another study, which assessed a 2-mo period after initial treatment, noted that dry mouth was present 35% of the time during treatment with oral aqueous morphine than with methadone92 or controlled-release morphine tablets.93

Finally, dehydration has been shown to cause many symptoms, including thirst and dry mouth.9 There are many causes of dehydration in advanced cancer (Table 3), and these can be present singularly or in association. The therapy can be specific (Table 4), or exclusively palliative (Table 5).

Taste Alteration

Taste alteration comprises a reduction in taste sensitivity (hypogeusia), an absence of taste sensation (ageusia), or a distortion of normal taste (dysgeusia). The exact incidence of these symptoms is not known because they are not included in the evaluation questionnaires of many hospices in Britain95 or palliative care centers. On the basis of inquiries about taste changes in cancer patients, Twycross96 suggests that between a quarter and a half of cancer patients have diminished taste sensation. Our clinical experience suggests that taste disturbances are hardly ever reported spontaneously by the patients, but many will report it as a reason for loss of appetite if specifically questioned. Patients typically report that “the food is tasteless,” or “the food is bitter.” Disturbances in taste can also alter digestion because stimulation of taste organs can increase salivary

<p>| Table 4 |</p>
<table>
<thead>
<tr>
<th>Specific Therapies for Oral Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dry Mouth</strong></td>
</tr>
<tr>
<td>1. <strong>Dry Mouth Caused by Xerostomia</strong></td>
</tr>
<tr>
<td>A 2% citric acid solution (Saliram)75</td>
</tr>
<tr>
<td>75-100 mg nicotinic acid more than once per day95</td>
</tr>
<tr>
<td>Dehydroergotamine10</td>
</tr>
<tr>
<td>Pilocarpine11</td>
</tr>
<tr>
<td>Antholetrithione ANTT (Sulfarlem)112</td>
</tr>
<tr>
<td>ANTT + pilocarpine85,113</td>
</tr>
<tr>
<td>2. <strong>Dry Mouth Caused by Drugs</strong></td>
</tr>
<tr>
<td>Reduce the dosage if possible</td>
</tr>
<tr>
<td>Change the medicine, e.g., metoclopramide or haloperidol instead of prochlorperazine; doxepin or mianserine instead of amitriptyline68</td>
</tr>
<tr>
<td>Application of fluoride to avoid dental damage</td>
</tr>
<tr>
<td>3. <strong>Dry Mouth Caused by Systemic Dehydration</strong></td>
</tr>
<tr>
<td>Correct the cause</td>
</tr>
<tr>
<td>Increase the liquid intake by mouth</td>
</tr>
<tr>
<td>Make use of the IV hydration in selected patients</td>
</tr>
<tr>
<td>Decay: Preventative Measures</td>
</tr>
<tr>
<td>Good dental hygiene</td>
</tr>
<tr>
<td>Gargles with saline, peroxide or solutions of baking soda</td>
</tr>
<tr>
<td>Daily application of fluoride gel100,114,115</td>
</tr>
<tr>
<td>Decay: Treatment Measures</td>
</tr>
<tr>
<td>Dental treatment</td>
</tr>
<tr>
<td>Alteration in Taste</td>
</tr>
<tr>
<td>Correct the cause</td>
</tr>
<tr>
<td>Administer zinc</td>
</tr>
<tr>
<td>Halitosis</td>
</tr>
<tr>
<td>Caused by Infection</td>
</tr>
<tr>
<td>Oral hygiene</td>
</tr>
<tr>
<td>Povidone iodine mouthwash antibiotics</td>
</tr>
<tr>
<td>Hydrogen peroxide (1%) gargles</td>
</tr>
<tr>
<td>Systemic antibiotics</td>
</tr>
<tr>
<td>Caused by Dry Mouth</td>
</tr>
<tr>
<td>Hydration</td>
</tr>
<tr>
<td>Artificial saliva</td>
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</tbody>
</table>
Table 5

Palliative Therapy

<table>
<thead>
<tr>
<th>Therapy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dry Mouth</td>
</tr>
<tr>
<td>Oral hygiene every 2 hr</td>
</tr>
<tr>
<td>Humidified air</td>
</tr>
<tr>
<td>Suck: ice cubes, vitamin C tablets, frozen tonic water</td>
</tr>
<tr>
<td>Chew: sugarless chewing gum, lemon sugar candy, acid and solid substances, pieces of pineapple</td>
</tr>
<tr>
<td>Artificial saliva:</td>
</tr>
<tr>
<td>(a) Glycerin, cologel, normal saine (1:1:8)</td>
</tr>
<tr>
<td>(b) Carbuxymethylcellulose, sorbitol, water, sodium fluoride, menthol, minerals and chlorhexidine</td>
</tr>
<tr>
<td>(c) methylcellulose + lemon essence + water</td>
</tr>
<tr>
<td>(d) hydrophilic chewing gum, which releases artificial saliva with a remineralizing effect</td>
</tr>
<tr>
<td>(e) mucin-containing based on bovine salivary gland extract</td>
</tr>
<tr>
<td>Dentures that include a reservoir for the release of artificial saliva</td>
</tr>
<tr>
<td>Administer the medicine far from meals</td>
</tr>
<tr>
<td>Avoid IV hydration in very advanced patients as it can cause discomfort and distress</td>
</tr>
<tr>
<td>Taste Alteration</td>
</tr>
<tr>
<td>Administer hot food, well presented, with a strong smell (add lemon and vinegar)</td>
</tr>
<tr>
<td>Oral hygiene</td>
</tr>
<tr>
<td>Treatment to increase salivation</td>
</tr>
<tr>
<td>Suspend the medicine that induced the symptom</td>
</tr>
</tbody>
</table>

Taste information is sent by way of the fifth, seventh, ninth, and tenth cranial nerves to the medulla (nucleus of the solitary tract), and from there through pons and thalamus to the cortical area subserving taste. Information in this pathway is also projected to the lateral hypothalamus. A lesion in any one of these areas can alter taste perception.

The effect of cancer on taste is not known. Potential causes of taste alteration are listed in Table 6. It is likely that one of the principal causes is the inadequate intake of protein, vitamins, and zinc. Deficiency of these substances may lead to both a reduction in the turnover of chemosensory cells and impaired function of the pores of the microvilli.

Zinc deficiency has been particularly noted as a potential cause of anorexia, dysgeusia, or hypogeusia. Such a relationship has been observed in patients with idiopathic hypogeusia, various forms of hepatic diseases, and delayed development. The administration of zinc in the diet corrects the symptom. Interestingly, plasma zinc levels have been found to be reduced in patients with bronchial carcinoma compared to the healthy population, and zinc in leukemic cells appears to be lower than normal white blood cells.

Alteration in taste in cancer patients may be correlated with the location or extent of the tumor, independent of the histological type. There is an association between advanced dis-

Table 6

Causes of Taste Alteration

1. Local disease of the mouth and tongue caused by cancer
2. Partial glossectomy
3. Damages to the nervous structure following surgery or cerebral lesions
4. Alteration of the cell renewing, or cell regenerating cycle:
   - Malnutrition
   - Metabolic disturbances
   - Ionized radiation
   - Medicines
   - Endocrine factors (throidectomy, hypophysectomy, adrenalectomy)
   - Viral infections
   - Reduced saliva
5. Modification in the receptor cells due to alteration of saliva by metabolic agents, medicine, radiation
6. Dental pathology
7. Bad dental hygiene
ease and an abnormality in the recognition of sugar and urea, for example. Williams and Cohen demonstrated elevated thresholds for recognition of sour (HCl), but not bitter (urea), sweet (sucrose), or salt (NaCl), in a group of patients with lung cancer, who were tested prior to chemotherapy or radiotherapy. An elevated threshold of detection for all four basic tastes was reported in a group of patients with laryngeal cancer who had been examined before laryngectomy.

Loss of taste has also been reported as a consequence of radiotherapy for tumors in the head and neck regions. A good correlation was found between the irradiated areas and the particular taste sensation lost. The mechanism for this effect may be due to damage to the microvilli of the taste cells or to reduced salivation. According to Conger, patients lose taste rapidly when their acuteness of taste is high before the therapy, and more slowly when it is low. A return to normal taste is rapid soon after treatment, then slows down. A complete return to normality is usually gained in 2 to 4 mo.

Medicines administered to cancer patients may also alter taste. About 80 different drugs are considered responsible for the alteration of taste, but many of these have been listed as a cause only once. Drugs that have been reported to produce this effect more than once include propranolol, flurazepam, penicillinamine, and benoxaprofen.

Despite the suffering caused by dry mouth and taste alteration, these symptoms are not often diagnosed, and as a result, they are seldom treated. Paradoxically, specific oncological therapy, which is given to reduce tumor mass and, therefore, the symptoms related to the disease, often causes the greatest suffering, even if the tumor is controlled. Potential therapies for dry mouth and taste alteration are listed in Tables 4 and 5.

Conclusions

Most of the medical literature on disorders of the oral cavity in cancer describe patients in the early stages of the illness, often during specific oncologic treatments. There are few epidemiologic and physiopathologic data regarding complications in the advanced stages of the disease. Furthermore, many lesions are studied in isolation, without considering the impact of the disease and its treatment on the quality of life of the patient. Greater knowledge about such subjects would have a positive effect on specific oncological therapies, in particular illuminating the side effects of treatment over long periods of time. In addition, this knowledge, which should ideally be gained through controlled clinical studies with adequate follow-up, may help alleviate a great deal of the physical and psychological suffering experienced by the cancer patient.

References