



## Development of an oral assessment tool to evaluate appetite in patients with head and neck cancer receiving radiotherapy



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### A B S T R A C T

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**Purpose:** The objective of this study was to develop an oral assessment tool for evaluating the appetite of patients with head and neck cancer receiving radiotherapy, who had dysgeusia, xerostomia, and oral mucositis, as well as to verify its validity and reliability.

**Methods and sample:** A draft oral assessment tool, which included a 5-point scale and 19 items, was prepared based on an interview survey of 30 patients. The resultant questionnaire survey was provided to 209 subjects.

**Results:** On the basis of factor analysis of construct validity, 3 factors (dysgeusia and loss of favors), (salivation abnormality and loss of moisture in the oral cavity), and (pain in the oral cavity and lack of motivation) comprising 14 items were adopted for the final survey. During a review of criteria validity, a correlation was found between the scores of the three factors and overall oral assessment tool, and the scores of taste sensitivity, xerostomia, oral mucositis, and appetite with a correlation coefficient of  $r = 0.41-0.89$  ( $p < 0.01$ ). With regard to reliability, stability was determined as 0.87 ( $p < 0.01$ ) according to test–retest study results. Internal consistency was confirmed by a Cronbach's alpha coefficient of 0.83 ( $p < 0.01$ ) and an interclass correlation coefficient of 0.80 ( $p < 0.01$ ).

**Conclusions:** On the basis of the validity and reliability of the oral assessment tool developed, it has been found to be practical for use in the assessment of appetite of patients with head and neck cancer.

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### Introduction

Since the oral cavity and salivary glands are irradiated during radiotherapy for head and neck cancer, patients suffer from oral adverse events (AEs) such as dysgeusia (taste abnormality), xerostomia (dry mouth), and oral mucositis (inflammation and ulceration in the mouth), more than any other issue. According to the relevant literature, 90% or more of patients with head and neck cancer receiving radiotherapy experience some type of oral AEs (Dirix et al., 2007; Sonis, 2007; Bansal et al., 2004). Radiotherapy for head and neck cancer often damages taste buds, results in peripheral nerve involvement, leads to inflammation of the oral mucosa, and impairs salivary secretion. Thus, many patients with head and neck cancer suffer from AEs such as dysgeusia, xerostomia, and oral mucositis during their recuperation (Scrimger, 2011; Hamilton et al., 2008; Haeman and Cieslik, 2008). In such cases, while the oral AEs associated with radiotherapy become a pressing quality-of-life issue, dysgeusia, xerostomia, and oral

mucositis have also been reported to affect the dietary intake of these patients (Unsal et al., 2006).

A review of previous research on diet and patients with head and neck cancer receiving radiotherapy revealed that much of the focus has been on the amount of dietary intake. In addition, it has been found that dietary intake itself does not decrease greatly even when the appetites of patients are lowered because meals are adjusted on the basis of the level of AEs during treatment (Ogama et al., 2011). As such, it is difficult for physicians to assess the satisfaction of patients with regard to their meals solely based on dietary intake. Therefore, an oral assessment tool to accurately evaluate appetite in association with oral AEs is necessary to determine satisfaction of patients with regard to meals.

According to our previous study (Ogama et al., 2010, 2006) and the relevant literature (Yamashita et al., 2006; Zheng et al., 2002; Sato and Kamata, 1984), when cumulative radiation exposure exceeds 50 Gy, the appetite of patients decreases considerably together with the onset of various oral AEs. These studies also showed that decreased saliva production due to worsened xerostomia aggravates dysgeusia and oral mucositis, which in turn reduce the appetite of patients.

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Previous studies have shown that physical and psychological symptoms such as anxiety and sorrow experienced by cancer patients are associated with loss of appetite (Cao et al., 2011; Kandasamy et al., 2011; Breen et al., 2009). However, for patients with head and neck cancer receiving radiotherapy, it remains unclear as to how loss of appetite is associated with physical and psychological symptoms caused by oral mucositis. As medical practitioners have discovered on the basis of their clinical experience, pain caused by oral mucositis leads to enervation, causing a decrease in appetite. This study demonstrates an association between appetite and psychological and physical symptoms.

As stated previously, studies suggest that oral AEs decrease the appetite of patients. Currently, a sensitivity survey is being conducted separately for each AE, which can be troublesome for patients and medical practitioners. Common Terminology Criteria for Adverse Events (CTCAE) version 3.0 (National Cancer Institute, 2006) are used as typical evaluation indicators and include endpoints on dysgeusia, xerostomia, oral mucositis, and appetite. However, the main objectives of the criteria are to measure the severity of each AE and to provide common terminology for medical practitioners. They do not indicate what role each oral AE plays in decreasing the appetite of patients. Medical practitioners sometimes have to assume the cause responsible for the loss of appetite; subsequently, remedies may be delayed. Various oral AEs are known to begin when cumulative radiation exposure exceeds 50 Gy. Medical practitioners should know what symptoms are associated with a decrease in appetite so that dietary intake for these patients can be efficiently supported.

Therefore, the objectives of this study were to develop an oral assessment tool for evaluating the appetite of patients with head and neck cancer receiving radiotherapy with a cumulative radiation exposure of 50 Gy and with dysgeusia, xerostomia, and oral mucositis, as well as to verify its validity and reliability.

**Study methods**

This research was conducted following approval by the ethics committees of the nursing department of Kansai University of Social Welfare and the collaborating institutions. Informed consent was

obtained from all subjects after they received a written explanation detailing their freewill to participate in and terminate the research, anonymity, confidentiality of personal information, and the fact that there was no disadvantage in refusing to participate.

*Oral assessment tool draft preparation*

Prior to initiation of this research, an interview survey was conducted for qualitative factor-exploratory analysis to extract questions for the draft oral assessment tool to accurately measure appetite. A total of 30 patients with head and neck cancer receiving radiotherapy at a specialized cancer hospital in Japan were questioned. When cumulative radiation exposure exceeded 50 Gy, a semi-structured interview was conducted according to an interview guide. The interview contents included various symptoms of dysgeusia, xerostomia, and oral mucositis used to make a clinical judgment regarding appetite. A verbatim record was made to include patients' comments on the 3 AEs. Other patients' comments were used for comparative classifications to extract question items for the draft oral assessment tool. With the approval of the surveyed patients, data for age, sex, course of radiotherapy, anamnestic history, and surgical history were collected from medical and nursing records.

The 30 subjects comprised 19 males and 11 females with a mean age of 60.79 years. Each interview took 46 min on average (range, 39–72 min) and the total number of interviews was 31.

As a result of the survey, 7 items for dysgeusia, 6 items for xerostomia, and 5 items for oral mucositis were selected as question material to assess the appetite of patients with head and neck cancer receiving radiotherapy (Table 1). Answers to the 18 items extracted from the interview survey for the draft oral assessment tool were scored on a 5-point scale from “very much (5 points)” through “not at all (1 point),” with a higher score indicating a lower appetite.

*Review of content validity*

To review content validity, the draft oral assessment tool was shown to 5 nurses having ≥5 years experience and a detailed

**Table 1**  
Content validity for items to assess appetite: modification and addition of items.

Adverse events	Items collected from the interview survey	Addition and modification of items after the review of content validity
Dysgeusia	1) Cannot tell the level of sensitive flavor	1) Cannot tell the level of sensitive flavor of savouriness
	2) Cannot tell the level of light/strong flavor	2) Cannot tell the level of light/strong flavors of salty, sweet and sour
	3) Cannot tell the level of simple flavor	3) Cannot tell the level of simple flavors of salty, sweet and sour
	4) Taste different from expected	4) Taste different from expected
	5) Anything tastes metal	5) Anything tastes metal
	6) Anything is tasteless	6) Anything is tasteless and like chewing the sand
	7) Anything is like chewing the sand	7) Feel bitterness without anything in the mouth
Xerostomia	8) Saliva is foam	8) Saliva is foam
	9) Feel dryness in the mouth	9) Feel dryness in the mouth
	10) Dry mouth and worry about bad breath	10) Dry mouth and worry about bad breath
	11) Feel sticky in the mouth	11) Feel sticky in the mouth
	12) Feel moldy in the mouth	12) Feel moldy in the mouth
	13) Have a cracking sensation in the mouth	13) Have a cracking sensation in the mouth
Oral mucositis	14) Feel feverish in the tongue and mucosal membrane	14) Feel feverish in the tongue and mucosal membrane
	15) Have a stinging sensation in the tongue and mucosal membrane	15) Have a stinging sensation in the tongue and mucosal membrane
	16) Have a smarting sensation when food is put in the mouth	16) Have a smarting sensation when food is put in the mouth
	17) Have a constant tingling pain in the mouth and oral membrane	17) Have a constant tingling pain in the mouth and oral membrane
	18) Feel lack of motivation caused by pain	18) Feel lack of motivation caused by pain
		19) Bleed with a small stimulation

Additional items

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