Taste and smell changes experienced by advanced cancer patients: stronger not weaker perception

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Introduction

- Taste and smell alterations can affect food intake behavior and quality of life (QOL), but their effect on nutritional intake varies depending on the nature of the alteration (i.e. heightened or decreased)[1]
- For cancer patients, taste and smell alterations are frequent and distressing, often causing food aversions, food preference changes, and lower QOL[2,3]
- There have been reports of both heightened and decreased chemosensory acuity among cancer patients, but there is no consensus as to which change in intensity is most commonly experienced[4]
- Age and chemotherapy may cause a loss of chemosensation[5], while a heightened chemosensory perception might be associated with nausea[4], physiological changes or food preference changes[6]

Purpose

1) To elucidate the nature of taste and smell complaints among advanced cancer patients using a self-assessment tool

2) To investigate any differences in nutritional intake, demographics, survival, symptom burden, or QOL for patients with stronger *vs* weaker chemosensory perceptions

Methods

- A total of 192 advanced cancer patients completed the previously validated questionnaires listed in Table 1
- Subjects from 6 studies were pooled for this study. Subjects were originally recruited from a regional home care program and a local cancer centre in Edmonton, AB, Canada over a 6 year period (2003-2008)
- Majority of subjects (68%) were not receiving chemotherapy and no subjects were receiving radiation to the head or neck area at the time of data collection
- 5 questions on the Taste and Smell Survey were rescored to group subjects according to whether they experienced: a) *No change* in sensations; b) *Stronger* sensation; c) *Weaker* sensation; or d) *Mixed* sensation where some sensations were stronger and others weaker
- Data were analyzed using Statistical Analysis System for Windows (Version 8.2, SAS Institute Inc., 1990)



Table 1: Questionnaires completed by advanced cancer patients (n=192)

Questionnaires	Parameters assessed	Scoring
Taste and Smell Survey[7]	Self-perceived chemosensory changes since the onset of cancer 16 questions: 8 related to taste and 6 pertaining to smell	1 complaint = 1 point Range: 0 (*no change*) - 16 (*severe alterations*)
FAACT[8]	5 domains of QOL: physical, functional, social/family, & emotional well-being; and nutritional QOL (40 questions)	5-point Likert-type scale (*0=not at all and 4=very much*) Range: 0 (*poor QOL*) – 160 (*good QOL)*
ESAS[9]	Burden of 9 commonly experienced symptoms by cancer patients *pain, tiredness, nausea, depression, anxiety, drowsiness, appetite, wellbeing, shortness of breath*	Symptom range: 0 (*not at all*) – 10 (*worse possible*) Total score range: 0 (*no burden*) – 90 (*high burden*)
Demographic survey	Gender, tumor type, age, lifestyle	N/A
3-day Food Record[10]	Dietary intake for 2 weekdays & 1 weekend day	Kcal/day; protein gram/day

Abbreviations: FAACT=Functional Assessment of Anorexia/Cachexia Therapy; ESAS=Edmonton Symptom Assessment Scale; Kcal=kilocalories

Results

- Most subjects (89%) reported altered chemosensory perception
- Subjects more often perceived the 4 basic tastes and sense of smell to be stronger rather than weaker since the onset of their cancer (Smell (p=0.0055), Sweet (p=0.0032), Salty (p=0.0350), Sour (p<0.0001), Bitter (p=0.0005), Figure 1)
- Subjects in the 'Weaker', 'Stronger', and 'Mixed' intensity groups had lower energy and protein intakes, higher cancer associated symptom burden, and lower QOL compared to subjects who perceived no change in chemosensory intensity since the onset of cancer (Table 2)
- Subjects in the 'Stronger' and 'Mixed' intensity groups had lower survival rates compared to subjects in the 'No Change' chemosensory group (Table 2)
- There were no differences among the 4 perceived chemosensory intensity groups for tumor type (p=0.1760), gender (p=0.1867), administration of chemotherapy (p= 0.4356), or nausea scores (p=0.2782)
- Only 11% of subjects had significant nausea (ESAS nausea score >3)
- There was no relationship with age and loss of chemosensation (Table 2)

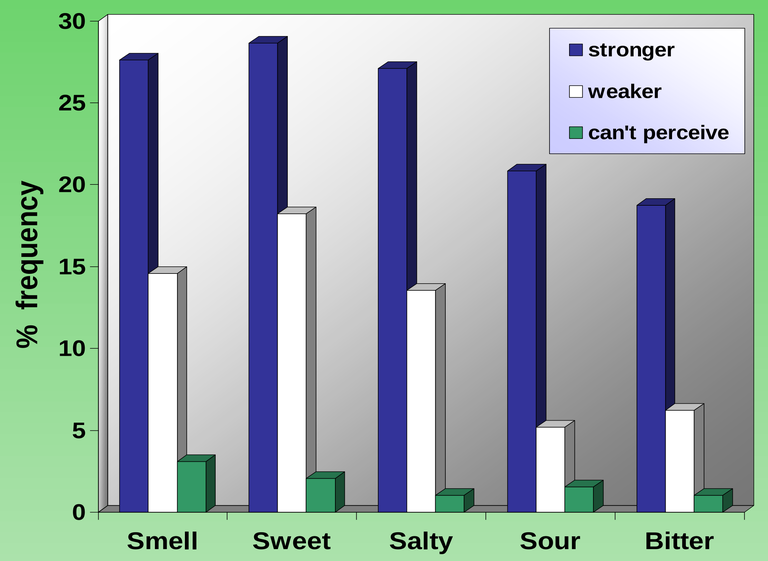

Figure 1: Frequencies of intensity ratings of individual sensations expressed as a % of the study population

Table 2: Nutrition impact factors and other related parameters based on 4 chemosensory intensity groups

	Perceived intensity of basic tastes and smell relative to onset of cancer								
	No Change *(n=49)*		**Stronger** (*n = 81)*		**Weaker** (*n = 35)*		**Mixed** (*n = 27)*		
Parameters	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	***p*-value**
Energy Intake kcal/day	2207.8 [a]	713.5	1776.4 [b]	721.2	1769.7 [b]	577.8	1642.5 [b]	826.8	0.0018
Protein Intake gram/day	89.6 [a]	35.5	68.7 [b]	30.4	70.6 [b]	24	69.8 [b]	33.2	0.0089
Age (yrs)	66.6	11.1	62.8	13.8	65	10	64	12.6	0.4035
Total ESAS score	16.4 [a]	12.7	22.7 [b]	17.5	25.3 [b]	15.9	23.9 [b]	15.6	0.0803
Months to death	12.7 [a]	10.3	7.1 [b]	7.1	9.3 [ab]	9.4	5.1 [b]	5.9	0.0021
Global Quality of Life (FAACT)	115.2 [a]	27.7	104.0 [b]	25.1	101.3 [b]	25.7	101.5 [b]	23.5	0.0176

Means in a row with different superscripted letters are significantly different, p< 0.05. SD=standard deviation

Conclusions & Significance

- For advanced cancer patients, taste and smell changes are more often perceived to be heightened rather than diminished
- Chemotherapy or age do not explain the perceived loss of chemosensation
- Nausea does not account for the heightened chemosensory perception
- Chemosensory alterations, regardless of their nature (intensity), negatively impact food intake behavior and QOL; survival appears to be worse for patients with heightened or mixed chemosensory perceptions
- Future research should aim to determine if the perceived chemosensory alterations are physiological or if they are preference changes. Once this is understood, identifying potential treatments for chemosensory alterations in cancer will become more feasible
- Dietary recommendations and development of nutritional products such as supplements for cancer patients must be considered carefully as some flavors may be perceived as overpowering

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