

1. Background

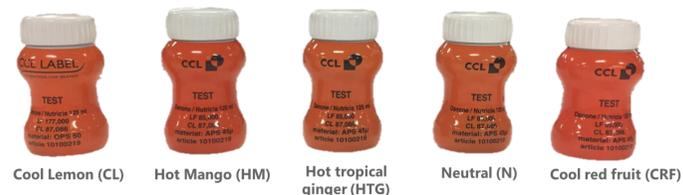
Taste and smell alterations (TSAs) are a common side effect in patients with cancer undergoing systemic anti-cancer therapy (affecting up to 70% of patients) and can negatively impact food intake and quality of life. Little is known about the relation between TSAs and taste preferences.

2. Aim

1. Explore the occurrence and characteristics of taste alterations (TAs) and smell alterations (SAs) in patients with cancer receiving systemic anti-cancer therapy.
2. To investigate the overall liking of oral nutritional supplements (ONS) with cooling and warming sensations designed to better address the needs of patients with TSAs.
3. Determine if the presence of TAs impacts the liking of ONS with cooling and warming sensations.

3. Methods

Patients with cancer undergoing systemic therapy were recruited in a single medical oncology centre. Patients completed a questionnaire on TSAs and evaluated the overall liking of 5 prototype flavours of Nutridrink[®] Compact Protein (cool lemon (CL), hot mango (HM), hot tropical ginger (HTG), neutral (N) and cool red fruit (CRF)) on a 10-point scale via a sip test. Permutation analysis was performed to investigate differences in overall liking of ONS flavours between patients with and without TAs.



4. Results

- Fifty patients (60% male, 72% were >55 years) with various types of cancer and treatments were included (Table 1).
- Thirty patients (60%) reported taste alterations (TAs) and 13 (26%) experienced smell alterations (SAs). All patients with smell alterations, had taste alterations (Fig 1).
- In patients with TAs, the severity was reported as moderate-severe by 40% (n=12) of patients with an impact on daily life rated as moderate-severe by 33% (n=10) of patients.
- Overall, 32% (n=16) of patients experienced dysgeusia and 26% (n=13) reported hypogeusia. In patients who experienced a bad taste (n=21), chemical (57%, n=12) and metallic (48%, n=10) tastes were common (Fig 2).
- In patients with TAs(±SAs), 3 flavours were rated highly with a liking score >6 including HTG by 65-69% of patients, N by 69-77% of patients and CRF by 92-94% of patients (Fig 3).
- Larger variation in liking scores of ONS flavours were observed in patients with TAs without SAs (4.6-7.2) and in patients with TAs and SAs (4.4-6.9) when compared to patients without TSAs (5.9-6.5)(Fig 3).
- In patients with TAs(±SAs), CRF and N rated significantly higher in overall liking when compared to patients without TAs, whereas HM rated lower (Fig 4).

Table 1. Patient characteristics

	N=50, n(%)
Cancer type	
Colorectal	10 (20%)
Hepatobiliary	3 (6%)
Oesophageal/gastric	4 (8%)
Lung	1 (2%)
Breast	3 (6%)
Sarcoma	5 (10%)
Brain	3 (6%)
Neuro-endocrine	2 (4%)
Melanoma	2 (4%)
Urogenital	13 (26%)
Gynaecological	4 (8%)
Type of treatment	
Chemotherapy	34 (68%)
Chemoradiotherapy	5 (10%)
Targeted therapy	2 (4%)
Immunotherapy	4 (8%)
Chemotherapy + targeted therapy	5 (10%)
Intention of treatment	
Palliative	34 (68%)
Curative	8 (16%)
Neo-adjuvant	5 (10%)
Adjuvant	3 (6%)

Figure 1. Prevalence of TSAs

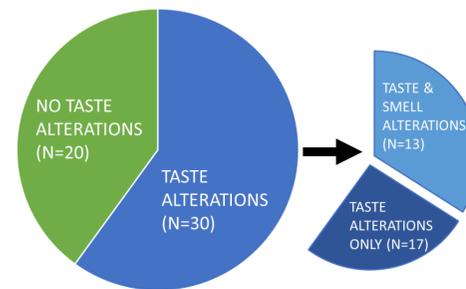


Figure 2. Types of bad taste experienced by patients (n=21)

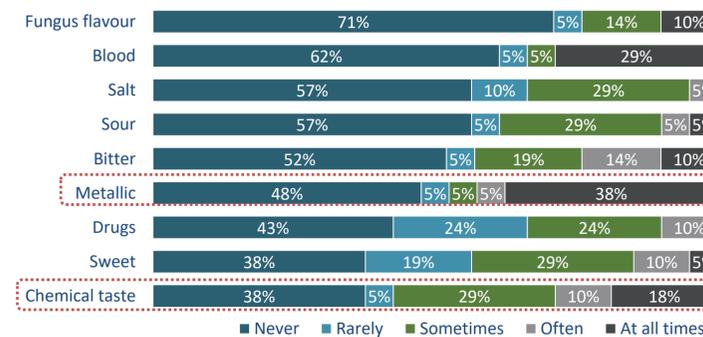


Figure 3. Liking of ONS flavours in all patients (A) and according to the absence (B) or presence of TSAs (C-D)

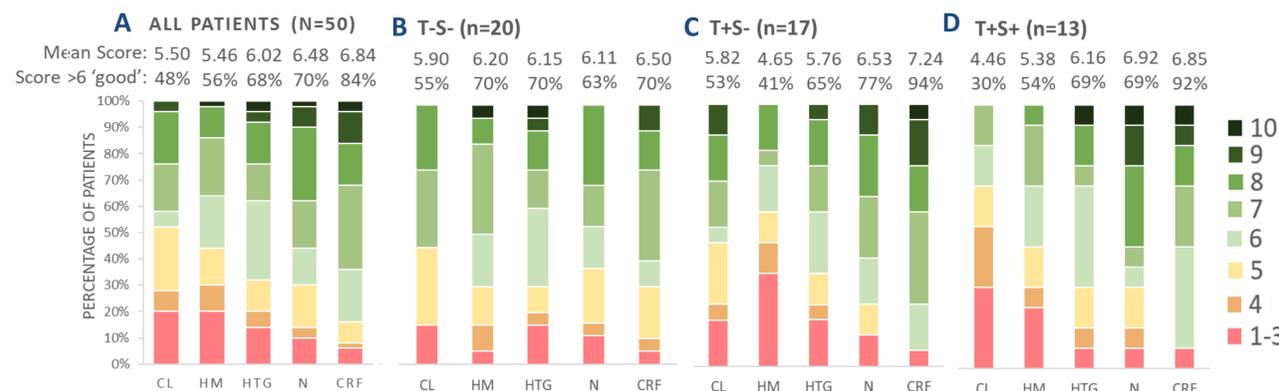
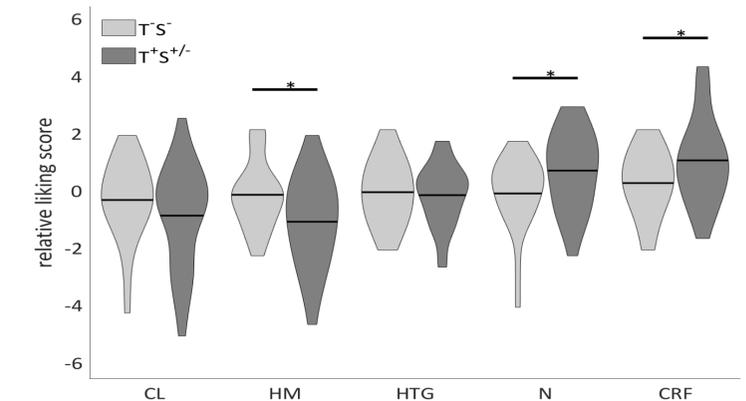


Figure 4. Difference in ONS flavour liking scores in patients with TA (±SAs) compared to patients without TSAs



Significant differences were observed between patients with and without TAs for neutral (N, $\Delta=+1.0$; $P<0.05$), cool red fruit (CRF, $\Delta=+0.9$; $P<0.05$), and hot mango (HM, $\Delta=-1.1$; $P<0.05$), * $p<0.05$.

5. Conclusion

- TSAs are common in patients with cancer undergoing anti-cancer therapy and adversely impact on patients daily life.
- Patients with TAs demonstrated a larger variation in overall liking score per product flavour compared to patients without TAs.
- Liking of ONS flavours may vary with TSAs, however, in patients with TSAs, sensory adapted flavours appear to be appreciated.

Clinical significance: These findings indicate that the presence of taste and smell alterations should be evaluated and considered when selecting or developing ONS for cancer patients.