Title:

Variation in thermally induced taste response across thermal tasters

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Introduction

Thermal tasters (TTs) perceive thermally induced taste (thermal taste) when the tongue is stimulated with temperature in the absence of gustatory stimuli, while thermal non tasters (TnTs) only perceive temperature[1]. Thermal taster status influences oral sensitivity[2,3], which may impact product perception, food choice[4], and associated health outcomes. As many as 50% of a population are classified as TTs[1], making it an important phenotype to characterise and understand. This is the first study to report detailed differences in thermal taste responses across TTs.

Methods

37 TTs were recruited, and the temporal characteristics of their thermal taste responses were collected during 10 replicates of temperature stimulation. The reproducibility of ratings were assessed using correlation coefficients, and common patterns of responses were identified using principal component analysis. The mean temperature range at which taste was reported was identified for each TT.

Results

When collecting the temporal taste responses, the taste quality, intensity, number of tastes reported, and the reproducibility of responses greatly varied. Categories of temporal responses were identified, e.g. Figure 1. Furthermore, the temperature range when thermal taste was perceived differed across TTs and taste qualities, with some TTs perceiving a taste for a small temperature range, and others across the whole temperature trial. The onset of thermal sweet taste ranged between 22 and 38°C during temperature increase.

Discussion and Conclusions

These novel findings identify vast differences in the thermal taste responses perceived across TTs, suggesting different mechanisms may be involved in eliciting the responses, including the proposed TRPM5 channel for thermal sweet taste[5], variation in fungiform papillae anatomy and temperature sensitive gustatory neurons. Understanding this variation within and across TTs, and sub-categorising the different types of responses, contributes to informing the impact that this may have on product perception and food choice.

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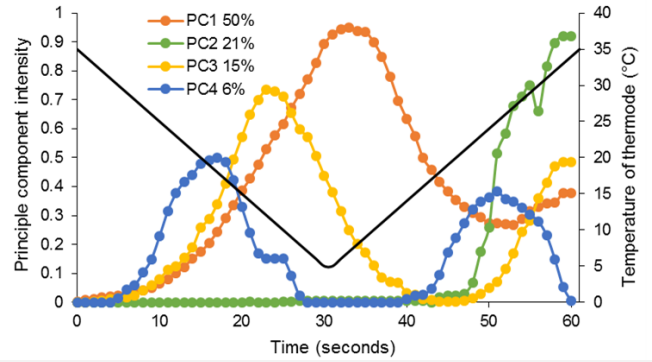

Figure 1. Principal component analysis performed on the average temporal taste intensity

ratings from 10 replicates of thermal stimulation reported by each TT. Four principal components accounted for 92% of the variation in the data, and highlights different types of responses observed within the thermal taster status group.

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