Thermal Taster Status, impact on Perception and relationship to PROP Taster Status

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INTRODUCTION

Individual variation in taste perception has long been investigated, particularly in relation to PROP taster status (PTS). In 2000, Cruz and Green[1] found a new marker of individual variation whereby some individuals perceive a 'phantom' taste sensation from temperature stimulation of the tongue -Thermal Tasters (TTs). Two possible underlying mechanisms have thus far been proposed to explain TTS: a temperature sensitive pathway involving TRPM5[2] and a higher level central gain mechanism[3]. Research on supra-threshold response across TTS groups has indicated that TTs perceive some stimuli as more intense [3,4], however, until now no research has focused on detection threshold level responses. This poster presents the impact of thermal taster status on detection thresholds for a variety of stimuli across different modalities, and its relationship with PROP taster status.

MATERIALS & METHODS

Subjects:

200 subjects were screened for thermal taster status:83 subjects attended the threshold study.

Thermal taster status:

Intra-oral thermode (Medoc, Israel) (*Fig1*), following warming (15 to 40°C) and cooling (35 to 5°C) trials was used to screen thermal taster status[4].

Subjects were classified as:

- Thermal Tasters -- TTs
- Thermal non Tasters -- TnTs
- Uncategorised -- Uncat

Fig1: a) Pathway Pain and Sensory System, b) thermode in use

PROP taster status:

Single solution of 0.32mM 6-n-propylthiouracil was used to determine PROP taster status by rating intensity on a gLMS scale.

Subjects were classified as:

- PROP non Tasters -- PNTs
- PROP medium Tasters -- PMTs
- PROP super Tasters -- PSTs

Detection threshold Measurement:

- ASTM procedure E679-04 was employed for measuring detection thresholds[5].
- Stimuli concentrations (*Tab1*) were prepared by serial dilution-from low to high, increasing by a step factor.

Table 1: Stimuli and concentration used

Stimuli	Concentration Range	Step Factor
Sucrose	630- 7000 (mg/l)	1.35
Sodium Chloride (NaCl)	78 - 2000 (mg/l)	1.5
Caffeine	30 - 450 (mg/l)	1.5
Capsaicin	1 - 170 (µg/l)	1.9
WS3	91 - 10000 (µg/l)	1.8
Ethyl butyrate (EB)	1 - 400 (ppb)	2.1
Isoamyl acetate (IAA)	1 - 400 (ppb)	2.1

Data Analysis:

- Each thermal group threshold was calculated from the means of the individual Best Estimate Thresholds (BET).
- ANOVA and Tukey's HSD tests, where appropriate, (α=0.05) were applied to all oral stimuli among TTS and PTS groups.
- 2-way ANOVA was used to examine the interaction between PTS and TTS on all oral sensations separately.

RESULTS & DISCUSSION

Thermal taster status (TTS) effect on oral sensations:

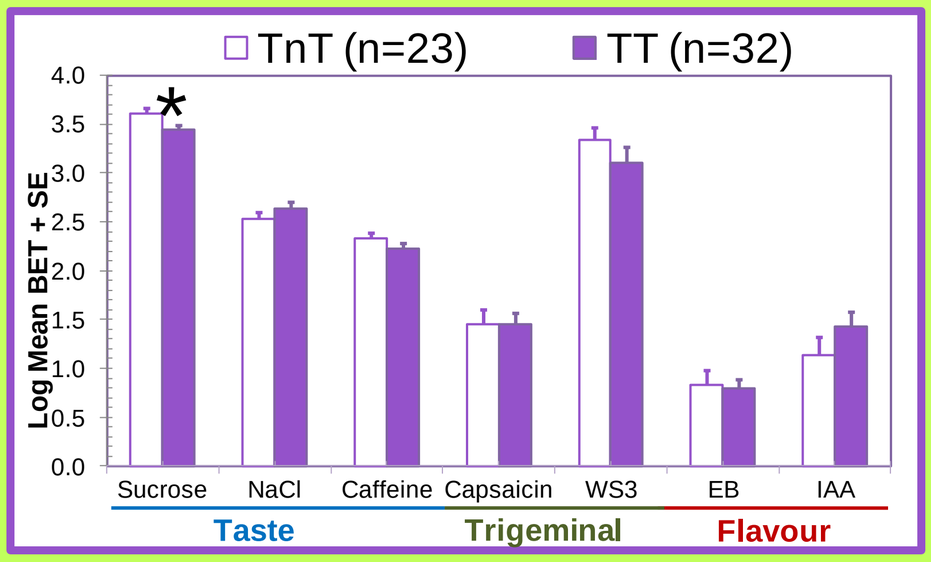

Fig 2: Thermal taster status (TTS) effect on oral sensations at detection threshold. Bars represent log Mean of Best Estimate Threshold (BET) + SE mean. See *tab1* for the unit of each stimuli. Means that differ at significance levels of p<0.05, indicated by*.

- No significant difference were observed for all stimuli at detection threshold level, except TT has a significant lower threshold than TnT for sucrose (p=0.04), but…
- No clear pattern was observed for all remaining stimuli at detection threshold among TTS groups (*Fig2*) .

PROP taster status (PTS) effect on oral sensations:

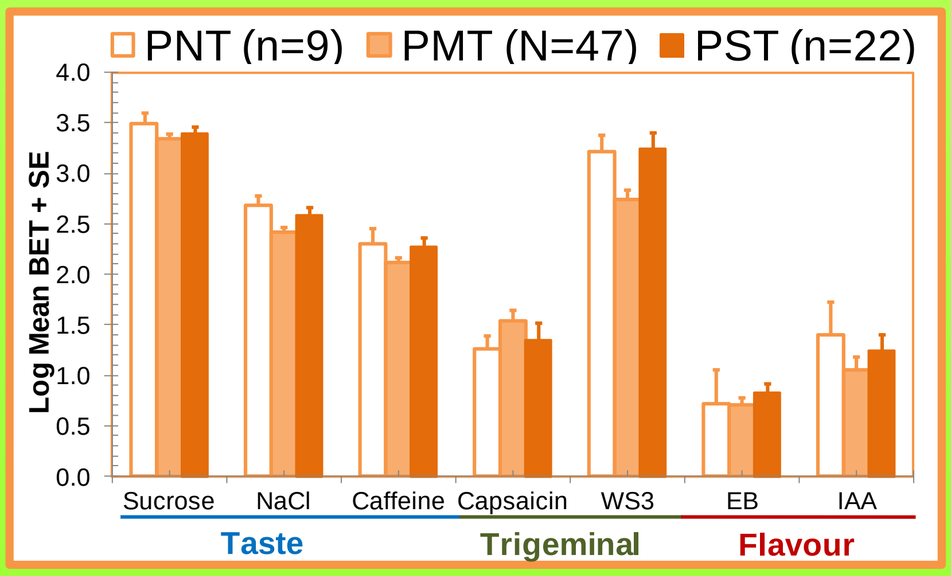

Fig 3: PROP taster status (PTS) effect on oral sensations at detection threshold level. Bars represent log Mean of Best Estimate Threshold (BET) +SE mean. See *tab1* for the unit of each stimuli.

- No significant differences in detection threshold among PROP taster groups for any stimuli(*Fig3*).

*Thermal taster status * PROP taster status:*

- No significant interactions were found between PTS and TTS for any oral stimuli (p>0.05) with 2-way ANOVA.

CONCLUSION

- Detection thresholds did not differ across both TTS and PTS phenotypes across all modalities, except for sucrose. The advantage of TTs on sucrose threshold is particularly attractive in light of the fact of TRPM5 channel play a critical role in human taste, however, more research is needed.
- This study indicates that the detection threshold sensitivity across TT groups may not be in accordance with supra-threshold findings. As detection threshold and supra-threshold are likely to operate via different mechanisms[6], this work suggests the TT advantage does not exist across the full perceptual range. This hypothesis is currently been tested.
- No correlation was observed between TTS and PTS indicating that, as shown by previous authors[4], TTS is not related to PTS.

References

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