

Fat Taste Sensitivity is Associated with Short-term and Habitual Fat Intake

A Costanzo¹, L Orellana², C Nowson³, K Duesing⁴, R Keast¹

¹ Centre for Advanced Sensory Science, Deakin University, Burwood, Australia ² Biostatistics Unit, Faculty of Health, Deakin University, Burwood, Australia ³ Institute of Physical Activity and Nutrition, Deakin University, Burwood, Australia ⁴ CSIRO, Health & Biosecurity, North Ryde, Australia

Background

Lipids in foods contain approximately 1-2% free fatty acids, which are able to be detected by the human taste system. Ability to taste fatty acids, known as fat taste sensitivity, varies amongst individuals. Fat taste sensitivity is associated with potential health outcomes. For example, individuals less able to taste free fatty acids may be more likely to be overweight or obese and consume greater amounts of dietary fat than more sensitive individuals.

Aims

To assess the associations between fat taste sensitivity, anthropometric measurements, nutrient intakes, habitual food consumption and liking of fatty foods.

Subjects & Methods

- A cross-sectional study including 68 Australian female twins (age range: 18-65 years; BMI range: 17.2-43.2 kg/m²) was conducted.
- Fat taste sensitivity is measured as fat taste thresholds - the smallest amount of free fatty acid required to elicit a taste response. Lower thresholds indicate greater sensitivity. Fat taste thresholds were assessed with a 3-alternate forced choice methodology using a fat-free milk solution spiked with oleic acid (C18:1), and transformed to an ordinal scale (FT rank).
- Food liking was assessed by tasting and rating regular-fat and reduced-fat variants of seven foods.
- Nutrient intakes were assessed using a 24-hour food recall.
- Habitual food consumption was assessed using a food frequency questionnaire.
- Linear mixed regression models were fitted adjusting for age, and including twin pair as a random factor.

Results

- Mean (SD) age: 41.3 (15.6 years); mean BMI: 26.3 (5.7) kg/m².
- Mean fat intake: 73.5 (33.4) g/day; mean energy from fat (%): 34.2 (7.5) %/day.
- FT rank was positively associated with energy from fat and negatively associated with energy from carbohydrate (%) (Table 1).
- FT rank was positively associated with consumption of high-fat dairy, meat & meat alternatives, and grain & cereal foods (Table 2).
- No associations between FT rank and anthropometric measurements or liking ratings for any foods ($p > 0.05$ for all).

Table 1. Associations between FT rank, energy and macronutrient intakes.

	Nutrient Intake (g) $\hat{\beta}$ (95% CI)	% Energy from Nutrients $\hat{\beta}$ (95% CI)
Energy (MJ)	0.1 (-0.1, 0.3)	-
Fat	0.015 (-0.010, 0.041)	0.110 (0.003, 0.216)*
Protein	0.012 (-0.009, 0.032)	0.077 (-0.073, 0.227)
Carbohydrate	-0.002 (-0.011, 0.006)	-0.112 (-0.188, -0.035)**
Alcohol	0.022 (-0.015, 0.060)	0.075 (-0.028, 0.178)

$\hat{\beta}$, estimated coefficient obtained under a mixed model including twin pair as a random effect; regression analysis was adjusted for age; CI, confidence interval; * p -value < 0.05; ** p -value < 0.01.

Table 2: Associations between FT rank and frequency of food group consumption from the Food Frequency Questionnaire

	Occasions of Consumption/Day $\hat{\beta}$ (95% CI)	Occasions of Consumption/Day Adjusted for Energy $\hat{\beta}$ (95% CI)
Meat & Meat Alternatives	0.616 (0.102, 1.130)*	0.669 (0.168, 1.170)**
Fruit	-0.485 (-1.024, 0.054)	-0.344 (-0.841, 0.154)
Vegetable	-0.039 (-0.226, 0.148)	-0.023 (-0.204, 0.157)
Low-Fat Dairy	-0.018 (-0.502, 0.466)	-0.011 (-0.476, 0.455)
High-Fat Dairy	1.033 (-0.223, 2.288)	1.091 (0.106, 2.242)*
Grains & Cereal	0.717 (0.152, 1.282)*	0.771 (0.212, 1.329)**
Discretionary Food	-0.129 (-0.581, 0.324)	-0.158 (-0.615, 0.299)
Alcoholic Beverage	0.614 (-0.711, 1.940)	-0.067 (-1.487, 1.354)

$\hat{\beta}$, estimated coefficient obtained under a mixed model including twin pair as a random effect; regression analysis was adjusted for age, and energy intake in the second column; CI, confidence interval; * p -value < 0.05; ** p -value < 0.01.

Conclusions

Fat taste sensitivity was associated with short-term dietary fat intake and habitual consumption of food groups containing fat, but not obesity or fatty food liking in this group of females.

References

- Costanzo A, et al. Fat taste sensitivity is associated with short-term and habitual fat intake. *Nutrients*. **2017**, 9, 781.
- Koriyama T, et al. Fatty acid compositions of oil species affect the 5 basic taste perceptions. *J Food Sci*. **2002**, 67, 868–873.
- Stewart JE, et al. Oral sensitivity to fatty acids, food consumption and BMI in human subjects. *Br J Nutr*. **2010**, 104, 145–152.

