TITLE
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Bitter Taste Sensitivity Is Determined by TAS2R38 Haplotype, Associated with Saturated Fat Intake and Is Lower in Overweight and Obese Compared to Normal Weight UK adults

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Objectives: Taste perception (sensitivity) may be determined by genetic variations in taste receptors and it affects food intake. Lower fat taste sensitivity is associated with higher dietary fat intake and body mass index (BMI). Recently, associations between bitter and fat taste sensitivity have been reported whereby bitter taste perception may be involved in textural perception of dietary fat. However, it is not clear if lower sensitivity to bitter taste would lead to an actual higher fat intake. Our objectives were to explore the associations between haplotypes in the bitter taste receptor TAS2R38, bitter taste sensitivity and fat intake and if bitter taste sensitivity is lower in individuals with higher BMI.

Methods: Ethical approval was obtained from the St Mary's and Oxford Brookes University Ethics Committee. Eighty-eight healthy Caucasian participants (44% male and 56% female; mean BMI 24.9 $\pm$ 4.8 kg/m^2 and mean age 35 $\pm$ 14 years) completed this cross-sectional study. Height and weight were measured and genotyping performed for rs713598, rs1726866, rs10246939 genetic variants in the TAS2R38. Haplotypes were determined with Haploview software. Participants rated the intensity of a phenylthiocarbamide (PTC) impregnated strip on the general Labelled Magnitude Scale (gLMS) to determine bitter taste sensitivity and were classified as bitter tasters and non-tasters. Dietary fat intake was calculated from the EPIC-Norfolk Food Frequency Questionnaire and expressed as % total energy intake.

Results: TAS2R38 haplotypes were associated with bitter taster status ($P < 0.005$). PTC ratings of intensity were negatively correlated with % saturated fat (SFA) intake (rs $= -0.256$, $P = 0.016$). %SFA and %total fat (rs $= 0.656$, $P < 0.005$) and %total fat and energy intake (kcal) (rs $= 0.225$, $P = 0.035$) were positively correlated. Normal weight participants rated PTC strips as more intense compared to overweight and obese participants (mean rank 53 vs. 41, $P = 0.033$).

Conclusions: Bitter taste perception is determined by genetics and lower sensitivity to this taste is associated with higher intake of SFA. Lower bitter taste sensitivity in overweight/obese participants suggests that impaired bitter taste may be associated with an overall unhealthier and more energy dense dietary pattern.

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