

Abstract

Investigating the Role of Genetics in Fatty Acids Oral Perception and Related Traits in Two European Cohorts [†]

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Abstract: Unsaturated fatty acids (FAs) can influence various aspects of human biology (e.g., the immune system), and an excess of saturated fatty acids is associated with non-communicable diseases. The olfactory perception of FAs has been demonstrated and debated as a possible sixth taste. The Cluster of Differentiation 36 (*CD36*) gene codes for a membrane protein apically located in taste bud cells, which is considered a possible fat taste mediator. The single nucleotide polymorphism (SNP) rs1761667 (G>A) is associated with a reduced protein expression, possibly leading to fat taste hyposensitivity, but the results are controversial. Here, we investigate, in two European cohorts, rs1761667's role on taste perception, food liking as an intake determinant, and diet-related traits. We analysed two cohorts from the UK (n = 49; 63% female) and Italy (Friuli Venezia Giulia (FVG); n = 235; 54% female). Data collected were taste perception and liking via actual foodstuffs in the UK; food liking, as evaluated by a questionnaire, in FVG; the rs1761667 genotype; and BMI as an indicator of non-communicable diseases. The effect of the SNP on the considered phenotypes was evaluated using linear regression models. In the UK, A-allele carriers showed higher perceived intensity ($\beta = 0.99$; $p = 0.02$) and reduced liking, although not significant ($\beta = -0.30$), from fat food sample; in the FVG cohort, we replicated the negative association between A-allele carriers and fat liking, specifically for “gorgonzola” cheese (β -value = -0.82 ; $p = 0.03$). These results align with the negative relationship seen between fat intensity and liking ($\text{cor} = -0.2$). Regarding other tastes, we found that A-allele carriers (UK) showed higher umami food perceived intensity (β -value = 0.89 ; $p = 0.02$) and reduced liking (FVG) for an umami food (“soy sauce”) (β value = -0.97 ; $p = 0.02$). Similarly, in the UK, the relationship between umami intensity and liking was negative ($\text{cor} = -0.32$). Considering effects on health status, we found that A-allele carriers (UK) showed an increased BMI (β -value = 2.02 ; $p = 0.02$). Our results show that the A-allele is associated with an increased perceived intensity and a decreased liking for fatty foods. In addition, a novel association was found between umami perception/liking and rs1761667. Further research is required to elucidate these observations and the possible effects on taste perception and dietary intake.

Keywords: genetics; personalised nutrition; fatty acids; CD36



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Institutional Review Board Statement: The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the ethical committee of the Institute for Maternal and Child Health—IRCCS “Burlo Garofolo” under the univocal code Prot. CE/V-78, 06/08/2007 and by the ethical committee of the St Mary’s University under the univocal code SMU_ETHICS_2021-22_217.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: A subset of the data is already available in the European Genome-phenome Archive (EGA) at the following links. FVG cohort: BAM files <https://www.ebi.ac.uk/ega/studies/EGAS00001000252> (accessed on 13 November 2023); sample list, vcf files <https://www.ebi.ac.uk/ega/studies/EGAS00001001597> (accessed on 13 November 2023); The raw data supporting the conclusions of this article from the United Kingdom will be made available by the authors on request.

Conflicts of Interest: L.P. is the founder of Optimyse Nutrition LTD, a personalised nutrition company offering genetic testing to clients.

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