

Abstract

Liking Milk Chocolate, Dairy Food and Eating Behaviour (Impulsivity) Are Linked to a Specific Genomic Region [†]

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Abstract: Eating behaviour (EB) is a complex system affected by different factors, including food liking and psychology. Researchers have highlighted the importance of genetics in EB, but little is known. Therefore, this study aimed to investigate the genetic factors involved in EB in Italian cohorts, Friuli-Venezia Giulia (FVG) and Val Borbera (VB). Genome-Wide Association Studies (GWAS) on food liking were performed in FVG (n = 575). The relationships between the genetic findings and other variables of interest (i.e., psychological outcomes) were evaluated using linear regression models. A replication study was carried out in an independent cohort (VB, n = 701). GWAS revealed a significant association between the liking of milk chocolate and a region on chromosome 5. The most associated single nucleotide polymorphism (SNP) was rs73280705 ($p = 1.02 \times 10^{-9}$), an eQTL for the *LARP1* gene in the nucleus accumbens (NAc). Subjects carrying the minor allele of the SNP show a reduced liking for milk chocolate, as well as a minor overall liking for a milk-based food group. The latter finding was replicated in VB ($p = 0.026$). Regarding the psychological data, these subjects also present a reduced impulsivity ($p = 0.031$). On the other hand, carriers of the counterpart allele show an increased liking for milk-based food and a high impulsivity ($p = 0.023$). These data are not influenced by the lactose deficiency allele. The results suggest that this genetic region could play a role in both impulsivity and food liking. Indeed, individuals carrying the *LARP1* gene variant show a decrease in liking for milk chocolate and milk-based food, as well as in impulsivity, while the others are more impulsive, like more milk-based foods and, in general, sweet and fatty foods. *LARP1* is expressed in the NAc, which is a central driver of reward response controlling the pleasantness and gratification given by food (mostly triggered by highly palatable foods). Moreover, the NAc also plays a role in integrating limbic system stimulation into the motor system, which can lead to addictive and impulsive behaviours. Additional studies are needed to increase our knowledge on this extremely interesting gene association and, overall, on the *LARP1* gene’s relationship with milk and *mTORC1*, food liking, and EB.



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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); <https://www.ebi.ac.uk/ega/datasets/EGAD00001002729> (accessed on 13 November 2023); VB cohort: BAM files <https://www.ebi.ac.uk/ega/studies/EGAS00001000398> (accessed on 13 November 2023); <https://www.ebi.ac.uk/ega/studies/EGAS00001000458> (accessed on 13 November 2023).

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