Gene-Culture Coevolution

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The Influence of Pastoralism and Wine Production on Lactase Persistence and Addiction-Related Alleles in the Caucasus

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List of Abbreviations

AD: Alcohol Dependence

BP: Before Present

LP: Lactase Persistence

MCM6: Minichromosome Maintenance Complex Component 6 (gene)

OPRM1: Opioid Receptor Mu 1 (gene)

SLC6A4: Solute Carrier Family 6 Member 4 (gene)

SNP: Single Nucleotide Polymorphism

5-HTT: Serotonin Transporter

Abstract

This study explores the interplay between cultural practices and genetic evolution in the Caucasus region, focusing on lactase persistence (LP) and addiction-related traits. LP, a hallmark of gene-culture coevolution, is influenced by the rs4988235 and rs182549 SNPs in the MCM6 gene, while addiction-related traits, including alcohol dependence, are linked to rs1799971 and rs1042173 SNPs in the OPRM1 and SLC6A4 genes, respectively. Drawing on genetic data from diverse Caucasian populations, this research investigates allele frequency distributions and their association with dairying and wine production, as well as cultural practices deeply rooted in the region's history.

Results indicate significantly higher frequencies of LP-related alleles in the Northern Caucasus than in Anatolia, reflecting historical dairying practices and migration patterns. However, no significant geographical differences were observed for addiction-related SNPs, suggesting that alcohol dependence traits were not shaped by early wine production in the region. Statistical analyses, confirmed these findings, highlighting the distinct selective pressures influencing LP and addiction-related traits.

By integrating genetic, historical, and cultural data, this study provides insights into the evolutionary processes shaping human adaptation in the Caucasus, underscoring the role of cultural practices in genetic evolution.