

## The Genetic and Environmental Roots of Alcohol use and Misuse

Giovanni Marco\*

Department of Medicine, University of Bologna, Bologna, Italy

### DESCRIPTION

Specific genes involved in alcohol metabolism and neurobiology contribute to the way individuals respond to alcohol, influencing both the desire to drink and the quantity consumed. One key set of genes related to alcohol metabolism includes Alcohol Dehydrogenase (ADH) and Aldehyde Dehydrogenase (ALDH). Variations in these genes can lead to differences in how quickly alcohol is processed, which in turn affects individual drinking behaviors. For example, certain alleles of the ADH1B gene lead to a faster conversion of ethanol to acetaldehyde, which may cause a flushing reaction in individuals who carry this gene. This can reduce alcohol consumption, as the unpleasant sensation deters further drinking. Conversely, individuals with slower alcohol metabolism might experience fewer negative consequences from drinking, making them more prone to higher consumption and potential alcohol dependence. In addition to genes involved in alcohol metabolism, variations in neurotransmitter systems also play a significant role in shaping alcohol-related behaviors. Alcohol has a direct impact on the brain's reward system, particularly involving neurotransmitters such as dopamine, serotonin and Gamma Amino Butyric Acid (GABA). Genes that influence the functioning of these systems can affect both an individual's initial response to alcohol and their susceptibility to addiction. This gene is involved in the reward pathways of the brain and certain variants are linked to a reduced number of dopamine receptors in the brain, which can make alcohol consumption more rewarding and addictive. Similarly, polymorphisms in the *GABRA2* gene, which encodes a subunit of the GABA-A receptor, have been shown to influence alcohol consumption patterns and the risk of developing Alcohol Use Disorder (AUD). These genetic differences can lead to a range of behaviors, from moderate drinking to problematic alcohol use. One of the most intriguing aspects of genetic variability in alcohol-related behavior is the role of alcohol sensitivity. Some

individuals are more sensitive to the effects of alcohol, experiencing stronger effects even with lower doses. Genetic factors contributing to this sensitivity are complex, involving a mix of genes related to alcohol metabolism and neural responses to alcohol. For example, individuals with certain genetic variants might feel a sense of euphoria after drinking, which could increase their likelihood of engaging in excessive drinking over time. While genetics play a major role, the interaction between genetic predisposition and environmental factors is critical in shaping alcohol-related behaviors. Environmental influences such as childhood trauma, peer pressure and cultural norms can interact with genetic vulnerabilities to either exacerbate or mitigate alcohol misuse. Epigenetic mechanisms, which involve changes in gene expression due to environmental exposures without altering the underlying Deoxy Ribonucleic acid (DNA) sequence, further complicate this picture. For example, exposure to stress or early-life adversity might trigger epigenetic changes that affect the expression of genes involved in alcohol metabolism or the brain's reward systems.

### CONCLUSION

The study of genetic variability in alcohol-related behavioral responses highlights the complexity of alcohol use and addiction. Genetic factors play a significant role in determining how individuals respond to alcohol, influencing both their drinking behaviors and the risk of developing alcohol use disorder. By understanding the genetic underpinnings of alcohol consumption, we can better address individual differences in drinking patterns, improve prevention strategies and personalize treatment for alcohol-related disorders. However, this must be done in conjunction with recognition of the important role that environmental and social factors also play in shaping alcohol-related behaviors. Additionally, genetic counseling may provide individuals with a better understanding of their susceptibility to alcohol misuse, allowing for more targeted prevention efforts.

**Correspondence to:** Giovanni Marco, Department of Medicine, University of Bologna, Bologna, Italy, E-mail: marcogiovanni@gmail.com

**Received:** 21-Aug-2024, Manuscript No. JALDD-24-35445; **Editor assigned:** 23-Aug-2024, PreQC No. JALDD-24-35445 (PQ); **Reviewed:** 06-Sep-2024, QC No. JALDD-24-35445; **Revised:** 16-Sep-2024, Manuscript No. JALDD-24-35445 (R); **Published:** 23-Sep-2024, DOI: 10.35248/2329-6488.24.12.419

**Citation:** Marco G (2024). The Genetic and Environmental Roots of Alcohol use and Misuse. J Alcohol Drug Depend. 12:419.

**Copyright:** © 2024 Marco G. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.