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Genetics of Alcohol Use in Humans: An Overview

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ABSTRACT Alcoholism is an extremely complex disease for which no generally accepted definition exists. There is a complex interaction between the socio-environmental context, the individual at risk, and the availability of alcohol. The result of family, twin and adoption studies suggest a significant genetic predisposition to the disease. Identifying novel genetic risk factors for common diseases is a global challenge in the post genomic era. Recent molecular genetic research into the causes of alcoholism has drawn attention to the potential role of alcohol and acetaldehyde metabolizing enzymes. Functional polymorphisms have been observed at various genes encoding these enzyme proteins that act as one of the biological determinants significantly influencing drinking behavior and the development of alcoholism and alcohol-induced organ damage. Most ethanol elimination occurs by alcohol dehydrogenase (ADH) and aldehyde dehydrogenase (ALDH) systems via oxidation of ethanol to acetaldehyde and acetic acid. However, the legacy of alcoholism among certain ethnic groups suggests that genetic factors can increase an individual's vulnerability for this disease. An association study in patient cohorts and controls, from large populations involving whole genome scans, is the preferred approach for complex traits. To understand the molecular epidemiology and role of cofactors in alcoholism the standard phenotype-genotype correlation may be a useful tool. The present paper reviews various aspects of alcoholism including both the behavioural and molecular etiologies.