

Association Analyses of the Dopamine Receptor Genes with Alcohol Use and Related Phenotypes in a Longitudinal Finnish Study

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Abstract

Dopamine is long believed to play an important role in reward behavior. Many studies support the role of dopamine transmission and reception in contributing to the risk for alcohol dependence and related phenotypes. Accordingly, the dopamine receptor genes, DRD1-DRD5 are good biological candidates for risk for alcoholism. However, several studies have produced inconsistent results. To understand the factors affecting the development of alcoholism, we genotyped SNPs across the dopamine receptor genes in the FinnTwin 16 study and tested for association with alcohol related phenotypes. FinnTwin16 is a population-based developmental twin study. Twins self-reported on their alcohol use at ages 16, 17, 18, and in the young 20s. A subset also completed psychiatric interviews and DNA collection in the young 20s. The association analyses were conducted, using multiple single-nucleotide polymorphisms (SNPs) in each of the dopamine receptor genes. The Nyholt correction method was used to ascertain tagging SNPs and provides an extent of linkage disequilibrium. We tested for association between SNPs in each of these genes and several alcohol-related behaviors: frequency of drinking at each age, Rutgers Alcohol Problem Index (RAPI) scores, alcohol dependence symptoms, age of onset of regular drinking; age at first drunkenness and Fagerstrom Test of Nicotine Dependence (FTND) scores. We found a significant evidence of association between DRD4 and drinking frequency at 18.5. The significant SNPs were not consistent across different ages. We found evidence for association between DRD4 VNTR and DSM-III-R alcohol dependence, and age at first drunkenness. These analyses provide preliminary evidence that more extensive study of the role of DRD4 in alcohol-related phenotypes may be warranted.