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Scientists identify gene that influences alcohol consumption

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A variant of a gene involved in communication among brain cells has a direct influence on alcohol consumption in mice, according to a new study by scientists supported by the National Institute on Alcohol Abuse and Alcoholism (NIAAA), part of the National Institutes of Health (NIH), and the U.S. Army.

Scientists do not know yet whether a similar gene variant, with a similar effect on alcohol consumption, exists in humans.

Known as Grm7, the gene encodes a receptor subtype that inhibits the release of glutamate and other neurotransmitter molecules that brain cells use to communicate with one another. Researchers identified a gene variant, or polymorphism, that reduces the abundance of Grm7 messenger RNA (mRNA) in brain tissue. mRNA is the molecular intermediate between a gene and its protein product. Mice that possess this gene variant drink more alcohol than do mice with higher brain levels of Grm7 mRNA. A report of the study appears as an online Article in Press in Genomics.

“This is a noteworthy contribution, particularly since identifying genes that predispose to alcohol-related behaviors is such an arduous task,” says NIAAA Director Ting-Kai Li, M.D.

Scientists have long known that genes account for a significant proportion of the risk for alcoholism. However, the fact that there are multiple such genes that interact with each other and with multiple

environmental factors to influence drinking behavior has hampered studies aimed at isolating individual genes.

“Controlling for this background noise -- the various gene-gene and gene-environment interactions -- presents considerable methodological challenges,” notes first author Csaba Vadasz, Ph.D., professor of psychiatric research in the department of psychiatry at New York University School of Medicine, and Director of the NeuroBehavioral Genetic Research Program at the Nathan Kline Institute in Orangeburg, N.Y.

To overcome these difficulties, Dr. Vadasz and colleagues applied a variety of genetic and analytic techniques to animals having nearly identical genetic background, but differing in their preference for alcohol, to identify a chromosomal region, and ultimately the Grm7 gene, associated with alcohol preference.

“Our findings support emerging evidence of the critical role that the brain’s glutamate pathways play in addiction,” says Dr. Vadasz. “While dopamine has traditionally been cast as a central actor in the neurochemistry of substance use and abuse, recent studies indicate that glutamate systems play an important role in reinforcement and addiction.”

If further studies show that a similar gene variant is relevant to alcohol problems in humans, the finding by Dr. Vadasz and colleagues may lead to new opportunities for developing drugs to treat alcohol dependence. Dr. Vadasz speculates that such drugs might be designed to control the level of the Grm7 gene product or modulate the activity of the gene product itself.

Source: National Institute on Alcohol Abuse and Alcoholism