

Gene and tonic: Genetic link in binge-drinking teens

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From minor acts of rebellion such as bunking off school, to the more serious experimentation with illicit substances, the teenage years can be a stressful time for parents. But what if your child goes beyond the odd cigarette behind the bike shed or sneaking sherry from the drinks cabinet? Some teenagers develop riskier behavior, such as binge drinking or drug taking, which can follow them into adulthood with all the health concerns that go with them.

New research conducted at the University of Sussex has identified a specific gene that links impulsive behavior to binge-drinking in teens.

"Our findings are important because we show that certain variations in the KALRN gene are associated both with alcohol binge drinking and with brain activation during impulsive responding in adolescents," said Dr. Yolanda Peña-Oliver, who led the researchers under the supervision of Professor Dai Stephens. "These results provide a novel insight into the possible neurobiological and genetic determinants of [impulsivity](#) and alcohol abuse. Studies like ours will be instrumental in discovering biomarkers that might be used to predict future vulnerability to develop disorders such as ADHD or drug addiction, in which impulsivity is a core symptom."

The scientists built their study on previous research on addictive behavior. It is already known that there is a link between impulsive behavior and a lack of control in drug and alcohol use. It is also known that genetic factors contribute to these addictions. What was not known

was whether the genes responsible for impulsive behavior are also present in binge-drinkers. The aim of the current research was to investigate [genetic factors](#) that may contribute to experimentation with, and abuse of, alcohol at an early age.

A two-step approach was used to carry out the research, which is published in the open-access journal *Frontiers in Genetics*. Firstly, genes that were linked to [impulsive behavior](#) were identified in mice. Under controlled conditions, the mice were assessed for their ability to wait to obtain a reward. Mice that responded too quickly lost their reward, and all were scored on a scale for "impulsivity". The researchers correlated these impulsivity values in a mouse genetic database, and then searched for human "homologues" - genes with a similar DNA sequence - in a human database.

The study then looked at the same genes in human participants - adolescents of around 14 years old. These teenagers had previously responded to a questionnaire regarding drinking and drug-taking habits over the previous month. In a similar test to the mice, the teens were asked to respond to cues in order to receive a reward. Whilst they carried out the tests, they underwent fMRI scans. The teens were then scored, as per the mice, according to their premature response - or impulsivity, and their genetic profile investigated for any correlations.

The study revealed that variations in one gene - KALRN - were associated with impulsivity and with a tendency to binge drinking in the teenagers. The KALRN gene codes for a protein called kalirin. Kalirin is essential to the development of the nervous system, especially the formation of dendritic spines that are important for the ability of nerve cells to communicate with each other, and has also been associated with other impulsivity-related disorders, like ADHD.

As noted by Dr. Peña-Oliver and her team, the most exciting result of

their research is that the identification of this gene opens the door to a potential "screening" of patients. This would allow scientists and doctors to predict impulsivity-related disorders like [binge drinking](#), drug abuse or ADHD, allowing appropriate and timely treatment.

More information: Yolanda Peña-Oliver et al, Mouse and Human Genetic Analyses Associate Kalirin with Ventral Striatal Activation during Impulsivity and with Alcohol Misuse, *Frontiers in Genetics* (2016). [DOI: 10.3389/fgene.2016.00052](https://doi.org/10.3389/fgene.2016.00052)

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