

Adolescents at risk for alcohol abuse show decreased brain activation

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Adolescence is a time of immense change in the brain, but unfortunately, it is also the time where many youths begin drinking. New research shows that individuals with a positive family history for alcohol abuse are at significantly higher risk to develop alcoholism in the future.

The period known as adolescence is a significant time of change for the individual experiencing it. Some of the most significant changes that occur are located within the [prefrontal cortex](#) in the brain, which is involved in decision making, social understanding and the ability to view situations from another individual's point of view. But, adolescence is also a time where many youths begin drinking, which can have serious effects on [brain development](#).

However, new research exploring the neural processes of [adolescents](#) with [alcohol abuse](#) in their families has indicated that a positive family history may confer a significant risk for future alcoholism.

The results will be published in the February 2011 issue of *Alcoholism: Clinical & Experimental Research* and are currently available at Early View.

Marisa Silveri, one of the authors of the study and assistant professor of Psychiatry at Harvard Medical School and neuroscientist at the Brain Imaging Center within McLean Hospital in Belmont, Massachusetts, said that the researchers examined adolescents that had not begun to drink, but possessed a positive family history of alcoholism, because it would

allow them to view unique differences in brain activity when compared to the control teens.

"Altered brain function in teens who are already drinking or abusing alcohol could either be a direct result of alcohol use or could be due to a pre-existing brain difference that leads to drinking," says Silveri.

"Therefore, this study sought to examine whether functional brain differences could be observed before alcohol use begins in a group of adolescents at greater risk for using alcohol, by having alcoholic parents or grandparents, compared to adolescents without alcoholism in their family."

The experiment utilized the Stroop Interference test, explained Silveri, where the subjects were required to prevent themselves from automatically reading a color word out loud, and focus instead on a less automatic response of stating the color of the ink the word was written in. For example, not reading the word red when it is written in blue ink.

Thirty-two adolescents volunteered to participate in the experiment, with 18 being denoted as family history positive (FH+), and the remaining 14 placed in the family history negative (FH-) or control group. An MRI scanner was used to collect fMRI BOLD (blood oxygen level dependent) data as an indicator of activation levels within the brain during performance of the Stroop test.

The researchers discovered that the FH+ group showed higher levels of frontal lobe activation during the Stroop Interference test. These results suggest that the FH+ group had decreased neuronal efficiency, that is, in order to retain equivalent performance levels compared to controls, there was an increased need for neural recruitment during performance of a response-inhibition task (like Stroop).

"The ability to sustain adequate performance by recruiting additional

[brain](#) resources suggests that their brains may have a subtle vulnerability that requires additional effort for a challenging task," says Susan F. Tapert, a professor at the Veterans Affairs San Diego Healthcare System and University of California San Diego Department of Psychiatry. "These results may suggest that youth with familial alcoholism have a less mature frontal system, and may be somewhat less equipped to manage real-life situations that require inhibition of impulsive responses, such as, potentially, to use [alcohol](#) or other drugs."

Silveri believes that, in addition to more research on identifying those who will be at risk of alcoholism later in life, is a much more important focus – the development and maintenance of school programs and curricula based on neuroscientific findings, which could help adolescents understand why a family history of alcoholism could put them at significantly greater risk.

Provided by Alcoholism: Clinical & Experimental Research

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