

Binge Drinking May Hamper Information Relay System in Teen Brain

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A study of adolescent binge drinkers has found that even relatively infrequent exposure to large amounts of alcohol during the teen years may compromise the integrity of the brain's white matter, which is critical for the efficient relay of information within the brain. The preliminary findings – to be published online in advance of the July issue of the journal *Alcoholism: Clinical & Experimental Research* - indicate that binge drinking may be detrimental to the developing adolescent brain. Heavy episodic or “binge” drinking is common among adolescents, with 55% of high-school seniors reporting having gotten drunk, and a quarter of them reporting having consumed five or more drinks in a row during the previous two weeks. “Because the brain is still developing during adolescence, there has been concern that it may be more vulnerable to high doses of alcohol,” said Susan F. Tapert, PhD, director of Substance Abuse/Mental Illness at the VA San Diego Healthcare System and associate professor of psychiatry at the University of California, San Diego School of Medicine. “This study showed that teens with histories of binge drinking episodes have lower coherence of white matter fibers in a variety of brain regions. White matter is the part of the brain made up of the axons of neurons – long filaments that extend from the cell bodies and carry the electrical signals that relay messages between neurons. The area appears white because of the axons’ protective myelin covering. Researchers know that the integrity of the brain’s white matter is compromised in adult alcoholics, but it is unclear when during the course of drinking white matter abnormalities begin to manifest themselves. However, white matter has been shown to continue developing throughout young adulthood. Tapert and colleagues used an MRI technique called diffusion tensor imaging, or DTI, to measure the integrity of white matter in the brains of 28 teenagers – 14 who had and 14 who did not have histories of binge drinking. DTI, which is sensitive to the random movement of water in cells or a target tissue, allowed the researchers to observe alterations to the structure of fibers within the brain’s white matter. The 28 participants were age 16 to 19, and none had a history of an alcohol or other drug use disorder. Binge drinkers were 14 of the teens who reported drinking at least four (for females) or five (for males) alcoholic beverages in one sitting during the three months prior to DTI imaging. The control teens were matched on age, gender and level of education. According to Tapert, the teen binge drinkers exhibited lower levels of white

matter fiber coherence, as measured in 18 separate areas of the brain, relative to the controls."Those who reported engaging in binge drinking showed lower levels of brain organization," said Tapert. She added that this could be either a risk factor for increased alcohol use or an effect of the alcohol. "While long-term studies that follow teens over time are essential to clarify the cause and effect of these brain changes, I would say that drinking to the point of being drunk may be detrimental to the adolescent brain." *Alcoholism: Clinical & Experimental Research (ACER)* is the official journal of the Research Society on Alcoholism and the International Society for Biomedical Research on Alcoholism. Co-authors of the ACER paper, *Altered White Matter Integrity in Adolescent Binge Drinkers* were Tim McQueeney of the University of Cincinnati, Brian C. Schweinsburg of the Department of Psychiatry at Yale University, and the VA Connecticut Healthcare System; Alecia D. Schweinsburg of the Department of Psychiatry at Yale University; Joanna Jacobus of the San Diego State University/University of California San Diego Joint Doctoral Program in Clinical Psychology; Sunita Bava of the University of California San Diego; and Lawrence R. Frank UC San Diego and the VA San Diego Healthcare System. The study was funded by the National Institute on Alcohol Abuse and Alcoholism and the National Institute on Drug Abuse.

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