



Making the Link

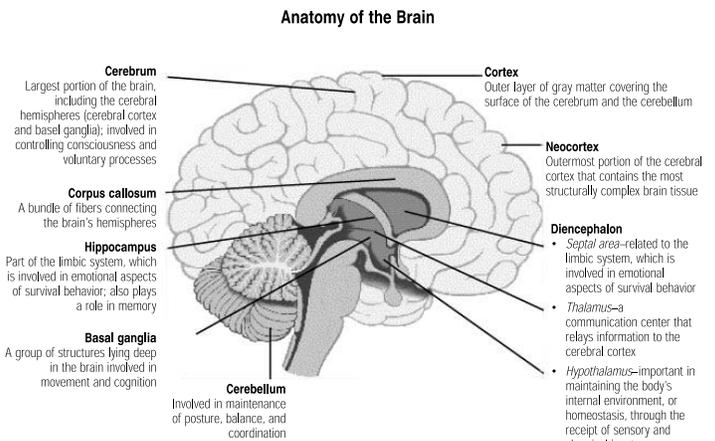
Underage Drinking and the Developing Brain

Alcohol consumption is associated with structural damage to the brain.

- Results of autopsy studies show that individuals with a history of chronic alcohol consumption have smaller, lighter, more shrunken brains than nonalcoholic adults of the same age and gender.¹
- Alcohol differs from illicit drugs in the complexity of its actions on the brain and other organs. While most illicit drugs work on one or several brain neurotransmitters, alcohol influences multiple neurotransmitter systems and brain circuits in ways that may differ from one drinker to the next.²
- Moderate consumption of alcohol affects the function of a variety of brain systems associated with emotion, learning, motivation, and coordination.³

Repeated exposure to alcohol can produce long-lasting changes in adolescent behavior and brain function.

- The hippocampus is the part of the brain where new memories are transferred from short-term to long-term storage. The hippocampus plays a prominent role in forming memories for events such as what you did last night, and facts like someone's name or phone number. Alcohol dramatically impairs the functioning of the hippocampus, and researchers now believe that this plays a critical role in the ability of alcohol to produce memory impairments, including blackouts.⁴
- MRIs used to assess the size of the hippocampus in subjects with adolescent-onset alcohol use disorders and in normal control subjects showed that the longer one abused alcohol, the smaller the hippocampus became.⁵
- Research suggests that heavy alcohol exposure produces more damage in the adolescent brain than the adult brain, including the hippocampus and regions associated with it.⁶
- Studies indicate that alcohol-dependent teens have impaired memory, altered perception of spatial relationships, and verbal skill deficiencies.⁷
- Cognitive impairments have been detected in adolescent alcohol abusers weeks after they stop drinking. The causes of these long-lasting changes are unclear, but they might involve brain damage and/or alterations in normal brain development.⁸



Source: Mattson, SN et al, MRI and prenatal alcohol exposure: Images provide insight into FAS, Alcohol Health Res World 18(1):49-52, 1994.

Initiative Partners

National Institute on Alcohol Abuse and Alcoholism (NIH)

The Robert Wood Johnson Foundation

Office of Research on Women's Health (NIH)

National Center on Minority Health and Health Disparities (NIH)

Office of Juvenile Justice and Delinquency Prevention (DOJ)

Substance Abuse and Mental Health Services Administration (DHHS)

National Highway Traffic Safety Administration (DOT)

¹ National Institute on Alcohol Abuse and Alcoholism (NIAAA). Imaging and Alcoholism: A Window on the Brain. Alcohol Alert No. 47, 2000. <http://www.niaaa.nih.gov/publications/aa47.htm> (accessed 10/28/02).

² Gordis, E. Statement made at Substance Abuse in the Twenty-First Century: Positioning the Nation for Progress, a conference of The National Center on Addiction and Substance Abuse at Columbia University and the Ronald Reagan Presidential Foundation, Simi Valley, CA, February 29, 2000.

³ Eckardt MJ, File SE, Gessa GL et al. Effects of moderate alcohol consumption on the central nervous system. Alcohol Clin Exp Res 22(5): 998-1040, 1998.

⁴ White AM, Matthews DB, Best PJ. Ethanol, memory and hippocampal function: a review of recent findings. Hippocampus 10: 88-93, 2000.

⁵ De Bellis MD, Clark DB, Beers SR, et al. Hippocampal volume in adolescent-onset alcohol use disorders. Am J Psychiatry 157(5):737-744, 2000.

⁶ Crews FT, Braun CJ, Hoplight B, et al. Binge ethanol consumption causes differential brain damage in young adolescent rats compared with adult rats. Alcohol Clin Exp Res 24(11):1712-23, 2000.

⁷ Brown SA, Tapert SF, Granholm E, et al. Neurocognitive functioning of adolescents: effects of protracted alcohol use. Alcohol Clin Exp Res 24(2):164-171, 2000.

⁸ Ibid.