

Binge drinking adolescent monkeys' brains seriously damaged by alcohol

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(PhysOrg.com) -- Binge drinking is increasing in adolescents, and new research has shown long-lasting damage to an important area in the brains of adolescent monkeys after binge alcohol consumption, and suggests binge drinking could seriously affect the memories of adolescents.

The study was carried out by the Committee on the Neurobiology of Addictive Disorders at the Scripps Research Institute at La Jolla, California, and aimed to determine the effects of binge [alcohol consumption](#) on the hippocampus area of the brains of adolescent macaque [monkeys](#).

Seven male adolescent monkeys were offered a citrus drink spiked with an amount of [ethanol](#) that increased from 1 to 6 percent over the first 40 days. Like humans, many monkeys like alcohol and can be big drinkers, and all seven took to the drink. The scientists allowed four of the monkeys access to the alcoholic drinks for an hour each weekday for 11 months, giving the controls the citrus drink unspiked. Blood alcohol levels in the drinking monkeys reached around 0.1 to 0.3 (about the equivalent of drinking 10-12 cans of beer). The researchers then withdrew access to alcohol for over two months before sacrificing the animals and examining their brains.

The results showed that the [binge drinking](#) monkeys had a dramatic and persistent decrease in [stem cells](#) in the hippocampus region and decreased neurogenesis (development of new neurons). The number of

several types of actively dividing stem cells was reduced by 80 to 90 percent in the drinking monkeys compared to the controls, and there was also an increase in neural degeneration, or [brain](#) cell death.

Earlier studies on rodents have shown similar effects, but monkeys are much more like humans in [brain structure](#), especially in the hippocampus, and in their longer period of adolescence. They are also often happy to voluntarily drink to intoxication.

The researchers said the results found may underlie the deficits in brain functions associated with the hippocampus seen in alcoholics. The hippocampus is an area in which the brain generates new brain neurons from stem cells, and is involved in short and long term memory, spatial learning, and executive functions.

Leader of the research team, Chitra D. Mandyam, said the study shows alcohol targets immature brain cells in adolescents, reducing the number of new [neurons](#) developed. “You’re messing with brain plasticity,” he said, and if the cells are inhibited in adolescence, the chances of normal brain cell production later in life are reduced. Mandyam said it is “very devastating” to see what binge drinking does to the brains of adolescents.

The results were published in the *Proceedings of the National Academy of Sciences (PNAS)* of the US.

More information: Michael A. Taffe et al., Long-lasting reduction in hippocampal neurogenesis by alcohol consumption in adolescent nonhuman primates, PNAS, Published online before print June 1, 2010, [doi:10.1073/pnas.0912810107](https://doi.org/10.1073/pnas.0912810107)

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