

Are teen binge drinkers risking future osteoporosis?

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Binge-drinking teenagers may be putting themselves at risk for future osteoporosis and bone fractures, according to researchers at Loyola University Health System.

A new Loyola study has found long-lasting disruptions in hundreds of genes involved in [bone formation](#) in rats. The study is published in the July-August issue of the journal [Alcohol and Alcoholism](#).

"Lifestyle-related damage done to the skeleton during young adulthood may have repercussions lasting decades," bone biologist John Callaci, PhD, and colleagues wrote.

Callaci cautioned that data from animals don't directly translate to people. "But the findings certainly suggest that this could be a problem with humans," he added.

Bone mass is lost throughout adult life as part of the aging process. Thus, anything that inhibits the build up of bone mass during the critical years of adolescence and young adulthood could increase the risk of osteoporosis and fractures in later life.

[Binge drinking](#) is defined as a woman having at least four drinks or a man having at least five drinks on one occasion. Heavy binge drinkers can consume 10 to 15 drinks. Binge drinking typically begins around age 13 and peaks between 18 and 22, before gradually decreasing. Thirty-six percent of youths ages 18 to 20 reported at least one binge-drinking

episode during the past 30 days, according to the Substance Abuse and Mental Health Services Administration.

A 2008 study by Callaci and colleagues found that adolescent rats exposed to alcohol in amounts comparable to that of binge drinkers had 15 percent less bone build-up than control rats exposed to saline solution.

The new study examined the effects of binge drinking on genes. Rats received injections of alcohol that resulted in a blood alcohol level of 0.28. (By comparison, a motorist with a blood alcohol level higher than 0.08 is legally drunk.) Rats were exposed to binge amounts of alcohol on either three consecutive days (acute binge) or three consecutive days for four weeks in a row (chronic binge). They were compared to control rats who received saline.

Researchers found that about 300 bone-related genes were disrupted in rats exposed to acute binge drinking and 180 bone-related genes were disrupted in rats exposed to chronic binge drinking. In the affected genes, alcohol either increased or decreased the amount of associated RNA. (RNA serves as the template for making proteins, the building blocks of bones and other tissue.) This change in how genes are expressed disrupted molecular pathways responsible for normal bone metabolism and maintenance of [bone mass](#).

In one of the most disturbing findings, researchers found that the gene disruption was long-lasting. Even after 30 days of sobriety, the genes still were being expressed differently. (Thirty days in a rat's lifespan is roughly equivalent to about three years in a human lifespan.)

The findings might help in the development of new drugs to minimize bone loss in alcohol abusers and in other people who are at risk for osteoporosis for other reasons.

"If we understand the mechanism of bone loss, eventually we will be able to figure out how to fix it," Callaci said.

Of course, the best way to prevent alcohol-induced [bone loss](#) is to drink moderately or not at all, Callaci said. "But when prevention doesn't work, we need other strategies to limit the damage."

Provided by Loyola University Health System

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