

Why binge drinking is bad for your bones

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Studies in recent years have demonstrated that binge drinking can decrease bone mass and bone strength, increasing the risk of osteoporosis.

Now a Loyola University Stritch School of Medicine study has found a possible mechanism: Alcohol disturbs genes necessary for maintaining healthy bones.

The findings could help in the development of new drugs to minimize bone loss in alcohol abusers. Such drugs also might help people who don't abuse alcohol but are at risk for osteoporosis.

"Of course, the best way to prevent alcohol-induced bone loss is to not drink or to drink moderately," said bone biologist John Callaci, PhD. "But when prevention doesn't work, we need other strategies to limit the damage."

Callaci is co-author of the study, published recently in the journal *Alcoholism: Clinical and Experimental Research*. He is an assistant professor in Stritch's Department of Orthopaedic Surgery and Rehabilitation.

Callaci's co-authors are Frederick Wezeman, PhD, professor in the Department of Orthopaedic Surgery and Rehabilitation and Ryan Himes, a research assistant in the Burn and Shock Trauma Institute.

The National Osteoporosis Foundation says that many people who abuse

alcohol do not get enough calcium. Alcohol also can affect the body's calcium supply. And drinking too much can increase the risk of falls and broken bones. The foundation advises drinking no more than two drinks per day.

Loyola's Alcohol Research Program was among the first centers to demonstrate that rats given an amount of alcohol equivalent to binge drinking show significant decreases in bone mineral density and bone strength. (In humans, binge drinking is defined as a woman having at least four drinks or a man having at least five drinks in two hours.) But surprisingly little was known about the mechanisms responsible for these effects.

In the new study, researchers injected rats with an amount of alcohol equivalent to binge drinking for three days or to chronic alcohol abuse for four weeks. Control groups received injections of saline.

Researchers focused on genes responsible for bone health. They found that alcohol affected the amounts of RNA associated with these genes. (RNA serves as the template for making proteins, the building blocks of bones and other tissue.) With some genes, alcohol increased the amount of RNA. With other genes, alcohol decreased the RNA. Changing the amounts of RNA disrupted two molecular pathways responsible for normal bone metabolism and maintenance of bone mass. These pathways are called the Wnt signaling pathway and the Integrin signaling pathway.

"We found that the expressions of certain genes important for maintaining bone integrity are disturbed by alcohol exposure," Callaci said.

Loyola scientists and doctors are conducting extensive research on the effects of alcohol. Researchers are, for example, studying how alcohol

causes memory loss and impairs the immune system.

Source: Loyola University

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