

Researchers uncover gender differences in the effects of long-term alcoholism

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Researchers from Boston University School of Medicine (BUSM) and Veterans Affairs (VA) Boston Healthcare System have demonstrated that the effects on white matter brain volume from long-term alcohol abuse are different for men and women. The study, which is published online in *Alcoholism: Clinical and Experimental Research*, also suggests that with abstinence, women recover their white matter brain volume more quickly than men.

The study was led by Susan Mosher Ruiz, PhD, postdoctoral research scientist in the Laboratory for Neuropsychology at BUSM and research scientist at the VA Boston Healthcare System, and Marlene Oscar Berman, PhD, professor of psychiatry, neurology and anatomy and neurobiology at BUSM and research career scientist at the VA Boston Healthcare System.

In previous research, alcoholism has been associated with [white matter](#) pathology. White matter forms the connections between neurons, allowing communication between different areas of the brain. While previous neuroimaging studies have shown an association between alcoholism and white matter reduction, this study furthered the understanding of this effect by examining gender differences and utilizing a novel region-of-interest approach.

The research team employed structural [magnetic resonance imaging](#) (MRI) to determine the effects of drinking history and gender on white matter volume. They examined [brain images](#) from 42 abstinent alcoholic

men and women who drank heavily for more than five years and 42 nonalcoholic control men and women. Looking at the correlation between years of alcohol abuse and white matter volume, the researchers found that a greater number of years of [alcohol abuse](#) was associated with smaller white matter volumes in the abstinent alcoholic men and women. In the men, the decrease was observed in the corpus callosum while in women, this effect was observed in cortical white matter regions.

"We believe that many of the cognitive and emotional deficits observed in people with [chronic alcoholism](#), including memory problems and flat affect, are related to disconnections that result from a loss of white matter," said Mosher Ruiz.

The researchers also examined if the average number of drinks consumed per day was associated with reduced white matter volume. They found that the number of daily drinks did have a strong impact on alcoholic women, and the volume loss was one and a half to two percent for each additional daily drink. Additionally, there was an eight to 10 percent increase in the size of the brain ventricles, which are areas filled with cerebrospinal fluid (CSF) that play a protective role in the brain. When white matter dies, CSF produced in the ventricles fills the ventricular space.

Recovery of white matter [brain volume](#) also was examined. They found that, in men, the corpus callosum recovered at a rate of one percent per year for each additional year of abstinence. For people who abstained less than a year, the researchers found evidence of increased white matter volume and decreased ventricular volume in women, but not at all in men. However, for people in recovery for more than a year, those signs of recovery disappeared in women and became apparent in men.

"These findings preliminarily suggest that restoration and recovery of the

brain's white matter among alcoholics occurs later in abstinence for men than for women," said Mosher Ruiz. "We hope that additional research in this area can help lead to improved treatment methods that include educating both alcoholic men and [women](#) about the harmful effects of excessive drinking and the potential for recovery with sustained abstinence."

Provided by Boston University Medical Center

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