

Study Reveals Molecular Mechanism Behind Alcohol-Related Brain Damage

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It has been well documented that heavy alcohol use can cause damage to the brain.

But for the first time, researchers from the University of the Basque Country in Spain and the University of Nottingham in the UK reveal the structural brain damage alcohol abuse can cause at a molecular level.

In the US, approximately 17 million individuals have an alcohol use disorder.

Past research has established that excessive alcohol use can cause problems with cognitive abilities, such as learning and memory impairments and problems with motor skills.

According to the researchers of this latest study, such impairments among alcohol abusers have been attributed to regional brain atrophy - the loss or damage of brain cells in certain areas. But they note that until now, the molecular mechanisms behind cognitive impairments have been unclear.

To investigate, the team analyzed the postmortem brains of 20 individuals who were diagnosed with alcohol dependence, alongside the postmortem brains of 20 non-alcoholic individuals.

The researchers analyzed the prefrontal cortex of each brain - the front region of the brain that is responsible for regulating behavior, abstract thinking and thought analysis.

Protein alterations 'may explain cognitive impairments in alcoholics'

The team's findings, recently published in the journal PLOS One, revealed that the prefrontal cortex of alcoholic patients demonstrated alterations in the proteins α - and β -tubulin and β II spectrin. The researchers explain that tubulins make up the cytoskeletal structure, or architecture of neurons in the brain, while spectrins are responsible for the shape of neurons.

The researchers say that such changes in neuronal structure can influence organization and how the neuronal network of the brain functions, adding:

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"Thus collectively, we propose that a reduction of the cytoskeletal architecture provides a rationale for the profound differences in the prefrontal cortex neuronal histology of alcoholics, and likely contributes to the cognitive and learning impairments experienced by alcoholics."

These findings, the team says, pave the way for further research into how excessive alcohol use impacts the brain.

In particular, the researchers want to determine exactly how alcohol leads to such structural alteration and see what changes occur in the enzymes that are responsible for the α - and β -tubulin and β II spectrin proteins.

They would like to see whether such changes occur in any other areas of the brain, including those responsible for motor function.

Such information, the researchers say, could lead to the development of new drugs and treatment options that may reverse the brain-damaging effects induced by excessive alcohol use, which could improve overall quality of life and reduce the number of alcohol-related deaths.

Last year, *Medical News Today* reported on a study published in the journal *Cortex*, suggesting that excessive alcohol use has long-term negative effects on the brain.

More recent research, by investigators at the University of Utah, analyzed the area of the brain that regulates how sensitive we are to the negative effects of alcohol - the lateral habenula.

Results of the study, which was conducted in rats, found that those with an inactivated lateral habenula drank more alcohol at a faster rate than control rats.

Source: Medical News Today?, Honor Whiteman