Researchers find that alcohol consumption damages brain's support cells

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Alcohol consumption affects the brain in multiple ways, ranging from acute changes in behavior to permanent molecular and functional alterations. The general consensus is that in the brain, alcohol targets mainly neurons. However, recent research suggests that other cells of the brain known as astrocytic glial cells or astrocytes are necessary for the rewarding effects of alcohol and the development of alcohol tolerance. The study, first-authored by Dr. Leonardo Pignataro, was published in the February 6th issue of the scientific journal *Brain and Behavior*.

"This is a fascinating result that we could have never anticipated. We know that astrocytes are the most abundant cell type in the central nervous system and that they are crucial for neuronal growth and survival, but so far, these cells had been thought to be involved only in brain's support functions. Our results, however, show that astrocytes have an active role in alcohol tolerance and dependence," explains Dr. Pignataro.

The team of researchers from Columbia and Yale Universities analyzed how alcohol exposure changes gene expression in astrocyte cells and identified gene sets associated with stress, immune response, cell death, and lipid metabolism, which may have profound implications for normal neuronal activity in the brain. "Our findings may explain many of the long-term inflammatory and degenerative effects observed in the brain of alcoholics," says Dr. Pignataro. "The change in gene expression observed in alcohol-exposed astrocytes supports the idea that some of the alcohol consumed reaches the brain and that ethanol (the active

component of alcoholic beverages) is locally metabolized, increasing the production free radicals that react with cell components to affect the normal function of cells. This activates a cellular stress response in the cells in an attempt to defend from this chemical damage. On the other hand, the body recognizes these oxidized molecules as "foreign objects" generating an immune response against them that leads to the death of damage cells. This mechanism can explain the inflammatory degenerative process observed in the brain of chronic alcoholics, allowing for the development of different and novel therapeutically approaches to treat this disease" added Dr. Pignataro.

The consequences of alcohol on astrocytes revealed in this study go far beyond what happens to this particular cell type. Astrocytes play a crucial role in the CNS, supporting normal neuronal activity by maintaining homeostasis. Therefore, alcohol changes in gene expression in astrocytes may have profound implications for neuronal activity in the brain.

These findings will help scientists better understand alcohol-associated disorders, such as the brain neurodegenerative damage associated with chronic alcoholism and alcohol tolerance and dependence. "We hope that this newly discovered role of astrocytes will give scientists new targets other than neurons to develop novel therapies to treat alcoholism," Leonardo Pignataro concluded.

More information: Research paper: onlinelibrary.wiley.com/doi/10 … 02/brb3.125/abstract

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