

# From the glass to the brain in 6 minutes

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Just one drink can quickly go to your head. Researchers in Heidelberg tested this well-known adage. Only six minutes after consuming an amount of alcohol equivalent to three glasses of beer or two glasses of wine, leading to a blood alcohol level of 0.05 to 0.06 percent, changes have already taken place in the brain cells, as the scientists in Heidelberg proved using magnetic resonance spectroscopy (MRS). Previously the only available data was from animal trials. The results of the study were published in the *Journal of Cerebral Blood Flow and Metabolism*.

## Metabolism of brain cells affected

The [brain](#) reacts quickly to alcohol. "Our study provides evidence for alternative energy utilization upon alcohol ingestion, i.e. the brain uses an alcohol breakdown product instead of glucose for energy demands," explains Dr. Armin Biller of the working group for cerebral metabolism at the Department of Neuroradiology at Heidelberg University Hospital (Medical Director: Prof. Dr. Martin Bendszus). The harmful effect also sets in quickly. During the experiment, the concentration of substances such as creatine ([energy metabolism](#)), which are attributed with protecting cells, decreases as the concentration of alcohol increases. Choline, a component of cell membranes, was also reduced. "That probably indicates that alcohol triggers changes in the composition of cell membranes," says Dr. Armin Biller.

Is all consumption of alcohol harmful for the brain? "Our follow-ups on the next day showed that the shifts in brain metabolites after moderate consumption of alcohol by healthy persons are completely reversible,"

says Dr. Armin Biller. "However, we assume that the brain's ability to recover from the effect of alcohol decreases or is eliminated as the consumption of alcohol increases. The acute effects demonstrated in our study could possibly form the basis for the permanent [brain damage](#) that is known to occur in alcoholics. This should be clarified in future studies."

## **Drinking for science / No differences between men and women**

Eight male and seven female subjects participated in the alcohol experiment. While lying in the MRI scanner, they drank the specified amount of alcohol through a long straw. The goal was to reach a blood alcohol content of 0.05 to 0.06 percent - a level that impairs ability to drive, but does not induce severe intoxication. In the MRI scanner, the nuclei of atoms in brain tissue were stimulated by a high-frequency impulse and the signal transmitted during the return to the initial condition was received. The spectral properties of this signal can be analyzed, allowing conclusions to be made as to the contents of various products of metabolism in the tissue examined. This study found no differences between the results of male and female individuals - the brains of female and male subjects reacted to [alcohol](#) consumption the same way.

## **What substances cause a "hangover"?**

In other studies, the researchers examined what a "hangover" does to the brain - magnetic resonance spectroscopy can possibly enable us to find out what substances in alcoholic beverages bring on the familiar "hangover".

Source: University Hospital Heidelberg ([news](#) : [web](#))

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