

# Why binge drinking cause binge eating

11 January 2017, by Bob Yirka



Credit: Peter Häger/Public Domain

(Medical Xpress)—A team of researchers affiliated with several institutions in the U.K. has found what they believe is the reason why consumption of alcohol leads to hunger pangs and excessive eating. In their paper published in the journal *Nature Communications*, the researchers outline experiments they conducted with mice given alcohol and the ways it impacted their brains.

Most people who drink beverages containing alcohol know that doing so causes them to feel hungry, which leads them to eating more than they normally would. This pattern, health scientists suggest, likely plays some role in modern obesity problems. But it has also puzzled other researchers because it seems illogical—alcohol is high in calories, which means it should quench hunger, not stimulate it. To better understand what is going on, the researchers injected alcohol directly into the abdomens of lab [mice](#) over a three-day weekend and then tested them to see what happened.

One of the findings was that the mice became hungrier—they ate far more than other mice that

were not given alcohol, particularly on the second day. The effect was temporary though; shortly after the alcohol spigot was turned off, the appetite of the mice returned to normal. This confirmed that mice react similarly to humans. Next, the researchers took a much closer look, studying the mice brains up close—focusing most specifically on *Agrp* neurons (located in the hypothalamus), because prior research has shown that they are the neurons that are activated when mice experience hunger pangs. Indeed, another study had shown that activating the neurons in mice caused them to continue to eat even when their bellies were completely full.

Deactivating the neurons in this study before injecting alcohol into test mice led to the mice not overeating, suggesting very strongly that alcohol causes the same neurons to fire as hunger pangs. Though the researchers could not repeat the experiment on humans, it appears likely that the same mechanism occurs, which in turn explains why we eat so much after drinking.

To better understand the underlying mechanism involved, the researchers caused calcium in the cells of some sample *Agrp* [neurons](#) to turn green when exposed to alcohol—an indicator of cell activity—and found that bathing them in [alcohol](#) caused an increase in calcium levels, which led to an increase in the rate of neural firing.

**More information:** Sarah Cains et al. *Agrp* neuron activity is required for alcohol-induced overeating, *Nature Communications* (2017). [DOI: 10.1038/ncomms14014](https://doi.org/10.1038/ncomms14014)

## Abstract

Alcohol intake associates with overeating in humans. This overeating is a clinical concern, but its causes are puzzling, because alcohol (ethanol) is a calorie-dense nutrient, and calorie intake usually suppresses brain appetite signals. The biological factors necessary for ethanol-induced overeating remain unclear, and societal causes have been proposed. Here we show that core

elements of the brain's feeding circuits—the hypothalamic Agrp neurons that are normally activated by starvation and evoke intense hunger—display electrical and biochemical hyperactivity on exposure to dietary doses of ethanol in brain slices. Furthermore, by circuit-specific chemogenetic interference in vivo, we find that the Agrp cell activity is essential for ethanol-induced overeating in the absence of societal factors, in single-housed mice. These data reveal how a widely consumed nutrient can paradoxically sustain brain starvation signals, and identify a biological factor required for appetite evoked by alcohol.

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