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An ingestible capsule cut rats' blood alcohol levels by up to 68%

The self-powered device, reported by researchers in China, converted ethanol in the gut before absorption but has not been tested in people

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Researchers in China reported on Wednesday, November 18 that they had developed an ingestible capsule that lowered blood alcohol levels and reduced signs of intoxication in rats, an early finding that points to a possible new way to limit alcohol-related harm but has not been tested in people.

The study, published in Nature Communications, describes a self-powered "electrocapsule" designed to work in the intestine after it is swallowed. The device uses a small galvanic system based on zinc and a manganese-ellagic acid-gold interface to convert ethanol into acetate on contact, giving the body an added pathway to clear alcohol before more of it circulates through the bloodstream.

The authors said acute alcohol intoxication remains hard to treat because ethanol is absorbed quickly in the gastrointestinal tract and the liver's own enzymes can process only so much at a time. Their approach aims to intercept some of that alcohol locally in the gut rather than relying only on the liver after absorption.

In rat experiments, animals that received the capsule before alcohol exposure had blood ethanol concentrations that were about 58% to 68% lower than those in untreated animals over an observation period ranging from 0.5 hours to 6 hours, according to the paper. The treated rats also recovered faster from loss of the righting reflex, a common lab measure of sedation and intoxication, and showed less alcohol-

related neurobehavioral impairment and less liver injury.

The researchers described the device as fully integrated and self-powered, meaning it did not need an external battery or outside control once swallowed. In laboratory testing, they said the capsule's electrochemical performance showed minimal interference from a representative mixture of biomolecules, a result meant to support the idea that it could function in a complex biological environment.

The work was led by scientists at Sichuan University in Chengdu, with one author also affiliated with the University of British Columbia. The paper presents the capsule as a preclinical platform, not a finished treatment. The authors said future studies will need to examine dosing at larger scales, how the device moves through the gastrointestinal tract, and its safety profile before any human use could be considered.

That caution is central to interpreting the findings. The study does not show that the capsule can prevent intoxication in people, treat alcohol poisoning in emergency settings, or make drinking safe. The device was tested in a rat model under controlled conditions and was given before alcohol exposure, not after severe intoxication had already developed.

The research could still draw attention across the beverage sector, including companies tied to beer, wine and spirits, because it opens a possible line of investigation into reducing some effects of alcohol exposure. But the current evidence is far from a consumer product or a clinical recommendation, and it does not change the established health risks linked to excessive drinking.

The paper also disclosed commercial ties that may attract scrutiny as the technology develops. One author, Junling Guo, and another co-author, Yunxiang He, hold equity interests in Novastra Therapeutics, and Guo is a shareholder and board director of Vitagenix Bio. The authors said those companies did not fund the study or influence its design, analysis or publication decision. The paper also said Guo, Gonghua Hong, He and Yiran Pu are inventors on a pending Chinese patent application related to the capsule technology, filed by Suzhou Bangjia Medical Co., Ltd.

The study adds to a growing field of ingestible bioelectronics, which has focused largely on monitoring the body or stimulating nerves and tissues. What sets this work apart, the authors argued, is the use of an autonomous device to alter a metabolically important substance inside the gastrointestinal tract. Whether that concept can move from rodents to people will depend on future tests showing that the capsule can work safely, reliably and at a clinically meaningful scale.