A cure for the common hangover?

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(Phys.org)—In a discovery that could derail the popular "Hangover" movie franchise, a team of researchers led by UCLA engineers has identified a method for speeding up the body's reaction to the consumption of alcohol.

In a paper published online Feb. 17 in the peer-reviewed journal *Nature Nanotechnology*, Yunfeng Lu, a professor of chemical and biomolecular engineering at the UCLA Henry Samueli School of Engineering and Applied Science, and his colleagues describe successfully placing two complementary enzymes in a tiny capsule to speed up the elimination of alcohol from the body. The enzyme combination within the capsule essentially processes alcohol the way the liver does.

Lu, the principal investigator, said the enzyme combination could be ingested as a pill, chemically altering alcohol in the digestive system, even as the liver does its work.

"The pill acts in a way extremely similar to the way your liver does," Lu said. "With further research, this discovery could be used as a preventative measure or antidote for alcohol intoxication."

Naturally occurring enzymes within cells often work in tandem to transform molecules or eliminate toxins. Lu's group assembled multiple enzymes to mimic the natural process. An enzyme known as an alcohol oxidase, for example, can promote the oxidization of alcohol but also produces hydrogen peroxide, which is toxic. Another type of enzyme, a catalase, prompts the decomposition of hydrogen peroxide into water

and oxygen. Placing the two enzymes next to each other can effectively remove alcohol.

The researchers placed the two enzymes in a polymer capsule measuring just tens of nanometers in diameter. The wall of the polymer capsule is only one nanometer thick—about 100,000 times thinner than a strand of human hair. The capsule protects the enzymes and allows them to freely enter an alcohol molecule. In this way, the nanocapsule mimics an organelle, a structure found in cells that spurs chemical reactions.

The researchers used a mouse model to test how well the enzyme package worked as an antidote after alcohol was consumed. They found that blood alcohol levels in mice that received the enzyme package fell more quickly than in mice that did not. Blood alcohol levels of the antidote test group were 15.8 percent lower than the control group after 45 minutes, 26.1 percent lower after 90 minutes and 34.7 percent lower after three hours.

In a test of how well the enzyme delivery system worked as a prophylactic when consumed at the same time as alcohol, the researchers found that blood alcohol levels in the mice that received the enzymes were 10.1 percent lower than in control-group mice after 45 minutes, 31.8 percent lower after 90 minutes and 36.8 percent lower after three hours.

"Considering the vast library of enzymes that are currently or potentially available," the authors write, "novel classes of enzyme nanocomplexes could be built for a broad range of applications."

Provided by University of California, Los Angeles