# Alcohol withdrawal symptoms caused by molecules in the brain

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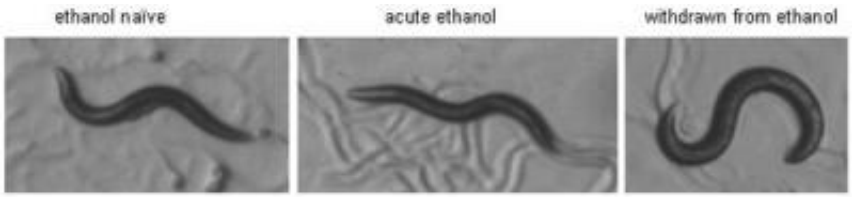


The body posture of worms during acute exposure to ethanol and during ethanol withdrawal is different. Image from doi:10.1371/journal.pone.0010422.

(PhysOrg.com) -- Researchers in Britain have discovered the molecular basis of some of the symptoms of hangover and alcohol withdrawal that appear as the body attempts to adapt to reduced levels of alcohol.

After a long period of exposure to alcohol, humans become adapted to increasingly higher levels in the blood, and when exposure to alcohol is stopped through abstinence the result is withdrawal symptoms such as agitation, anxiety, tremors, and in extreme cases, seizures. The symptoms are relieved by small doses of alcohol, but this can contribute to alcohol dependency. The researchers said the fact that alcohol provides relief from the symptoms suggests there is an alcohol-induced adaptation that “resets the balance of signaling in neural circuits” in the brain but the molecular mechanisms responsible for withdrawal are poorly understood and likely to be complex.

The neuroscientists, from the University of Southampton's School of Biological Sciences, studied the brains of worms (Caenorhabditis elegans ), which have a similar response to alcohol to human brains, with the aim of investigating the genetic basis of neural plasticity induced by alcohol. Studying the reactions of the worms enables the scientists to determine how signaling in nerve circuits is affected by alcohol, and how this in turn affects behavior.

The research was led by Dr Lindy M. Holden-Dye, a neuroscientist at the university and member of the Southampton Neurosciences Group (SoNG). In the study around 50 worms were subjected to "food race assays" in which they were placed on one end of a plate with a source of food at the opposite end. The worms learned to navigate towards the food, and their efficiency was measured by counting the percentage of worms reaching the food in a given time. When the worms were given alcohol (ethanol), their ability to reach the food was reduced. In worms exhibiting withdrawal symptoms, a small amount of ethanol improved their performance.

The study found when the worms were given ethanol in small doses during their withdrawal period one symptom of withdrawal (spontaneous deep body bends) was relieved. The study also found a mutant worm lacking in neuropeptides eg1-3 was resistant to withdrawal symptoms, but it did respond to ethanol. The findings support studies in mammals that have also implicated neuropeptides in the responses of the body to alcohol.

Alcohol dependency and alcohol abuse affect around 13 percent of adults in the U.S. and are two of the commonest mental disorders around the globe. Dr Holden-Dye said the research provides an effective system for experiments on the problem of alcoholism and alcohol dependency, and is already leading to novel ideas on how to treat the disorders.

The paper is published in the latest Public Library of Sciences online journal *PLoS One*.

**More information:** Mitchell P, Mould R, Dillon J, Glautier S, Andrianakis I, et al. (2010) A Differential Role for Neuropeptides in Acute and Chronic Adaptive Responses to Alcohol: Behavioural and Genetic Analysis in Caenorhabditis elegans. PLoS ONE 5(5): e10422. doi:10.1371/journal.pone.0010422