

## **Folic Acid and Reduction of Alcohol-related Damage**

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A new study with groundbreaking public health implications for treating alcoholism and preventing Fetal Alcohol Syndrome has shown that a byproduct of methanol, a contaminant found in many alcoholic beverages, causes neurotoxicity that can be mitigated by folic acid.

Formic acid, a byproduct of methanol, is known to alter the normal functioning of the nervous system and was found in higher quantities in alcoholics. The toxicity of formic acid was significantly slowed down by administering folic acid in an animal model.

The study was led by Dr. Bhushan Kapur, Department of Clinical Pathology, Sunnybrook Health Sciences Centre in collaboration with Dr. Peter Carlen, Department of Neurosciences, Toronto Western Division of the University Health Network. Supported by a grant from the Canadian Institutes of Health Research and appearing in today's edition of *Alcoholism: Clinical and Experimental Research*, the study examined formic acid levels in alcoholics as compared with those in a control group. The serum formic acid levels were significantly higher in alcoholics as compared to the controls. Formic acid was not detected in the cerebrospinal fluid (a clear fluid bathing the entire surface of central nervous system) in the control group, but was found in three of the four alcoholic cases.

When the equivalent amount of formic acid that is found in alcoholics was added to rat brain slice cultures, the acid caused neuronal cell death. When folic acid was added with formic acid, neuronal cell death could be prevented.

"Our studies suggest that formic acid may indeed be the mechanism for many alcohol-related diseases, such as liver disease and central nervous system disorders," says Dr. Bhushan Kapur. "Because the neurotoxicity of formic acid can be greatly slowed by administering folic acid, which is inexpensive and readily available, the public health impact is staggering in terms of treating alcohol abusers and possibly preventing the serious affects of Fetal Alcohol Syndrome."

Dr. Kapur, also a scientist with Motherisk at the Hospital for Sick Children, notes that chronic exposure to low levels of formic acid gradually harms the body, citing that liver damage in alcoholics does not take place overnight. It is conceivable that a continuous exposure to low, but above normal, formic acid levels may be toxic to cells and contribute to alcohol-related organ damage.

This research resulted in a CIHR New Emerging Team Grants, intended to support the creation or development of teams of investigators undertaking collaborative, multidisciplinary research. Drs. Kapur and Carlen are collaborating with researchers at Queen's University on an ongoing study on folic acid supplementation as a potential therapeutic intervention in preventing Fetal Alcohol Spectrum Disorders using an animal model.

"This research will certainly raise some interesting discussions for frontline healthcare providers, including the challenges of how much folic acid to recommend per day to their patients who drink, as well as factors such as absorption of folic acid, which is poor in chronic drinkers, and also the issue of compliance in this population," adds Dr. Kapur.