Medical Xpress

Linking brain-derived neurotrophic factor to alcohol dependence

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One of the ways an alcohol dependence (AD) diagnosis can be made is through measurement of biological markers of hepatic injury such as gamma glutamyl transferase (GGT) and mean corpuscular volume (MCV). These markers, however, are not always sufficiently sensitive or specific enough for determining AD, nor do their levels change rapidly in response to abstinence or relapse. A new study of brain-derived neurotrophic factor (BDNF), which regulates neuronal plasticity, indicates it may predict relapse in AD individuals undergoing treatment.

Results will be published in the November 2011 issue of *Alcoholism: Clinical & Experimental Research* and are currently available at Early View.

"As we are [located] in a psychiatric hospital, we were sensitive to BDNF and its role in psychiatric diseases," explained Murielle Girard, a researcher at the Centre Hospitalier Esquirol in Limoges, France and corresponding author for the study. "At the same time, we were beginning [to follow] a cohort of AD subjects in an attempt to better understand their clinical evolution. This study helped us to realize that abstinence from a clinical point of view is not the same as abstinence from a biological point of view."

Girard explained that the concept of abstinence in this current study includes the notion of abstinent behavior and not just the linkage between alcohol consumption and related toxicity, which is traditionally evaluated through biological markers. "A subject can have reduced

alcohol consumption and normalized biological markers but still remain sensitive to drinking and have a high risk of relapse," she said. "[Markers] are absolutely not an indicator of alcohol dependence, or alcohol craving, they just indicate somatic consequences of excessive alcohol consumption."

"Three biological markers are pertinent for measuring alcohol consumption," added Philippe Nubukpo, chief of the addiction department at the Centre Hospitalier Esquirol, "GGT for hepatic injury, MCV for macrocytose without anemia, and carbohydrate deficient transferrin (CDT)." He agreed with Girard that these markers give information on chronically excessive drinking but not on AD. "What we need today is a biomarker which can reflect AD, and we know that this relies on many interconnected mechanisms. To our knowledge, this study is the first to look for links between BDNF and alcohol abstinence."

Girard and her colleagues examined serum BDNF levels in 101 (84 men, 17 women) abstinent and relapsing AD individuals at the moment of hospitalization for alcohol withdrawal as well as six months later, and compared those findings to serum BDNF levels of 39 (28 men, 11 women) non-AD individuals who were matched on age and gender. Participants were also tested for their GGT levels, their MCV values, and their score on the Beck Depression Inventory questionnaire.

"Our study [showed] that alcohol consumption and toxicity markers do not exactly reflect the dependence status of the AD subjects," said Girard. "[Additionally,] abstinence and non-abstinence condition may be accompanied by neurological mechanisms which must be taken into account in the care and the way the patients with dependence are attended.

"People used to believe that AD, due to its neurologic and cerebral toxicity, induced a decrease of BDNF in plasma and that abstinence

reversed this because of neuroadaptation and neurogenesis," said Nubukpo. "In this study, the mean BDNF rate at baseline and six months later showed no difference between AD persons and controls. In fact, those who were totally abstinent or partially abstinent had increased BDNF levels between these two time points. This means that alcohol withdrawal may induce neurological transformations that are reflected by peripheral levels of BDNF."

"[AD] subjects are often cared for according to a marker of alcohol consumption, rather than a marker of their dependence, but it is the latter that care should target," said Girard. "[We need to consider] the AD patient from the [perspective] that dependence relies on neurological mechanisms, [and that] patient care [should] consider this dependence status, [not just] their evolution in alcohol consumption, which may be less persistent."

"Monitoring serum BDNF concentrations could help to characterize AD profiles in clinical practice, help predict relapses, and assist in adjusting care to prevent difficulties in alcohol withdrawal and define people with higher risks of relapse," said Nubukpo. "In clinical practice, these findings may help to remind professionals that biological markers are only relevant in terms of the toxicity of alcohol consumption, and in no way are they indicators of the behavior in relation to alcohol, which has to be taken into account and explored with other tools. It is too early to assess BDNF as a biological marker of AD, but it should be useful in conjunction with other clinical data."

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