

Chronic drinking can disrupt circadian rhythms

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Circadian rhythmicity is regulated by circadian clock genes, and animal studies have shown that chronic drinking can alter expressions in these genes. A new study has found that significantly lower levels of messenger ribonucleic acid (mRNA) - a molecule of RNA that helps to manufacture proteins - in circadian clock genes in alcohol-dependent (AD) patients support a relationship between circadian clock gene dysregulation and drinking in humans.

Results will be published in the November 2010 issue of *Alcoholism: Clinical & Experimental Research* and are currently available at Early View.

"The body's daily biological, or circadian, rhythms modulate our physiological functions and related behaviors such as body temperature, hormone secretions, and sleep/wake cycle," explained Sy-Jye Leu, a researcher with the Taipei Medical University and corresponding author for the study. "Circadian rhythms are the outward manifestation of an internal timing system which is driven by several genetic elements, what we call circadian clock genes." The appropriate expression or regulation of these genes is necessary for any organism to efficiently "program" physiological and behavioral activities in order to ensure survival, she said.

"AD is related to circadian rhythm dysfunction such as sleep problems and mood changes," added Chian-Jue Kuo, attending psychiatrist and assistant professor at Taipei City Hospital. "This study is important

because the authors used a clinical sample, instead of animal models, to look into circadian dysregulation in AD patients."

"Previous studies had demonstrated that [alcohol](#) could directly disrupt ... neuronal transmission in the brain," said Leu. "This would, in turn, influence the activity of circadian clock genes and disturb circadian rhythm-related responses. Assessing the levels of mRNA offers a direct measurement of gene expression of the circadian clock genes, and we can simultaneously assess nearly all of them."

Leu and her colleagues examined blood samples from 22 male patients who met the Diagnostic and Statistical Manual of Mental Disorders - Fourth Edition criteria for AD, as well as 12 healthy "control" subjects for comparison.

Results showed markedly lower baseline mRNA levels of the target circadian clock genes in the AD patients than in the control subjects, which indicates an overall lowering of circadian clock gene expression in individuals with chronic drinking.

"In other words, chronic alcohol consumption was associated with a destruction of normal [circadian clock](#) gene expression," said Leu. "This altered expression is closely related to circadian rhythm dysfunction and might link to a variety of physiological problems such as sleep/wake cycle dysregulation, depression, and even cancer."

In addition, said Leu, the reduced [gene expression](#) did not restore following early [alcohol](#) withdrawal treatment. "This provides the first human evidence that chronic drinking can have long-term damaging effects on the expression of circadian rhythm-responsible genes," she said. "It also lends clinical support to previous reports of circadian rhythm dysregulation as a consequence of chronic drinking."

Provided by Alcoholism: Clinical & Experimental Research

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