Want a good night's sleep in the New Year? Quit smoking

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As if cancer, heart disease and other diseases were not enough motivation to make quitting smoking your New Year's resolution, here's another wake-up call: New research published in the January 2014 issue of *The FASEB Journal* suggests that smoking disrupts the circadian clock function in both the lungs and the brain. Translation: Smoking ruins productive sleep, leading to cognitive dysfunction, mood disorders, depression and anxiety.

"This study has found a common pathway whereby cigarette smoke impacts both pulmonary and neurophysiological function. Further, the results suggest the possible therapeutic value of targeting this pathway with compounds that could improve both lung and brain functions in smokers," said Irfan Rahman, Ph.D., a researcher involved in the work from the Department of Environmental Medicine at the University of Rochester Medical Center in Rochester, N.Y. "We envisage that our findings will be the basis for future developments in the treatment of those patients who are suffering with tobacco smoke-mediated injuries and diseases.

Rahman and colleagues found that tobacco smoke affects clock gene expression rhythms in the lung by producing parallel inflammation and depressed levels of brain locomotor activity. Short- and long- term smoking decreased a molecule known as SIRTUIN1 (SIRT1, an anti-aging molecule) and this reduction altered the level of the clock protein (BMAL1) in both lung and brain tissues in mice. A similar reduction was seen in lung tissue from human smokers and patients with chronic

obstructive pulmonary disease (COPD). They made this discovery using two groups of mice which were placed in smoking chambers for short-term and long-term tobacco inhalation. One of the groups was exposed to clean air only and the other was exposed to different numbers of cigarettes during the day. Researchers monitored their daily activity patterns and found that these mice were considerably less active following smoke exposure.

Scientists then used mice deficient in SIRT1 and found that tobacco smoke caused a dramatic decline in activity but this effect was attenuated in mice that over expressed this protein or were treated with a small pharmacological activator of the anti-aging protein. Further results suggest that the clock protein, BMAL1, was regulated by SIRT1, and the decrease in SIRT1 damaged BMAL1, resulting in a disturbance in the sleep cycle/molecular clock in mice and human smokers. However, this defect was restored by a small molecule activator of SIRT1.

"If you only stick to one New Year's resolution this year, make it quitting smoking," said Gerald Weissmann, M.D., Editor-in-Chief of *The FASEB Journal*. "Only Santa Claus has a list longer than that of the ailments caused or worsened by smoking. If you like having a good night's sleep, then that's just another reason to never smoke."

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