

Obesity, Fitness & Wellness Week

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Smoking detrimental, not beneficial to patients with AD

University of California, Irvine, (UCI) researchers have determined that chronic nicotine exposure worsens some Alzheimer-related brain abnormalities, contradicting the common belief that nicotine can actually be used to treat the disease.

In the February 22, 2005, edition of the *Proceedings of the National Academy of Sciences*, the researchers report that chronic nicotine exposure increases neurofibrillary tangles - the bundles of fibers that are one of the two neuropathological hallmarks of the disease, the other being clump-like plaques. Previous animal studies had suggested that nicotine reduces the number of these plaques; however, this possible benefit is outweighed by the increase in tangles.

Alzheimer is a slow, progressive disease and the most common cause of dementia among the elderly in the United States, affecting 4.5-5 million adults - 10 times more than those affected by Parkinson disease. The disease is marked by the accumulation of two distinct brain lesions - beta-amyloid plaques and neurofibrillary tangles - which accumulate in specific brain regions critical to learning and memory.

"In earlier work, we showed that plaques can induce tangles," said Salvatore Oddo, graduate student in the School of Biological Sciences' department of

neurobiology and behavior, and the first author of the paper. "But that is only one way in which tangles can form. There are other pathways, independent of plaques, that can lead to the formation of tangles. One of these, our work shows, is nicotine. It increases tangles independent of plaques, and, therefore, should not be used as a treatment for Alzheimer's disease."

To determine whether nicotine has a preventative effect on both lesions of Alzheimer disease, the researchers administered the drug in the drinking water of 20 mice that were genetically engineered to develop both the plaques and the tangles of Alzheimer disease. The researchers found that chronic nicotine exposure increased the tangles while having no significant effect on the plaques.

"In contrast to previous reports that nicotine has some marginally positive effects, our latest findings suggest that chronic nicotine exposure may actually be **detrimental**, enhancing certain Alzheimer disease brain pathologies," said Frank LaFerla, principal investigator of the research project, associate professor of neurobiology and behavior, and codirector of the UCI Institute for Brain Aging and Dementia. "But these previous studies drew their conclusions after focusing only on plaque formation. Our paper stresses the importance of investigating Alzheimer's

disease therapies in animal models that involve both types of pathologies - plaques and tangles - as it is possible for a compound to positively affect one lesion while worsening the other."

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