

Caffeine may reverse Alzheimer's disease: Mouse study

By Stephen Daniells, 07-Jul-2009

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Five cups of coffee's worth of caffeine may reverse the impairment of memory associated with Alzheimer's disease, suggest two new studies with mice.

A dose of 500 milligrams of caffeine was found to reduce the amount of a protein called beta-amyloid in the brain of mice by about 40 per cent, according to studies from researchers at the Florida Alzheimer's Disease Research Center (ADRC).

The build-up of plaque from beta-amyloid deposits is associated with an increase in brain cell damage and death from oxidative stress. This is related to a loss of cognitive function and an increased risk of Alzheimer's, the most common form of dementia and currently affects over 13 million people worldwide.

The direct and indirect cost of Alzheimer care is over \$100 bn (€81 bn) in the US, while direct costs in the UK are estimated at £15 bn (€22 bn).

"These are some of the most promising Alzheimer's mouse experiments ever done showing that caffeine rapidly reduces beta amyloid protein in the blood, an effect that is mirrored in the brain, and this reduction is linked to cognitive benefit," said Huntington Potter, PhD, director of the Florida ADRC.

"Our goal is to obtain the funding needed to translate the therapeutic discoveries in mice into well-designed clinical trials."

Studies details

According to the new data published in the *Journal of Alzheimer's Disease*, 55 mice genetically programmed to develop age-related memory problems mimicking Alzheimer's disease were given either caffeine in their drinking water or plain water.

After two months of supplementation, the mice receiving the caffeine performed identically in tests of memory and reasoning to control mice aged normally and free of dementia.

Furthermore, the caffeinated mice had nearly 50 per cent lower levels of beta amyloid. Additional experiments indicated that caffeine may restore memory by reducing both enzymes needed to produce beta amyloid.

On the flip side, the Florida-based researchers did not observe any benefits in memory in non-demented (normal) mice when they were given caffeine from young adulthood through to old age.

"This suggests that caffeine will not increase memory performance above normal levels. Rather, it appears to benefit those destined to develop Alzheimer's disease," said Gary Arendash, the lead author of one of the two studies.

Human trials

The Florida-based researchers are hoping to undertake human trials in order to test if caffeine can benefit people with mild cognitive impairment or early Alzheimer's disease.

Early results have reportedly shown that caffeine may affect blood levels of beta-amyloid in elderly non-demented humans, just as it did in the Alzheimer's mice.

However, the researchers note: *"Plasma beta-amyloid levels are not an accurate index of brain beta-amyloid levels/deposition or cognitive performance in aged AD mice"*.

A blend of the science

Earlier this year, Scandinavian researchers reported that between three and five cups of coffee a day in middle age could decrease the risk of dementia and Alzheimer's disease by 65 per cent.

Data from participants of the Cardiovascular Risk Factors, Aging and Dementia (CAIDE) study were published in *Alzheimer's Disease*.

The average worldwide daily coffee consumption is one and a half cups, while the US average is more than three and a half cups.

Source: *Journal of Alzheimer's Disease*
Volume 17, Number 3, July 2009

"Caffeine Reverses Cognitive Impairment and Decreases Brain Amyloid- β Levels in Aged Alzheimer's Disease Mice"

Authors: G.W. Arendash, T. Mori, C. Cao, M. Mamcarz, M. Runfeldt, A. Dickson, K. Rezai-Zadeh, J. Tan, B.A. Citron, X. Lin, V. Echeverria, H. Potter

Source: *Journal of Alzheimer's Disease*
Volume 17, Number 3, July 2009

"Caffeine Suppresses Amyloid- β Levels in Plasma and Brain of Alzheimer's Disease Transgenic Mice"

Authors: C. Cao, J.R. Cirrito, X. Lin, L. Wang, D.K. Verges, A. Dickson, M. Mamcarz, C. Zhang, T. Mori, G.W. Arendash, D.M. Holtzman, H. Potter

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