

Mystery ingredient in coffee boosts protection against Alzheimer's disease

June 21 2011

A yet unidentified component of coffee interacts with the beverage's caffeine, which could be a surprising reason why daily coffee intake protects against Alzheimer's disease. A new Alzheimer's mouse study by researchers at the University of South Florida found that this interaction boosts blood levels of a critical growth factor that seems to fight off the Alzheimer's disease process.

The findings appear in the early online version of an article to be published June 28 in the *Journal of Alzheimer's Disease*. Using [mice](#) bred to develop symptoms mimicking [Alzheimer's disease](#), the USF team presents the first evidence that caffeinated coffee offers protection against the memory-robbing disease that is not possible with other caffeine-containing drinks or decaffeinated coffee.

Previous observational studies in humans reported that daily coffee/caffeine intake during mid-life and in older age decreases the risk of Alzheimer's disease. The USF researchers' earlier studies in Alzheimer's mice indicated that caffeine was likely the ingredient in coffee that provides this protection because it decreases [brain](#) production of the [abnormal protein](#) beta-amyloid, which is thought to cause the disease.

The new study does not diminish the importance of caffeine to protect against Alzheimer's. Rather it shows that caffeinated coffee induces an increase in blood levels of a growth factor called GCSF (granulocyte colony stimulating factor). GCSF is a substance greatly decreased in

patients with Alzheimer's disease and demonstrated to improve memory in Alzheimer's mice. A just-completed clinical trial at the USF Health Byrd Alzheimer's Institute is investigating GCSF treatment to prevent full-blown Alzheimer's in patients with [mild cognitive impairment](#), a condition preceding the disease. The results of that trial are currently being evaluated and should be known soon.

"Caffeinated coffee provides a natural increase in blood GCSF levels," said USF neuroscientist Dr. Chuanhai Cao, lead author of the study. "The exact way that this occurs is not understood. There is a synergistic interaction between caffeine and some mystery component of coffee that provides this beneficial increase in blood GCSF levels."

The researchers would like to identify this yet unknown component so that coffee and other beverages could be enriched with it to provide long-term protection against Alzheimer's.

In their study, the researchers compared the effects of caffeinated and decaffeinated coffee to those of caffeine alone. In both Alzheimer's mice and normal mice, treatment with caffeinated coffee greatly increased [blood levels](#) of GCSF; neither caffeine alone or decaffeinated coffee provided this effect. The researchers caution that, since they used only "drip" coffee in their studies, they do not know whether "instant" caffeinated coffee would provide the same GCSF response.

The boost in GCSF levels is important, because the researchers also reported that long-term treatment with coffee (but not decaffeinated coffee) enhances memory in Alzheimer's mice. Higher blood GCSF levels due to [coffee intake](#) were associated with better memory. The researchers identified three ways that GCSF seems to improve memory performance in the Alzheimer's mice. First, GCSF recruits stem cells from bone marrow to enter the brain and remove the harmful beta-amyloid protein that initiates the disease. GCSF also creates new

connections between brain cells and increases the birth of new neurons in the brain.

"All three mechanisms could complement caffeine's ability to suppress [beta amyloid](#) production in the brain" Dr. Cao said, "Together these actions appear to give coffee an amazing potential to protect against Alzheimer's -- but only if you drink moderate amounts of caffeinated coffee."

Although the present study was performed in Alzheimer's mice, the researchers indicated that they've gathered clinical evidence of caffeine/coffee's ability to protect humans against Alzheimer's and will soon publish those findings.

Coffee is safe for most Americans to consume in the moderate amounts (4 to 5 cups a day) that appear necessary to protect against Alzheimer's disease. The USF researchers previously reported this level of coffee/[caffeine intake](#) was needed to counteract the brain pathology and memory impairment in Alzheimer's mice. The average American drinks 1½ to 2 cups of coffee a day, considerably less than the amount the researchers believe protects against Alzheimer's.

"No synthetic drugs have yet been developed to treat the underlying Alzheimer's disease process" said Dr. Gary Arendash, the study's other lead author. "We see no reason why an inherently natural product such as coffee cannot be more beneficial and safer than medications, especially to protect against a disease that takes decades to become apparent after it starts in the brain."

The researchers believe that moderate daily coffee intake starting at least by middle age (30s – 50s) is optimal for providing protection against Alzheimer's disease, although starting even in older age appears protective from their studies. "We are not saying that daily moderate

coffee consumption will completely protect people from getting Alzheimer's disease," Dr. Cao said. "However, we do believe that moderate coffee consumption can appreciably reduce your risk of this dreaded disease or delay its onset."

The researchers conclude that coffee is the best source of caffeine to counteract the cognitive decline of Alzheimer's because its yet unidentified component synergizes with caffeine to increase blood GCSF levels. Other sources of caffeine, such as carbonated drinks, energy drinks, and tea, would not provide the same level of protection against Alzheimer's as coffee, they said.

Coffee also contains many ingredients other than caffeine that potentially offer cognitive benefits against Alzheimer's disease. "The average American gets most of their daily antioxidants intake through coffee," Dr. Cao said. "Coffee is high in anti-inflammatory compounds that also may provide protective benefits against Alzheimer's disease."

An increasing body of scientific literature indicates that moderate consumption of coffee decreases the risk of several diseases of aging, including Parkinson's disease, Type II diabetes and stroke. Just within the last few months, new studies have reported that drinking coffee in moderation may also significantly reduce the risk of breast and prostate cancers.

"Now is the time to aggressively pursue the protective benefits of coffee against Alzheimer's disease," Dr. Arendash said. "Hopefully, the coffee industry will soon become an active partner with Alzheimer's researchers to find the protective ingredient in coffee and concentrate it in dietary sources."

New Alzheimer's diagnostic guidelines, now encompassing the full continuum of the disease from no overt symptoms to mild impairment to

clear cognitive decline, could double the number of Americans with some form of the disease to more than 10 million. With the baby-boomer generation entering older age, these numbers will climb even more unless an effective preventive measure is identified.

"Because Alzheimer's starts in the brain several decades before it is diagnosed, any protective therapy would obviously need to be taken for decades," Dr. Cao said. "We believe moderate daily consumption of caffeinated coffee is the best current option for long-term protection against Alzheimer's memory loss. Coffee is inexpensive, readily available, easily gets into the brain, appears to directly attack the disease process, and has few side-effects for most of us."

According to the researchers, no other Alzheimer's therapy being developed comes close to meeting all these criteria.

"Aside from coffee, two other lifestyle choices -- physical and cognitive activity -- appear to reduce the risk of dementia. Combining regular physical and mental exercise with moderate coffee consumption would seem to be an excellent multi-faceted approach to reducing risk or delaying Alzheimer's," Dr. Arendash said. "With pharmaceutical companies spending millions of dollars trying to develop drugs against Alzheimer's disease, there may very well be an effective preventive right under our noses every morning – caffeinated [coffee](#)."

More information: Caffeine Synergizes with Another Coffee Component to Increase Plasma GCSF: Linkage to Cognitive Benefits in Alzheimer's Mice; Chuanhai Cao, Li Wang, Xiaoyang Lin, Malgorzata Mamcarz, Chi Zhang, Ge Bai, Jasson Nong, Sam Sussman and Gary Arendash; *Journal of Alzheimer's Disease*, 25(2), June 28, 2011.

Provided by University of South Florida

Citation: Mystery ingredient in coffee boosts protection against Alzheimer's disease (2011, June 21) retrieved 25 April 2024 from <https://medicalxpress.com/news/2011-06-mystery-ingredient-coffee-boosts-alzheimer.html>

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