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Vitamin D, curcumin may help clear amyloid plaques found in Alzheimer's

Early research findings may lead to new treatments for the disease

By Rachel Champeau | July 15, 2009

UCLA scientists and colleagues from UC Riverside and the Human BioMolecular Research Institute have found that a form of vitamin D, together with a chemical found in turmeric spice called curcumin, may help stimulate the immune system to clear the brain of amyloid beta, which forms the plaques considered the hallmark of Alzheimer's disease.

The early research findings, which appear in the July issue of the Journal of Alzheimer's Disease, may lead to new approaches in preventing and treating Alzheimer's by utilizing the property of vitamin D3 — a form of vitamin D — both alone and together with natural or synthetic curcumin to boost the immune system in protecting the brain against amyloid beta.

Vitamin D3 is an essential nutrient for bone and immune system health; its main source is sunshine, and it is synthesized through the skin. Deficiencies may occur during winter months or in those who spend a lot of time indoors, such as Alzheimer's patients.

"We hope that vitamin D3 and curcumin, both naturally occurring nutrients, may offer new preventive and treatment possibilities for Alzheimer's disease," said Dr. Milan Fiala, study author and a researcher at the David Geffen School of Medicine at UCLA and the Veterans Affairs Greater Los Angeles Healthcare System.

Using blood samples from nine Alzheimer's patients, one patient with mild cognitive impairment and three healthy control subjects, scientists isolated monocyte cells, which transform into macrophages that act as the immune system's clean-up crew, traveling through the brain and body and gobbling up waste products, including amyloid beta. Researchers incubated the macrophages with amyloid beta, vitamin D3 and natural or synthetic curcumin.

The synthetic curcuminoid compounds were developed in the laboratory of John Cashman at the Human BioMolecular Research Institute, a nonprofit institute dedicated to research on diseases of the human brain.

Researchers found that naturally occurring curcumin was not readily absorbed, that it tended to break down quickly before it could be utilized and that its potency level was low, making it less effective than the new synthetic curcuminoids.

"We think some of the novel synthetic compounds will get around the shortcomings of curcumin and improve the therapeutic efficacy," Cashman said.

The team discovered that curcuminoids enhanced the surface binding of amyloid beta to macrophages and that vitamin D strongly stimulated the uptake and absorption of amyloid beta in macrophages in a majority of patients.

Previous research by the team demonstrated that the immune genes MGAT III and TLR-3 are associated with the immune system's ability to better ingest amyloid beta. In this earlier work, Fiala noted, it was shown that there are two types of Alzheimer's patients: Type 1 patients, who respond positively to curcuminoids, and Type II patients, who do not.

"Since vitamin D and curcumin work differently with the immune system, we may find that a combination of the two or each used alone may be more effective — depending on the individual patient," he said.

Fiala noted that this is early laboratory research and that no dosage of vitamin D or curcumin can be recommended at this point. Larger vitamin D and curcumin studies with more patients are planned.

The study was funded by the Human BioMolecular Research Institute, the Alzheimer's Association and MP Biomedicals LLC, a global life sciences and diagnostics company dedicated to Alzheimer's disease research. Fiala is a consultant for MP Biomedicals and also served in the company's speakers bureau.

Additional study authors include Ava Masoumi, Ben Goldenson, Hripsime Avagyan, Justin Zaghi, Michelle Mahanian, Martin Hewison, Araceli Espinosa-Jeffrey and Phillip T. Liu, of the David Geffen School of Medicine at UCLA; Senait Ghirami, Ken Abel, Xuying Zheng and John Cashman, of the Human BioMolecular Research Institute; and Mathew Mizwicki, of the department of biochemistry at UC Riverside.

The David Geffen School of Medicine at UCLA, founded in 1951, is the youngest medical school to be ranked among the top 11 in the nation by U.S. News & World Report. The school has more than 2,000 full-time faculty members, including recipients of the Nobel Prize, the Pulitzer Prize and

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