

Advances in research into Alzheimer's disease

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Advances in research into Alzheimer's disease: transporter proteins at the blood CSF barrier and vitamin D may help prevent amyloid β build up in the brain

Advancing age is a major risk factor for Alzheimer's disease and is associated with build-up of the peptide amyloid β in the [brain](#). New research published in BioMed Central's open access journal *Fluids and Barriers of the CNS* shows that removal of amyloid β from the brain depends on [vitamin D](#) and also on an age-related alteration in the production of transporter proteins which move amyloid β in and out of the brain.

Low levels of vitamin D are thought to be involved in age-related decline in memory and cognition and are also associated with Alzheimer's disease. Researchers from Tohoku University, Japan, looked at the mechanism behind this and found that vitamin D injections improved the removal of amyloid β from the brain of mice.

Prof Tetsuya Terasaki said, "Vitamin D appears increase transport of amyloid β across the blood brain barrier (BBB) by regulating protein expression, via the vitamin D receptor, and also by regulating cell signaling via the MEK pathway. These results lead the way towards new therapeutic targets in the search for prevention of Alzheimer's disease."

The transport of amyloid β across the BBB is known to be orchestrated by transporter proteins such as LRP-1 and P-gp, which move amyloid β

out of the brain, and RAGE, which controls influx. Looking at the transport of amyloid β from blood to cerebrospinal fluid (CSF), and from CSF to blood, researchers from Rhode Island Hospital and The Warren Alpert Medical School, found that LRP-1 and P-gp at the blood-cerebrospinal fluid barrier (BCSFB), increased with age so increasing removal of amyloid β from the CSF and brain.

Prof Gerald Silverberg said, "While increased production of [transporter proteins](#) at the [blood](#) CSF barrier may help amyloid β removal from the older brain, production of these proteins eventually fails. This failure may be an important event in brain function as we age and for people with [Alzheimer's disease](#)."

More information: $1\alpha,25$ -Dihydroxyvitamin D₃ enhances cerebral clearance of human amyloid- β peptide(1-40) from mouse brain across the blood-brain barrier, Shingo Ito, Sumio Ohtsuki, Yasuko Nezu, Yusuke Koitabashi, Sho Murata and Tetsuya Terasaki, *Fluids and Barriers of the CNS* (in press)

Provided by BioMed Central

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