Alzheimer's disease drug treats traumatic brain injury

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The destructive cellular pathways activated in Alzheimer's disease are also triggered following traumatic brain injury, say researchers from Georgetown University Medical Center (GUMC). They say this finding suggests that novel therapy might successfully target both conditions.

In an oral presentation at the Alzheimer's Association 2009 International Conference on Alzheimer's Disease, the scientists will show that deactivating these pathways in part by using a gamma secretase inhibitor - a class of Alzheimer's disease drugs currently being tested - reduced loss of neurons in animal models of traumatic brain injury and protected the animals against motor and cognitive deficits.

"The goal for both diseases is to prevent neuronal cell death, and this study suggests that one therapy could possibly work for both," says the study's lead author, neuroscientist Mark Burns, PhD, an assistant professor at GUMC.

Both disorders are associated with build-up of beta amyloid, a toxic brain peptide. This substance is commonly found in the brains of elderly patients who died from Alzheimer's disease, but has also been found in a third of traumatic brain injury victims, some of whom are children, Burns says. It is also known that people who experience such a brain injury have a 400 percent increased risk of developing Alzheimer's disease.

Burns says that buildup of beta amyloid occurs in a second wave of

damage that follows immediate "necrotic" death of nerve cells after traumatic brain injury. This secondary injury can last months, if not years, resulting in large holes within brain tissue.

Amyloid peptides are produced when a long brain protein known as the amyloid precursor protein (APP) is cut in two by the enzyme beta secretase, and then cut once again by a second enzyme known as gamma secretase. Agents that inhibit the activity of gamma secretase are now being studied as treatment for Alzheimer's disease.

In this study, researchers used mice that were either treated with DAPT, an experimental gamma secretase inhibitor, or mice which were "BACE knock-outs" - so called because they were genetically altered in such a way that they could not produce beta secretase. In unaltered and untreated "normal" mice, brain injury resulted in a rapid accumulation of beta amyloid, along with cognitive and motor deficits. But DAPT and BACE knock-out mice had brain lesions that were as much as 70 percent smaller than control animals and they experienced minimal impairment.

The findings further cement the connection between Alzheimer's disease and traumatic brain injury, Burns says, and show that "modulation of beta and gamma secretase may provide novel therapeutic targets for the treatment of traumatic brain injury."

Source: Georgetown University Medical Center (news : web)