

Promising results for new Alzheimer therapy

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Scientists at Karolinska Institutet have evaluated a new Alzheimer's therapy in which the patients receive an implant that stimulates the growth of a certain type of nerve cell. The results, which are published in the scientific journal *Alzheimer's & Dementia*, suggest that the introduction of a nerve growth factor can prevent neuronal degradation in Alzheimer's patients.

Patients with Alzheimer's disease suffer a selective and early breakdown of so-called cholinergic nerve cells, which require a specific [nerve growth factor](#) (NGF) – essentially a group of proteins necessary for cell growth and survival – to function. As NGF levels decline, the cholinergic nerve cells begin to degrade and the patient's condition slowly deteriorates.

In an attempt to curb the breakdown of the cholinergic nerve cells, researchers at Karolinska Institutet's Centre for Alzheimer's Research and their colleagues at Karolinska University Hospital's neurosurgery clinic and the Danish biotech company NsGene introduced NGF directly into the brains of Alzheimer's patients. To do this, they used NGF-producing cell capsules, placing them in the basal fore-brain where the cholinergic cells reside using precision stereotactic surgery. There the capsules, which can easily be removed, release NGF to the surrounding cells in order to prevent their degradation.

The study now published in *Alzheimer's & Dementia* is based on data from six Alzheimer's patients. To gauge whether the NGF release had any effect on the cholinergic [nerve cells](#), the researchers assayed the

presence of specific markers of functioning cholinergic cells. This cell system communicates using acetylcholine, which in turn produces an enzyme called ChAT (pronounced Cat) that is found both inside and outside the cells. The team therefore developed a method enabling them to measure ChAT in the cerebral spinal fluid for the first time.

"Our results show that when the patients received NGF, there was a significant increase in ChAT in the CSF," says Dr Taher Darreh-Shori, one of the researchers involved in the study. "The patients that exhibited this increase were also those that responded best to the treatment. Our PET scans also showed an increase in cholinergic cell activity and metabolism in the brain."

In addition, the researchers were able to detect a retardation of memory impairment over time compared with untreated patients. While all this suggests that cholinergic functionality improved in the Alzheimer's patients who had received NGF therapy, the team adds the caveat that far-reaching conclusions should not be drawn from the results:

"The results are promising, but must be treated with circumspection as only a few patients participated in the study," says principal investigator Professor Maria Eriksson. "So our findings will have to be substantiated in a larger controlled study using more [patients](#)."

More information: "Changes in CSF cholinergic biomarkers in response to cell therapy with NGF in patients with Alzheimer's disease", Karami, A., H. Eyjólfsson, S. Vijayaraghavan, G. Lind, P. Almqvist, A. Kadir, B. Linderoth, N. Andreasen, K. Blennow, A. Wall, E. Westman, D. Ferreira, M. Kristoffersen-Wiberg, L. O. Wahlund, Seiger, Å., A. Nordberg, L. Wahlberg, T. Darreh-Shori, M. Eriksson, *Alzheimer's & Dementia*, uncorrected proof online 9 February 2015, [DOI: 10.1016/j.jalz.2014.11.008](https://doi.org/10.1016/j.jalz.2014.11.008).

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