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820 Jorie Blvd
Oak Brook, IL 60523
TEL 1-630-571-2670
FAX 1-630-571-7837
RSNA.org

NEWS

RSNA Press Release

MRI Shows Brain Atrophy Pattern that Predicts Alzheimer's

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Media Contacts:

RSNA Media Relations: (630) 590-7762

Maureen Morley
(630) 590-7754
mmorley@rsna.org

Linda Brooks
1-630-590-7738
lbrooks@rsna.org

At A Glance

- Researchers have used quantitative MRI to identify a pattern of brain atrophy that may be predictive of Alzheimer's disease.
- Patients with mild cognitive impairment who exhibit this atrophy pattern are significantly more likely to progress to Alzheimer's disease than those who do not.
- More than five million Americans have Alzheimer's disease.

OAK BROOK, Ill. — Using special MRI methods, researchers have identified a pattern of regional brain atrophy in patients with mild cognitive impairment (MCI) that indicates a greater likelihood of progression to Alzheimer's disease. The findings are published in the online edition of *Radiology*.

"Previously, this pattern has been observed only after a diagnosis of probable Alzheimer's disease," said the study's lead author, Linda K. McEvoy, Ph.D., assistant project scientist in the Department of Radiology at the University of California San Diego School of Medicine in La Jolla. "Our results show that some individuals with MCI have the atrophy pattern characteristic of mild Alzheimer's disease, and these people are at higher risk of experiencing a faster rate of brain degeneration and a faster decline to dementia than individuals with MCI who do not show that atrophy pattern."

According to the Alzheimer's Association, more than five million Americans currently have Alzheimer's disease. One of the goals of modern neuroimaging is to help in early and accurate diagnosis, which can be challenging. There is no cure for Alzheimer's disease, but when it is diagnosed early, drug treatment may help improve or stabilize patient symptoms.

In Alzheimer's disease, nerve cell death and tissue loss cause areas of the brain to atrophy. Structural MRI allows radiologists to visualize subtle anatomic changes in the brain that signal atrophy. MCI is associated with an increased risk of progression to Alzheimer's disease. Rates of progression vary. Some patients progress rapidly, while others remain stable for relatively long periods of time.

For the study, Dr. McEvoy and colleagues set out to determine if they could identify a pattern of regional atrophy characteristic of mild Alzheimer's disease in order to aid in the prediction of cognitive decline in patients with MCI.

In the study, the researchers analyzed brain MR images from 84 patients with mild Alzheimer's disease, 175 patients with MCI and 139 healthy controls, using with

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semi-automated, individually specific quantitative MRI methods. The results showed widespread cortical atrophy in some patients with MCI, involving all cortical areas except those involved with processing of primary motor and sensory information. However, most indicative of future cognitive decline were atrophy in parts of the medial and lateral temporal lobes and in the frontal lobes. This pattern was also present in the patients with mild Alzheimer's disease.

"Although these individuals are reporting problems mainly with memory, the atrophy involves more than just memory areas, extending into brain regions involved in planning, organization, problem solving and language," Dr. McEvoy said.

Follow-up data were available for 160 patients with MCI. The patients exhibiting atrophy in the brain regions described above showed significant one-year clinical decline and structural brain loss and were more likely to progress to a probable diagnosis of Alzheimer's disease. MCI patients without that pattern of atrophy remained stable after a year.

Dr. McEvoy hopes that these findings will have an impact on the design of clinical trials to test medications that may slow or halt the progression of Alzheimer's disease.

"Currently there are no treatments that will prevent or cure Alzheimer's disease, but information about risk of rapid decline may help patients with MCI and their families plan for the future," Dr. McEvoy said.

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"Alzheimer Disease: Quantitative Structural Neuroimaging for Detection and Prediction of Clinical and Structural Changes in Mild Cognitive Impairment." Collaborating with Dr. McEvoy were Christine Fennema-Notestine, Ph.D., J. Cooper Roddey, Ph.D., Donald J. Hagler, Jr., Ph.D., Dominic Holland, Ph.D., David S. Karow, M.D., Christopher J. Pung, B.A., James B. Brewer, M.D., Ph.D., and Anders M. Dale, Ph.D. Journal attribution requested.

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