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NEWS

RSNA Press Release

MRI May Predict Continued Decline in Patients with Mild Cognitive Impairment

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At A Glance

- Using MRI, researchers may identify which patients with mild cognitive impairment (MCI) will continue to decline.
- Patients with MCI had significantly more microbleeds and iron concentration in certain areas deep within the structure of the brain and reduced levels of iron in others.
- Half of all individuals with mild cognitive impairment will develop Alzheimer's disease.

OAK BROOK, Ill. — Using advanced MRI and an artificial intelligence technique, researchers in Geneva, Switzerland, have identified a method that may help identify which individuals with mild cognitive impairment (MCI) will continue to decline, according to a study published online and in the December issue of *Radiology*.

We know that about half of all individuals with early-stage mild cognitive impairment will progress to Alzheimer's disease," said lead researcher Sven Haller, M.D, M.Sc., a radiologist at University Hospitals of Geneva. "But not knowing which patients will continue to decline makes it difficult to treat Alzheimer's early in the disease process."

Haller and a team of researchers used two novel techniques to image the brains of 35 control participants (mean age 63.7) and 69 patients with MCI (mean age 65 years), including 38 women and 31 men. Patients were diagnosed with MCI based on a battery of neuropsychological tests, which were repeated on 67 of the patients one year later to determine whether their disease was stable (40 patients) or progressive (27 patients).

Using an advanced technique called susceptibility-weighted MRI, the researchers were able to generate scans with greater detail of the many blood vessels in the brain, including the presence of tiny leaks called microhemorrhages or microbleeds.

"The number of cerebral microbleeds was significantly higher in the individuals with mild cognitive impairment than those in the control group," Dr. Haller said.

The MRI scans revealed microbleeds in 33 percent of individuals with stable MCI and 54 percent of those with progressive MCI. Only 14 percent of the control participants had microbleeds.

The susceptibility-weighted MRI also revealed that compared to the control participants,

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individuals with MCI had significantly increased iron concentration in certain areas deep within the structure of the brain and reduced levels of iron in others.

"Altered iron distribution in the subcortical nuclei was another distinguishing feature between the healthy control individuals and patients with mild cognitive impairment," Dr. Haller said.

Haller's team also analyzed the MRI data with support vector machines (SVM), an artificial intelligence technique that uses algorithms to identify patterns within a group and create classifications. SVM analysis of baseline MRI data acquired at the initial exam distinguished patients with progressive MCI from those with stable MCI with 85 percent accuracy.

"The goal of my work is to identify biomarkers of mild cognitive impairment that will help us diagnose individual patients at risk for further decline," Dr. Haller said. "Using SVM to analyze iron deposits in the brain may be such a biomarker."

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"Cerebral Microhemorrhage and Iron Deposition in Mild Cognitive Impairment: Susceptibility-weighted MR Imaging Assessment." Collaborating with Dr. Haller were Andreas Bartsch, M.D., Duy Nguyen, M.D., Cristelle Rodriguez, M.R.Psychol., Joan Emch, M.R.Psychol., Gabriel Gold, M.D., Karl O. Lovblad, M.D., and Panteleimon Giannakopoulos, M.D.

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