MedicalXpress

Prediction of conversion to Alzheimer's disease with longitudinal measures and time-to-event data

May 12 2017

Predicting the timing of Alzheimer's disease (AD) conversion for individuals with mild cognitive impairment (MCI) can be significantly improved by incorporating longitudinal change information of clinical and neuroimaging markers, in addition to baseline characteristics, according to projections made by investigators from The University of Texas Health Science Center at Houston. In an article published in *Journal of Alzheimer's Disease*, the research team describes how their novel statistical models found that longitudinal measurements of ADAS-Cog was the strongest predictor for AD progression and the predictive utility was consistently significant with progression of disease.

"The growing public health threat posed by Alzheimer's disease has raised urgency to discover and assess prognostic markers for the early detection of the disease," says Sheng Luo, PhD, senior author of the report. "We assessed the comparative predictive utility of thirty-three longitudinal markers in determining the risk of AD conversion at future time points among individuals with MCI. We found that longitudinal measurements of common cognitive and functional tools can provide more accurate prediction regarding AD conversion than volumetric MRI markers for MCI patients, and markers would show different predictive values at different times in disease progression."

The data used for this study was from the Alzheimer's Disease Neuroimaging Initiative (ADNI) study. It was very well suited for the

tasks because of its large samples, long follow-up period, breadth of cognitive markers and biomarkers, and prospective nature. "We simultaneously modeled time-to-dementia as well as longitudinal change in the neuropsychological, neuroimaging, and functional/behavioral variables, using joint modelling for longitudinal and survival data. These longitudinal measures may be highly associated with time-to-dementia, and therefore statistical methods that can model both the longitudinal and the time-to-event components jointly are becoming increasingly essential in most observational studies and clinical trials of neurodegenerative disorders such as AD," remarked Dr. Luo.

"The main contribution of the study," according to the lead author Li, "is that it's the first attempt to comprehensively evaluate the comparative predictive ability of longitudinal markers, both clinical and biological, for timing of AD conversion under the joint model framework. We demonstrated that the imaging and other technology-intensive markers are less powerful than cognitive and functional assessments in the prediction of AD conversion. We expect the markers identified as strong predictors in this study along with the joint modeling approach can serve as a useful tool for continuous monitoring of AD progression and treatment effect in the clinical practice."

Provided by IOS Press