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Differentiation between normal aging, mild cognitive impairment and Alzheimer's disease using MRI, neuropsychological, CSF and PET markers: Which are the best contributors?

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Abstract

Alzheimer's disease (AD) is a progressive neurodegenerative disease with an insidious onset that is difficult to distinguish from normal aging especially in its earliest stages. It typically begins with a subtle impairment of memory that evolves into the amnestic form of mild cognitive impairment (aMCI). As the disease continues to progress, other cognitive domains become affected and a full dementia state becomes apparent. In order to better understand this disease and to develop effective treatments for it, biomarkers are needed to identify the stages of normal aging, MCI, and AD and predict future cognitive decline. A number of potential biomarkers have been studied in isolation and some have been shown to have reasonable predictive power, but the relationship between the various markers is not well understood making it difficult to understand just what combinations are optimal. We've been working to determine the optimal combination of CSF biomarkers, MRI morphometry variable, FDG PET metabolism variables and neuropsychological test scores to differentiate between subjects who are aging normally and those with either MCI or AD. Our results indicate that combining variables from all of the modalities significantly improved the index of discrimination, especially at the earliest stages of the disease when identifying one's group membership would be expected to be most difficult. MRI variables proved to be highly associated with baseline cognitive function and the best predictor future cognitive decline. These findings suggest that complex approaches will be needed to identify individuals at the earliest stages of this disease.

Biography

Ronald J. Killiany completed his Ph.D. in Physiological Psychology in 1991 from Northeastern University and went on to complete postdoctoral studies where he began working in Neuropsychology and MRI scanning at Boston University School of Medicine, Brigham and Women's Hospital and Massachusetts General Hospital. He is currently the director of the Center for Biomedical Imaging at Boston University School of Medicine. He has published more than 70 papers in reputed journals and serves as an ad hoc reviewer for a number of scientific journals.

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