Neuroimaging may shed light on how Alzheimer's disease develops

11 January 2010

Current Alzheimer's disease (AD) research indicates that accumulation of amyloid-beta (A?) protein plaques in the brain is central to the development of AD. Unfortunately, presence of these plaques is typically confirmed only at autopsy. In a special issue of the journal *Behavioural Neurology*, researchers review the evidence that Positron Emission Tomography (PET) can image these plaques during life. This exciting new technique provides researchers with an opportunity to test the amyloid hypothesis as it occurs in living patients.

In a review article with over 100 references, Dr. Gil Rabinovici and Dr. William Jagust from the University of California, San Francisco and Berkeley, summarize the results of experiments from their laboratories and others using the A? tracer Pittsburgh Compound-B (PIB). This compound binds to A? protein and allows the mapping of plaques in the brains of AD and non-AD volunteer subjects.

They report that PIB-PET can detect A? deposits in a significant proportion of cognitively normal older subjects and that these deposits are associated with brain atrophy even in the absence of cognitive symptoms. By the time patients develop mild cognitive impairment (MCI) amyloid load in the brain appears to have reached a plateau. As patients progress to dementia, neurodegeneration and cognitive decline proceed independently of further amyloid accumulation.

The authors interpret these results as consistent with a model in which amyloid deposition plays a critical early role on the path to AD, beginning years before onset of symptoms and triggering a series of events which ultimately leads to cognitive decline and dementia.

While the use of PIB-PET is currently limited to research centers because of the compound's very short radioactive half-life (20 minutes), new amyloid imaging agents with longer half-lives are under development for more widespread use. Amyloid imaging is already playing an important role in the development of amyloid-based therapies for AD, and Dr. Rabinovici and Dr. Jagust speculate that in the future amyloid imaging will assist clinicians in identifying patients with mild or atypical symptoms who may be candidates for anti-amyloid treatments.

Writing in the article, the authors state, "PIB-PET has provided us with our first in vivo glance at the dynamic relationship between amyloid deposition, clinical symptoms, and structural and functional changes in the brain in the continuum between normal aging and AD…In the future, A? imaging will likely supplement clinical evaluation in selecting patients for anti-amyloid therapies both during drug development and in the clinic."

More information: The article is "Amyloid imaging in aging and dementia: Testing the amyloid hypothesis in vivo" by G.D. Rabinovici and W.J. Jagust. It appears in Behavioural Neurology, Vol. 21, Issues 1-2 (2009), published by IOS Press.

Provided by IOS Press