Closer to a cure: PET imaging tracks early stages of Alzheimer's

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Research unveiled at SNM's 57th Annual Meeting shows that scientists are drawing closer to documenting the progression of a disease process believed to cause Alzheimer's disease. This research could eventually lead to life-saving preventative measures for millions of patients who suffer from this chronic neurodegenerative disorder.

"Alzheimer's is a relentless disease that kills once it is established in the brain, but we are tantalizingly close to a cure," said Mark Mintun, M.D., professor of radiology and director of the Center for Clinical Imaging Research at Washington University, St. Louis, Mo. "The build-up of a naturally-occurring protein called beta-amyloid appears to be associated with the initiation of the disease. There is significant interest in understanding how to image this process and develop potential pharmaceuticals to prevent or remove beta-amyloid from the brain before the onset of dementia."

In one of the few large-scale, longitudinal studies of its kind, scientists used positron emission tomography (PET) to document changes in the accumulation of beta-amyloid, which forms into a plaque in the neural tissues of those diagnosed with Alzheimer's. Research reveals that by the time patients are diagnosed and once-healthy neurons have begun to deteriorate, it may be too late to effectively treat Alzheimer's disease and restore brain function. PET and other molecular imaging techniques are helping researchers to understand the initial pathology of the disease in order to determine the best course of treatment for each patient—even before symptoms occur, such as diminished memory and critical thinking and eventually the ability to perform simple tasks.

Using molecular imaging to monitor changes in beta-amyloid levels in the brains of elderly patients, scientists will be able to develop drugs that could potentially prevent Alzheimer's disease, and physicians will be able to determine at what stage of the disease treatment should begin. "With this type of research, physicians could be able to recommend treatment before irreversible damage occurs," added Mintun.

The study involved 129 participants, ages 45 to 86 with a mean age of 67 and with no signs or symptoms of cognitive disorder. Subjects underwent two PET scans within a five-year period using 11C Pittsburgh Compound-B (11C-PIB), a PET imaging agent that binds to beta-amyloid in the brain. The average length of time between scans was two-and-a-half years. Changes in beta-amyloid deposits were documented and used to determine the progression of potential preclinical disease. Results revealed that beta-amyloid deposits were abnormally high in 19 of the 129 subjects on the very first PET scan, and eight of the remaining 110 subjects became abnormal by the second scan. In these 27 subjects with abnormal beta-amyloid deposits, there were highly significant increases in the level of beta-amyloid between the two scans. Researchers hope to ultimately use this and other data to develop a method of detecting the onset and progression of very early stages of Alzheimer's disease.

Scientists now suspect that Alzheimer's disease begins developing an estimated 10 years before the appearance of cognitive dysfunction. According to the World Health Organization, approximately 18 million people are currently living with Alzheimer's disease worldwide. This number is projected to almost double by 2025.

Provided by Society of Nuclear Medicine

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