OFFICIAL ABSTRACT and CERTIFICATION

Detection of Amyloid Plaques Targeted by USPIOs and ARIA Evaluation in a Non-Human Primate Model of Sporadic Cerebral Amyloid Angiopathy (CAA)

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Alzheimer's Disease is a neurodegenerative disorder that is one of the most common forms of dementia. While there is still no cure for the disease, early diagnosis of the disorder is important for gauging the efficacy of any treatments. To this end, there have been developments on an MRI method of determining amyloid-β (Aβ) and CAA burden of aged squirrel monkey models of AD using a compound of ultrasmall superparamagnetic iron-oxide nanoparticles, polyethylene glycol, and Aβ-40/42 peptides (USPIO-PEG-Aβ). Analyses of pre- vs. post-injections at various time points suggest that USPIO compounds can cross the blood-brain barrier and accurately bind to Aβ plaques.

Another aim of the study was to determine the efficacy of squirrel monkeys as a model for amyloid-related imaging abnormalities (ARIA) pathology seen in humans. This model can be utilized for determining the efficacy of different immunotherapeutic treatments being tested in non-human primate models for future clinical trials. ARIA evaluation in this model has also been done, helping to better assess the safety of different immunotherapeutic drugs.

The usage of USPIO-PEG-Aβ nanoparticles by medical researchers can help to accurately assess the presence of Alzheimer's disease in patients. While continuing to optimize MRI sequences for better quality images, data that has been obtained suggests that squirrel monkeys show pathology similar to those of human AD patients. Results suggest that the usage of USPIOs combined with white matter hyperintensity analysis of ARIA pathology can be used to effectively gauge the severity of amyloid plaque pathology and non-toxicity in squirrel monkeys.

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