

# AFSUMB 2024

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Societies for Ultrasound in Medicine and Biology

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**Speaker** : Jaeho Kim

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**Specialty** : Others

**Lecture Title** : Enhancement of Glymphatic Activity in Neurodegenerative Disease Using Low-Intensity Ultrasound Treatment

$\beta$ -Amyloid accumulation is the earliest pathological hallmark in Alzheimer's disease, initiating a cascade of neurodegenerative changes and cognitive decline. While recent advancements have introduced anti-amyloid therapies as potential treatments for Alzheimer's disease, their feasibility remains limited by concerns over stability and cost-effectiveness. Emerging research has elucidated the safety and neuromodulatory effects of low-intensity ultrasound within the brain, positioning it alongside techniques such as transcranial electrical stimulation (tES) and transcranial magnetic stimulation (TMS) in the realm of neuromodulation.

This prospective pivotal study involved ten participants whose baseline amyloid PET readings were positive and who had LIUS between September 2022 and February 2023. Treatment for LIUS involves four weeks of sessions. The blood-brain barrier (BBB), amyloid deposition changes, glymphatic activity, and microbleed incidence were quantitatively analyzed using MRI and amyloid PET scans. Neuropsychological assessments were also evaluated to assess cognitive changes.

No major adverse events occurred during treatment for any of the participants. Increased glymphatic activity was observed in the cerebral cortex after treatment. Improvements in cognitive function were shown by neuropsychological testing. No significant changes were observed in BBB integrity, microbleed occurrence, or brain volume.

These safety and feasibility results indicate that low-intensity ultrasound can lead to clinical improvement in patients on the AD continuum.