WashU

Office of Technology Management

BIOMARKER-BASED METHOD FOR PREDICTING COCHLEAR IMPLANT PERFORMANCE

Rutherford, Mark, Walia, Amit

Richards, Jennifer

T-021100

Published date: 2/17/2026

Value Proposition: *Novel method that measures levels of Alzheimer's disease-related biomarkers to improve patient care and satisfaction for cochlear implant outcomes.*

Technology Description

Researchers at Washington University in St. Louis have developed a method for collecting and analyzing perilymph fluid during cochlear implantation. Despite the success of using Cochlear implants (CIs), speech outcomes with CIs remain variable and unpredictable. This variability complicates the management of patient expectations, early identification of cases needing additional aural rehabilitation, and determination of optimal device function for each individual recipient. Currently, clinicians lack the ability to accurately predict a patient's performance with the device, limiting their ability to provide personalized counseling and guidance.

This method addresses a critical commercial problem by providing a minimally invasive technique for collecting and analyzing perilymph fluid during cochlear implantation. By measuring levels of Alzheimer's disease-related biomarkers such as amyloid-β and tau proteins using highly sensitive technologies like the Single Molecule Array (SiMoA), this innovation enables clinicians to predict individual CI performance better and to more deeply explore the connection between cognitive decline and inner ear health. This approach enhances understanding of hearing loss and its potential association with neurocognitive decline. Ultimately, it offers a novel approach to improving patient care and satisfaction by leveraging molecular diagnostics in cochlear implantation outcomes.

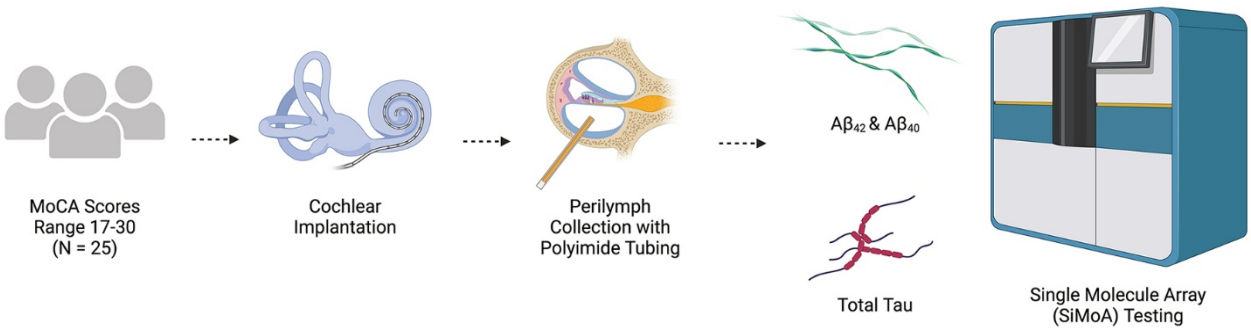

Figure: Flow diagram showing perilymph collection from scala tympani during cochlear implantation and subsequent single molecule array (SiMoA) testing for Tau, Aβ42, and Aβ40 levels.

Stage of Research

Tested on collected perilymph fluid from patients undergoing cochlear implantation.

Publications

Walia A, Shew MA, et. al. Alzheimer's Disease-Related Analytes Amyloid-β and Tau in Perilymph: Correlation with Patient Age and Cognitive Score. Otolaryngol Head Neck Surg. 2024 Dec;171(6):1850-1858. doi: 10.1002/ohn.942. Epub 2024 Aug 27. PMID: 39189154; PMCID: PMC11606756.

Applications

- Improving performance of cochlear implants

Key Advantages

- Provides personalized insights to improve cochlear implant outcomes and patient care
- Innovative technique for collecting and analyzing perilymph fluid during cochlear implantation
- Employs highly sensitive SiMoA technology for precise biomarker detection
- Innovative technique for collecting and analyzing perilymph fluid during cochlear implantation
- Potential for predictive analytics in cochlear implantation based on cognitive biomarker levels

Patent Pending

Related Web Links – Amit Walia Profile