

Transforming the Electronic Health Record into a Discovery Platform for Alzheimer's Research

Fellow: Angela L. Jefferson, PhD, Vanderbilt University Medical Center

Collaborators: Jennifer Pietenpol, PhD, Timothy Hohman, PhD, and Maureen Gannon, PhD

Background/Significance: Within the electronic health record (EHR), ICD-9 and ICD-10 diagnostic codes are the only available “technology” for Alzheimer’s discovery. Even if patients are correctly identified, Alzheimer’s pathology develops 25 years prior to memory symptom onset, so by the time a patient is symptomatic, the damage is widespread. A more forward-thinking approach is to improve our early identification tools, years before symptom onset, when therapies can substantially delay or prevent the disease. New, ultra-sensitive technology can capture lower abundance proteins in the blood. For the first time ever, we can use a blood test to detect phosphorylated tau, one of the primary protein abnormalities in Alzheimer’s disease, and we can do so well before symptom onset.

Purpose: The purpose of this institutional action project is to transform the EHR into a world class discovery platform for Alzheimer’s therapies by integrating an Alzheimer’s blood test.

Approach: We will build a viable, robust, and transformative database with a blood-based biomarker of phosphorylated tau. First, using institutional seed funding, we will pilot the concept by integrating into the BioVU sample processing pipeline using existing protocols to access unused plasma from outpatients age 50 and older. We will purchase and set up the biomarker platform, create a pilot dataset of 500 samples, and integrate these data into BioVU.

Next, we will establish the phosphorylated tau test as a one-of-a-kind discovery asset. We will generate phosphorylated tau data on 25,000 outpatients. To achieve this phase, we will procure NIH funding to finance sample processing, storage, assays, and a series of integrated cutting-edge research projects. We will curate other data elements, such as brain scans, to further optimize BioVU for our neuroscience community.

Once we establish this robust resource, we will utilize it as a transformative tool, with endless opportunities to pursue additional funding to advance discovery. We will translate our discoveries into trials and promote the resource externally, including commercial opportunities.

Outcomes: To confirm our success, we will track two sets of metrics. First, we will track scientific gains, including Alzheimer’s and neuroscience discoveries and their translation. Second, we will track ancillary financial benefits, including federal grant dollars and commercialization opportunities.

Discussion: For decades, the ‘holy grail’ for Alzheimer’s detection has been the creation a valid blood-based biomarker, which is finally a reality. We can integrate ultra-sensitive technology capturing phosphorylated tau in the blood for thousands of patients and create unparalleled discovery opportunities for our Alzheimer’s and neuroscience community. Integrating this technology into the EHR not only capitalizes on the strengths of BioVU’s capabilities, but it also aligns with our institutional strategy to make healthcare personal.

Conclusion: Transforming the EHR into a discovery platform for Alzheimer’s research can convert Alzheimer’s from a disease we cannot treat to a disease we can prevent, revolutionizing healthcare delivery for millions.