Quanterix®

Fact Sheet

Brain-Derived Tau (BD-Tau)

What is BD-Tau?

Brain-derived Tau (BD-Tau) is one of the latest additions to the growing neurology biomarker family that holds promise to improve the accuracy in the identification and staging of neurodegeneration in Alzheimer's disease (AD) and other neurological conditions.

AD is the most common type of neurodegenerative disease, characterized by the presence of amyloid plaques and neurofibrillary tangles in the brain that can occur over a decade before cognitive decline. Early identification and monitoring of neurodegeneration risks are crucial for effective AD management. While cerebral spinal fluid (CSF) total Tau (T-Tau) reliably indicates AD-specific neurodegeneration, blood T-Tau shows lack of correlation with CSF T-Tau and minimal change in AD. This limitation is likely due to the predominant peripheral origin of Tau in blood, which accounts for approximately 80%, making brain-specific changes in circulating Tau levels hard to detect. Selectively measure BD-Tau by targeting the low molecular weight Tau isoforms expressed in the central nervous system (CNS) creates an avenue to profile more brain-specific changes in Tau levels in blood and to better understand the dynamic between BD-Tau and T-Tau in AD research and beyond.

Research has shown that blood BD-Tau levels well correlate with CSF T-Tau and track with amyloid pathophysiology. Blood BD-Tau outperforms blood T-Tau and NfL in identifying AD-specific neurodegeneration from other dementias. Blood BD-Tau has the potential to predict risks for short-term cognitive decline in AD individuals. Additionally, compare to NfL, blood BD-Tau levels have shown to be less susceptible to age, renal function, APOE genotype, and other comorbidities, suggesting blood BD-Tau may help improve the accuracy in the stratification of individuals in heterogenous populations. Moreover, BD-Tau may aid in monitoring recovery following severe traumatic brain injury (sTBI) and ischemic stroke.

The unique brain specificity makes BD-Tau a promising biomarker in biofluids for the study of neurological conditions. The use of BD-Tau in combination with other neurology biomarkers could provide critical brain-specific insights for better understanding and diagnostics of neurodegenerative diseases and other neurological disorders.

How to Measure BD-Tau?

Quanterix offers Simoa® digital immunoassays for the quantitative determination of BD-Tau in human serum, plasma, and CSF samples, available in single plex and multiplex assay formats with a single, automatable assay workflow.

What is the Simoa® Difference?

Simoa® is a powerful digital immunoassay technology that is up to 1000 times more sensitive than standard sandwich-based immunoassay techniques. Traditional ELISA measurements are limited to pg/ml levels of detection. Quanterix Simoa® can achieve sensitivity as low as femtogram (fg/ml) levels, delivering the gold standard for early, ultra-sensitive detection and quantification of proteins far below the typical lower limit of quantification (LLOQ).

Simoa® is based upon the isolation of individual immunocomplexes on paramagnetic beads using standard ELISA reagents. The main difference between Simoa® and conventional immunoassays lies in the ability to trap single molecules in femtoliter-sized wells, allowing for a "digital" readout of each individual bead to determine if it is bound to the target analyte or not.

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The Simoa® technology was essential to the discovery and foundational studies of BD-Tau as a blood-based marker. Quanterix, with its leading neuro biomarker science insights and assay development expertise, is the first to offer integrated assay solutions for BD-Tau, providing a novel and valuable tool for advancing research into AD and beyond.

Neurological disorders continue to be among the most challenging to diagnose early and treat. Unlike 'visible' illnesses, neuronal injury and neurodegeneration can be overlooked or mistaken for other conditions. The subtlety of symptoms and the subjective nature of today's assessments also make it difficult to identify these diseases early. Currently, no definitive tests exist for the early detection of neurodegenerative diseases such as AD. Clinicians can only conclusively diagnose them once symptoms start to present. As a result, many patients may wait years for a diagnosis or a clear treatment pathway.

BD-Tau has emerged as a novel biomarker for AD-specific neurodegeneration and longitudinal monitoring of brain injury. The Simoa® technology was essential to the discovery and founding studies of BD-Tau as a blood-based neurology biomarker. Quanterix, with its leading neurology biomarker science insights and assay development expertise, is the first to offer integrated assay solutions for BD-Tau, adding a novel and valuable tool for the advancement of research into AD and beyond.