Biomarker Detection Tech From Tufts Fuels Diagnostic And Therapeutic Advances

Tufts University

Blood tests can now help doctors diagnose Alzheimer's disease and other neurological conditions long before symptoms start to appear, thanks to technology developed at Tufts University that detects subtle increases in the number of tiny disease-specific proteins, or biomarkers, in a blood sample.

Protein biomarkers in blood have been identified for many diseases, which means that blood tests for these biomarkers can be used to confirm the presence of disease. However, for diseases with very low concentrations of these biomarkers (known as "low-abundance" biomarkers) in the blood, early diagnosis has not been possible using conventional biomarker tests.

Simoa (**si**ngle **mo**lecule **a**rray) technology, developed at Tufts, is up to 1,000 times more sensitive for detecting low-abundance biomarkers than conventional methods. The process uses antibody-coated beads that bind to biomarkers—

as few as one molecule per bead—and then set off a fluorescent signal for easy quantification.
Simoa technology was developed in 2007 by David Walt, PhD, and his research team with support from US government grants. Walt, with the support of Tufts Tech Transfer, co-founded Quanterix, Inc. that same year to commercialize the technology. Tufts Technology Transfer filed and prosecuted the core patents on which the Simoa technology is based and negotiated a license agreement with Quanterix.

Simoa enables much earlier disease detection, better prognoses and enhanced treatment methods to improve patient quality of life and longevity. Quanterix is developing applications in several therapeutic areas, including oncology, neurology and neurodegenerative diseases, cardiology, inflammation and infectious disease. Tufts has remained an active partner, supporting Quanterix's continued success. Quanterix launched its IPO in 2017.

Simoa's sensitivity offers a new way to monitor healthy individuals and detect disease biomarkers early, making intervention possible before significant clinical signs and symptoms have appeared. In April 2022, the Simoa technology received a Breakthrough Device designation from the Food and Drug Administration to be used to help identify patients with relapsing-remitting multiple sclerosis who are at risk for relapse within a few years. In October 2023, as part of the company's LucentAD diagnostic blood testing platform, the Simoa biomarker detection technology became available for doctors to use in conjunction with other diagnostic tools for the early diagnosis of Alzheimer's disease.

Being able to detect changes in biomarker levels can also help researchers test the effectiveness of new treatments. In patients with a genetic form of amyotropic lateral sclerosis (ALS), Simoa technology helped document positive changes in disease-specific biomarker levels following spinal injection of a drug called Qualsody—findings that led to the treatment receiving FDA accelerated approval in April 2023.

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