Development of a multiplex nanofluidic assay for selective detection and monitoring of Alzheimer’s disease biomarkers

https://www.neurodegenerationresearch.eu/survey/development-of-a-multiplex-nanofluidic-assay-for-selective-detection-and-monitoring-of-alzheimers-disease-biomarkers/

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Research Abstract

In this work, I propose the use of a nano/microfluidic system to detect biomarkers relevant to Alzheimer’s disease (AD). The use of this system could give earlier and more accurate diagnoses, as well as provide the opportunity for therapeutic interventions and effective disease monitoring. Prior to the diagnosis of dementia and even before the appearance of plaques and tangles, it is suspected that biochemical changes have begun to occur in the brain that eventually lead to AD. Due to the brain being a particularly difficult organ to access, the search for biomarkers has focused primarily on cerebrospinal fluid (CSF) and blood. Because the available sample and biomarker levels are low, clinical tools that can measure candidate biomarkers for reproducible detection are currently insufficient. Here we propose a nanofluidic system with well-defined surface chemistry to greatly improve the sensitivity, selectivity and reproducibility in detection of biomarkers found in CSF. Our device will be fabricated using standard silicon microfabrication procedures to produce highly controlled channels for sample handling and multiplex detection. By working under continuous-flow conditions rather than in batch format, we eliminate variability due to mass transport limitations while allowing for improved standardization. Concentrating the antibodies to a discrete area will increase selectivity and allow amyloid-beta quantitation in spiked serum and real CSF of normal and Alzheimer’s donor samples to be achieved. I believe that development of a multiplex diagnostic tool will offer many more people access to better disease diagnosis management and assist in the search for better therapeutics that not only slow disease progression but potentially reverse it.

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