Methods and Devices for Detection of Biological Materials Using Electric Field Assisted Rapid Analyte Capture

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Inventor:

Debashis Dutta

Patent Status:

Utility Patent

Description of Technology

Alzheimer's Disease (AD) is a debilitating condition that causes brain cells to degenerate and die. AD generally causes a continuous decline in thinking, behavioral, and social skills. The early detection of Alzheimer's Disease can help the patient's comfort and treatment before many of their life skills seriously decline. An event that is central to the progression of AD is the formation of plaque between the neurons in the brain. Amyloid-β derived ligands (ADDL) are the species responsible for plaque formation. Currently, the commercially available enzyme-linked immunosorbent assay (ELISA) kits are the primary method to detect ADDL. The main issue with ELISA kits is that they are not sensitive enough to detect the low concentrations of ADDL that are present in early stage AD.

Researchers at the University of Wyoming have created a new method for detecting lower concentrations of a biological material in a sample. The approach works by having a sample flow through a microfluidic channel where bonding molecules are attached to the walls of the channel. These bonding molecules specifically bond to whatever biological material is to be identified in the sample by applying an electric current during a portion of the binding step. Once the material bonds to the bonding molecules, reporter molecules inside the channel generate a detectable electrical signal. Concentrations much smaller than those identified with current methods can now be detected because the same sample can be run through the channel many times to increase the amount detected.

Applications

This new identification method can be used for any application where a biological material needs to be detected in a sample, but it is especially helpful detecting ADDL for diagnosing early stage Alzheimer's Disease. Since this method is much more accurate than what is currently commercially available, it can detect AD much earlier and lead to more valuable treatment for the patient.

Features & Benefits

- Detects different types of biological materials from a sample
- Can detect materials in samples in much lower concentrations than what is currently available
- Can detect Alzheimer's Disease much sooner than the current method
- One sample can be run through the system many times to increase detection