Fast and accurate detection of Alzheimer’s Disease targets with SimpleStep ELISA® kits and SPECTROstar® Nano

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- Assessing expression of neuronal targets is an important part in Alzheimer’s disease research
- SimpleStep ELISA® Kits quantify BDNF, Tau and TREM2 in a one-wash 90 min protocol
- SPECTROstar® Nano detects assays and results are analyzed automatically with MARS analysis software

Introduction

Alzheimer’s disease (AD) is a multifactorial neurodegenerative condition. While it is accepted that AD results in progressive dementia, the causes and mechanisms leading to this condition are still poorly understood. Numerous candidates for potential intervention have been proposed, but further research on their roles in AD and normal neural function is required to develop safe and effective therapies. Here, we describe the detection of 3 targets; Human BDNF (Brain derived neurotrophic factor), Tau and TREM2 (Triggering receptor expressed in myeloid cells 2) for which changes in expression have been implicated in AD progression. Each of the analytes was tested using the innovative SimpleStep ELISA® kits and detected with the SPECTROstar Nano microplate reader. SimpleStep ELISA® technology streamlines ELISA experiments to a semi-homogeneous format that results in a simple 90-minute, single-wash protocol (Figure 1). Combining these technologies with MARS data analysis allows you to get great results in the fastest, easiest way possible.

Assay Principle

Fig. 1: SimpleStep ELISA® kits Assay Principle.
The first step involves the addition of samples as well as a mixture of the capture and detector antibodies. A sandwich complex of these components is formed in solution, which binds to the immobilization antibody coated on the plate via an affinity tag. Absorbance measurement is collected after a single wash step followed by color development.

Materials & Methods

- SPECTROstar® Nano
- SimpleStep ELISA® kits
  - Human BDNF ELISA Kit (ab212166)
  - Human Tau ELISA Kit (ab210972)
  - Human TREM2 ELISA Kit (ab224881)

Experimental procedure

For all kits, samples were handled in accordance with instructions. For all tests, standard curves were prepared based on an 8-point, 2-fold dilution series using duplicate samples. Starting concentrations were 5000, 2000 and 1000 pg/mL for TREM2, Tau and BDNF, respectively. Two different dilutions of biological replicates and blank replicates were used to determine assay reproducibility. The biological replicates were: human citrate plasma for BDNF, human brain extract for Tau and human serum for TREM2. Plates were read on a SPECTROstar Nano with the following settings:

Instrument Settings

<table>
<thead>
<tr>
<th>Optic settings</th>
<th>Absorbance spectrum, Endpoint test</th>
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<tbody>
<tr>
<td>Wavelength range (step width)</td>
<td>400-700 (2) nm</td>
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Data analysis

A MARS data analysis template was used to select appropriate wavelengths from spectral data set, generate a 4-parameter fit curve based on reference corrected data (OD_max – OD blanks), assess %CV of blanks and recalculated
Results & Discussion

BDNF is a growth factor in the neurotrophin family. It is best characterized for promoting survival and maintenance of neurons, thus decreased BDNF might participate in the disrupted function of neurons associated with AD.

TREM2 is a receptor expressed exclusively by brain immune cells. Elevated levels of TREM2 is a biomarker for increased AD risk. (Fig. 4).

Conclusion

SimpleStep ELISA® technology provides fast sample analysis with little hands-on time required. The SimpleStep ELISA® protocol only requires one washing step, providing results in just 90 minutes while delivering high sensitivity, specificity and reproducibility. Each single kit has been validated using biological samples to ensure it works the first time with high performance standards. The combination of SimpleStep ELISA® kits, SPECTROstar Nano microplate reader and MARS data analysis templates provide further benefits in performance, saving significant time and effort. These tools offer immediate and accurate results to support current and future neuroscience research needs.

References