

2 min poster presentations – part 3

Time: Thursday 14 April 2022, 10:40am - 10:55am

Molecularly imprinted polymer-based electrochemical biosensor for alpha-synuclein detection in Parkinson's Disease - ADx Neurosciences TRAVEL AWARD WINNER

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A novel and sensitive molecularly imprinted polymer (MIP)-based biosensor was developed for alpha synuclein synaptic neuronal protein detection, a specific Parkinson's disease (PD) biomarker. PD is the second most common neurodegenerative disease worldwide [1]. The leading neuropathological defining hallmark of PD is the presence of Lewy bodies and Lewy neurites mainly composed of aggregates of alpha-synuclein [2]. An early disease diagnosis is essential for an effective treatment application, thus there is an urgent need for finding accurate, reproducible, sensitive, and inexpensive diagnosis tools. MIP-based biosensors represent cost-effective and easy-to-use solutions for disease biomarker recognition [3]. In this work, methylene blue was combined with alpha-synuclein and applied in situ on the surface of standard carbon screen-printed electrodes through bulk polymerization. This work describes a MIP-based electrochemical biosensor capable of detecting the target template with excellent precision and accuracy using for the first-time methylene blue for sensing alpha-synuclein analyte. The developed MIP-based sensor showed great analytical performance in alpha-synuclein detection, with a linear range from 1 fM to 10 pM based on electrochemical impedance spectroscopy measurements. To conclude, the developed electrodes were used to detect alpha-synuclein in serum and the selectivity tests were performed against different target molecules.

References:

[1]S.K. Van Den Eeden, C.M. Tanner, A.L. Bernstein, R.D. Fross, A. Leimpeter, D.A. Bloch, L.M. Nelson, Incidence of Parkinson's disease: Variation by age, gender, and race/ethnicity, *Am. J. Epidemiol.* 157 (2003) 1015–1022. <https://doi.org/10.1093/aje/kwg068>.

[2]J.R. Spillantini M. G., Schmidt M. L., Lee V. M., Trojanowski J. Q., and G. M., Alpha-synuclein in Lewy bodies, *Nature.* 388 (1997) 839–840.

[3]A. Florea, B. Feier, C. Cristea, In situ analysis based on molecularly imprinted polymer electrochemical sensors, 1st ed., Elsevier B.V., 2019. <https://doi.org/10.1016/bs.coac.2019.05.005>.

Keywords: alpha-synuclein; electrochemical biosensor; electrochemical impedance spectroscopy; molecularly imprinted polymer; carbon screen-printed electrodes; Parkinson's disease.