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BIOTECNOLOGIA  
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LIBERIAN CONGRESS ON  
MEDICINAL  
BIOTECHNOLOGY

BOOK OF ABSTRACTS



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## Development of an electrochemical biosensor for an Alzheimer biomarker detection in Point-of-Care

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**Introduction:** Alzheimer's disease (AD) is the dominant dementia condition of our society with great social and economic impact. One of the major pathological changes is the formation of extracellular insoluble deposits of  $\beta$ -amyloid protein ( $A\beta$ ) in plaques. Pathological changes are often accompanied by neuroinflammation, abnormal activity of the neural network, dysfunction, degeneration and loss of neurons.

Moreover, there is no current test capable of providing accurate diagnosis of AD and, besides that there is no treatment of prevention available, only a way to delay its progression, so the early diagnosis is the key in present. Research activities targeting such possibility include the identification of biomarkers in several biological fluids that may turn out an important means to diagnosis within future, mostly if these are found in peripheral blood (avoiding more invasive procedures).

Thus, the main goal of this proposal is to develop novel, low cost (bio)sensing-devices with an aptamer as a biorecognition element of AD biomarker detection,  $A\beta_{42}$ , in point-of-care.

**Material and Methods:** The electrochemical measurements were conducted with a potentiostat/galvanostat from Metrohm Autolab and a PGSTAT302N, equipped with a FRA module and controlled by Nova software. The development of the biosensor makes use of two different strategies: covalent and physical adsorption of the aptamer probe onto a carbon screen printed electrode (SPE), modified by drop-casting biographene, on work electrode area. Then, the aptamer modified electrode was incubated with L-asparagine to prevent unspecific links.

The surface modification and the ability of the biomaterial to rebind  $A\beta_{42}$  oligomers was measured by electrochemical techniques, namely electrochemical impedance spectroscopy (EIS), square wave voltammetry (SWV), and cyclic voltammetry (CV). RAMAN analysis was performed in order to control the surface modification of the carbon electrode.

**Results and conclusion:** The biorecognition element was successful immobilized with different strategies: covalently and physically adsorbed on the modified SPE with a biocompatible nanostructured material, biographene. The control of the surface modification were evaluated electrochemically and by RAMAN techniques. Further tests are progressing to couple the target analyte and the aptamer modified biosensor.

**Keywords:** Alzheimer's disease ;  $A\beta_{42}$  ; electrochemical biosensor.