Abstract

An Ultrasensitive Aptasensor for The Analysis of Aβ Oligomers in Serum †

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Abstract: It’s one of the great challenges that how to improve the sensitivity of early biomarker detection for Alzheimer’s disease (AD). Therefore, an electrochemical aptasensor was prepared based on thionine (Th) - functionalized three - dimensional carbon nanomaterials (reduced graphene oxide (rGO) and multi-walled carbon nanotubes (MWCNTs) immobilized aptamer for the analysis of Aβ oligomers (AβO), one of the AD biomarkers. Th, the positively charged planar aromatic molecule, could form a large number of π - conjugated structures with rGO and MWCNTs, thereby bringing extra stability to the conjugated macromolecules and improve the structural stability and capacitive properties of Th-rGO-MWCNTs nanocomposites. Under the optimal conditions, DPV response decreased with the increase of AβO concentration. And the aptasensor has a good linear range of 0.0443 pM to 443.00 pM with a LOD of 0.01 pM. Meanwhile, its remarkable stability and selectivity were also discussed. It has a great potential for early diagnosis of AD.

Keywords: Aβ oligomers; Alzheimer’s disease; Aptasensor; Th-rGO-MWCNTs nanocomposites; human serum