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Peptide Aptasensor for Electrochemical Detection of Rheumatoid Arthritis

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Abstract : Rheumatoid arthritis is a systemic, inflammatory autoimmune disease, affecting an overall 1% of the global population. Despite being tremendous efforts by scientists, early diagnosis of RA still has not been achieved. In the current study, a Graphene oxide (GO) based electrochemical sensor has been developed for early diagnosis of RA through Cyclic voltammetry. Chitosan (CHI), a CPnatural polymer has also been incorporated along with GO in order to enhance the biocompatibility and functionalization potential of the biosensor. CCPs are known antigens for Anti Citrullinated Peptide Antibodies (ACPAs) which can be detected in serum even 14 years before the appearance of symptoms, thus they are believed to be an ideal target for the early diagnosis of RA. This study has yielded some promising results regarding the binding and detection of ACPAs through changes in the electrochemical properties of biosensing material. The cyclic voltammogram of this biosensor reflects the binding of ACPAs to the biosensor surface, due to its shifts observed in the current flow (cathodic current) as compared to the when no ACPAs bind as it is absent in RA negative patients.

Keywords : rheumatoid arthritis, peptide sensor, graphene oxide, anti citrullinated peptide antibodies, cyclic voltammetry
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