

## Fabrication of adenosine biosensor for analysis of adenosine with help of electrochemical method

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**Background and Aims:** Adenosine is an ubiquitous purine nucleoside, playing a fundamental role in many biological processes such as energy generation and proteins metabolism. It has potent biological activities including extension of the blood vessels, increment of the blood flow of the arteries, anti-arrhythmia and improvement of the oxygen supply of cardiac muscle. Aptamers are synthetic RNA or DNA single-stranded oligonucleotide sequences folding into different three-dimensional shapes that exhibit high specificity and affinity for a target molecule. In the present study, a simple and label-free method was proposed to analysis of adenosine with help of electrochemical method.

**Methods:** At first an amino aptamer was attached covalently onto GC electrode modified with nanocomposite containing ionic liquids, multi-walled carbon nanotubes and chitosan, using glutaraldehyde as linking agent. Then adenosine aptamer was immobilized on the electrode surface by hybridization reaction with amino aptamer. In the part, it was used methylene blue (MB) as an electrochemical indicator. So sensitive quantitative detection of adenosine is realized by monitoring differences of differential pulse voltammetric responses of electrostatically MB can specifically bind with G base backbone of the conjugated aptamer.

**Results:** The peak current of MB linearly decreased with the concentration of adenosine over a range of 0.5-400 nM with a detection limit of 154 pM. In addition, examined the selectivity of this electrochemical biosensor for cytidine, uridine and guanosine that belonged to the nucleosides family and possessed a similar structure with adenosine. Finally the proposed biosensor was successfully used to detect adenosine in human serum samples. The obtained results are well agreed with the values really.

**Conclusions:** These findings confirm that proposed aptasensor was successfully used to detect adenosine that it is simplicity, rapidity, good stability and high sensitivity and could be used to detect adenosine from real human serum samples.

**Keywords:** Biosensor; Adenosine; Aptamer; Nanocomposite