

Biotechnology 2015: Towards a novel FRET immunosensor using biocompatible graphene quantum dot for early diagnosis of Myocardial Infarction - Deepika Bhatnagar^{1,2}, Ashok Kumar³ and Inderpreet Kaur¹-Research Institute of Internal and Preventive Medicine, Russia FSBI Institute of Internal and Preventive Medicine, Russia 1CSIR-Central Scientific Instruments Organization, India 2Academy of Scientific & Innovative Research, India 3CSIR-Institute of Genomics and Integrative Biology, India

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Abstract

Cardiovascular disease related conditions cost approximately 192 billion Euros per year representing a major financial burden on clinical resources. New research looking at the costs of cardiovascular disease (CVD) concludes that the financial burden on clinical will rise to €195 billion by 2020, up from €102.1 billion in 2014. We provide an ultrasensitive immunosensor based on Fluorescence Resonance Energy Transfer (FRET) for monitoring the levels of cardiac biomarker Troponin-I (cTnI) using highly biocompatible graphene quantum dots (GQDs) and graphene. We report a diagnostic platform for cTnI using amine functionalized GQDs-anti-cTnI nano probe fluorescently quenched with graphene with high sensitive detection of myocardial infarction.

We accomplish the qualities of strong fluorescence and biocompatible GQDs, biofunctionalization with protein cTnI and distinguishing fluorescence resonance energy transfer between GQDs and graphene to attain and examine the evidence of cTnI. On further injecting target analyte (cTnI) in the system, resulting in immunocomplex formation and quantifying the cTnI in the sample by recovered PL due to weak non-covalent interactions between them. Proposed immunosensor is highly selective which can distinguish exact and approximate antigens to check the cross reactivity. Our reported sensitive immunoassay have widens up a novel chance of fast, easy and sensitive diagnosis of myocardial infarction by monitoring the fluorescence change and measuring cTnI levels. The fabricated immunosensor is probable to be highly biocompatible because of all its components with excellent biocompatibility.

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