Fast detection of Dengue virus with new diagnostic
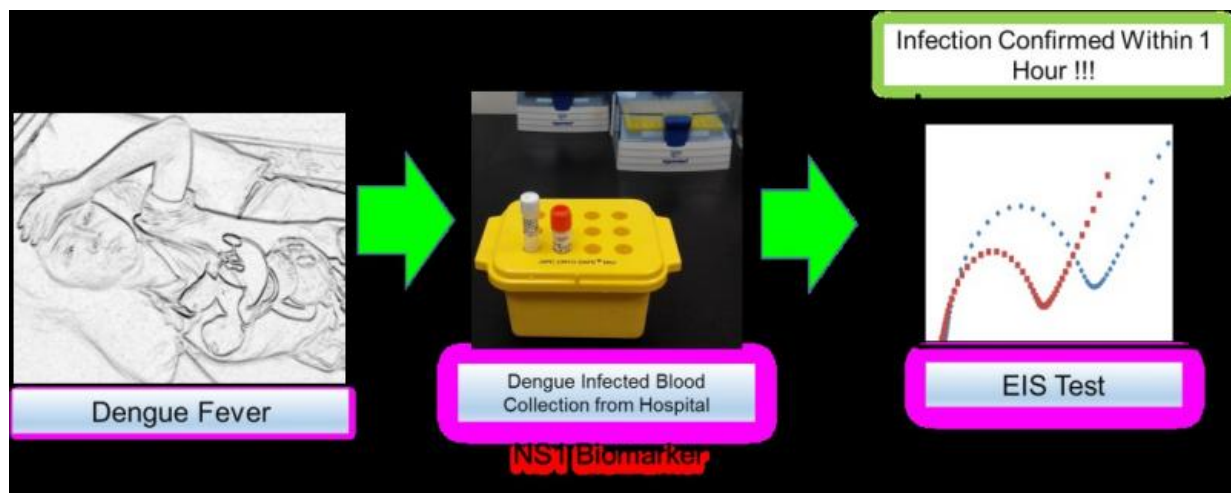
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Figure 1 - Rapid, sensitive, specific and direct detection of Dengue virus NS1 biomarker in serum

Fast detection for Dengue virus is possible based on an innovative label free immunosensor. The novel immunosensor with antibody-nanoparticle hybrid design offers high selectivity and sensitivity for Dengue virus NS1 biomarker diagnosis in sera sample.

Translation of biological event into an electrical signal by immunosensory receptors reflects the beauty of science in a very fascinating scene. The translation of embracing process between an antibody and its antigen has a wide range of use in medical applications

such as disease biomarkers detection and drug testing and discovery. Great sensitivity and selectivity can be achieved, when this event takes place on a well-designed platform. Immunosensor based on piezoelectric, optical or electrochemical measurements, are different types of biosensing models. Immunosensor based on electrochemical measurements and more specifically electrochemical impedance measurements have greater efficiency than other models. However, poor sensitivity and selectivity as shown in previously reported biosensors used for Dengue virus diagnosis have urged our research group to design a novel biosensing interface incorporated with antifouling and biorecognition molecules.

Our innovative immunosensor consists of two types of zwitterionic antifouling molecules incorporated with biorecognition molecules which have been deposited on the gold nanoparticles surface. In this research, the detection of NS1 biomarker (antigen produced by Dengue virus) at nano detection limit is achieved with help of gold nanoparticles and antifouling molecules. Gold nanoparticles provide bigger surface area for the affinity interactions between the antibody-antigen and thus enhance the translated signal, while the antifouling molecules help to resist the non-specific adsorption of unwanted proteins from serum onto the transducer surface. Besides, the developed immunosensor is found highly selective to NS1 biomarker and it is able to detect the NS1 antigen directly in actual serum specimens collected from patients who has been infected with Dengue virus, without sample preparation steps needed. The new design of immunosensor exhibits high sensitivity, selectivity and rapidity as the detection of NS1 biomarker can be done in less than 1 hour. These outcomes emphasize the key role of biosensor interfacial design in improving the efficiency of immunosensor for analyte detection in complex matrices. In short, fast detection for Dengue virus is possible based on an innovative label free immunosensor. The novel immunosensor with antibody-nanoparticle hybrid design offers high selectivity and sensitivity for Dengue virus

NS1 biomarker diagnosis in sera sample.

Provided by University of Malaya

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