Malaria Detection using an Electrochemical Biosensor

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Malaria is a disease that is caused by an Apicomplexan Plasmodium parasite and affects approximately 50% of the world's population causing millions of deaths every year. Many of the deaths are among pregnant women and children under the age of five in sub-Saharan Africa. Despite control efforts the disease continues to affect productivity and is known to be related to poverty. Available methods for malaria detection include blood film microscopy, immunochromatographic tests, polymerase chain reaction, serological tests and laser desorption spectroscopy. Some of these methods show high sensitivity and specificity but are time consuming, require the use of expensive instruments and cannot be applied as a point of care diagnostic method. Electrochemical methods of analyte detection have been used as transducers in affinity assays and show high sensitivity. Detection limits of the assay can be enhanced with the modification of the sensor surface and also by the modification of the biomolecules for detection. *Plasmodium falciparum* histidine rich protein 2 was used as a biomarker for malaria detection. A sandwich ELISA format developed in a microtiter plate confirmed the specificity and sensitivity of the paired antibodies. The assay was transferred onto the surface of an electrochemical biosensor. Enhanced sensitivity was recorded at a limit of detection of 0.03 pg mL^{-1} in the gold nanoparticles enhanced assay. This result implies that the AuNPs increase detection of the analyte at lower concentration.

Key words: Malaria, biosensor, diagnostics, electrochemical, histidine rich protein 2