

## Nanoparticle-Based Histidine-Rich Protein-2 Assay for the Detection of the Malaria Parasite Plasmodium Falciparum

**Authors :** Yagahira E. Castro-Sesquen, Chloe Kim, Robert H. Gilman, David J. Sullivan, Peter C. Searson

**Abstract :** Diagnosis of severe malaria is particularly important in highly endemic regions since most patients are positive for parasitemia and treatment differs from non-severe malaria. Diagnosis can be challenging due to the prevalence of diseases with similar symptoms. Accurate diagnosis is increasingly important to avoid overprescribing antimalarial drugs, minimize drug resistance, and minimize costs. A nanoparticle-based assay for detection and quantification of Plasmodium falciparum histidine-rich protein 2 (HRP2) in urine and serum is reported. The assay uses magnetic beads conjugated with anti-HRP2 antibody for protein capture and concentration, and antibody-conjugated quantum dots for optical detection. Western Blot analysis demonstrated that magnetic beads allows the concentration of HRP2 protein in urine by 20-fold. The concentration effect was achieved because large volume of urine can be incubated with beads, and magnetic separation can be easily performed in minutes to isolate beads containing HRP2 protein. Magnetic beads and Quantum Dots 525 conjugated to anti-HRP2 antibodies allows the detection of low concentration of HRP2 protein (0.5 ng mL<sup>-1</sup>), and quantification in the range of 33 to 2,000 ng mL<sup>-1</sup> corresponding to the range associated with non-severe to severe malaria. This assay can be easily adapted to a non-invasive point-of-care test for classification of severe malaria.

**Keywords :** HRP2 protein, malaria, magnetic beads, Quantum dots

**Conference Title :** ICN 2016 : International Conference on Nanotechnology

**Conference Location :** Rome, Italy

**Conference Dates :** May 02-03, 2016