A multiplex qPCR approach for detection of pfhrp2 and pfhrp3 gene deletions in multiple strain infections of Plasmodium falciparum

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The rapid and accurate diagnosis of Plasmodium falciparum malaria infection is an essential factor in malaria control. Currently, malaria diagnosis in the field depends heavily on using rapid diagnostic tests (RDTs) many of which detect circulating parasite-derived histidine-rich protein 2 antigen (PfHRP2) in capillary blood. P. falciparum strains lacking PfHRP2, due to pfhrp2 gene deletions, are an emerging threat to malaria control programs. The novel assay described here, named qHRP2/3-del, is well suited for high-throughput screening of P. falciparum isolates to identify these gene deletions. The qHRP2/3-del assay identified pfhrp2 and pfhrp3 deletion status correctly in 93.4% of samples with parasitemia levels higher than 5 parasites/ţL when compared to nested PCR. The qHRP2/3-del assay can correctly identify pfhrp2 and pfhrp3 gene deletions in multiple strain co-infections, particularly prevalent in Sub-Saharan countries. Deployment of this qHRP2/3-del assay will provide rapid insight into the prevalence and potential spread of P. falciparum isolates that escape surveillance by RDTs.
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