

# Rapid Diagnosis of Malaria - A New Approach

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## Introduction

Malaria is endemic in our part of the world. During the last decade incidence of falciparum malaria is on the rise<sup>1</sup> with increasing mortality especially among children. Diagnosis is often clinical based on the presence of fever but in most malarious areas other fevers are also common. Early diagnosis of P. Falciparum malaria diagnosis will help in prompt treatment of the patient thus reducing morbidity and mortality. Until now lab diagnosis is dependent on the microscopy of the stained peripheral blood films. This method is time consuming, labour intensive and requires considerable technical skills. A new test for the rapid diagnosis of falciparum malaria based on immunochromatographic technology was evaluated and compared with the traditional method of microscopy of the peripheral blood smear. The test kit used in this study contains two antibodies specific for Pf HRP-2 (histidine-rich protein-2) antigen. This specific antigen is present in the blood of the individual who has various blood stages of Plasmodium falciparum malaria<sup>2,3</sup>.

## Patients, Methods and Results

Four hundred seventy blood samples were tested for the presence of malarial parasites. All these samples were from patients with clinical symptoms of malaria and blood was sent to the laboratory for screening of malaria parasite. The samples were tested by both methods, i.e., thick and thin blood films stained with Leishman stain and ICT malaria Pf test card (ICT Diagnostics, Australia). The tests were run simultaneously without the knowledge of the results obtained by each technique. The performance of the tests was assessed in terms of its sensitivity, specificity, positive predictive value and negative predictive value in comparison with the routine microscopic diagnosis of P. Falciparum malaria. Blood films were examined by a qualified haematologist. According to the British guidelines recommended for malarial parasite examination<sup>4</sup> 200 oil immersion fields were examined before the slide was labelled negative for malarial parasite. For ICT test about 100 µl of whole blood was added to the area mentioned in the test card. Lysis occurred immediately and any PfHRP2 antigen present in the patient's blood was captured by the antibody present within the kit. After further processing a pink test line appeared with the control line confirming that the test is positive for Plasmodium falciparum. The test took 3 minutes to give results.

Examination of the blood film showed that 31 patients had P. Falciparum. The ICT test detected PfHRP2 antigen in 33 samples. The test was negative for all those samples that showed P. Vivax in the blood films. However, 2 samples were positive with ICT while its blood film was negative. The sensitivity of this test was 100% and specificity was 96%. Positive predictive value was 94% and negative predictive value was 100%.

## Comments

This preliminary study showed that the results of this test are promising with 100% sensitivity and 96% specificity. Similar results were reported in a study in India<sup>5</sup>, they showed a sensitivity of 93% and specificity of 92.5% compared with microscopy. In United Kingdom Chiodini et al<sup>6</sup> in a multi center study reported a sensitivity of 92% and a specificity of 98%. Beadle et al<sup>7</sup> conducted two field studies

and an experimental challenge study in USA to assess the accuracy of dipstick antigen-capture assay. The assay was 96.5% sensitive for detection of greater than 60 plasmodium falciparum asexual parasites/ul blood, 70-80% sensitive for 11-60 parasites/ul blood and 11-67% sensitive for 10 parasites or less/ul blood. Specificity was 88% among Kenyans living in an area with holoendemic malaria. They also indicated that Pfl-IRP-2 antigen was not detected in blood 6 days after initiation of curative chemotherapy. All these studies were conducted using ParaSight F test (Becton Dickinson). This test also works by detecting HRP-2 Antigen in patients blood like ICT Malaria Pf (ICT Diagnostics). However, there has been one report in which false positive results was obtained in serum of patients with rheumatoid arthritis<sup>8</sup>. In this report<sup>8</sup> out of 12 patients of rheumatoid arthritis gave positive results with ParaSight F test who never visited malaria endemic area. Results of our study showed no cross reactivity with other Plasmodium species. This method does not require any special equipment, electricity or experts to interpret the results. WHO also recommends the use of antigen capture assay for the management of falciparum malaria in epidemics and emergencies where laboratory services are inadequate<sup>9</sup>.

However, it should not be forgotten that a blood film can provide more information, than ICT test. A blood film can show all types of morphological changes among red blood cells, white blood cells and platelets. Different species of malarial parasites can be identified. Blood parasites other than malaria can also be detected. ICT test may prove to be a simple and practical means of making a rapid diagnosis of falciparum malaria but it is not cost effective (Rupees 200 per test), At the moment it will be too early to recommend this test to replace the old method of blood film examination. Thus the peripheral smear remains the gold standard for the laboratory diagnosis of different species of malaria.

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