Plasmodium falciparum malaria has routinely been diagnosed using thick smear microscopy, a procedure that has been difficult to standardize because of different levels of technician expertise and quality of reagents in use. More recently, malaria diagnosis has used immuno-diagnostic tests for the detection of circulating Plasmodium falciparum histidine rich protein 2 (pf HRP-2) antigen in the parasight-F test. However, this test is limited in use in that the HRP-2 may persist after parasite clearance in some patients, mostly those with high initial parasitaemia and hence give a false positive with the parasight-F test. All the diagnostic tests currently in use to identify malaria parasites in clinical specimens, are restricted to picking circulating parasites. Since mature asexual forms of P. falciparum sequester in deep tissue capillaries and may be inaccessible to veni puncture, an alternative diagnostic procedure needs to be developed. The new diagnostic tool should be technically simple to perform, affordable and possess standard sensitivity and specificity for use in P. falciparum endemic areas. It will have an added advantage if it could also be used for the evaluation of antimalaria drug susceptibility and sensitivities.

A new diagnostic method namely, parasite lactate dehydrogenase (PLDH) assay was investigated as a tool for malaria diagnosis and drug studies between 1994-1997 in Kenyan population in laboratory, under field and clinical in vitro situations. One hundred and seven (107) healthy Kenyan volunteers from a malaria non-endemic region of Kenya were recruited into the PLDH studies as controls and their plasma and red blood cells measured using the modified PLDH procedure. The results of the controls plasma and red blood cells PLDH indicated significantly lower values compared to those from subjects from field and clinical studies who were either parasitaemic, symptomatic or asymptomatic from malaria endemic region of Kenya. The results indicated that the controls optical density values could not be used to calculate mean cut-off as well as mean positive values for plasma and red blood cells in field and clinical studies for sensitivity and specificity analysis. The study indicated that individuals living in malaria non-endemic region, who have not suffered malaria attack for three consecutive months have significantly lower red blood cell and plasma pLDH values compared to individuals in endemic regions, who are exposed to frequent infections. Evaluation of the study indicated a new cut-off system for calculating mean plasma and red blood cell pLDH which can be used in any region to calculate sensitivity and specificity of pLDH in a given population for diagnostic purpose, independent of microscopy.

The drug sensitivity profiles for laboratory and field adapted malaria isolates could be comfortably measured using pLDH as opposed to the hypoxanthine assay which requires a lot of complicated procedures before IC 50 cut-off could be calculated by probit analysis. However, in both assays, the results were comparable. pLDH enzyme assay was successfully used to measure the IC 50 of six antimalarial drugs, chloroquine, quinine, mefloquine, dehydroartemisinin, atovaquone and halofantrine but was not successful with the other four antimalarial drugs, doxycycline, azithromycin, pyrimethamine, and sulphadoxine, which are slow acting antimalarials. The latter four drugs did not give consistent results even when the incubation time was raised from 48 hours to 66 hours, by using the reference strains, D6 and W2.

The laboratory isolates indicated a high correlation between pLDH and hypoxanthine assay, which was not the case with field isolates. The Kisumu isolates collected for the study and culture adapted for comparative studies using reference strains were generally chloroquine
resistant, nearly mefloquine resistant, quinine sensitive, and sensitive to the remaining new antimalarial drugs, atovaquone, halofantrine and dehydroartemisinin. The results of this study indicate that it is possible to use pLDH for drug sensitivity studies in the field, especially using the six antimalarial drugs, a finding that may improve on malaria chemoprophylaxis without necessarily exerting drug pressure on the few available effective antimalarial drugs.

The study indicated no correlation in pLDH optical density and parasitaemia in culture adapted NF54 gametocytes, strongly suggesting that mature gametocytes (stages three, four and five) may not be producing significant amounts of pLDH in the red blood cell. The study has strongly indicated low parasitaemia as a major limiting factor, a condition limiting its field applicability especially in non-immunes and the high risk groups (children and expectant mothers).

From the study, pLDH compared to ICT and Parasight-F, gives the highest specificity but lowest sensitivity suggesting that it would be a better tool for diagnosis if the sensitivity is improved to enable picking of even low parasitaemias. pLDH was the only procedure among the three that picked pure infection of P. malariae as P. vivax while the other two missed any pure infection that was not P. falciparum. The overall report about pLDH assay is that: it has indicated potential for diagnosis of malaria in endemic areas save for its low sensitivity, it identifies other species of Plasmodia and it is quite fast and safe in drug studies in vitro.