INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

Name of the Student	:	M. Rajendra Prasad
Roll Number	:	196106103
Programme of Study	:	Ph.D.

Thesis Title: **"Characterization of Molecular and Antigenic Determinants of FIKK Kinase(s) to Detect *Plasmodium falciparum*"**

Name of Thesis Supervisor(s)	:	Professor Vishal Trivedi
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Key words for description of Thesis Work	:	*P. falciparum* malaria; Biomarker; C-FIKK; Diagnostic Potential; Antigenicity; Co-infection; Specificity; and Sensitivity

SHORT ABSTRACT

Accurate malaria diagnosis is essential for effective disease management and species-specific treatment. Existing diagnostic methods, including PCR and rapid diagnostic tests (RDTs), often suffer from limited sensitivity and specificity due to the use of conserved targets such as 18S rRNA, Pf-LDH, Pf-HRP2, and aldolase, which share homology with human counterparts. In this study, we identified and validated *Plasmodium falciparum*-specific FIKK kinases as novel diagnostic biomarkers. Exclusive regions of FIKK genes were identified through in-silico PCR and confirmed experimentally, demonstrating exceptional sensitivity with a detection limit of 10^{-5} ng of parasite DNA and 0.0003% parasitemia, while remaining highly specific against *P. vivax* and other pathogens. Furthermore, a chimeric FIKK (C-FIKK) construct was designed by selecting highly antigenic, species-specific B- and T-cell epitopes from six *P. falciparum* FIKKs. The generated anti-C-FIKK antibodies exhibited higher sensitivity at concentrations as low as 3 µM, without cross-reactivity to host or non-*Plasmodium* proteins. These findings establish FIKK kinases as highly selective and sensitive biomarkers, offering a promising foundation for next-generation malaria diagnostic systems.

Keywords: FIKK; Biomarker; Specificity; Sensitivity; C-FIKK; Antigenicity; and Diagnostic Potential