



**INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS**

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SHORT ABSTRACT

Malaria is the second most infectious disease and leads to heavy economic loss in the underdeveloped and developing countries. In severe malaria cases, multiorgan failure is one of the common problems which is often misinterpreted due to the lack of malaria pathology. In our lab, we have tried to identify the contribution of small molecules in malaria pathology and this thesis work specifically focuses on the role of methemoglobin in malaria. The thesis work presented here was divided into five chapters. The first chapter introduces malaria and it also elaborates different malarial complications in humans in a detailed manner. The second chapter is entitled as 'Extracellular methemoglobin catalyzes rapid RBC lysis to explain acute anemia during malaria' in which, we have shown that methemoglobin has the potential to cause hemolysis with mechanistic approaches. The third chapter is entitled as 'extracellular methemoglobin primes red blood cell aggregation in malaria like microenvironment'. In this chapter, we have proved that MetHb is a potential aggregant which is present in the malaria culture supernatant. The fourth chapter 'Methemoglobin contributes into primaquine toxicity through single electron oxidation and modification' explains another toxic role of MetHb in which it catalyses primaquine to potent toxins to cause hemolysis. The fifth chapter entitled as 'Suicidal inactivation of methemoglobin by generation of thiyl radical explains NAC mediated protection in RBC' describes a detailed study of NAC mediated methemoglobin peroxidase inactivation mechanism and the role of NAC in hemolytic protection. The current study is useful to the medical community to improve the malarial therapy to avoid the complications during malaria.