INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: Strategic Exploitation of NDV-Plasmodium Interaction Axis to Develop Novel Anti-malarials

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SHORT ABSTRACT

Malaria is a severe protozoan infection that affects around 200 million people annually, with Plasmodium falciparum being the major driver of malaria-related mortality. Treatment of the disease mainly relies on antimalarial drugs that target the blood stages of the parasite. However, drug-induced toxicity and the development of resistance pose significant challenges. Independent cases of multi-drug resistance to Artemisinin Combination Therapies (ACTs) have emerged globally, driven by prolonged parasite clearance times, allowing resistant strains to emerge. This underscores the need for novel antimalarial agents and targeted drug delivery approaches. The erythrocytic cycle of the parasite is a key target for both novel therapies and targeted delivery. The ability of the malaria parasite to propagate in blood depends on its interaction with uninfected red blood cells (RBCs). The merozoite, an invasive form of the parasite, must adhere to and invade uninfected RBCs for erythrocytic schizogony. This process involves recognition of sialic acid-rich receptors on the RBC surface, including Glycophorin A, B, C, D, and Band 3, through various parasite antigens like the Erythrocyte-Binding Antigens (EBAs) and rhoptry proteins. Blocking these receptors with specific antibodies and anti-malarial peptides has been shown to disrupt the erythrocytic cycle across multiple parasite strains. The Newcastle Disease Virus (NDV) also targets sialic acid-rich receptors on host cells through its Hemagglutinin Neuraminidase (HN) spike protein. Similar to the malaria parasite, this interaction is vital for viral entry and infection. The affinity of NDV for avian erythrocytes suggests potential implications in co-infection scenarios, where it's possible engagement with the RBCs and malaria parasitized RBCs (PRBCs) could be the key to offering a novel therapeutic strategy against human malaria.