DBT-NII study paves way for development of drugs for babesiosis

New Delhi, Oct 15: Babesia is the second most common blood parasite in mammals after trypanosomes. Babesiamicroti is primarily transmitted to humans by the bite of an infected tick from genus Ixodes or through blood transfusion. Human babesiosis results in 6% to 9% of fatality in normal individuals and up to 20% in immunocompromised or elderly, putting a huge economic burden on the human population.

The genetic manipulation of a pathogen represents a potent tool to identify and study the function of important genes for the discovery of new drug and vaccine targets. Genetic manipulation of B. microti has not been reported yet owing to the intracellular life stages and complicated life cycle of the parasite. The characterization of a genetically modified parasite will greatly improve our understanding of parasite biology at various developmental stages of its life cycle.

In vivo transient and stable transfection methods were till recently not available for Babesiamicroti. For the first time, researchers at DBT-National Institute of Immunology (DBT-NII), New Delhi have established a method for stable transfection of the Babesiamicroti (B. microti) in in vivo conditions. They have identified a novel promoter of B. microti. They have demonstrated that Plasmodium berghei DHFR promoter is recognized and functional in B. microti and showed that BM-CTQ41297 promoter control the expression of two genes, which are present on either side and thus represents a bi-functional promoter in B. microti.

The predicted promoter activity values are higher for BM-CTQ41297 promoter than various strong promoters such as β-actin, ef-1β. Further, they discovered a non-essential locus for the genetic manipulation of the parasite, allowing us to stably integrate foreign genes; GFP, mCherry, into the B. microti.
The transfection using an electroporation method and genetic manipulation of B. microti is now achievable and it is possible to obtain transfected viable parasites under in vivo growing conditions. The growth curve analysis of transfected and WT B. microti are similar indicating no defects in the transgenic parasites. This study will enable other researchers in understanding the B. microti biology, host modulation and diverse parasite developmental stages using reverse genetics and holds great potential to identify novel drug targets and vaccine development.


Contact Person & Contact Details: Dr. A.P. Singh; Email id: singhap@nii.ac.in

Link: http://www.nii.res.in/