

Exploring the concept of adaptive immunity to viruses in mosquitoes

PUBLIC ABSTRACT

The current Zika virus epidemic attracted public attention to the problem of mosquito-borne viral infections. Vector control is an essential element to prevent disease transmission due to the absence of arbovirus-specific drugs and limited availability of vaccines. Historical vector control methods such as the use of insecticides and environmental control are facing challenges due to the wide spread of insecticide resistance throughout natural mosquito populations and the complexity of breeding site elimination in the modern urban environment. Novel genetics-based strategies are emerging as promising complement to historical mosquito control methods. One idea is to genetically-manipulate the vectors so that they become unable to support pathogen infection, replication or transmission. The development of these novel transmission-blocking interventions requires in-depth insights into how mosquito vectors interact with and transmit arboviruses. It is thought that the immune system influences the efficiency by which mosquitoes transmit specific viruses. Recently, a novel immune response was identified that recognizes viral RNA and breaks it down into small fragments. In this project, the investigators will study whether mosquitoes from different locations across the globe differ in this immune response. Moreover, they will analyze how these differences influence transmission of the epidemic Dengue and Zika viruses. The multi-disciplinary research team includes experts in mosquito evolution and genomics, entomology, and virology, allowing a complementary approach to address the research aims. The proposed project will have immediate and profound implications for public health and may lead to novel mosquito control strategies.