

TITLE: Heterologous Immunity and Host Susceptibility to Emerging Alphaviral Infections

Drivers of arboviral emergence

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RESEARCH PROJECT DESCRIPTION

Arthropod-borne viruses (arboviruses) have gained in public health and veterinary importance worldwide, as demonstrated by the expansion of geographic range and rising incidence of viruses such as Zika, West Nile, Rift Valley, dengue, chikungunya, and Venezuelan equine encephalitis during the past decades. Drivers such as urbanization, migration, and deforestation have been implicated as underlying causes for arboviral disease emergence. Host susceptibility has also been speculated to play a key role in determining the geographic distribution of some arboviral diseases such as yellow fever. Its absence in Asia has been hypothesized to be due to endemic (and serologically cross-reacting) dengue. However, the contribution and mechanism of this important factor has not been well studied in human arboviral disease.

Prior pathogen exposure leaves its imprint in immunological memory, giving rise to some degree of cross-reactive immunity upon encountering antigenically related (and at times, unrelated) pathogens. In arbovirology, important questions remain unanswered. How much protective (or deleterious) immunity is conferred upon sequential exposure to heterologous arboviruses? What immunological mechanisms underlie this process? Does heterologous immunity on a population level significantly influence the ability of a new arboviral pathogen to emerge?

We are seeking to answer these questions by examining host immunity Darien, Panama, where eastern equine encephalitis virus (EEEV) newly emerged in 2010. The genetically similar Venezuelan equine encephalitis virus (VEEV) has long circulated in this region. As a region experiencing deforestation, migration, urbanization, and co-circulation of sympatric viruses, Panama serves as a laboratory for understanding the contribution of these factors on disease emergence.

Medical students will have the opportunity to perform assays in virology and immunology at the Emerging Pathogens Institute at UF. If the student has

prior laboratory experience, an independent but related project in the laboratory can be considered.