Center for Inference and Dynamics of Infectious Diseases Seminar

Dynamics of arthropod-borne virus evolution during transmission

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Fri Jan 13th 2017, 10:30am to 11:30am
Pelton Auditorium, Weintraub Building
Fred Hutchinson Cancer Research Center

Abstract: Arthropod-borne viruses (arboviruses), such as Zika, chikungunya, and West Nile virus (WNV), pose as continuous threats to emerge and cause large epidemics. Often these events are associated with novel virus variants optimized for local transmission, which first arise as minorities within a host. Thus the conditions that regulate the frequency of intrahost variants are important determinants of emergence. For arboviruses, these conditions are complex as they cycle between the different environments of their arthropod vectors and vertebrate hosts. First, I will describe the forces that alter WNV genetic diversity during transmission. Next, we will explore the fitness costs and benefits of replicating different enzootic mosquito vectors and avian hosts. The general theme is that in mosquitoes, the WNV genetic repertoire dramatically changes due to repeated bottles and to escape the innate immune response, RNA interference. The consequence, however, is that the diversity generated in mosquitoes decreases its fitness in birds, and thus most WNV variants are rapidly purged upon transmission. Lastly, I will compare these results to a tick-borne virus (Powassan virus) to demonstrate how vector ecology can be a determinate of evolution. The results presented here highlight the complex evolutionary forces that a novel arbovirus variant must overcome to alter infection phenotypes at the population level.

The seminar will be streamed live and is accessiable at the following link.

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Contact Trevor Bedford (tbedford@fredhutch.org) or Rebecca Allen (rebecca@fredhutch.org) with questions
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