

## Effects of AeDNV infection on *Aedes aegypti* populations

E. Suchman<sup>1</sup>, A. Kononko<sup>2</sup>, W.C. Black, IV<sup>1</sup>, L. Buchatsky<sup>2</sup> and J. Carlson<sup>1</sup>

1. Department of Microbiology, Immunology and Pathology, Colorado State University, Fort Collins, Colorado 80523
2. Department of Zoology, Taras Shevchenko' Kiev National University, Kiev, Ukraine 01033

The effects of *Aedes* Densovirus (AeDNV) infections on the survival, fecundity and vertical transmission in *Aedes aegypti* mosquitoes were measured in our laboratories in Kiev, Ukraine and Colorado, USA. Mosquitoes were infected as larvae by adding virus to the rearing water. Larvae are killed in a dose dependent manner, and sublethal doses cause a delay in pupation. The LD<sub>50</sub> for larvae is about 10<sup>10</sup> genome equivalents/ml. Adults infected with 10<sup>10</sup> geq as larvae died ~8 days sooner than controls and the mortality rate was dose dependant. A significant fraction die before the extrinsic incubation period for dengue virus is completed. When an infected female oviposits, ~70% of her eggs, 55% of the resulting larvae and 52% of adult offspring maintain the infection. Infected females oviposited less often and oviposition size was smaller, more eggs failed to hatch, and the survival of larvae was less. These results were combined into a Leslie-Lewis model that predicted that AeDNV infection potentially reduces vector capacity by ~77%.

Population cage studies were performed to determine the ability of AeDNV to accumulate, persist and spread in mosquito populations. Two containers of water were placed in the cages. One served as the larval habitat and the other was the oviposition site. Adult females were allowed to blood feed on a mouse weekly. The population was monitored by removing and counting the eggs from the oviposition site at weekly intervals. The population was maintained by adding a constant number of eggs to the larval habitat container every week. AeDNV was introduced into the larval habitat containers in infected cages at a concentration too low to cause significant larval mortality (10<sup>8</sup> geq/ml). Over a period of several weeks the virus concentration increased to 10<sup>10</sup> geq/ml in the larval habitat container and virus was detected in the oviposition site container. Subsequently the number of eggs laid in the oviposition sites of the infected cages became significantly lower than in the uninfected control cages. Larvae hatched from eggs from infected cages at the end of the experiment were just as susceptible to AeDNV infection as larvae hatched from uninfected cages. Thus resistance to infection did not develop during the course of these experiments. These results suggest that virus can accumulate and persist in a larval rearing site to concentrations that affect the lifespan and vectorial capacity of the mosquitoes and that it can be spread to new larval rearing sites by vertical transmission.