

Dengue viral RNA spread in mosquito cells.

Kumran Hafez*

Department of Microbiology, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

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Description

Dengue Virus (DENV) is a major mosquito-borne arbovirus that is most common in tropical and subtropical regions of the world. The virus is typically consumed with a blood meal, where it replicates in host tissues and spreads to salivary glands for transmission to the next host. Membrane-bound vacuoles carrying DENV particles have been observed in mosquito cells and are thought to play a role in DENV2 cell-to-cell transmission. C189 is a tetraspanin that generally increases its expression as a component of vacuoles (C189-VCs) in C6/36 cells infected with DENV2. The RNA of DENV2 was eventually carried by C189-VCs, as demonstrated by sucrose gradient centrifugation and Magnetic Immune Isolation (MI) in the current study. Furthermore, it was demonstrated in a co-culture study that viral RNA could transfer from donor to recipient cells even when 20 mM NH₄Cl was added to stop virus multiplication in the culture. In a different trans well study, viral RNA was only found in recipient cells when 40 mM NH₄Cl was not present, indicating that cell-to-cell contact is necessary for the intercellular transmission of DENV2. At these locations of cell contact, Viral Synapses (VS), which are made up of clusters of viral particles, were commonly seen forming. When taken as a whole, DENV2 infection causes the development of C189-VCs in C6/36 cells and may operate as a vehicle for the transmission of viral RNA and virions to nearby cells through cell-to-cell contact. This finding contributes to our understanding of viral transmission between mosquito cells. It might also shed light on the efficiently disseminated DENV infection within a mosquito vector and the benign chronic infection in mosquito cells.

The flaviviridae family includes the Dengue Virus (DENV). The virus can be antigenically split into four serotypes, each of which causes symptoms that range from mild febrile sickness and Dengue Fever (DF) to Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS), all of which are potentially fatal. A new study estimates that 390 million dengue infections occur each year, of which 96 million result in some degree of illness severity. Tropical and subtropical

regions have reported the majority of outbreaks. Additionally, more than 100 nations are home to at least 2.5–3 billion individuals who are at risk of contracting dengue, creating major worldwide public health issues. *Aedes aegypti* and *Aedes albopictus* are the primary vectors of DENV transmission among humans spontaneously, which causes outbreaks in endemic or epidemic areas. Climate, population, and socioeconomic position all affect how mosquitoes spread, making tropical regions particularly susceptible to dengue and at risk.

As a mosquito-borne virus, DENV typically infects Langerhans cells and hepatocytes after blood feeding to begin viral replication in the epidermis of an individual bitten by the mosquito vector. Human and other mammalian cells are typically infected by DENV through endocytosis, which is mediated by one or more receptors, such as A Dendritic Cell-Specific ICAM-Grabbing Nonintegrin (DC-SIGN), mannose, and CLEC5A .

Conclusion

The majority of susceptible mammalian cells infected by DENV die, resulting in a large number of offspring virions leaking from infected cells into the bloodstream or cell culture and infecting more cells. In order to support productive infection and maintain the viral transmission cycle in nature, mosquito cells and mosquitoes must be infected with DENV. Perhaps multiple strategies, working independently or in concert, are required to make the mosquito an effective vector of the virus it transmits in nature.

*Correspondence to

Dr. Kumran. Hafez

Department of Microbiology,

Ahvaz Jundishapur University of Medical Sciences,

Ahvaz, Iran

E-mail: kumran.hafez123@gmail.com

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