

# Dengue Virus

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## Dengue Virus

Dengue virus is a virus which belongs to the family *Flaviviridae* and genus *Flavivirus* single stranded RNA positive-strand virus. Dengue virus is a mosquito-borne disease causes fever and in some cases it leads to life-threatening disease or life-threatening syndrome Dengue Hemorrhagic Fever (DHF) or Dengue Shock Syndrome (DSS).

Dengue virus has increased in the last 20 years. It is becoming as one of the worst mosquito-borne disease.

Few people suffer from mild to severe forms of dengue, such as dengue hemorrhagic fever. Different strains of viruses are interacting with the individuals with different immune backgrounds lead to a complex interaction. Among these, possible causes are cross-serotypic immune response, through a mechanism known as antibody-dependent enhancement, happens when an individual who has been infected earlier with dengue can get infected for the next time (second, third, or fourth time). The previous antibodies to the old strain of dengue virus are now interferes with the immune response to the current strain, leading paradoxically to more virus entry and uptake. Dengue virus has the ability to inhibit the innate immune response during infection.

Dengue outbreaks are occurring in many countries like America, Africa, Middle East, Pacific Islands, and Asia. 40% of the world's population, 3 billion (approximately) people, live in areas with the risk of dengue.

Prevention for the dengue disease is to control mosquito. IMM (Integrated Mosquito Management) uses a combination of methods to prevent and control mosquitoes that spread viruses

Vaccine research for dengue has approved in 11 countries (Singapore, Philippines, Brazil, Mexico, Paraguay, El Salvador, Indonesia, Costa Rica,

Peru, Thailand, and Guatemala). Several vaccines are under development by public and private researchers. It is a challenge to develop the vaccine because it may cause disease with its four types of serotypes. The developed vaccine should immunize the four types. When the individual is infected with dengue virus, the immune system produces cross-reactive antibodies that provide immunity to the particular serotype. However, these antibodies are incapable of neutralizing the other serotypes upon reinfection and actually increase viral replication. A common problem faced in dengue-endemic regions is when mothers infected with the dengue virus; after giving birth, offspring carries the immunity from mother and are susceptible to hemorrhagic fever if infected with any type serotypes.

In late 2015 and early 2016, the dengue first vaccine, Dengvaxia (CYD-TDV) by Sanofi-Pasteur, was registered in several countries for use in individuals 9–45 years of age living in endemic areas. On May 1, 2019, the U.S. FDA announced the approval of Dengvaxia, the first vaccine for prevention of dengue disease caused by all dengue virus serotypes in people ages 9 through 16 who have laboratory-confirmed previous dengue infection and who live in endemic areas.

None of the direct antiviral treatments are approved for Dengue fever. A drug, Balapiravir, repurposed hepatitis C NS5 polymerase inhibitor progressed to Phase II clinical trial before being stopped due to lack of efficacy. Most antiviral drug research for Dengue infections were focussed on the inhibition of NS2B/NS3 protease or NS5 proteins.

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