

BHSAI Team Builds Dengue Virus Antibody Database to Aid in Vaccine Research

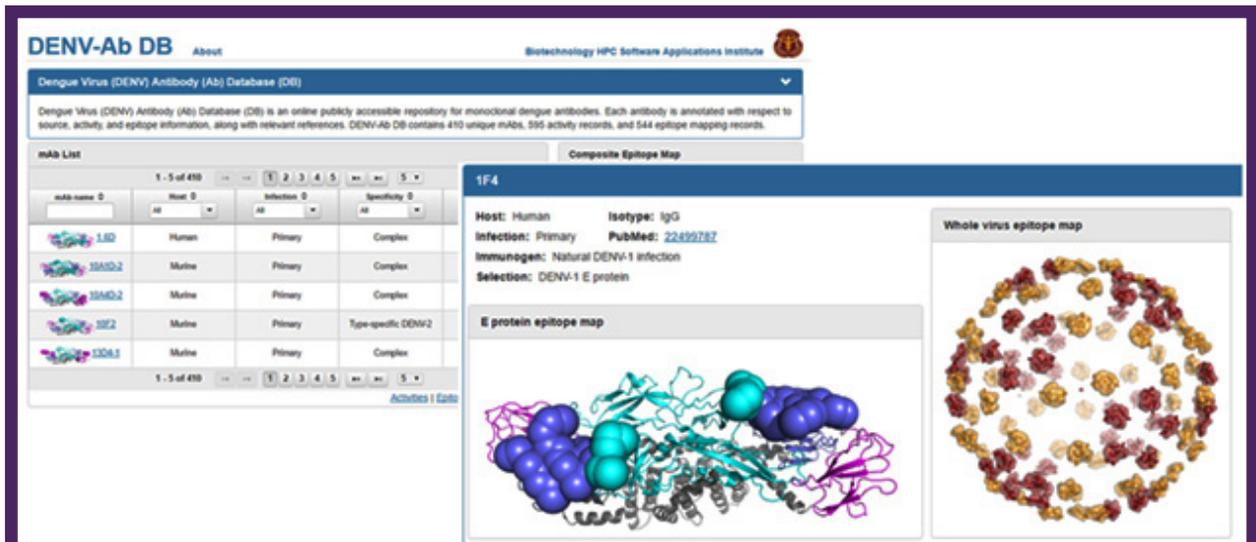
Dengue fever is a mosquito-borne tropical illness that afflicts over 100 million people each year worldwide, and is endemic to large regions of Central and South America, Africa, and South Asia. In recent years, climate change and other factors have led to an increase in the spread of dengue virus and other closely related viruses in the flavivirus family, including yellow fever and, most recently, Zika virus. The US military has long been an active participant in dengue virus research, and extensive efforts are underway to develop a dengue virus vaccine that would serve to protect Warfighters stationed in regions of the world where dengue fever is endemic.

Dengue fever has long fascinated virologists and vaccine researchers because of its peculiar etiology. A first-time infection by dengue virus, termed a 'primary' infection, is typically asymptomatic or results in a mild fever. The body's immune system produces antibodies that successfully fight off the viral infection. However, when an individual is infected again, by a different variant of dengue virus, termed a 'secondary infection,' there is a heightened risk of developing severe disease symptoms such as dengue hemorrhagic fever, despite pre-existing immunity acquired from the primary infection. Paradoxically, the antibody response in a secondary infection not only seems incapable of effectively fighting off the infection, but in some cases actually *enhances* the infection. Determining how the antibody response

changes between primary and secondary infections may provide the key to understanding the pathogenesis of dengue fever and developing effective dengue vaccines.

Scientists at TATRC's Biotechnology High Performance Computing Software Applications Institute (BHSAI), have developed the Dengue Virus Antibody Database, an online repository that stores information on hundreds of dengue virus antibodies. This includes information on the type of dengue infection from which the antibody was isolated, the regions of the dengue virus that the antibody binds to, and the neutralizing activity of the antibody to all four variants of dengue virus.

By carrying out large-scale analysis of the antibody data, Dr. Sid Chaudhury and his team were able to identify how the antibody response in secondary infections shows a systematic shift in terms of its binding activity and neutralization. This database serves as an invaluable tool to dengue virus researchers, allowing them to search for particular dengue virus antibodies, map where on the dengue virus surface those antibodies are binding, and determine which antibodies are best suited for experimental studies on dengue infection and pathogenesis. Further analysis of the information in the Dengue Virus Antibody Database may provide insight into dengue immunity and guide future dengue vaccine research efforts. 



DENV-Ab DB About Biotechnology HPC Software Applications Institute

Dengue Virus (DENV) Antibody (Ab) Database (DB)

Dengue Virus (DENV) Antibody (Ab) Database (DB) is an online publicly accessible repository for monoclonal dengue antibodies. Each antibody is annotated with respect to source, activity, and epitope information, along with relevant references. DENV-Ab DB contains 410 unique mAbs, 595 activity records, and 544 epitope mapping records.

mAb List	1 - 5 of 410	Host	Infection	Specificity
 11D	Human	Primary	Complex	
 15A10.2	Murine	Primary	Complex	
 15A10.2	Murine	Primary	Complex	
 15F2	Murine	Primary	Type-specific DENV2	
 13D4.1	Murine	Primary	Complex	

Composite Epitope Map

1F4

Host: Human Isotype: IgG
Infection: Primary PubMed: [22499787](#)
Immunogen: Natural DENV-1 infection
Selection: DENV-1 E protein

E protein epitope map

Whole virus epitope map

Screen shot from the BHSAI's Dengue Virus Antibody Database.