WashU

Office of Technology Management

PREFUSION GLYCOPROTEIN FOR THE PREVENTION OF BOURBON VIRUS AND OTHER THOGOTOVIRUSES

Boon, Adrianus "Jacco", Dai, Yanan, Fremont, Daved, Harastani, Houda

Hanford, Charles

T-021548

Published date: 1/6/2025

Value Proposition: *Stabilization of glycoprotein of Bourbon Virus (BRBV) and related thogotoviruses as a key target for vaccine and antiviral development.*

Technology Description

Researchers at Washington University in St. Louis have determined the pre-fusion structure of BRBV-GP at 3.7 Å resolution, revealing key conformational rearrangements that drive membrane fusion. As emerging and re-emerging pathogens, tick-borne viruses are a growing concern worldwide, responsible for a range of diseases that affect both humans and animals. BRBV is an enveloped virus with a six-segmented RNA genome, closely related to thogotovirus (THOV), Dhori virus (DHOV), and Oz virus (OZV). Glycoproteins (GPs) on the surface of enveloped viruses play critical roles in mediating the fusion of the viral envelope with the host cell membrane during viral entry, making them prime targets for vaccine and antiviral drug development. Additionally, BRBV is transmitted by the lone star tick Amblyomma americanum. Despite the virus's prevalence in ticks, few human cases have been reported, leaving the true infection burden unknown.

This invention has revealed that the stabilized pre-fusion BRBV-GP inhibits viral replication and exposes more neutralizing epitopes than its post-fusion counterpart. These findings emphasize the critical role of the pre-fusion conformation in immune recognition and vaccine development while contributing to the broader understanding of Class III viral fusion proteins.

Stage of Research

Recombinant BRBV GP was successfully purified from Expi293 cells, revealing a mixture of post-fusion and a novel conformation. In addition, have stabilized the protein, obtained structures with the stabilized protein version, and demonstrated that the serum depleted with pre-fusion, allowing for a >90% loss of its neutralizing capacity.

Applications

- Vaccine development
- Prevention of BRBV and other thogotoviruses

Key Advantages

- Provides the first high-resolution structural data on the pre-fusion conformation of BRBV GP

- Offers a new paradigm for vaccine design against thogotoviruses
- Pre-fusion GP provides a valuable tool for functional studies, paving the way for therapeutic interventions targeting the viral entry process

Patents
Patent pending

Related Web Links – Daved Fremont Profile; Fremont Lab