Development of a Therapeutic Against Flavivirus NS1 Protein as a Treatment for Flavivirus Infection

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OVERVIEW

A novel therapeutic agent capable of binding the NS1 domain of flavivirus

- A biologic therapeutic for treating dengue, Zika, and West Nile diseases
- Especially useful in diminishing symptoms of severe flavivirus infections

BACKGROUND

Mosquito-borne flaviviruses are responsible for several types of infections including dengue, Zika, and West Nile diseases. Up to 100 million dengue virus (DENV) cases occur worldwide each year, and the most severe form of the disease can cause vascular leak as a result of endothelial dysfunction. The trigger for this "cytokine storm" is uncontrolled viral replication and activation of target immune cells as mediated by the DENV non-structural protein 1 (NS1). NS1 is a glycoprotein essential for flavivirus viability, and it correlates with disease severity and severe dengue pathogenesis. Extracellular NS1 acts as a virulence factor that inhibits complement, activates platelets and immune cells, and decreases the ability of endothelial cells to maintain a fluid equilibrium. There are currently no approved therapeutics for these flavivirus diseases, and successful vaccines remain elusive. A need therefore exists for a broadly reactive flavivirus treatment or vaccine that targets NS1.

INNOVATION

Researchers have discovered a Flavivirus therapeutic targeting the NS1 domain of the virus to serve as a potential target against pathogens causing dengue, Zika, and the West Nile Virus. The researchers have demonstrated that the antibody is protective against lethal dengue virus infection in a mouse model. This novel biotherapeutic agent is derived from a monoclonal antibody (2B7) that attaches to NS1 and blocks it from binding with cell surfaces and triggering the endothelial dysfunction associated with the most severe forms of flavivirus diseases. The therapeutic agent can even be fused with another protein that breaks down or clears proteins such as NS1 from the serum, removing the potentially dangerous mediator from the circulation. The beneficial protein does not cause antibody dependent enhancement (ADE), a phenomenon associated with the unintentional enhancement of viral entry and replication in cells. The positive clinical effects should be able to help treat infections caused by any one of the flavivirus family of pathogens.

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Category

Therapeutics and Vaccines
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