Mast cell targeting to predict and prevent virus-induced vascular leakage

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Value Proposition

Dengue is a mosquito spread virus that affects millions of people worldwide. According to the World Health Organization, there are approximately 390 million dengue virus infections each year, and it is the leading cause of childhood death in some Asian and Latin American countries. While most dengue infections are mild, some can develop into Dengue Hemorrhagic Fever (DHF) or Dengue Shock Syndrome (DSS) or Severe Dengue (SD), which involve increased vascular permeability and hemorrhaging of internal organs. Currently, there are not tests to distinguish between mild dengue infections and DHF/DSS or SD. Also, there are no therapies to prevent virus-induced bleeding in these patients. Accurate detection of DHF/DSS or SD can lead to timely medical intervention and the administration vascular integrity supportive care to prevent severe complications and death.

Technology

This technology is for the diagnosis and prevention of mast cell induced vascular permeability during dengue infection. Mast cells line blood vessels and support vascular integrity, tone, and function. Degranulation of mast cells leads to the breakdown of cellular junctions and vascular leakage. Administration of a mast cell stabilizers was shown to decrease vascular leakage and decrease serum mast cell protease 1 (MCPT1), a product of mast cell activation, in a mouse model of dengue infection. In addition, mast cell stabilizers were shown to be effective at preventing vascular leakage during a secondary dengue infection in mice that were perfused with antibodies against dengue prior to infection. Finally, serum levels of chymase, a human MCPT1 homolog, were shown to be predictive of dengue infection in humans and could be used to distinguish between mild dengue fever and DHF/DSS or SD. This data demonstrates the utility of chymase testing and mast cells stabilizers in the detection of DHF/DSS or SD and the prevention of severe vascular complications during dengue infection.

Other Applications

- May be useful for the diagnosis and prevention of mast cell-induced vascular leakage during infection with other hemorrhagic fever viruses such as Ebola, Marburg, and West Nile.

Advantages

- Prevents vascular leakage, hemorrhaging and organ damage

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during both primary and secondary dengue infection
- Accurately distinguishes between mild and severe dengue infections

Patents

Patent Number: 9,730,921

Title: COMPOSITIONS AND METHODS FOR THE PREVENTION AND TREATMENT OF MAST CELL-INDUCED VASCULAR LEAKAGE

Country: United States of America

Patent Number: 2013240189

Title: HOST BIOMARKERS FOR DENGUE FEVER (DF) AND METHODS THEREOF

Country: Australia

Patent Number: 11201406142X

Title: COMPOSITIONS AND METHODS FOR THE PREVENTION AND TREATMENT OF MAST CELL-INDUCED VASCULAR LEAKAGE

Country: Singapore

Patent Number: 10201607977R

Title: HOST BIOMARKERS FOR DENGUE FEVER (DF) AND METHODS THEREOF

Country: Singapore

Patent Number: 10,668,059

Title: COMPOSITIONS AND METHODS FOR THE PREVENTION AND TREATMENT OF MAST CELL-INDUCED VASCULAR LEAKAGE

Country: United States of America