



Singapore-MIT Alliance for Research and Technology

News Release

Dengue: Humanised mouse model paves the way for scientists to understand the complex dengue disease and validate novel therapeutics

- SMART researchers have developed a humanised mouse model for dengue infection that captures key features of the disease, paving the way for scientists to understand the mystery behind the dengue disease and test novel and potential therapeutics for it, before clinical trials.

1. Singapore, 11 Sep 2013 – Researchers at the Singapore-MIT Alliance for Research and Technology (SMART) [新加坡-麻省理工学院研究中心] have developed a humanised mouse model that will expedite the search for an efficient therapeutic for dengue infection in the future. This humanised mouse model for dengue is able to capture some of the key features of dengue infection, such as platelet drop (important symptom and indicator of dengue infection in patients), transient decrease in immune cell populations in blood and elevation of liver enzymes (common during viral infections in patients).
2. Dengue generally affects only humans and specifically uses immune cells for replication. The efforts of finding the right therapeutics has been undermined due to the absence of animal models to validate the human response to the dengue infection and study the disease in a human cell context. Now researchers can use the mouse with human blood cells (humanised mouse) to understand the disease and also validate their dengue therapeutics (vaccine and treatment) before clinical trials.
3. With this new development by the SMART researchers from the Infectious Diseases Interdisciplinary Research Group (ID IRG), researchers all over the world can now use this humanised mouse model for dengue to test or validate therapeutics, as well as to understand the disease better in the human cell context (i.e. as close as possible to that of the disease in the human body).
4. Jianzhu Chen 陈建柱, the Ivan R. Cottrell Professor of Immunology at MIT, and SMART Lead Investigator of ID IRG, said: “The humanised mice have human immune cells as opposed to non-humanised mouse with no human immune cells at all. Because dengue virus infects only human cells, development of humanised mouse enables us to establish a small animal model of dengue virus infection. This means that researchers can now test a drug on this mouse and evaluate the drug’s efficacy more effectively.”
5. This research is based on the paper “Inhibition of Megakaryocyte Development in the Bone Marrow Underlies Dengue Virus-Induced Thrombocytopenia in Humanised Mice”. Here, the humanised mouse model for dengue was used to understand an important aspect of the dengue disease – thrombocytopenia or platelet drop and the reason why it occurs during dengue infection. The abstract can be found at <http://jvi.asm.org/content/early/2013/08/16/JVI.01156-13.abstract>. The research was funded by the Singapore National Research Foundation (NRF) through SMART at the Campus for Research Excellence And Technological Enterprise (CREATE).

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About SMART

The SMART Centre is a major research enterprise established by the Massachusetts Institute of Technology (MIT) in partnership with the National Research Foundation of Singapore (NRF) since 2007. It is the first entity in the Campus for Research Excellence and Technological Enterprise (CREATE) developed by NRF.

The SMART Centre serves as an intellectual hub for research interactions between MIT and Singapore. Cutting-edge research projects in areas of interest to both Singapore and MIT are undertaken at the SMART Centre. SMART comprises an Innovation Centre and five Interdisciplinary Research Groups (IRGs): BioSystems and Micromechanics (BioSyM), Center for Environmental Sensing and Modeling (CENSAM), Infectious Diseases (ID), Future Urban Mobility (FM) and Low Energy Electronic Systems (LEES).

About SMART Infectious Diseases Interdisciplinary Research Group

SMART Infectious Diseases IRG (ID IRG) seeks fundamental understanding of host-pathogen interactions as well as direct impact on human health through translational research. The ID IRG focuses on infectious diseases that have major impact on human health, including influenza, dengue fever, malaria and tuberculosis. The strategy of the IRG is to develop enabling technologies, including humanised mouse model, high resolution proteomics, glycomics, metabolomics and cellular mechanics platforms, to study infectious diseases using novel approaches and from new angles. The ID IRG has developed an integrated, cutting-edge research program with participation of both MIT faculty and investigators from Singapore universities and research institutes.

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