Stopping dengue: recent advances and new challenges

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Dengue remains a major problem throughout the world with an estimated 30% of the world's population at risk of infection. In the past few years, major advances have been made across virology, clinical insights, vaccines and mosquito control strategies. The first of its kind to be ever held in Australia, the International Dengue Symposium 2015 showcased some of the best science and clinical/public health research being undertaken in the field.

Proudly organised by The Peter Doherty Institute for Infection and Immunity, under the leadership of Professor Cameron Simmons, this symposium brought together 130 national and international dengue researchers. The organising committee acknowledges the support of ASM as an important partner to this meeting, together with generous support from The University of Melbourne, The Royal Melbourne Hospital, the Oxford University Clinical Research Unit, Vietnam and the DUKE-NUS Graduate Medical School, Singapore. Industry sponsors included Sanofi Pasteur, BioTools, VWR International, In Vitro Technologies, Pacific Lab Products, Interpath Services and Alere Global.

The formal symposium was opened by Professor Cameron Simmons. This was followed by a series of 21 brief talks spanning across four main themes of dengue research: Virology, Public Health, Clinical Research and Immunology/Pathogenesis. Short breaks for networking were scheduled in between each of these four sessions.

All of the invited speakers had considerable international profiles in dengue and hence the quality of the presentations was very high. Associate Professor Sheemei Lok discussed the structural basis behind how a dengue-2-specific human monoclonal antibody effectively protects mice from dengue infection due to its ability to 'lock' the dengue envelope proteins while blocking the binding of enhancing antibodies. Following that, Professor Ooi Eng Eong described the novel finding of a viral RNA-host protein interaction that allows dengue virus to evade the host immune response- this work was recently published in the prestigious journal, *Science*.

A highlight of this symposium was the 'Public Health' session, which was the first of its kind in Australia, with speakers from various companies including Sanofi Pasteur and Takeda, coming together to discuss their respective dengue vaccines, thereby providing attendees with a useful summary of all the dengue vaccines currently in clinical development.

Novel and highly innovative medical technologies were next discussed in the 'Clinical Research' session, with Dr Jenny Low explaining how *in vivo* imaging technologies such as positron emission tomography are being optimised presently to track dengue virus progression in a mouse model. Dr Sophie Yacoub gave a summary on changes in microvasculature of dengue patients upon infection and how these disturbances might precede the development of severe disease.

In the next session, Dr Laura Rivino discussed their work on elucidating the human cellular responses during dengue infection and how both CD4+ and CD8+ T-cell subsets remain enriched in the skin of dengue patients up to 5 months post infection. Professor Cameron Simmons then described an interesting dengue neutralisation assay developed in Vietnam using patients' viraemic blood and infected mosquitoes as a readout of the efficacy of monoclonal antibodies to efficiently neutralise dengue virus. Next, Dr David Muller introduced the concept of nanopatches that allow vaccine delivery in a needle-free manner.

In closing, the sponsors were wholeheartedly acknowledged for their contributions by Professor Cameron Simmons and their support was instrumental in allowing this symposium to be a success. Not only was the stellar line-up of talks highly educational but importantly, this symposium provided a networking opportunity for everyone interested in meeting the challenge of reducing dengue burden throughout the world.

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