Peptide Inhibitor and Its Interaction with Dengue Virus Structural Proteins

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Background/Objective
Dengue, a mosquito-borne viral disease is caused by the infection with various serotypes of dengue viruses (DENV-1 to -4). DENV infection causes a spectrum of clinical manifestations ranging from mild symptoms to life threatening dengue hemorrhagic fever and dengue shock syndrome. Treatment for DENV however remains limited to supportive care. There is neither specific anti-viral drugs nor licensed vaccine for the treatment and prevention of dengue infections. Therefore, discovery and development of anti-DENV drugs is pressingly needed. In this study, we aim to screen for novel anti-viral peptide(s) against DENV-2 by using phage display peptide screening methodology and to further investigate its interactions with DENV-2 proteins.

Method
A phage display peptide library was biopanned against purified DENV-2. Binding specificity of the identified phages were determined via ELISA. The toxicity of the selected peptide was being evaluated along with a battery of antiviral assays, including plaque reduction assay and RT-qPCR. Its mode of action and interaction with DENV-2 structural proteins were further elucidated via RT-qPCR, co-localization, and fluorescence polarization assays.

Result
We managed to identify a novel peptide (P mf-sh-1) through affinity selection from phage display peptide library. Using ELISA, we showed that the peptide has significant binding specificity against DENV-2. Approximate hundred percent inhibition was successfully achieved at a nontoxic concentration. Results from RT-qPCR and protein-peptide interaction assays showed that P mf-sh-1 is likely to inhibit DENV-2 infection by interacting with DENV envelope protein, thus inhibits the viral entry.

Conclusion
In conclusion, a novel anti-DENV peptide was identified and it may represent a new therapeutic candidate for the treatment of DENV infections.