

Engineering Approaches to Combat Infectious Diseases: An Example of Broad-Spectrum Antiviral Peptides

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Infectious diseases represent one of the leading causes of worldwide morbidity and mortality, with their emergence, re-emergence, and potential application as bio-terror agents all serious public health and security concerns. While there have been important advances in antiviral drug development over the past few decades, there remains an urgent need to develop new classes of antiviral agents. One promising antiviral target is the lipid envelope surrounding a wide range of medically important viruses, although its selective targeting is difficult to achieve. By utilizing engineering approaches, we have addressed this need by developing a broad-spectrum antiviral peptide that acts by selectively destabilizing lipid membranes with high-curvature membrane architectures, including small, spherical particles (e.g., dengue) and filamentous particles (e.g., Ebola). The peptide exhibits highly potent *in vitro* antiviral activity against multiple virus families and has a therapeutic index around 1,000. *In vivo* experiments in a humanized dengue mouse model demonstrate that treatment with the peptide significantly reduces viral titer in the bloodstream. The findings support that viral membrane targeting holds excellent potential for the treatment and prevention of virus infections and highlight the potential of engineering approaches to combat infectious diseases.

Biography Associate Professor Nam-Joon Cho



Nam-Joon Cho is Nanyang Associate Professor in the School of Materials Science and Engineering at Nanyang Technological University in Singapore and Deputy Director of the Nanyang Institute of Technology in Health and Medicine. In addition, he is a Principal Investigator at the Singapore-MIT Alliance for Research and Technology. His group's research focuses on engineering approaches to solve important biomedical problems and to translate these capabilities into practical applications for global health. Dr. Cho's scientific work has been highlighted by international media organizations such as *Reuters*, *CNBC*, and *Businessweek*, and has led to the identification of novel classes of antiviral drugs to treat virus infections. Dr. Cho is also the Founder and Chief Scientific Advisor of TSG Therapeutics, which is pioneering efforts to develop viral membrane-targeting antiviral drugs. He is a graduate of Stanford University and the University of California, Berkeley.

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