# New designer lipid-like peptide with lipid nanostructures for drug delivery systems

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Scientists from Institute of Biophysics and Nanosystems Research (IBN), Austrian Academy of Sciences and of Centre for Biomedical Engineering, Massachusetts Institute of Technology, Cambridge, USA report the study of “Tuning Curvature and Stability of Monoolein Bilayers by Designer Lipid-Like Peptide Surfactants” in the May 30th issue of the online, open-access journal PLoS ONE. Their findings not only help us to understand the basic science of how lipid-like peptides interact with lipid molecules, but also may provide new strategies for the encapsulation and the delivery of biological active materials. They detailed their findings in the report on the impact of integrating short surfactant-like designer peptides in lipidic nanostructures.

Anan Yaghmur, Michael Rappolt, Peter Laggner and Shuguang Zhang reported the formations of dynamic nanostructures of lipid-like peptides that are like two-headed Janus, both water-loving and water-hating, which represent a new class of designer materials using common amino acids, the same basic molecules from meat, beans and fruits. These lipid-like peptides have excellent potential to solubilize membrane proteins and enzymes, and - as now demonstrated - can also be utilized to stabilize different self-assembled liquid crystalline nanostructures. Moreover, the surface charge density of lipidic nanostructures can be varied in a simple manner.

Dr. Anan Yaghmur, first author of the study, comments on the study, “the addition of small amounts of designer lipid-like peptides is sufficient to form systems with excellent potential for various

biotechnological applications such as the encapsulation of water-insoluble drugs and the delivery of biological active materials."

Currently, many anticancer drugs are difficult to deliver to patients due to their difficulty to be soluble in water. "This is a systematic study to combine with lipid molecules," Shuguang Zhang of MIT, a co-author said, "people have been curious about if these similar molecules can interact. This study provided the first answer". "Since these lipid-like peptides can be designed, just like to design an elegant watch, an art object, a music instrument, a ski, or a pair of sunglasses, we have the ultimate control to the outcome of the structure and their properties" Zhang added.

This study stemmed from a scientific visit by Peter Laggner to Shuguang Zhang at MIT in Cambridge, USA in May 2006. They shared some ideas and decided to collaborate since Laggner is a world-expert on nanostructure using small angle X-ray scattering and Zhang can provide the designer lipid-like peptides that he has been studied since 2000.

In the near future, many colloidal aqueous dispersions, which are similar to milk and some paints, with confined inner nanostructures, will offer unique characteristics like high drug load capacities and low viscosity. Here these designer lipid-like peptides may play a key role in improving effective drug delivery systems.

Source: Public Library of Science