Nanostructured materials | Jožef Stefan Institute Ljubljana, Slovenia

SEMINAR I

Friday, 12.04.2024, 13:00, IPS Lecture Room

Hybrid Nanocarriers Featuring Genipin-Polyamine Polymers and Erythrocyte Membrane Coating for Nucleic Acids

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The development of sustained release in 1951 laid the groundwork for Drug Delivery Systems (DDSs). This seminar summarizes the history of DDSs to highlight their significant impact on medicine. Special attention is given to DDSs for nucleic acid delivery, particularly siRNA, because of their efficient gene silencing ability.

We will examine Lipid, Polymer, Hybrid and Cell-Based DDSs, focusing on erythrocyte membrane vesicles. Both synthetic and natural particles have their pros and cons, leading us to propose a hybrid system. We aim to design a naturally hybrid system, introducing genipin-polyamine cationic nanoparticles complexed with siRNA. Genipin acts as a crosslinker, allowing the formation of solid nanoparticles, while polyamines (spermine and spermidine) stabilize the siRNA conformation, preventing aggregation.

The erythrocyte membrane coating serves as a "camouflage", protecting drugs from immune cell phagocytosis and reducing the potential biotoxicity of drugs. Carriers made of natural polymers, like those proposed here, are a novel development in this field. We believe that EMVs-coated hybrid nanoparticles, consisting of a genipin-polyamine core and an EMVs shell, represent a safe and efficient delivery system for RNAi therapeutics.

Kindly invited.