Self-assembled peptides in lipid-based RNA delivery systems

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Based on previous investigations in our group,[1] this study presents the development and characterization of nanoscale gel-core liposomes using a short self-assembled peptide hydrogel, aiming to enhance drug delivery applications. Traditional liposomes face challenges such as rapid drug release and structural instability, which can limit their efficacy. By incorporating a peptide-based hydrogel core, the authors aimed to improve the mechanical properties, stability, and controlled drug release profile of liposomes. The study utilized Fmoc-GFF, a self-assembling peptide gelator, and successfully integrated it within liposomes. Characterization confirmed the formation and stability of the gel-core liposomes. The results demonstrated that the incorporation of a hydrogel core enhanced structural integrity compared to traditional liposomes. These findings suggest that gel-core liposomes could serve as a promising platform for controlled and sustained drug delivery.[1] Lipid-based nanoparticles (LNPs) are essential for mRNA delivery in vaccines and therapeutics, providing protection and facilitating cellular uptake,[2] however, concerns with these relating to rapid degradation in the endosome and immunogenicity of the PEG lipids used,[3,4] mean that better delivery systems are desired. Although, self-assembled peptides such as Fmoc-KKFF (Figure 1) have been widely investigated for their potential in creating effective drug delivery platforms,[5] their application in RNA delivery remains underexplored. This project investigates the use of self-assembled peptides in lipid-based nanoparticles as carriers for RNA, focusing on their potential to enhance delivery performance.

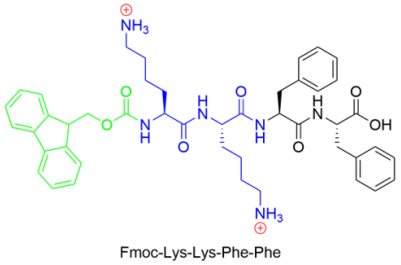

Figure 1. The structure of Fmoc-KKFF

References

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