Engineered Proteinticles for Targeted Delivery of siRNA

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Here we genetically engineered human ferritin based proteinticles to simultaneously display various functional peptides on the surface of proteinticles: cationic peptide to capture siRNA, tumor cell targeting and penetrating peptides, and enzymatically cleaved peptide to release siRNA inside tumor cell. The polymerized siRNA (poly-siRNA) tightly bound to the engineered proteinticles and formed stable and condensed structure (poly-siRNA-proteinticle complex) without cytotoxicity problem. Furthermore, siRNAs in the condensed complex were effectively protected from endonuclease due to a shielding effect of proteinticles. In the in vitro treatment of poly-siRNA-proteinticle complex, both of the tumor cell targeting and penetrating peptides were important for efficient delivery of siRNA, and the red fluorescent protein (RFP) expression in RFP-expressing tumor cells was notably suppressed by the delivered siRNA with the complementary sequence to RFP mRNA. It seems that the human ferritin-based proteinticle is an efficient, stable, and safe tool for siRNA delivery, having a great potential for application to in vivo cancer treatment.