Targeted delivery of CRISPR/Cas9 protein by functional nanoparticle for highly efficient gene editing in cancer cells *in vitro* and *in vivo*

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Targeting the oncogene which has the potential to induce cancer have emerged as a therapeutic approach for cancer treatment. CRISPR/Cas9 system is the most robust tools for the gene editing that modulate the target gene expression with its mechanism of specific DNA complementary recognition by engineered single guide RNA (sgRNA). However, undesired effect derived from the delivery of Cas9 plasmid DNA (pDNA) or mRNA to the cells and its transport technology limits its utility for the clinical approach. To achieve targeted therapy of cancer with the CRISPR/Cas9 system, we encapsulate a CRISPR/Cas9 protein complex targeting the fusion region of the TACC3-FGFR3 gene that promotes cancer based on functional nanoparticles. The vehicles loading the CRISPR/Cas9 protein complex efficiently knock-out the fusion gene of cancer cells and improve the tumor suppression of the xenograft mouse model after intravenous injection. Therefore, the combinatory effect of the CRISPR/Cas9 protein and nanocarrier suggests a promising strategy on biomedical research and has potential as a therapeutic application for genome-modified diseases *in vivo*.