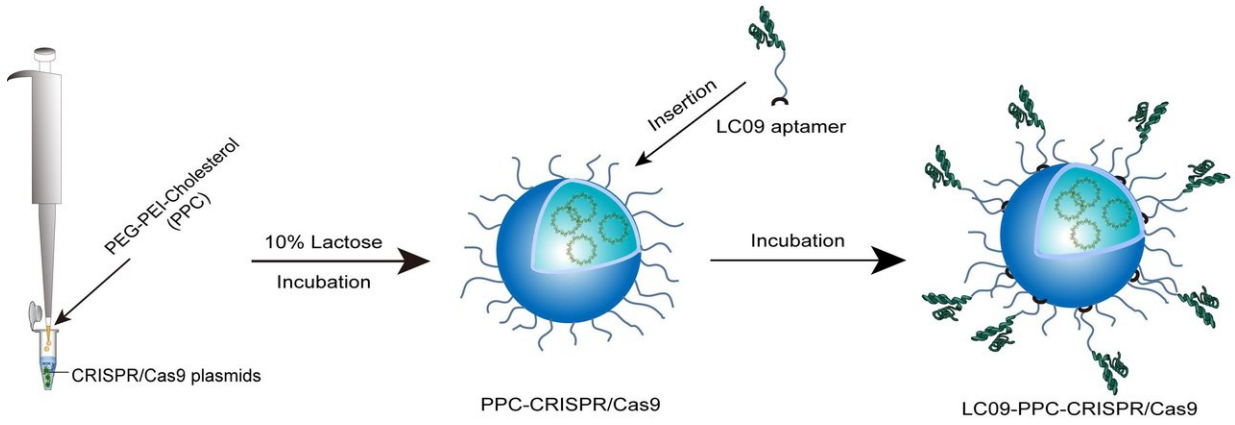
Medicine scholars develop innovative targeted delivery system for treating osteosarcoma

November 10 2017



The preparation of LC09-PPC-CRISPR/Cas9 delivery system. Credit: HKBU

Chinese Medicine scholars at Hong Kong Baptist University (HKBU) have succeeded in developing a novel targeted delivery system for CRISPR/Cas9 to achieve therapeutic genome editing of VEGFA in osteosarcoma (OS). Their research paper entitled "Tumor cell-targeted delivery of CRISPR/Cas9 by aptamer-functionalised lipopolymer for therapeutic genome editing of VEGFA in osteosarcoma" was recently published in the internationally renowned academic journal *Biomaterials*.

CRISPR/Cas9 is a budding genome editing technology which holds

tremendous promise for cancer treatment. However, a major bottleneck for achieving the therapeutic potential of CRISPR/Cas9 is the lack of an in vivo targeted delivery system. The HKBU team has achieved a breakthrough in the search for an answer to the crux of the above mentioned problem and developed an aptamer-functionalised delivery system for CRISPR/Cas9 with the treatment of OS as a research target.

The research team is led by Professor Lyu Aiping, Dean of the School of Chinese Medicine (SCM) of HKBU, and Professor Zhang Ge, Director of Technology Development Division and Associate Director of Teaching and Research Division of SCM.

Professor Zhang Ge said: "OS, a very common primary malignant bone tumor in children and adolescents, is mainly treated by surgery and chemotherapy but the five-year post-surgery survival rate is a mere 5% to 20%. Aptamers which are single-stranded oligonucleotides and could specifically recognise target cells have been widely used for in vivo targeted delivery of therapeutics. VEGFA has been reported to be a novel therapeutic target for OS."

Professor Lyu Aiping said: "The tumor-specific aptamers, when conjugated with PPC polymers encapsulating CRISPR/Cas9, may facilitate therapeutic genome editing in tumors."

In the experiments using a mouse model, the aptamer facilitated selective distribution of CRISPR/Cas9 in both orthotopic OS and lung metastasis, leading to effective in vivo VEGFA genome editing, inhibited orthotopic OS malignancy and lung metastasis, as well as reduced angiogenesis and bone lesion with no detectable toxicity. The research facilitated clinical application of CRISPR/Cas9 in tumor treatment.

Other researchers who participated in the research include SCM's Post-

doctoral Research Fellow Dr Liang Chao, Research Assistant Professor Dr Li Fangfei, PhD student Ms Wang Luyao, Dr Wang Chao from the research team of Dr Zhu Hailong of SCM, and Dr Zhang Zongkang of the research team of Dr Zhang Baoting of the School of Chinese Medicine, The Chinese University of Hong Kong.

More information: Chao Liang et al. Tumor cell-targeted delivery of CRISPR/Cas9 by aptamer-functionalized lipopolymer for therapeutic genome editing of VEGFA in osteosarcoma, *Biomaterials* (2017). DOI: 10.1016/j.biomaterials.2017.09.015