

Supplementary Information for

Self-assemble Magnetic Theranostic Nanoparticles for Highly Sensitive MRI of Minicircle DNA Delivery

Qian Wan,^{#a} Lisi Xie,^{#a} Lin Gao,^a Zhiyong Wang,^{*a} Xiang Nan,^a Hulong Lei,^a Xiaojing Long,^a Zhi-Ying Chen,^b Cheng-Yi He,^b Gang Liu,^d Xin Liu,^a and Bensheng Qiu^{*a,c}

^a Paul C. Lauterbur Research Center for Biomedical Imaging, Institute of Biomedical and Health Engineering, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen 518055, China.

^b Center for Gene and Cell Engineering, Institute of Biomedicine and Biotechnology, Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen, China.

^c Department of Radiology, University of Washington School of Medicine, USA.

^d Center for Molecular Imaging and Translational Medicine, School of Public Health, Xiamen University, Xiamen, China.

Equally contributing authors

* Corresponding author

Zhiyong Wang, Ph.D.

Bensheng Qiu, Ph.D.

Paul C. Lauterbur Research Center for Biomedical Imaging

Institute of Biomedical and Health Engineering

Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen 518055, China.

Tel: +86-755-86392268

Fax: +86-755-86392299

E-mail: zy.wang@siat.ac.cn

bs.qiu@siat.ac.cn

MRI sensitivity of transfected cells in blood background signal

Method:

The MRI sensitivity of transfected cells in background signal coming from iron in blood was measured. First, MCF-7 cells were transfected with the Stearic-LWPEI-SPIO/mcDNA nanocomplexes at N/P ratio 20. At 48 h post transfection, these cells were washed three times with PBS and harvested. The fresh venous blood was collected from the BABL/c mice. Then various numbers of the transfected cells were redispersed in 200 μ l blood-gel with 100 μ l fresh bloods and 100 μ l 0.5% gelatin. The untransfected cells in the blood-gel were used as the controlled group. T_2 -weighted MR images of the cells were performed on a clinical Siemens 3.0 T MRI scanner with a 4-channel small animal coil and the following parameters: TSE sequence, TR=3000ms, TE from 11 to 212 ms, FOV= 40 \times 100 mm, and slice thickness=1.0 mm. The signal intensity of T_2 -weighted MRI was measured to analysis the T_2 value of each sample. Herein, the T_2 -value ratio was calculated as the T_2 values of transfected cells divided by the value of the control.

In vivo MR imaging and bioluminescence imaging of the transfected cells

Method:

The transfected cells (5×10^5 cells) were injected subcutaneously at the right scapular of BALB/c nude mouse, and the same amount of untransfected cells was injected in the left side. The MRI study was performed on a clinical Siemens 3.0 T MRI scanner equipped with a mouse coil. The images were acquired with a modified 2D T_2 -weighted fast spin-echo sequence and the following

parameters: TR= 3500 ms, TE= 50 ms, FOV = 26 × 44 mm, slice thickness =1 mm. The luciferase expression was visualized by using a Xenogen IVIS-100 system.

Supplement 1

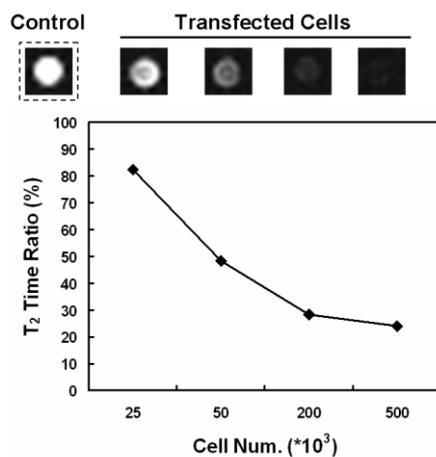


Fig. S1. T_2 values ratio of transfected cells to the control ones as a function of cell number in blood-gel with a total volume of 200 μ l. 3T, se-mc acquisition, insets: cross section MR images of corresponding tubes: TR = 3000 ms, TE = 53 ms.

Supplement 2

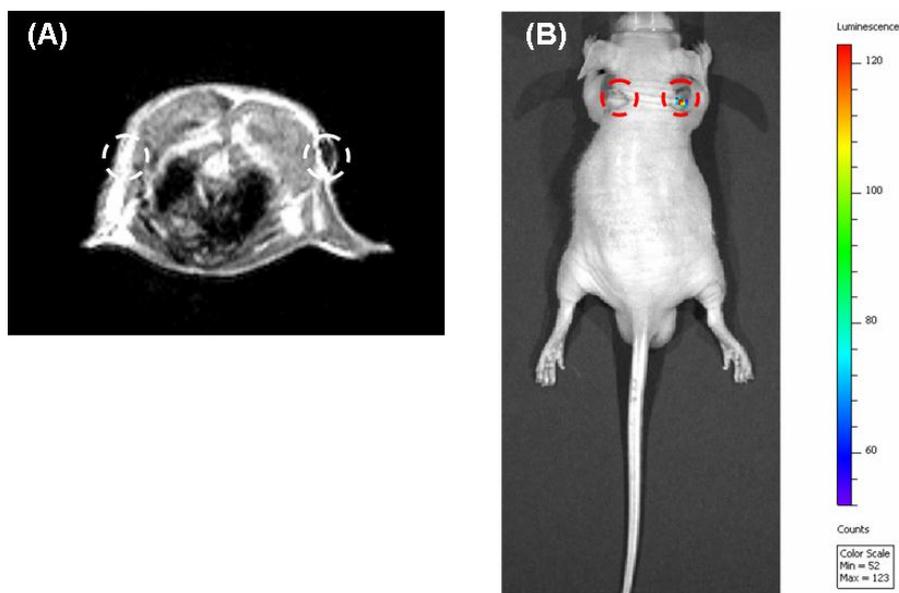


Fig. S2. (A) *In vivo* T_2 image of Stearic-LWPEI-SPIO/mcDNA nanocomplexes transfected cells shows a prominent hypointense area at the injection site in the right of body comparing with the control cells in the left site. TR = 3500 ms, TE = 50 ms. (B) *In vivo* optical images.