Supplementary Information for

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

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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 µl blood-gel with 100 µl fresh bloods and 100 µl 0.5% gelatin. The untransfected cells in the blood-gel were used as the controlled group. T2-weighted MR images of the cells were performed on a clinical Siemens 3.0 T MRI scanner equipped with a 4-channel small animal coil and the following parameters: TSE sequence, TR=3000ms, TE from 11 to 212 ms, FOV= 40x100 mm, and slice thickness=1.0 mm. The signal intensity of T2-weighted MRI was measured to analysis the T2 value of each sample. Herein, the T2-value ratio was calculated as the T2 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 T2-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

![T2 values ratio graph](image)

Fig. S1. T₂ values ratio of transfected cells to the control ones as a function of cell number in blood-gel with a total volume of 200 µl. 3T: se-mc acquisition, insets: cross section MR images of corresponding tubes: TR = 3000 ms, TE = 53 ms.

Supplement 2

![In vivo images](image)

Fig. S2. (A) In vivo T₂ 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.