

## Electronic Supplementary Information

### Ligand-Free Gadolinium Oxide for *In Vivo* T<sub>1</sub>-Weighted Magnetic Resonance Imaging

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**Calculation of the relaxation rates ( $1/T_1$ ).** In T1 inversion recovery (IR) imaging (Figure S1(s)), signal intensity ( $S_{IR}$ ) versus inversion time ( $T_I$ ) is fitted to the following exponential  $T_1$  recovery model by non-linear least square regression: <sup>1</sup>

$$S_{IR}(T_I) = S_0[1 - 2\exp(-T_I/T_1) + \exp(-T_R/T_1)] \quad (S1)$$

In our measurement,  $T_I$  ranges from 500 to 1800 ms (13 measurement points), and  $T_R$  is 2000 ms. For different  $Gd^{3+}$  concentration (0-0.1mM), detail calculation of the relaxation rates ( $1/T_1$ ) are showed in Figure S1.

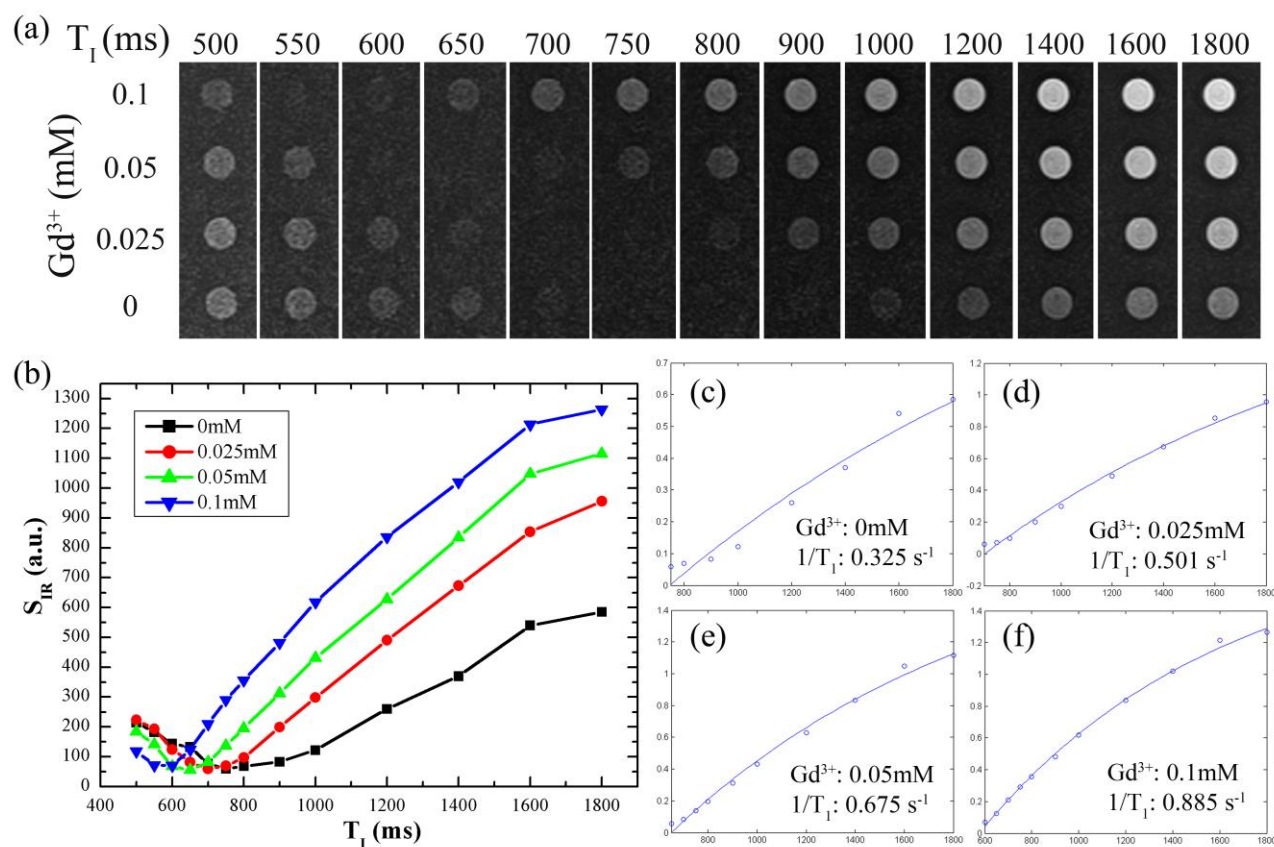


Figure S1. (a) T1-weighted MR images of different  $Gd^{3+}$  concentration (0-0.1mM) in different inversion time. (b) Plotted curves of signal intensity versus inversion time from (a). (c-f) Fitting curves of different  $Gd^{3+}$  concentration according to Equation (S1).

**Animal Model.** Animal experiments were done according to the National Institutes of Health guidelines on the rules of animals during research. Four to six-week-old Balb/c nude mice (weight of 18 to 22 g) were bought from the animal experiment center of the Medical College, Sun Yat-sen University, China, and maintained in a specific pathogen-free (SPF) environment (Certificate No. 26-99S031). Mice were subcutaneously injected with  $5 \times 10^6$  nasopharyngeal carcinoma (NPC) CNE-2 cells with 100  $\mu$ L phosphate buffered saline (PBS). Ten days after tumor cell inoculation, mice were randomized by tumor size (approximately 60 mm<sup>3</sup>).

#### References

1. G. Liang, J. Ronald, Y. Chen, D. Ye, P. Pandit, M. L. Ma, B. Rutt, and J. Rao, *Angewandte Chemie*, 2011, **123**, 6407–6410.