Supplementary Information

Shape-dependent cellular behaviors and relaxivity of iron oxide-based T_1 MRI contrast agents

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Figure SS1 a and e presented the r_1 and r_2 values of USNPs and NWs determined by the equation $1/T_{i\,sample} = 1/T_{i\,solvent} + r_i[M](i = 1,2)$ where, $1/T_{i\,sample}$ are the relaxation times of NP solutions (s-1) and $1/T_{i\,solvent}$ are the relaxation times of pure solvent (s-1), [M] is the concentration of iron (mM), and $r_i(i = 1,2)$ is the relaxivity of the NPs. The relaxation times of USNPs and NWs were measured at 3 different concentrations and the r_1 and r_2 relaxivities were determined by the slope. The T_1 and T_2 relaxation curves of USNPs and NWs internalized in HepG2 cells along with the calculated iron concentrations were utilized to determine the r_1 and r_2 relaxivities of NPs after cell internalization.

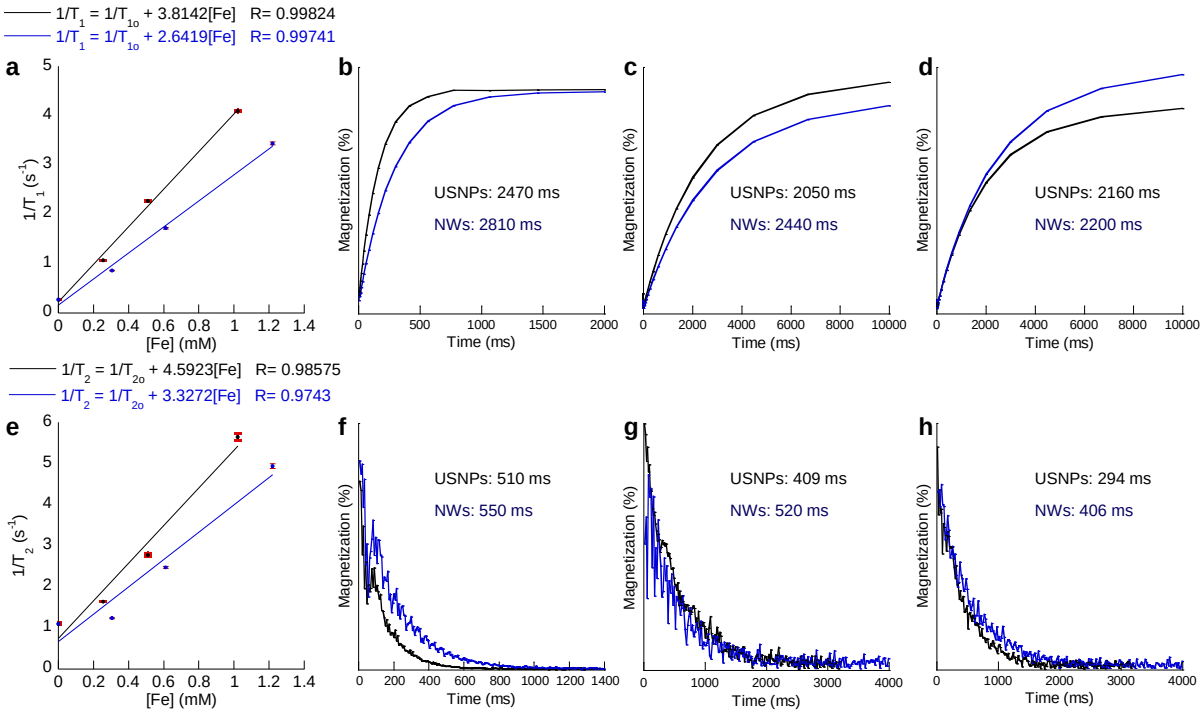

Fig. SS1 Relaxivities of USNPs and NWs in buffer (a and e) and inside HepG2 cells (b-d and f-h): (a and e) Relaxation rate vs. iron concentration plots, (b-d) T_1 relaxation curves (b-d) and T_2 relaxation curves (f-h) of NPs inside cells at 4 (b, f) , 24 (c, g), and 72 hours (d, h).

Figure SS2 shows the invert phase microscope images of cells treated with USNPs (Figure ss2 a-c) NWs (Figure ss2 d-f), Gd complexes (Figure 22g-i) and control cells (Figure ss2j-l). The cell morphology of HepG2 cells incubated with USNPs and NWs showed minimal cell morphology variations compared to control cells. The cells treated with both types of NPs grew continuously throughout the time dependent studies and all of the cells reached 100% confluence after 72 hours. In contrast, HepG2 cells treated with an equal molar concentration of Gd-complexes showed significant cell morphology alteration and inhibited cell growth. The changes in cell morphology for Gd-treated HepG2 cells but not in cells treated with USNPs or NWs indicated the biocompatibility of these NPs.

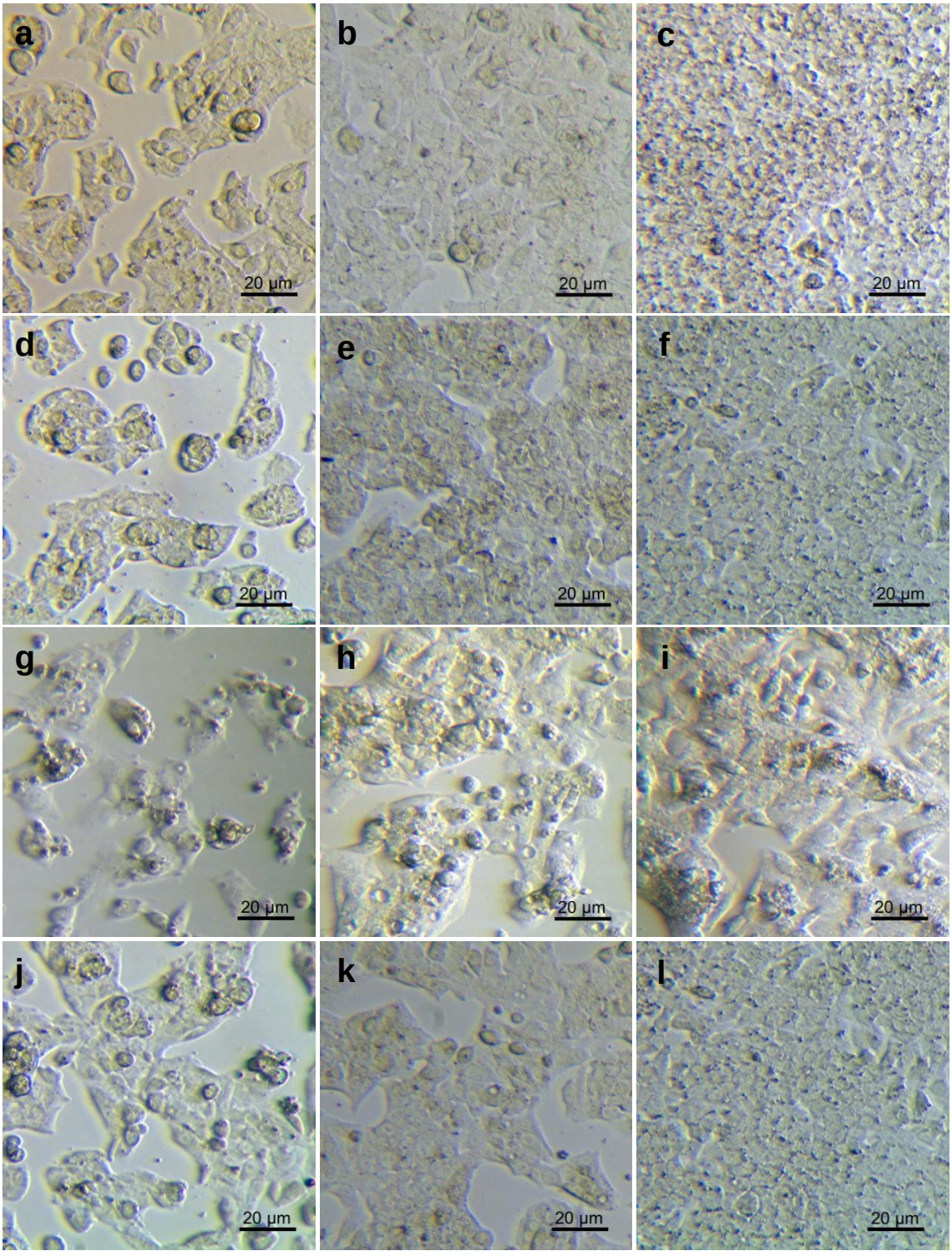

Fig. SS2 HepG2 cells incubated with USNPs (a, b, c), NWs (d, e, f), Gd (g, h, i), and control cells (j, k, l) at 4, 24, and 72 hours. Incubation times increase from left to right.

Figure SS3 shows the photographs of cell pellets with internalized USNPs and NWs. The color differences in cell pellets indicated different cellular uptake with respect to particle shape and time. The observations during cell collection correlated well with results from Prussian blue staining, TEM imaging, and iron concentration quantification.

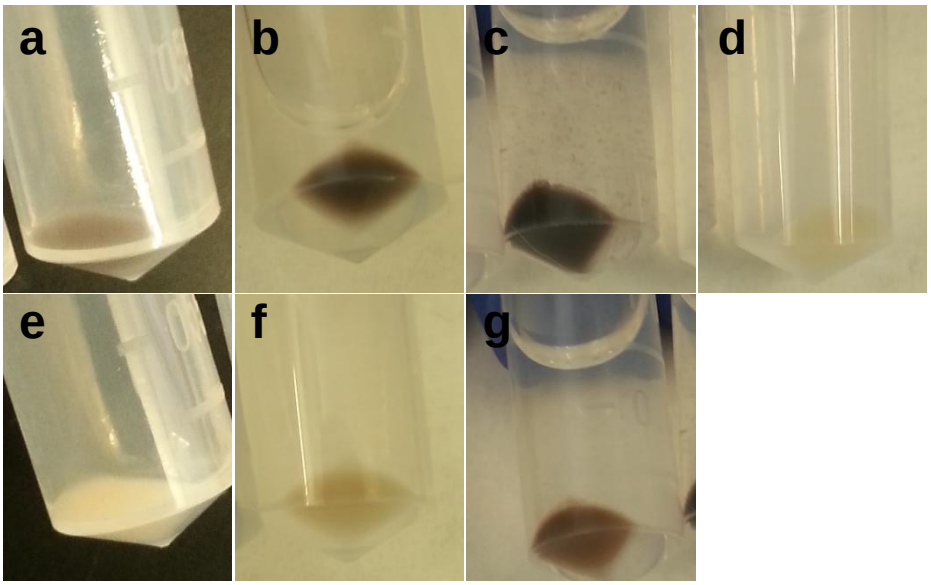

Fig. SS3 HepG2 cells incubated with USNPs (a, b, c), NWs (c, f, g), and control cells (d). USNPs and NWs at 4, 24, and 72 hours. Incubation times increase from left to right. Control cells after 72 hours.