Supporting Information

A Facile Synthetic Route for Surface Functionalized Magnetic Nanoparticles: Cell Labeling and Magnetic Resonance Imaging Studies

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Table S1. Screening of a commercial library of PEG derivatives for organic-to-aqueous phase transfer of iron oxide nanoparticles (– : no transfer, + : incomplete transfer, ++ : complete transfer).

Category	Polymer type	Molecular weight	Transfer	Stability after
Nonfunctional PEGs	HO-PEG-OH	1,000	–	–
	HO-PEG-OH	2,000	–	–
	HO-PEG-OH	3,400	–	–
	HO-PEG-OH	5,000	–	–
	HO-PEG-OH	10,000	–	–
	HO-PEG-OH	20,000	+	–
	HO-PEG-OH	35,000	+	–
	HO-PEG-OH	2,000,000	+	–
Amine-functionalized PEG	H_2N-PEG-NH_2	1,000	–	–
	H_2N-PEG-NH_2	2,000	++	–
	H_2N-PEG-NH_2	3,400	++	–
	H_2N-PEG-NH_2	5,000	++	+
	H_2N-PEG-NH_2	10,000	++	++
	H_2N-PEG-NH_2	35,000	++	++
	4(PEG-NH_2)[a]	10,000	++	++
	6(PEG-NH_2)[b]	15,000	++	++
Thiol-functionalized PEG	HS-PEG-SH	5,000	–	–
	4(PEG-SH)[c]	10,000	+	–
Carboxyl-functionalized PEG	HOOC-PEG-COOH	5,000	++	–
	4(PEG-COOH)[d]	10,000	++	–
Methoxy PEG	mPEG[e]-NH_2	2,000	–	–
	mPEG-NH_2	5,000	++	+
	mPEG-COOH	5,000	++	–
	mPEG-SH	5,000	–	–
Hetero-functionalized PEG	H_2N-PEG-COOH	3,400	++	–
	H_2N-PEG-COOH	5,000	++	+
	HO-PEG-NH_2	5,000	++	–
	HOOC-PEG-SH	5,000	+	–
	mPEG-biotin	5,000	–	–
	Biotin-PEG-NH_2	5,000	–	–
	Fluorescein-PEG-NH_2	5,000	++	+

[a]4-arm amine-functionalized PEG, [b]6-arm amine-functionalized PEG, [c]4-arm thiol-functionalized PEG, [d]4-arm carboxyl-functionalized PEG, [e]methoxy-functionalized PEG.

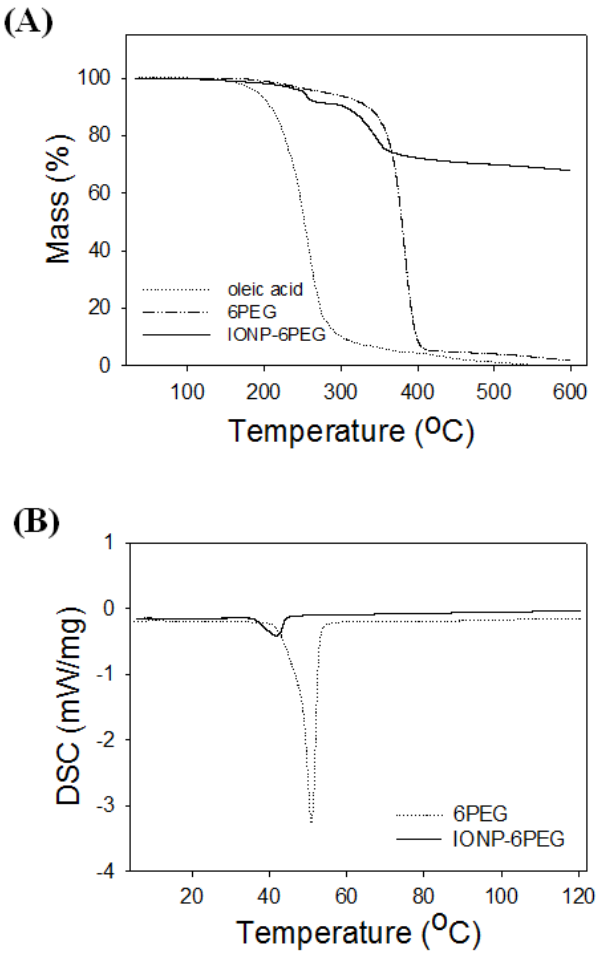

Figure S1. Characterization of IONP-6PEG: (A) TGA of aqueous-dispersed IONPs (IONP-6PEG) with oleic acid and 6(PEG-NH_2) (6PEG) as control. (B) DSC of aqueous-dispersed IONPs (IONP-6PEG) with 6(PEG-NH_2) (6PEG) as control.

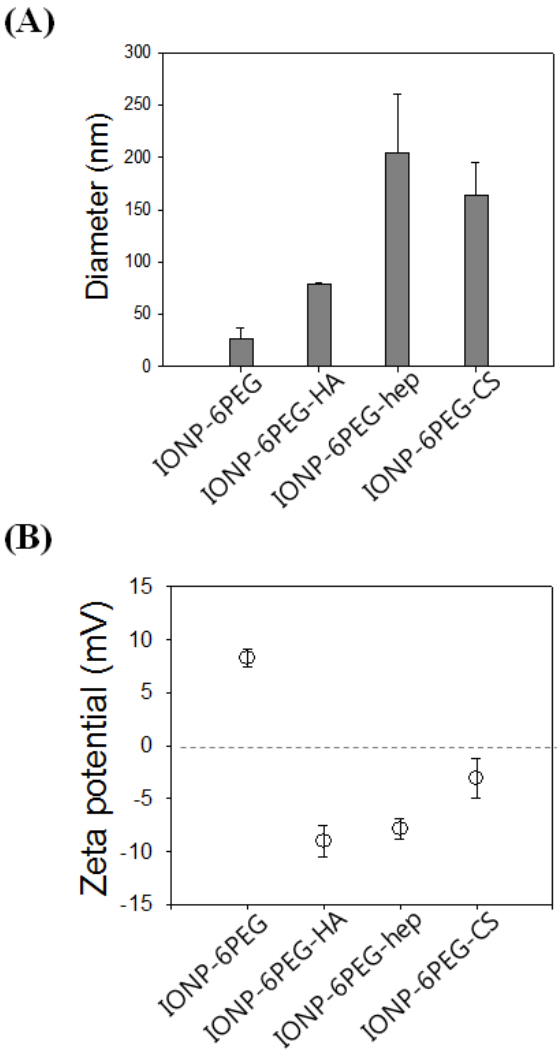

Figure S2. DLS (A) and zeta potential (B) measurements of IONP-6PEGs before (IONP-6PEG) or after biofunctionalization with HA (IONP-6PEG-HA), heparin (IONP-6PEG-hep), and chondroitin sulfate (IONP-6PEG-CS).

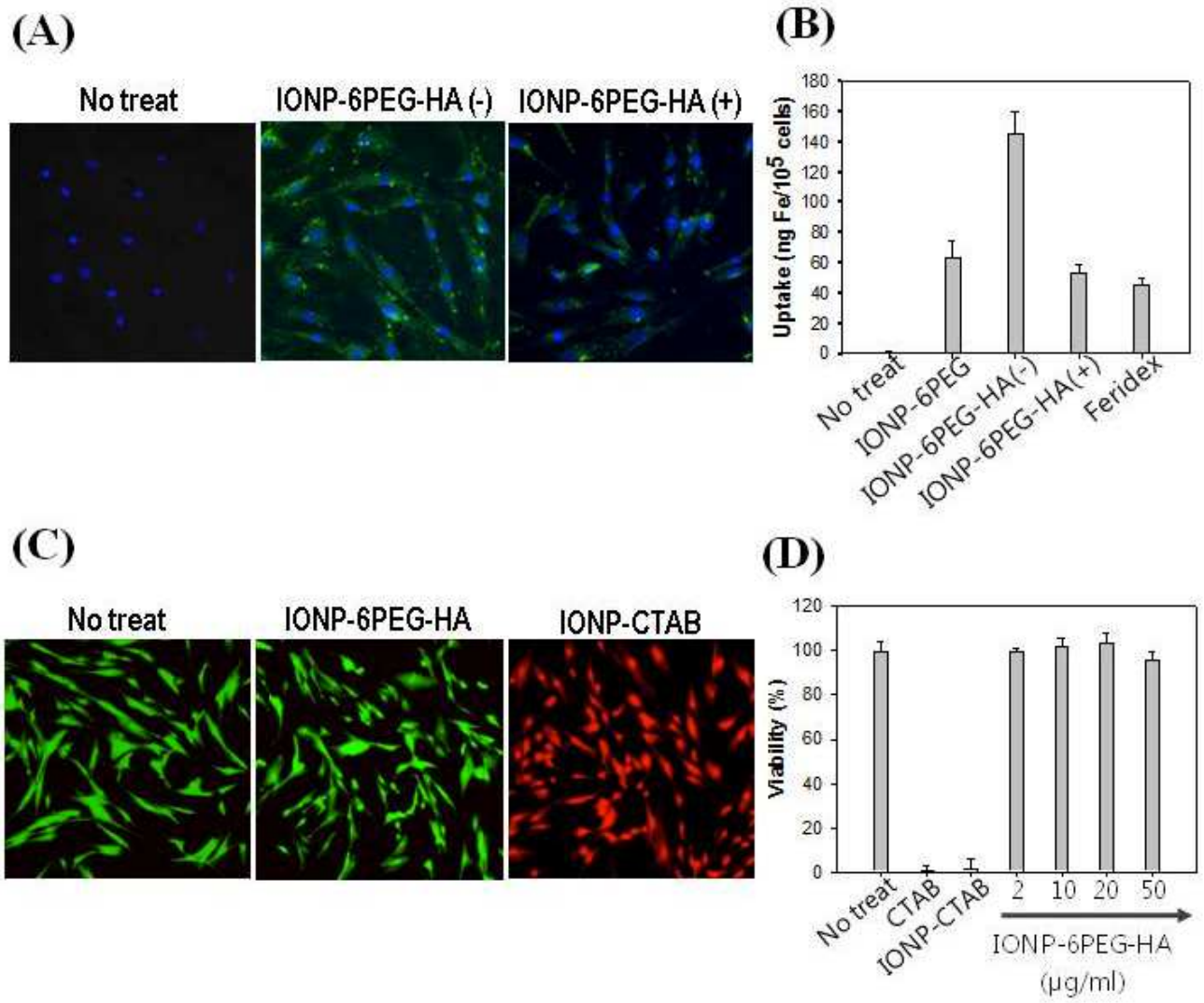

Figure S3**.** Labeling of MSCs using IONP-6PEG-HA. (A) Confocal microscopy of MSCs treated with fluorescein-labeled IONP-6PEG-HA (green) with nuclei stained with DAPI (blue). (B) Quantitative uptake of IONP-6PEG-HA measured by ICP-AES. (C) Live (green) and dead (red) cells treated with IONP-6PEG-HA. Values for MSCs without any treatment (no treat) or treated with CTAB (CTAB) and CTAB coated IONPs (IONP-CTAB) are shown as control. Cells treated with IONP-6PEG-HA in the presence of excess HA is shown with a (+), otherwise (-).

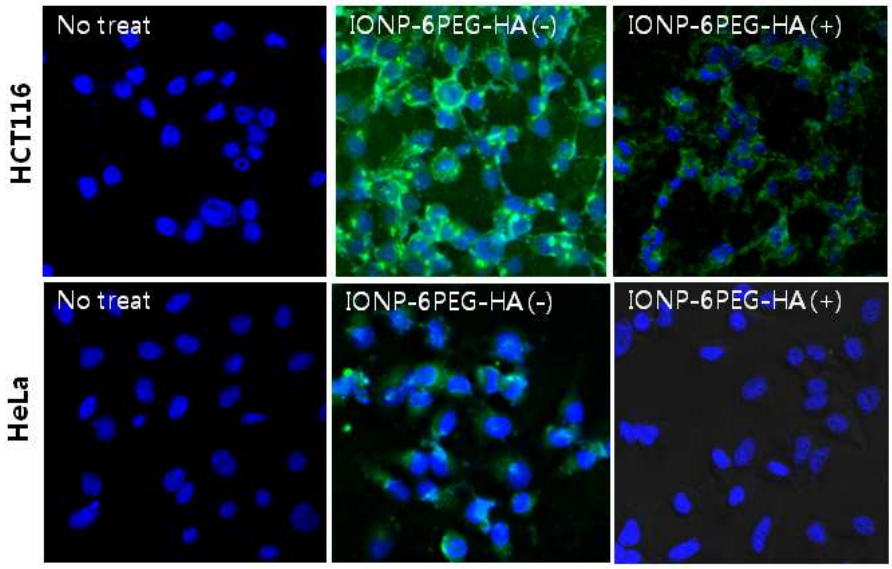

Figure S4. Confocal microscopy of CD44 over-expressing HCT116 cells (upper row) and normally expressing HeLa cells (bottom row) treated with fluorescein-labeled IONP-6PEG-HA (green) in absence (-) or presence (+) of excess HA, or without any treatment (No treat). Nuclei were stained with DAPI (blue).