^{99m}Tc-conjugated manganese-based mesoporous silica nanoparticles

for SPECT, pH-responsive MRI and anti-cancer drug delivery

Hongbo Gao^{a,b}, Xiaohang Liu^{a,b}, Wei Tang^{a,b}, Dechao Niu^c, Bingni Zhou^{a,b}, Hua Zhang^d, Wei Liu^{a,b}, Gu bingxin^{b,e,}, Xiaobao Zhou^f, Yingying Zheng^{b,e}, Yiyun Sun^{b,e} , Xiaobo Jia^c, Liangping Zhou*^{a,b}

^a Department of Radiology, Fudan University Shanghai Cancer Center, Shanghai 200032, China. E-mail: zhoulp2006@163.com

^b Department of Oncology, Shanghai Medical College, Fudan University, Shanghai 200032, China

^c Lab of Low-Dimensional Materials Chemistry, Key Laboratory for Ultrafine Materials of Ministry of Education,

School of Materials Science and Engineering, East China University of Science and Technology, Shanghai 200237, China.

^d Department of Radiology, Huashan Hospital, Shanghai Medical College, Fudan University, Shanghai 200040,

China.

^e Department of Nuclear Medicine, Fudan University Shanghai Cancer Center, Shanghai 200032, China

^f The Key Laboratory of Resource Chemistry of Ministry of Education, College of Life and Environmental

Science, Shanghai Normal University, Shanghai 200234, China



Figure S1 TEM images of PEG-Mn-MSNs under different scales.



Figure S2 TEM images of MnO_x -MSNs (a) and PEG-Mn-MSNs (b) with low Mn ion concentrations (0.2 mmol KMnO₄ were reacted with MnO_x-MSNs).



Figure S3 Nitrogen adsorption-desorption isotherms (a) and the corresponding pore size distribution of MnO_x-MSNs NPs (b).



Figure S4 EDS spectrum of MnO_x -MSNs (a, pH=7.4) and MnO_x -MSNs (b, pH=5.5,t=3h). Line-scan images of MnO_x -MSNs (c, pH=7.4) and MnO_x -MSNs (d, pH=5.5, t=3 h)



Figure S5 T_1 relaxivity (a) and T_1 -weighted MRI image (b) of PBS (PH= 7.4) and CBS (pH= 5.5) for PEG-Mn-MSNs-DOX after co-incubation for 3h.



Figure S6 Viabilities of MBA-MD-231, BRL and RAW cells after co-incubation with PEG-Mn-MSNs as assessed via MTT protocol.



Figure S7 H&E staining of heart, liver, spleen, lung, and kidney prior to and after the intravenous injection of ^{99m}Tc-Mn-MSNs-PEG (2, 15, and 30 days).



Figure S8 Weight of km-mice before and after intravenous administration of ^{99m}Tc-Mn-MSNs-PEG (Mn, 5 mg/kg; Radioactivity, 20 mci/kg).