Supplementary materials

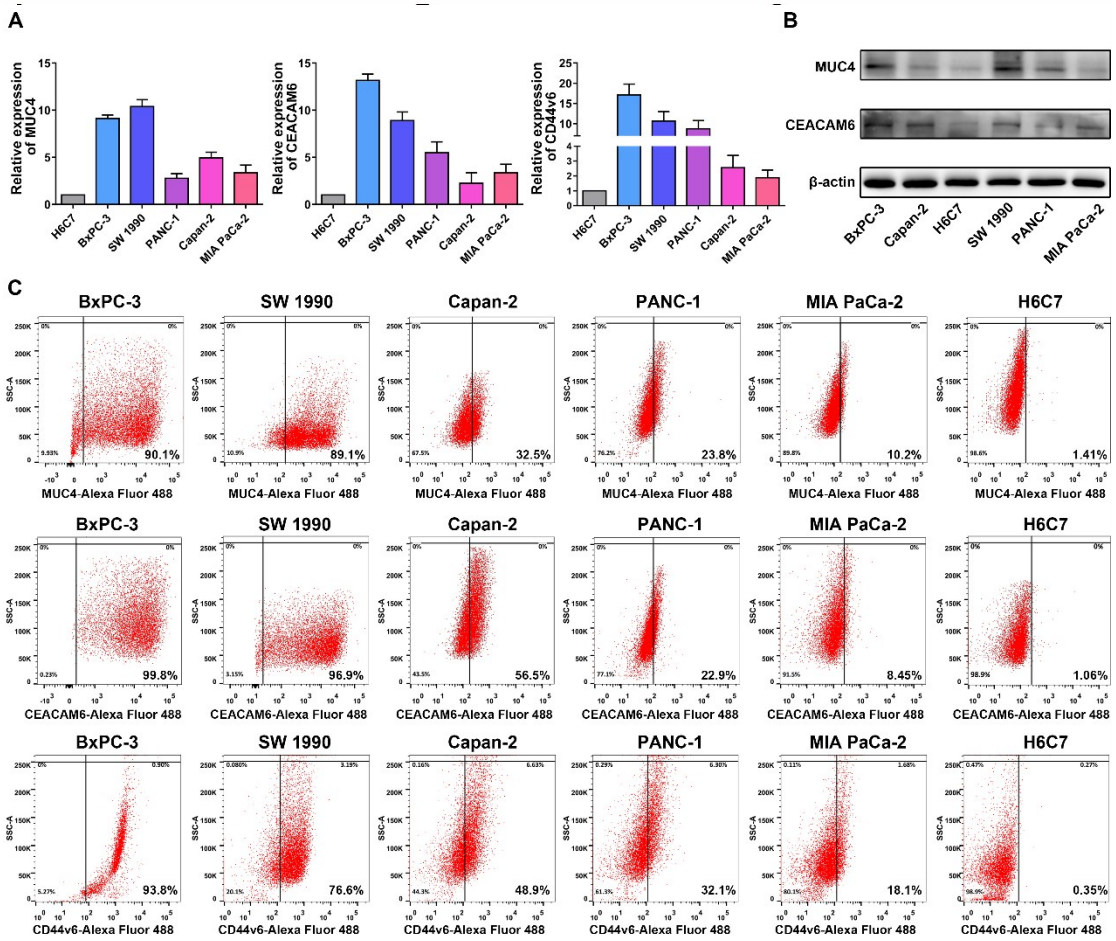

Figure S1. Expression level of MUC4, CEACAM6 and CD44v6 in cells. The expression level of MUC4 and CEACAM were evaluated in 5 pancreatic cancer cell lines, including BxPc-3, SW 1990, Panc-1, MIA PaCa 2, Capan-2, and 1 normal pancreatic ductal epithelial cell H6C7 by qRT-PCR (A), western blot (b), and flow cytometry (C). The expression level of CD44v6 in these 6 cell lines was assessed by qRT-PCR (A) and flow cytometry (C). It can be noticed that the three molecules showed higher expression level in PDAC cells.

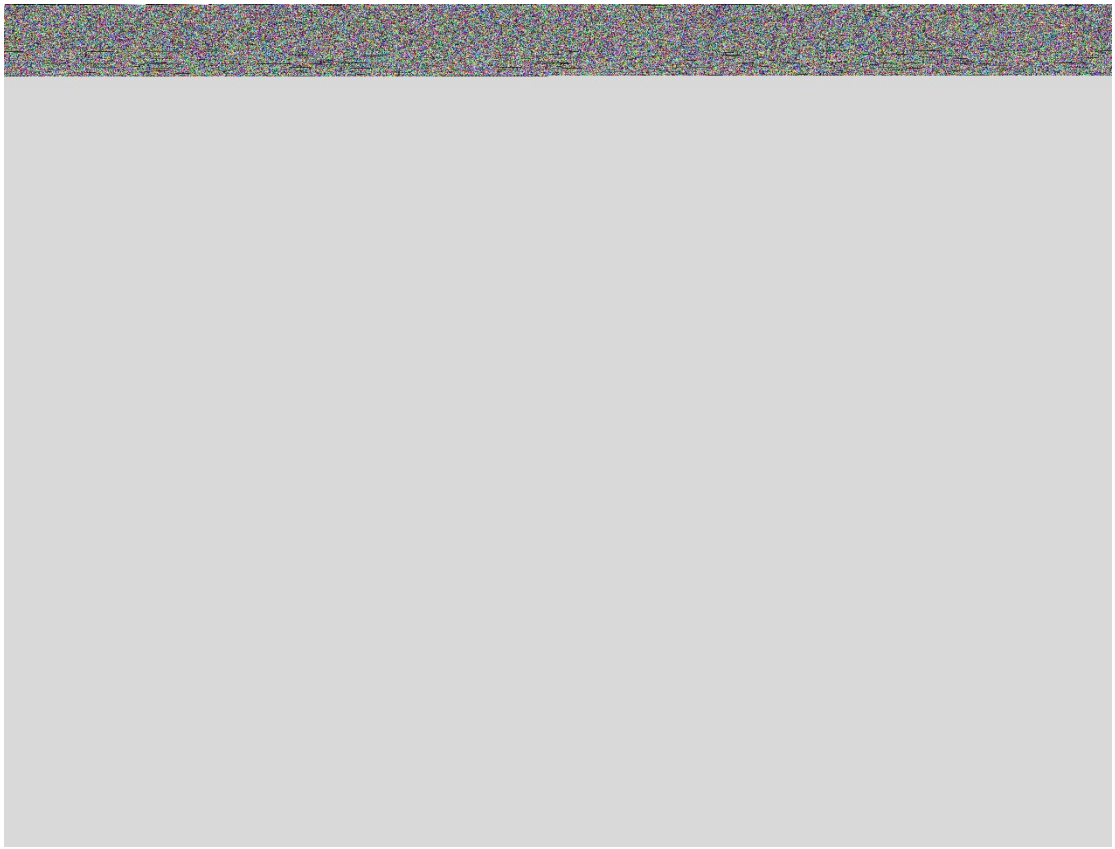

Figure S2. Verification of clinical significance of MUC4, CEACAM6, and CD44v6. The expression level of MUC4, CEACAM6, and CD44v6 were assessed by immunohistochemical staining of the tissue slides of in situ pancreatic cancer. 35 patients with PDAC in our hospital were selected. The representative images of immunohistochemical staining of MUC4, CEACAM6, and CD44v6 were showed in A, B, and C respectively; scale bars: 100 μm. Immunostaining was classified based on staining intensity. Staining intensity was determined as 0 (absent), 1 (low), and 2 (high). Expression levels were semi-quantified using the staining intensity. Patients with a staining intensity of 2 were classified into high expression, those with a staining intensity of 0, 1 were considered negative and low expression respectively. 172 patients with PDAC in The Cancer Genome Atlas were included as well. The expression level of MUC4, CEACAM6, CD44v6 were divided into low and high by the median point. Kaplan-Meier analysis was performed to reveal the relationship between expression level of the three molecules and overall survival of the 35 PDAC patients (D, E, F) and the 172 PDAC patients (G, H, I). A higher expression level of MUC4, CEACAM6, CD44v6 was associated with a worse prognosis.

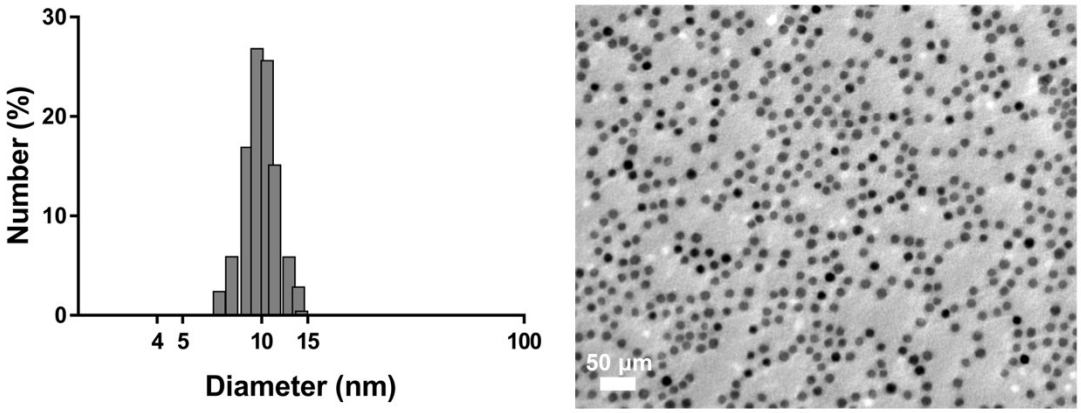

Figure S3. The original size of IONPs-PEG. The particles size of IONPs-PEG was (9.8 ± 0.025) nm, which was consistent with the description of the product; scale bars: 50 μm.

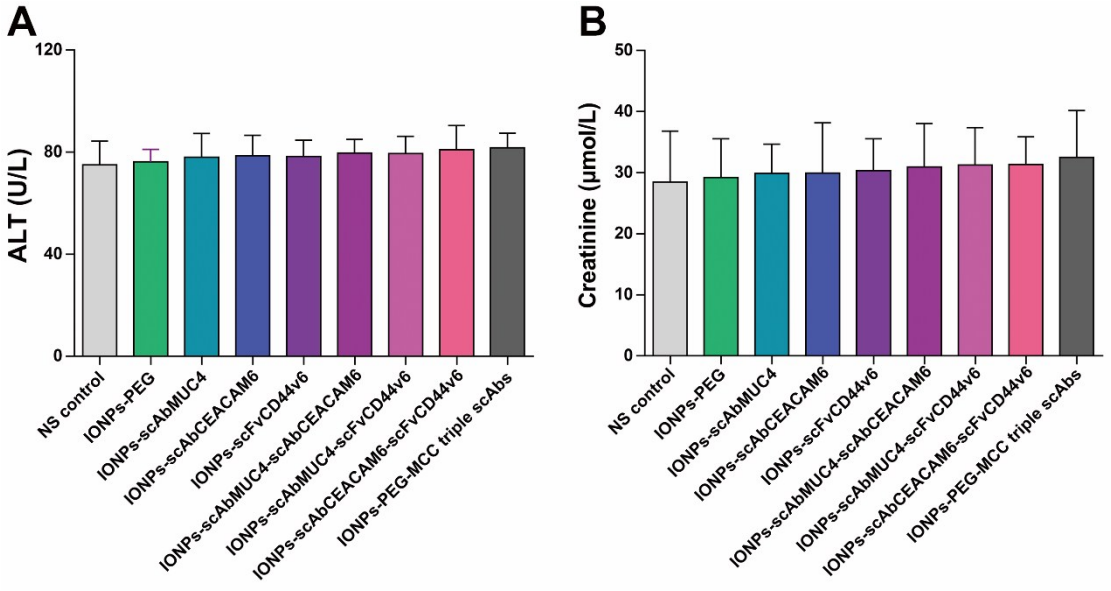

Figure S4. In vivo hepatorenal toxicity of IONP-PEG-MCC triple scAbs. In vivo hepatorenal toxicity was assessed by the detection of ALT (A) and creatinine (b). None of the groups showed significant hepatorenal toxicity.

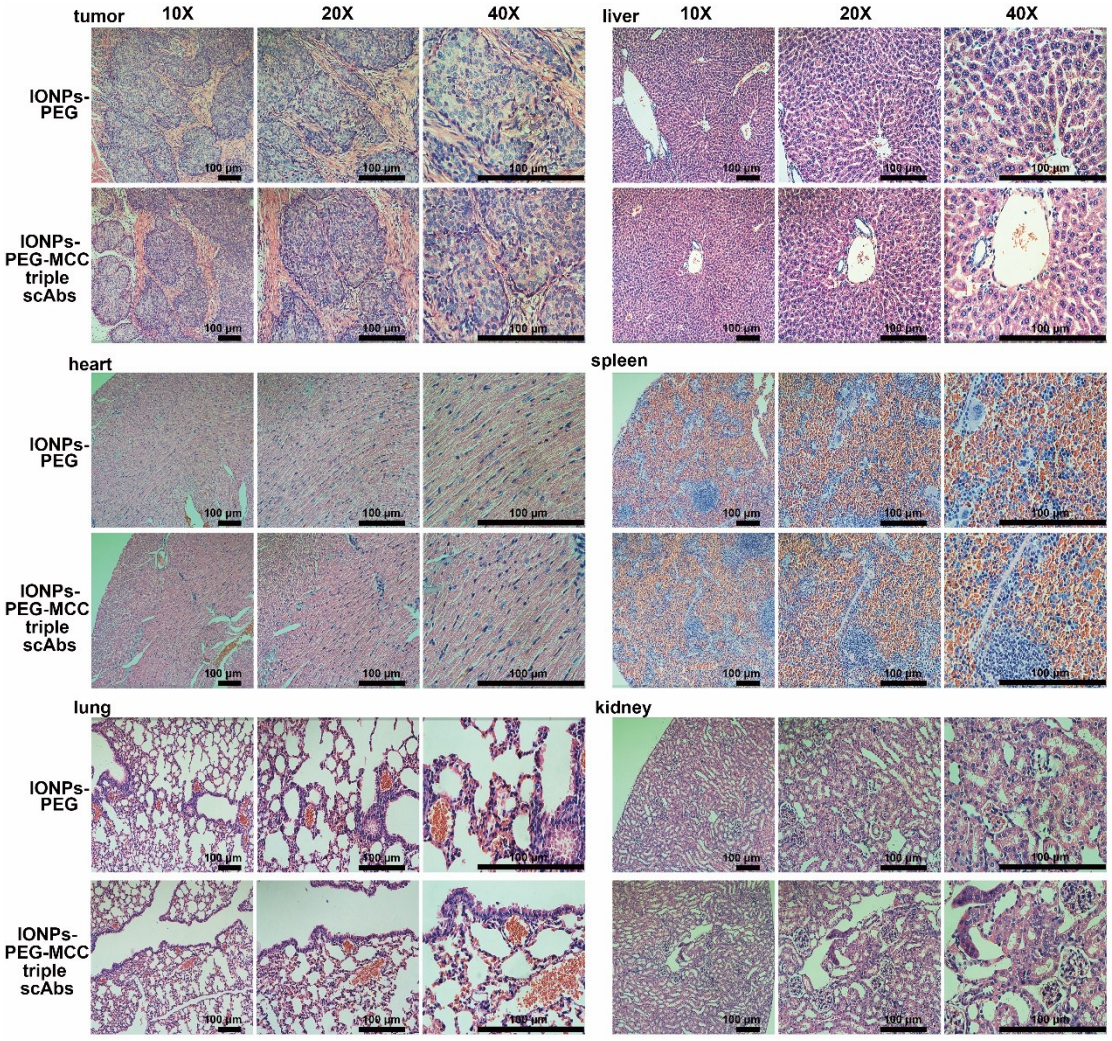

Figure S5. H&E staining of the tumor and vital organs after the MRI experiment. H&E staining was used to exam the morphological changes in tumor sections and vital organ (liver, heart, spleen, lung, kidney) tissue sections. H&E staining showed no abnormal changes in tissue morphology in both groups; scale bars: 100 μm.

Table S1. Primer sequences of MUC4, CEACAM6, CD44v6, and β-actin

（1）MUC4 primer sequence	
forward primer	5’-CGTTCTGGGACGATGCTGAC-3’
reverse primer	3’-GATGGCTTGGTAGGTGTTGCT-5’
（2）CEACAM6 primer sequence	
forward primer	5’-TCAATGGGACGTTCCAGCAAT-3’
reverse primer	3’-CACTCCAATCGTGATGCCGA-5’
（3）β-actin primer sequence	
forward primer	5'-TGGCACCCAGCACAATGAA-3'
reverse primer	5'-CTAAGTCATAGTCCGCCTAGAAGCA-3'
（4）CD44v6 primer sequence	
forward primer	5'-GCA CAA TCC AGG CAA CTC C-3'
reverse primer	5'-GCT GTC CCT GTT GTC GAA TG-3'