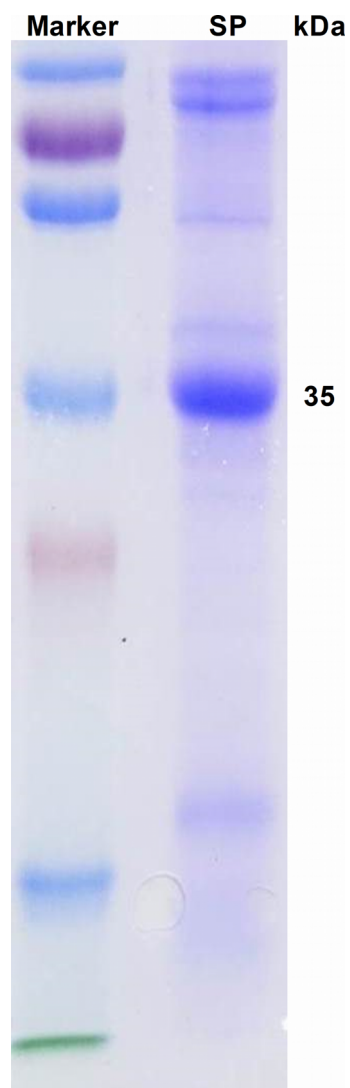


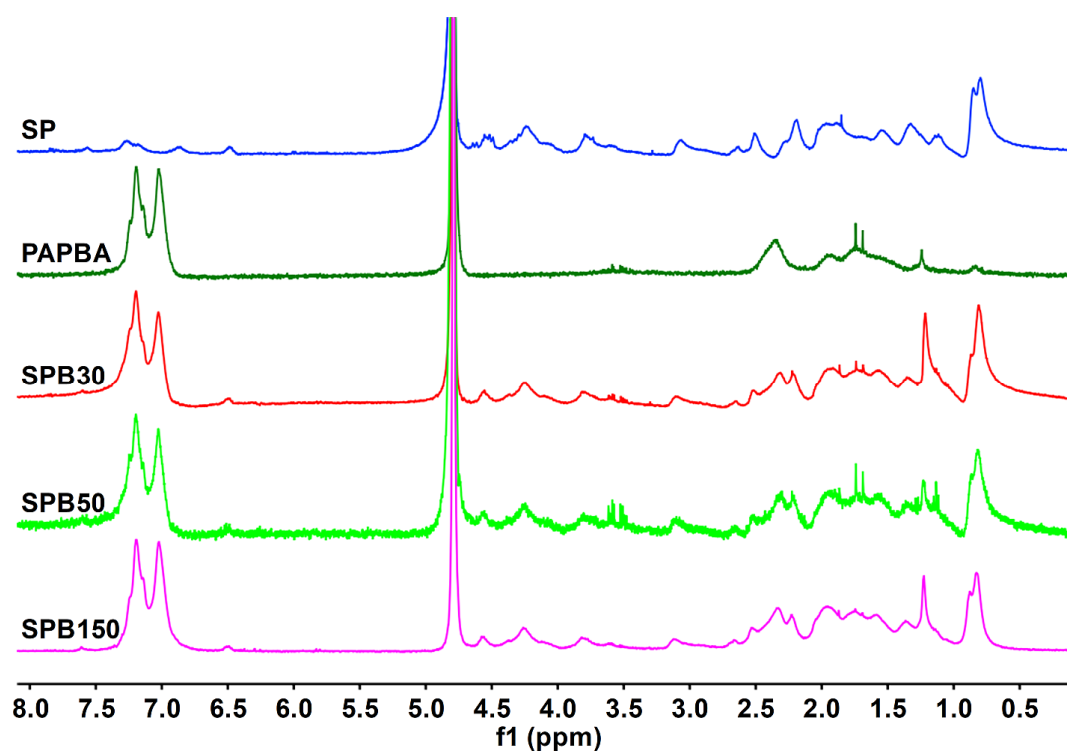
## **Supplementary Data**

### **Targeting and microenvironment-improving of phenylboronic acid-decorated soybean protein nanoparticles with different sizes to tumor**

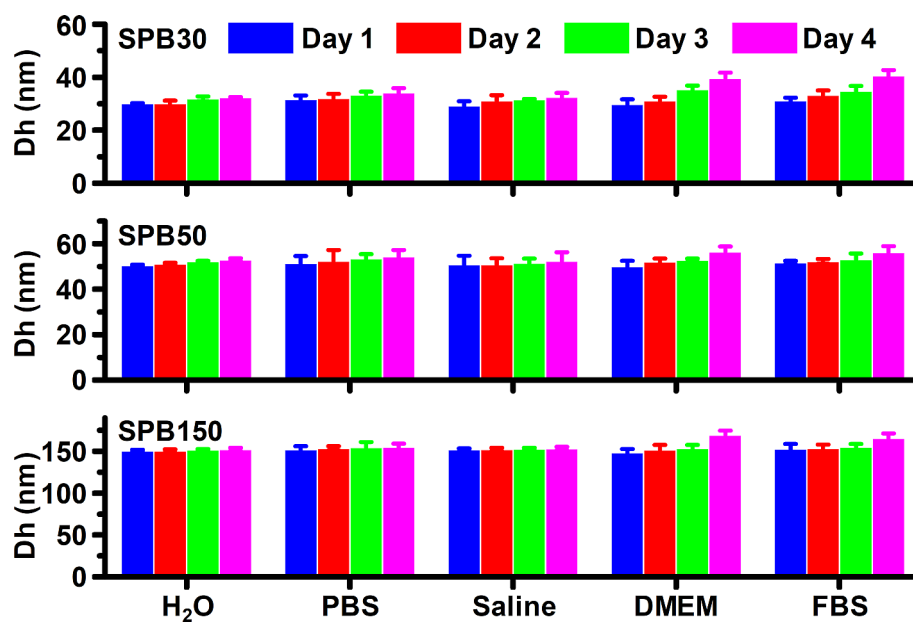
Xiaoping Qian<sup>1</sup>, Lei Ge<sup>1</sup>, Kangjun Yuan<sup>1</sup>, Cheng Li<sup>1</sup>, Xu Zhen<sup>1</sup>, Weibo Cai<sup>2</sup>, Xiqun Jiang<sup>1</sup>✉



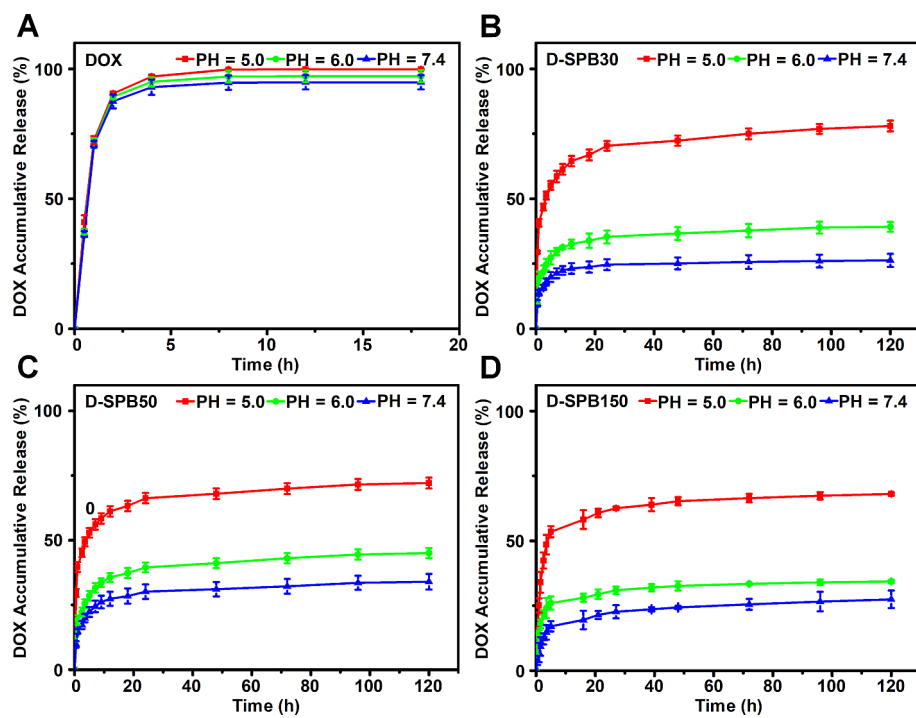
**Figure S1.** SDS-PAGE banding patterns of purified SP.



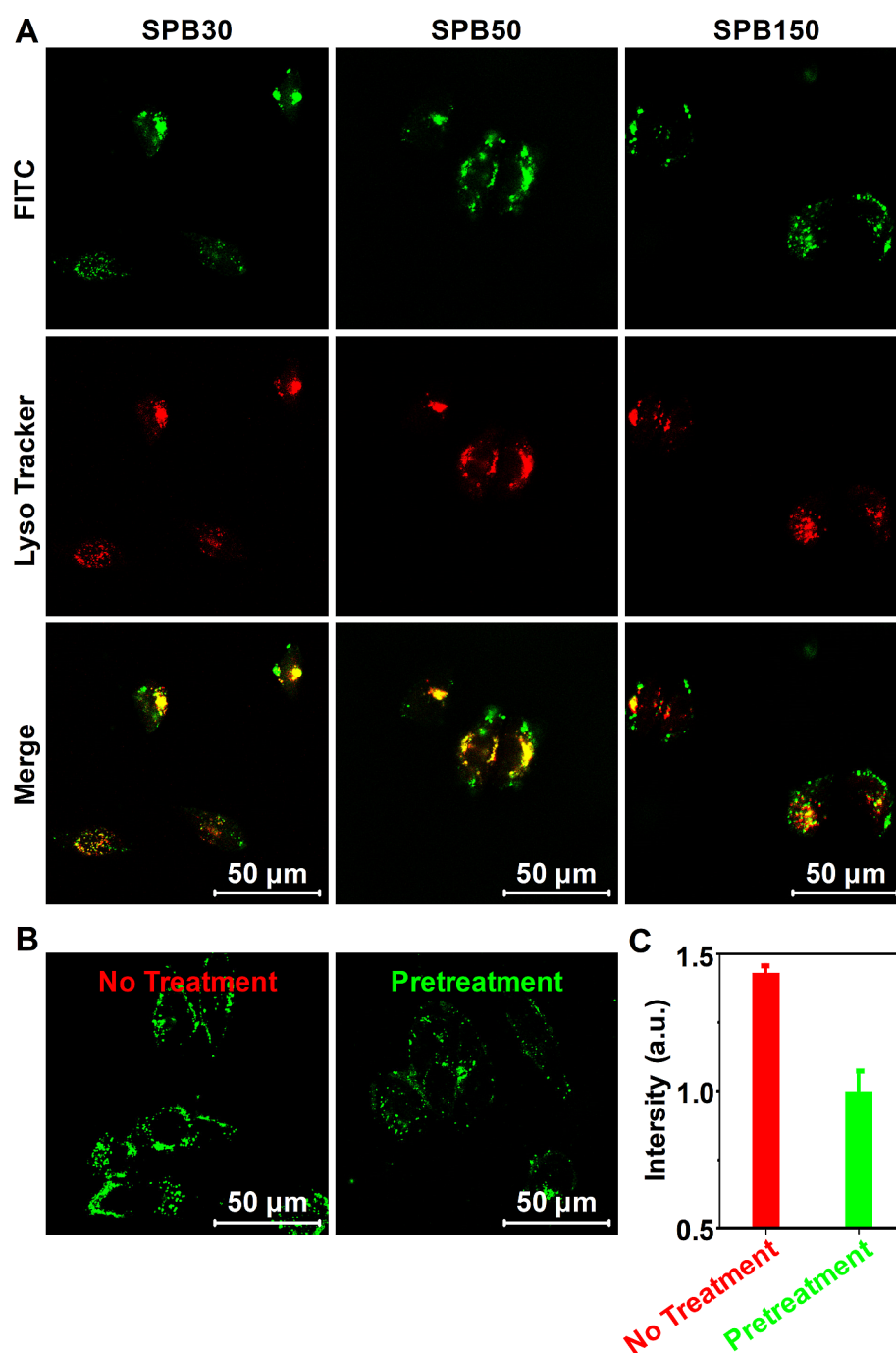
**Figure S2.**  $^1\text{H}$  NMR spectra of SP, PAPBA, SPB30, SPB50 and SPB150 in  $\text{D}_2\text{O}$  with NaOD.



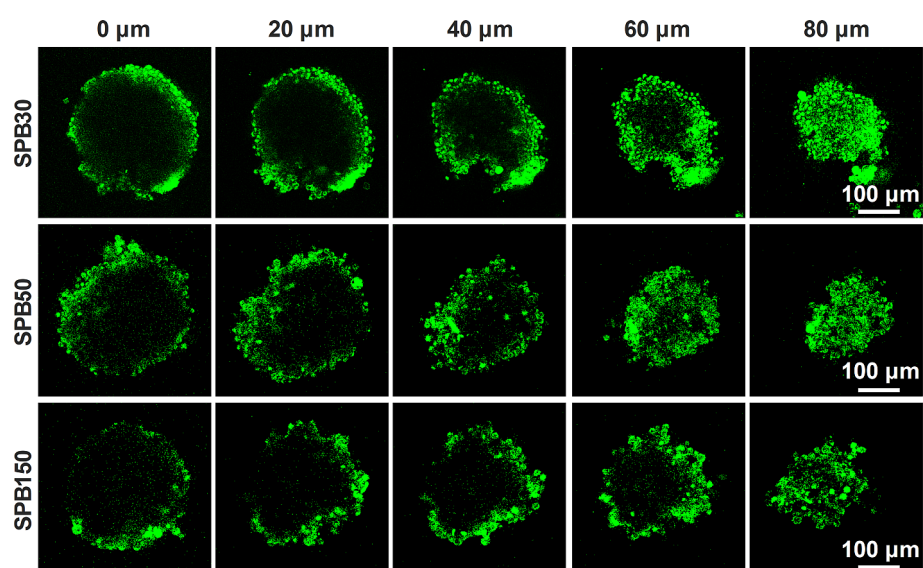
**Figure S3.** Stability of SPB30, SPB50 and SPB150 in distilled H<sub>2</sub>O, PBS, saline, DMEM and 10% FBS solution. Data is represented as mean  $\pm$  SD (N = 3).



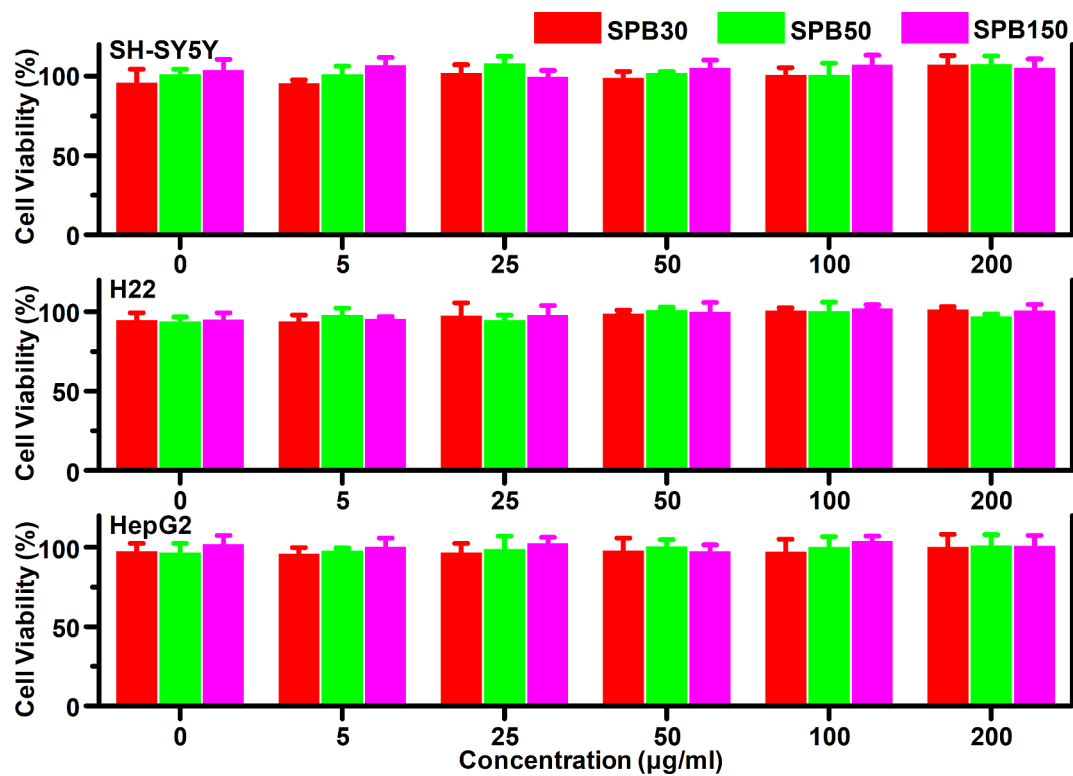
**Figure S4.** In vitro release profile of DOX from free DOX (A), D-SPB30 (B), D-SPB50 (C) and D-SPB150 (D) in 0.01 M PBS at PH 5.0, 6.0 and 7.4 at 37 °C. Data is represented as mean  $\pm$  SD (N = 3).



**Figure S5.** CLSM images of HepG2 cells after 4 h incubation with FITC-labeled SPB NPs at 37 °C. Endosomes/ lysosomes of the cells were marked by Lyso Tracker (red) (A). CLSM images of HepG2 cells after 4 h incubation with FITC-labeled SPB30 with or without pretreatment of APBA (B) and their quantitative data received by flow cytometry (C).

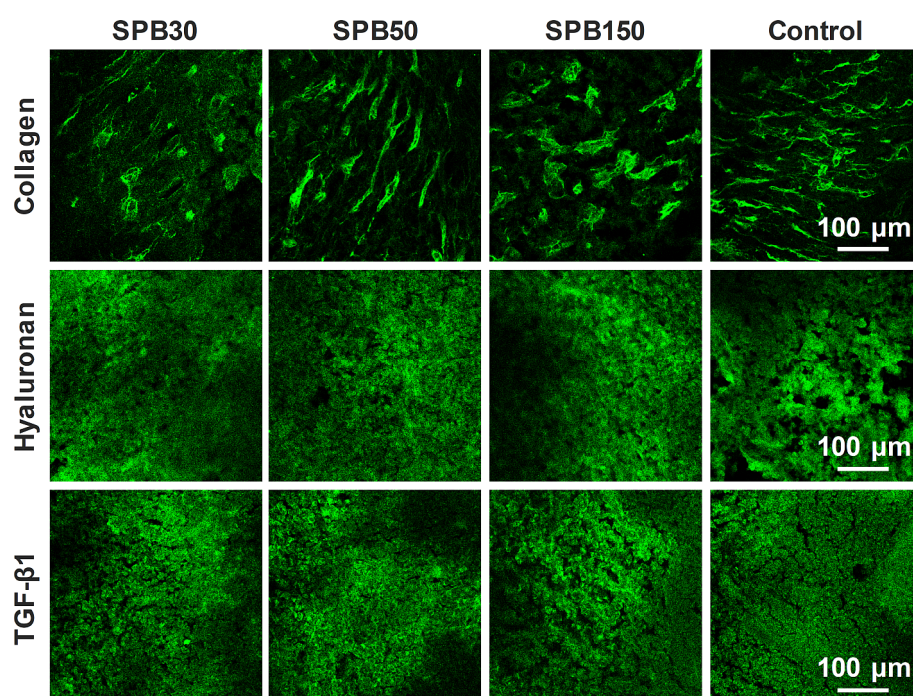


**Figure S6.** Representative Z-stack CLSM images of HepG2 MCTs incubated with FITC-labeled SPB NPs for 24 h were obtained starting in the middle of the spheroid in 20 μm intervals.

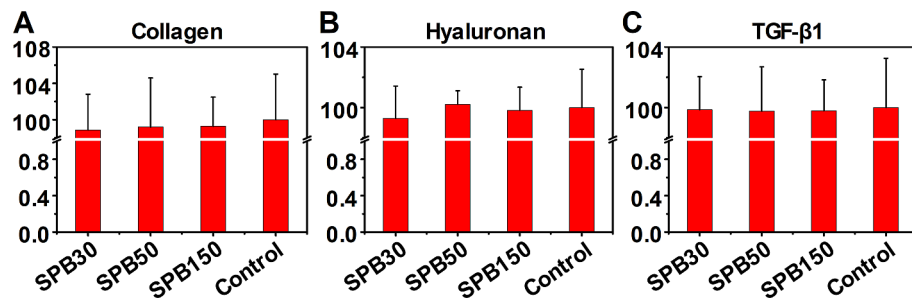


**Figure S7.** In vitro cytotoxicity of blank SPB NPs against SH-SY5Y, H22 and HepG2 cells. Data is represented as mean  $\pm$  SD (N = 3).

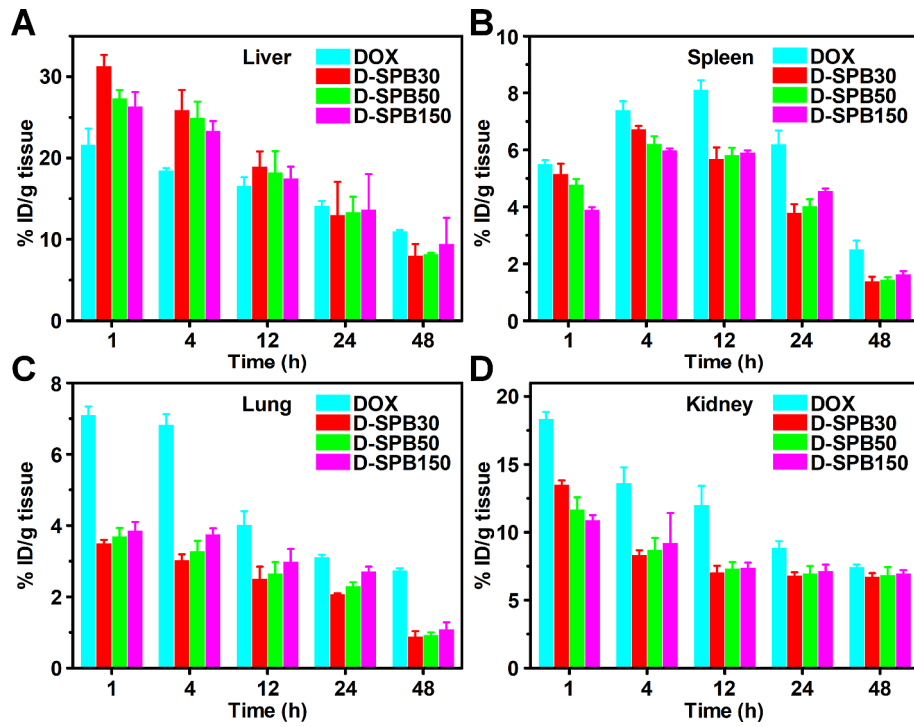




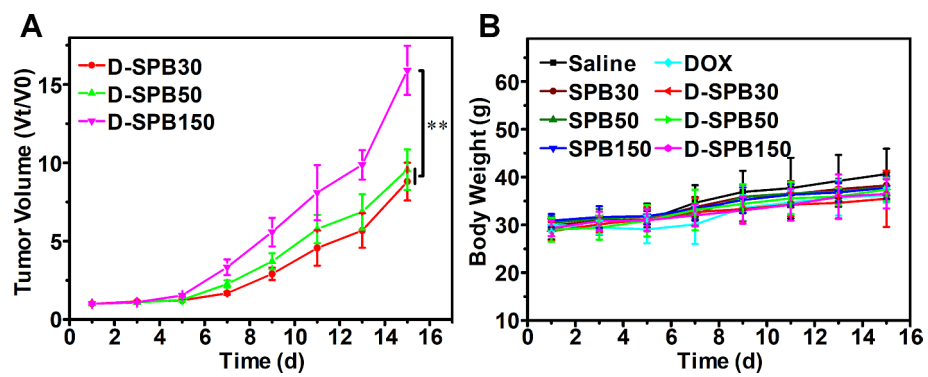
**Figure S8.** CLSM images of collagen I, hyaluronan and TGF- $\beta$ 1 of sliced H22 tumor before and after treatment with SPB NPs.



**Figure S9.** The normalized average fluorescence intensity of collagen I, hyaluronan and TGF-β1 obtained from the corresponding CLSM images in Figure S8.



**Figure S10.** Biodistribution of DOX in liver (A), spleen (B), lung (C) and kidney (D) of H22 tumor-bearing mice at various time points after i.v. injection of D-SPB NPs. Data is represented as mean  $\pm$  SD (N = 3).



**Figure S11.** In vivo tumor growth curves (A) and body weight change (B) of H22 tumor-bearing mice. Data is represented as mean  $\pm$  SD (N = 10). (\*\* represents  $P < 0.01$ )