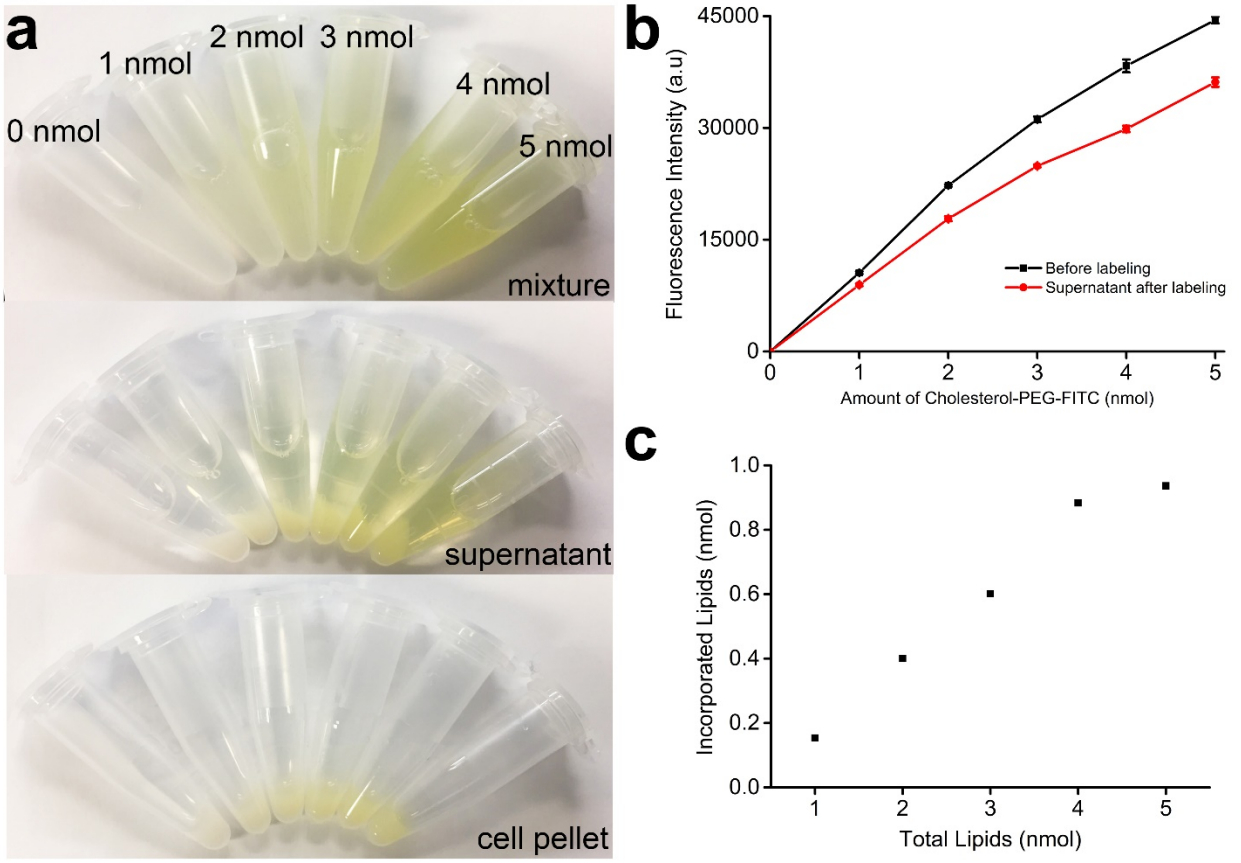

Figure S1 | Optimization of PEGylated cholesterol amount for cell labeling. a, various amount of FITC tagged PEGylated cholesterol ranging from 0 to 5 nmol was used to incubated with ~10^7 cells, respectively. After labeling cells were pelleted, and the supernatant was removed for measurement of fluorescence intensity. **b**, fluorescence intensity of FITC tagged PEGylated cholesterol before and after cell labeling (n = 25). **c**, amount of incorporated lipids onto cell membrane in respective group (n = 25).

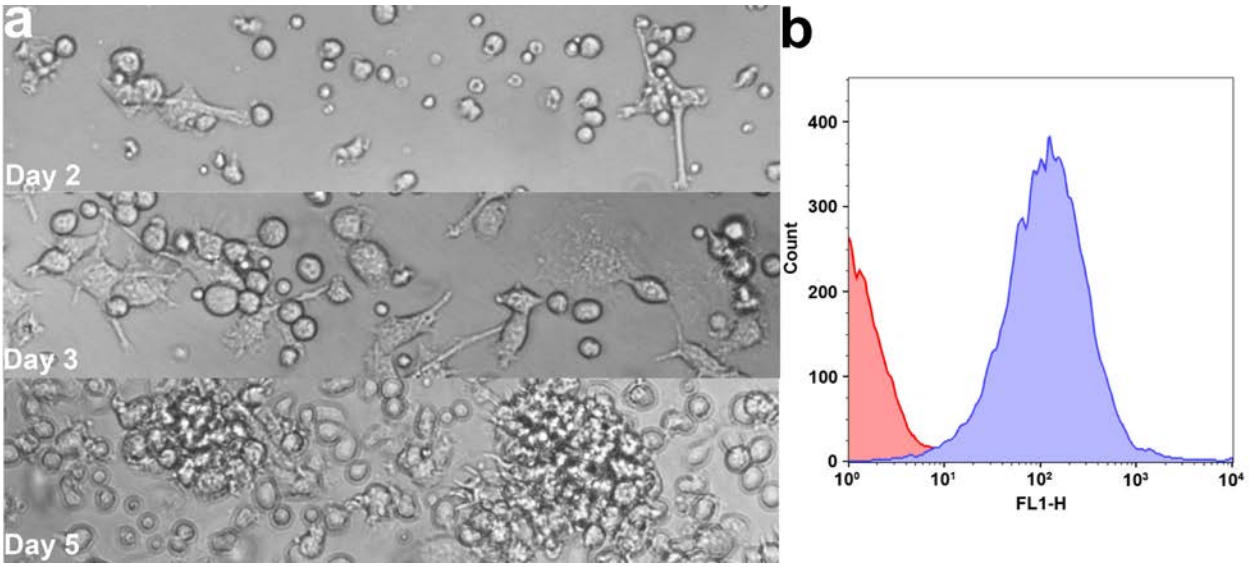

Figure S2 | Morphology and characterization of isolated bone marrow dendritic cells. a, morphology of bone marrow dendritic cells at day-2, -3, and -5, respectively. **b**, histogram plot for CD11c expression on purified dendritic cells at day-6. Isotype control was used as background control (red-filled area). The percentage of CD11c positive cell was approximately 90%.

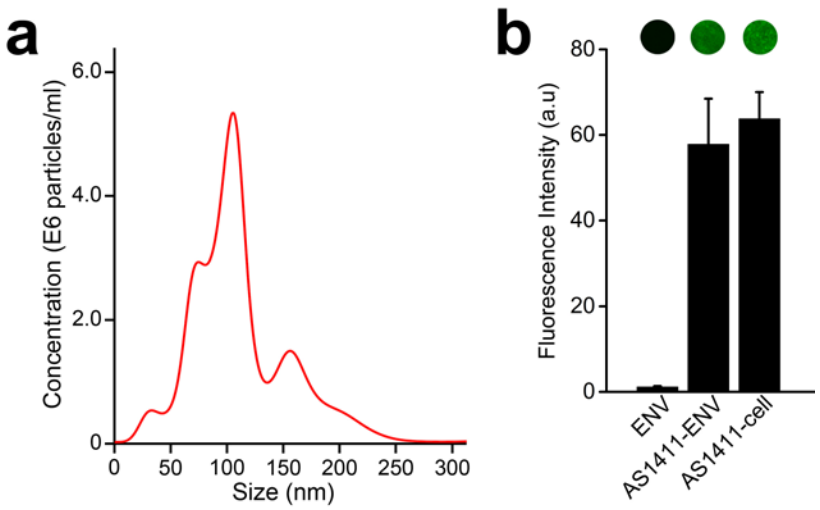

Figure S3 | Characterization of AS1411-ENVs prepared by direct incubation of ENVs with AS1411-PEG$_{2000}$-Chol. a, size distribution of AS1411-ENVs prepared by direct incubation of ENVs with AS1411-PEG$_{2000}$-Chol at 4 °C for 5 min. **b,** fluorescence intensity of dots of ENVs, AS1411-ENVs prepared by cell labeling and extrusion, and AS1411-ENVs prepared by direct incubation of ENVs with lipidated AS1411, respectively (n=25, p<0.05).

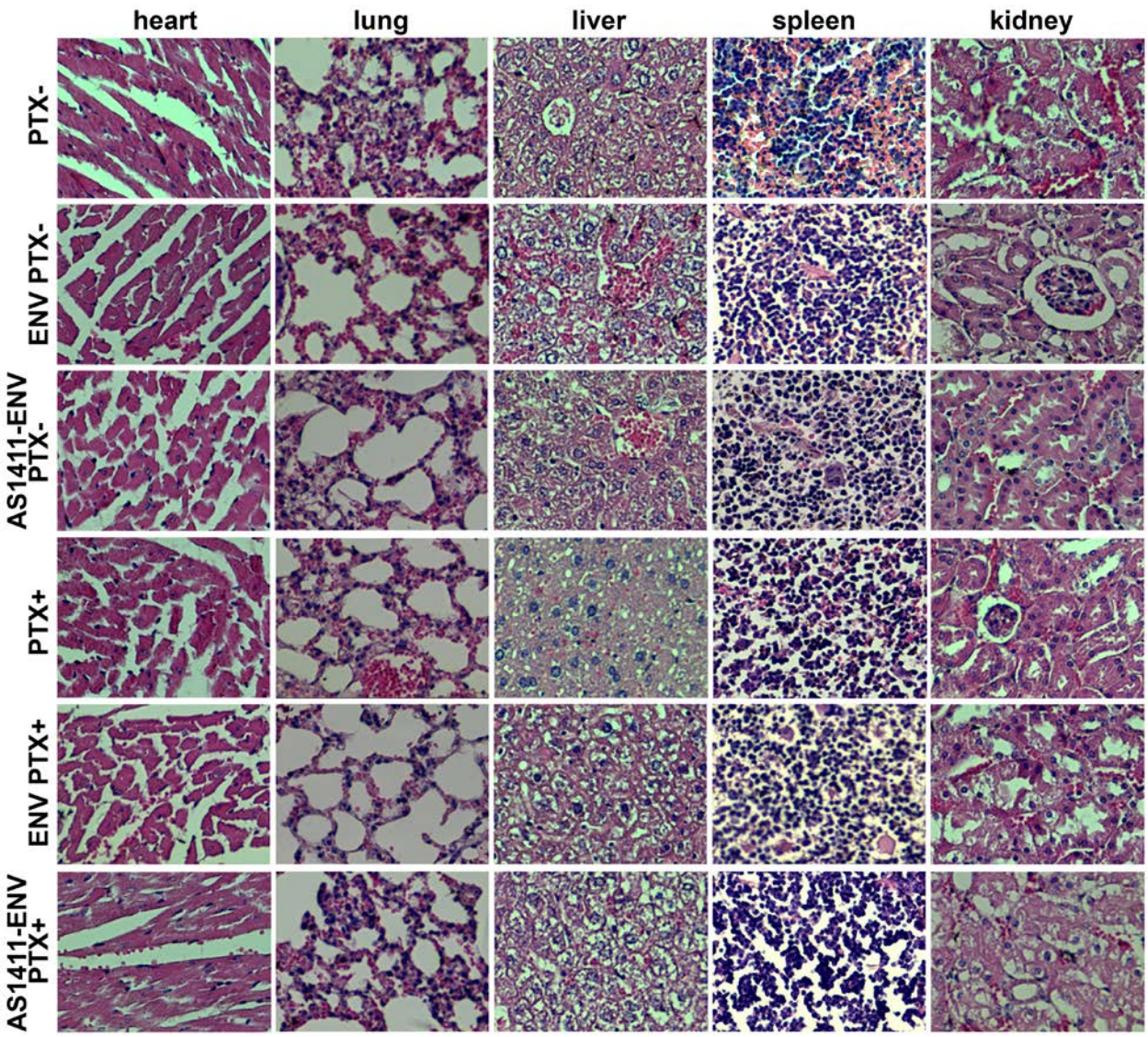

Figure S4 | HE staining of major organs and tumor in three negative control groups. After 20 days of treatment, mice were sacrificed. Major organs and tumors were processed for HE staining to detect organ specific toxicity induced by PTX.