**Table S1.** The Characteristics of ES100-PIP/GA NCs (mean ± SD, n = 3)

| Nanocrystals | Particle Size (nm) | PDI | Zeta-potential (mV) | EE(%) | | DL(%) | |
|---|---|---|---|---|---|---|---|
| | | | | PIP | GA | PIP | GA |
| PIP/GA NCs | 225.6±2.85 | 0.150±0.05 | -31.1±0.64 | 91.79±0.002 | 99.14±0.001 | 47.86±0.001 | 24.84±0.001 |
| ES100-PIP/GA NCs | 206.1±0.26 | 0.378±0.01 | -31.6±0.31 | 80.79±0.006 | 98.55±0.002 | 37.27±0.002 | 24.29±0.003 |

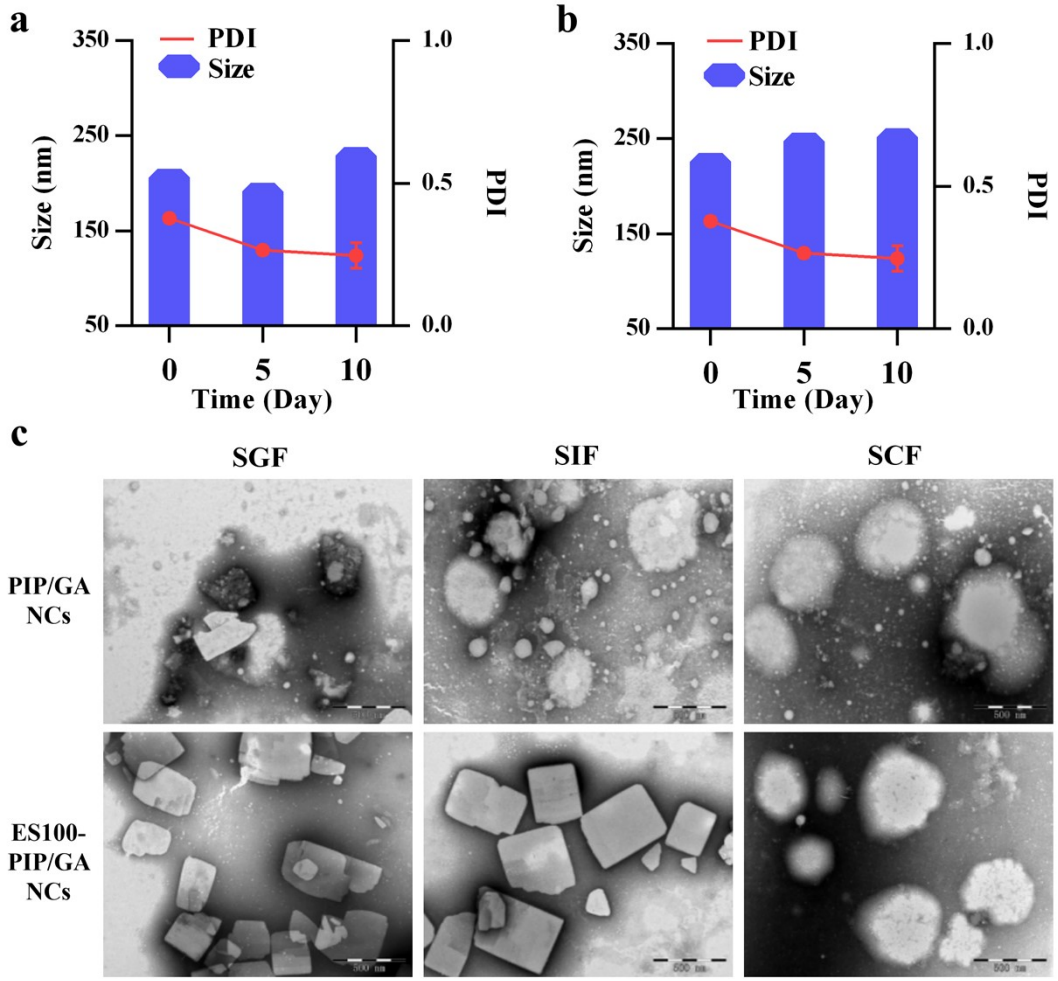


**Fig. S1.** Characterization of ES100-PIP/GA NCs. hydrodynamic particle size and polydispersity index (PDI) of (a) PIP/GA NCs and (b) ES100-PIP/GA NCs after at 4 °C for different time. (c) TEM of PIP/GA NCs and ES100-PIP/GA NCs in simulated digestive solutions.

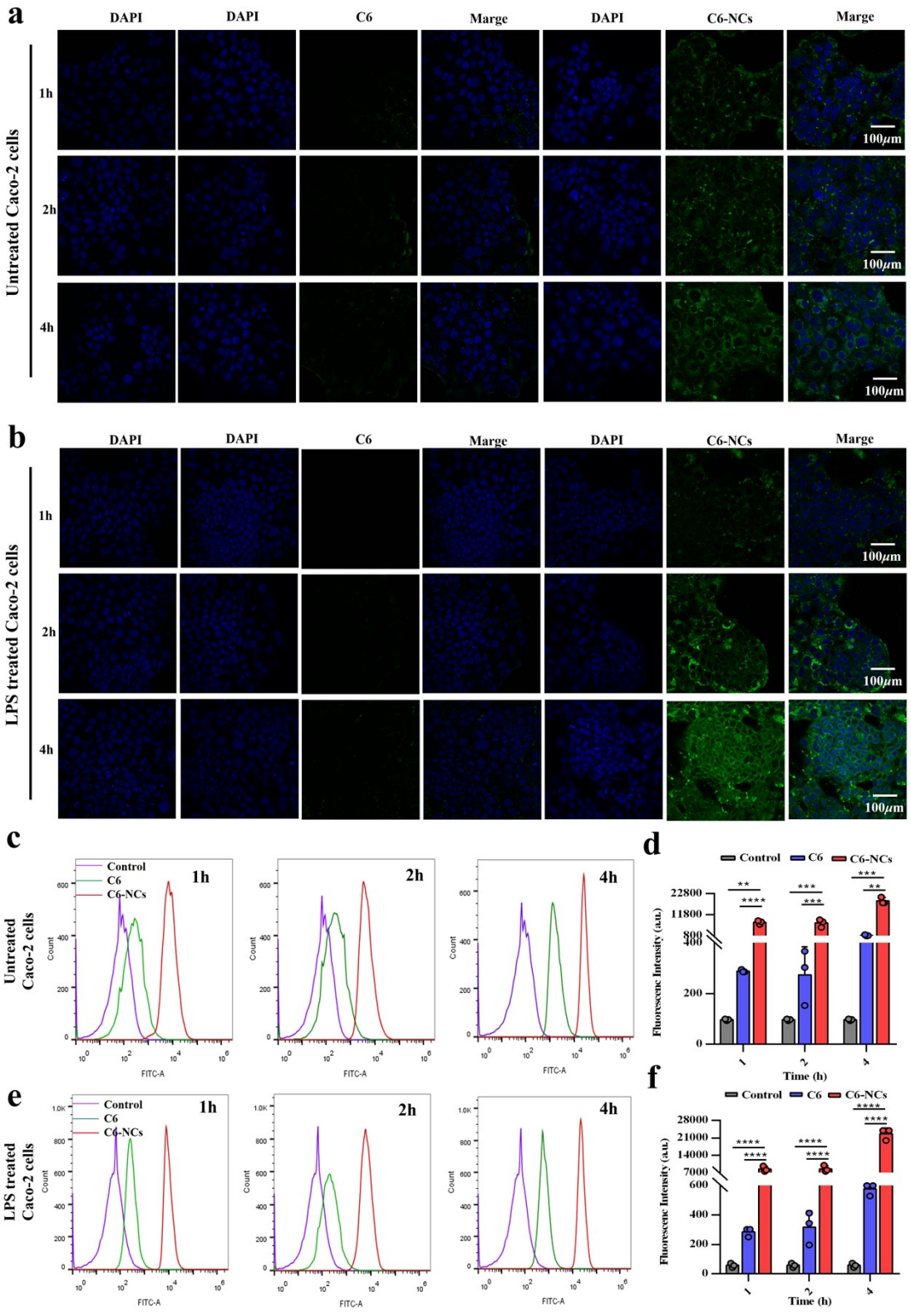


**Fig. S2.** *In vitro* cell uptake of different NCs. Laser confocal microscopy showed that free C6 and C6-NCs pretreated Caco-2 (a) and LPS treated Caco-2 (b) cells for 1, 2 and 4 h, and untreated cells were used as negative controls. Scale bar is 100 μm. FCM

histogram of internalization of C6 and C6 NCs in Caco-2 (c) and LPS treated Caco-2 (e) cells after incubation for 1, 2 and 4 h. Fluorescence intensity of Caco-2 (d) and LPS treated Caco-2 (f) cells after treatment with free C6 and C6-NCs. $^{*}p<0.05$, $^{**}p<0.01$ and $^{***}p<0.001$.

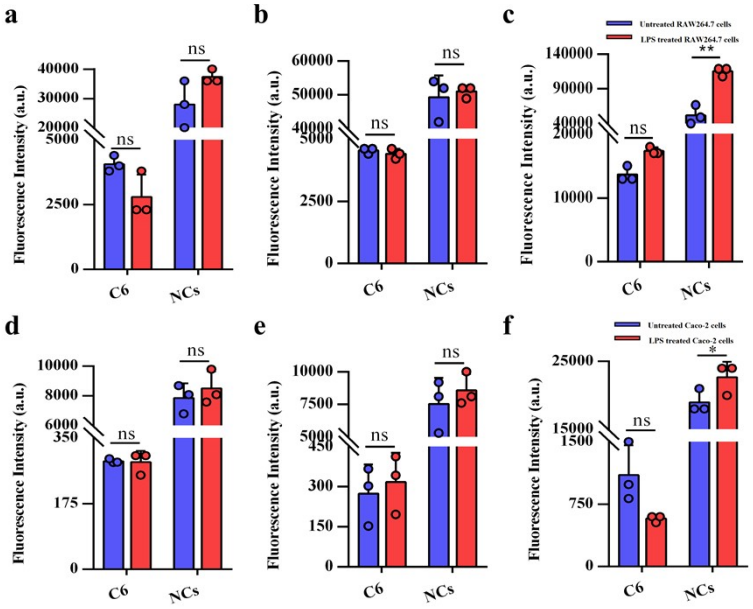


**Fig. S3.** *In vitro* cell uptake of different NCs.Fluorescence intensity of RAW 264.7 and LPS treated RAW 264.7 after incubation with free C6 and C6-NCs for 1 h (a), 2 h (b) and 4 h (c). Fluorescence intensity of Caco-2 and LPS treated Caco-2 after incubation with free C6 and C6-NCs for 1 h (d), 2 h (e) and 4 h (f). $^{*}p<0.05$ and $^{**}p<0.01$.

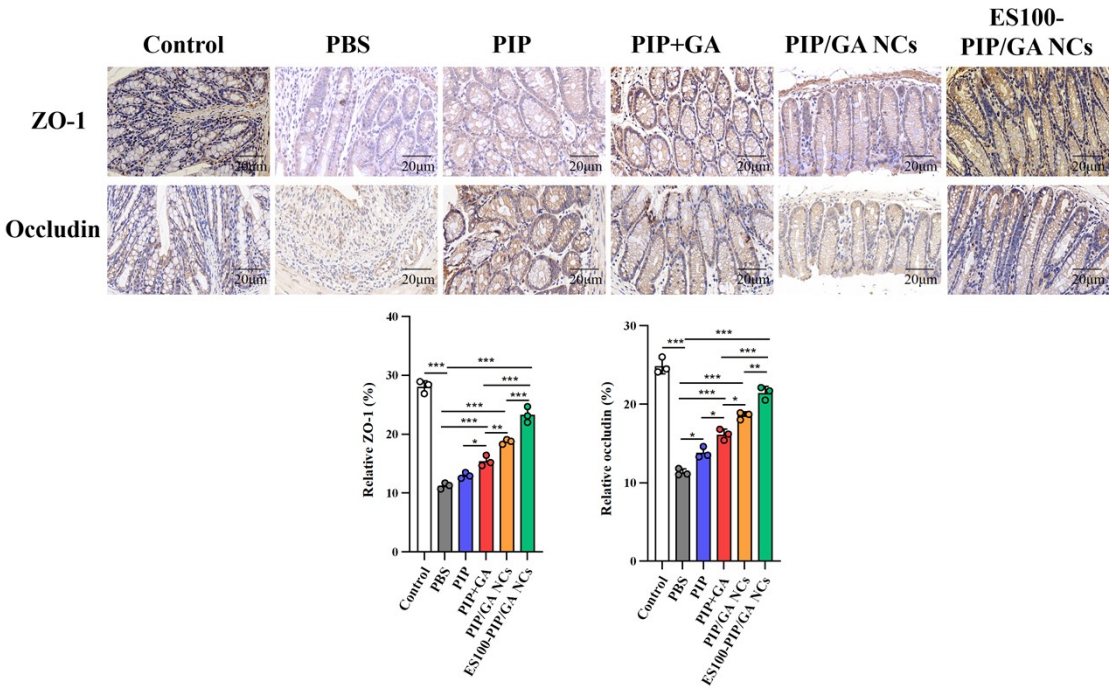


**Fig. S4.** ES100-PIP/GA NCs improved the tight junctions of the colonic epithelial barrier in mice. Immunohistochemical results of ZO-1 and occludin in colon tissue. Scale bar = 20 μm

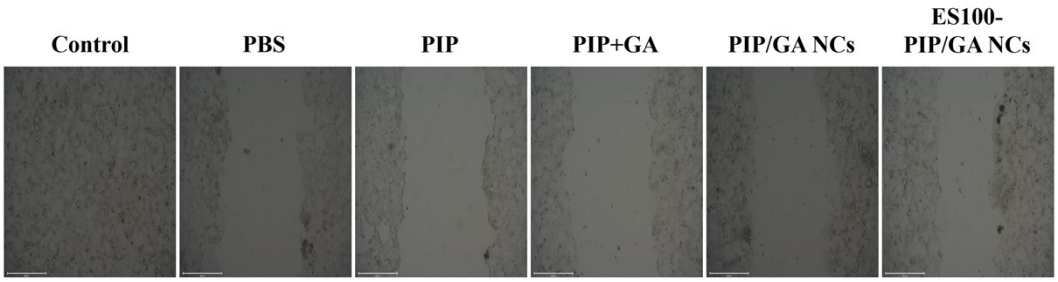


**Fig. S5.** Repair ability of intestinal epithelial cells in vitro. Cell migration of Caco-2 after 24 h treatment. Scale bars = 1000 μm.

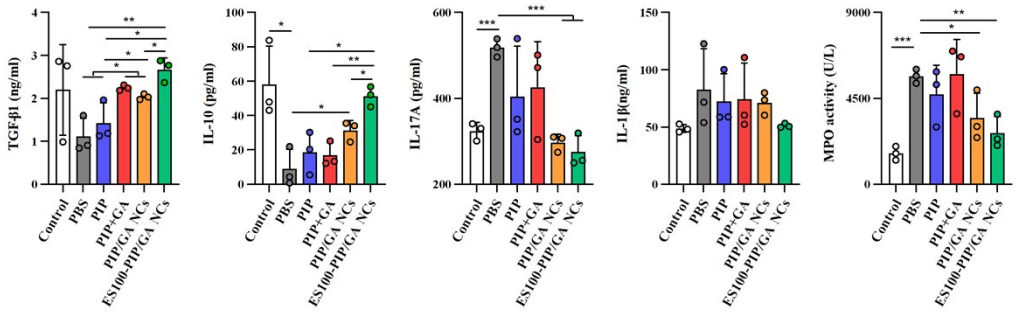


**Fig. S6.** ES100-PIP/GA NCs improved inflammatory factors in the mice's blood. The expression of TGF-β1 (a), IL-17A (b), IL-10 (c), IL-1β (d), MPO activity (e) in serum

was determined by ELISA kit. *$p$<0.05, **$p$<0.01 and ***$p$<0.001.

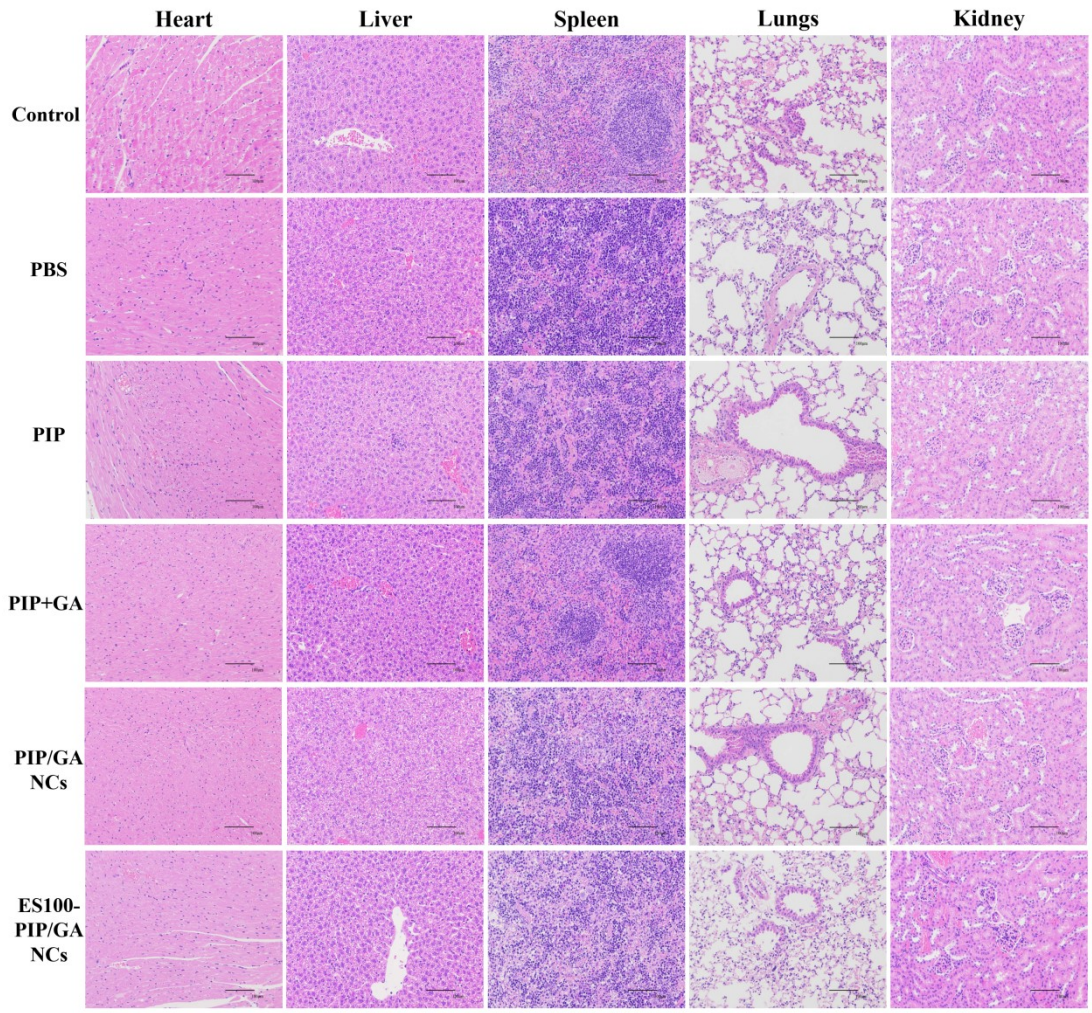


**Fig. S7.** *In vivo* biosafety evaluation of ES100-PIP/GA NCs. H&E staining of main organs slices from mice. Scale bar = 100 μm.