Supplementary Information

Fig. S1 Pathways associated with RHO/ROCK activation

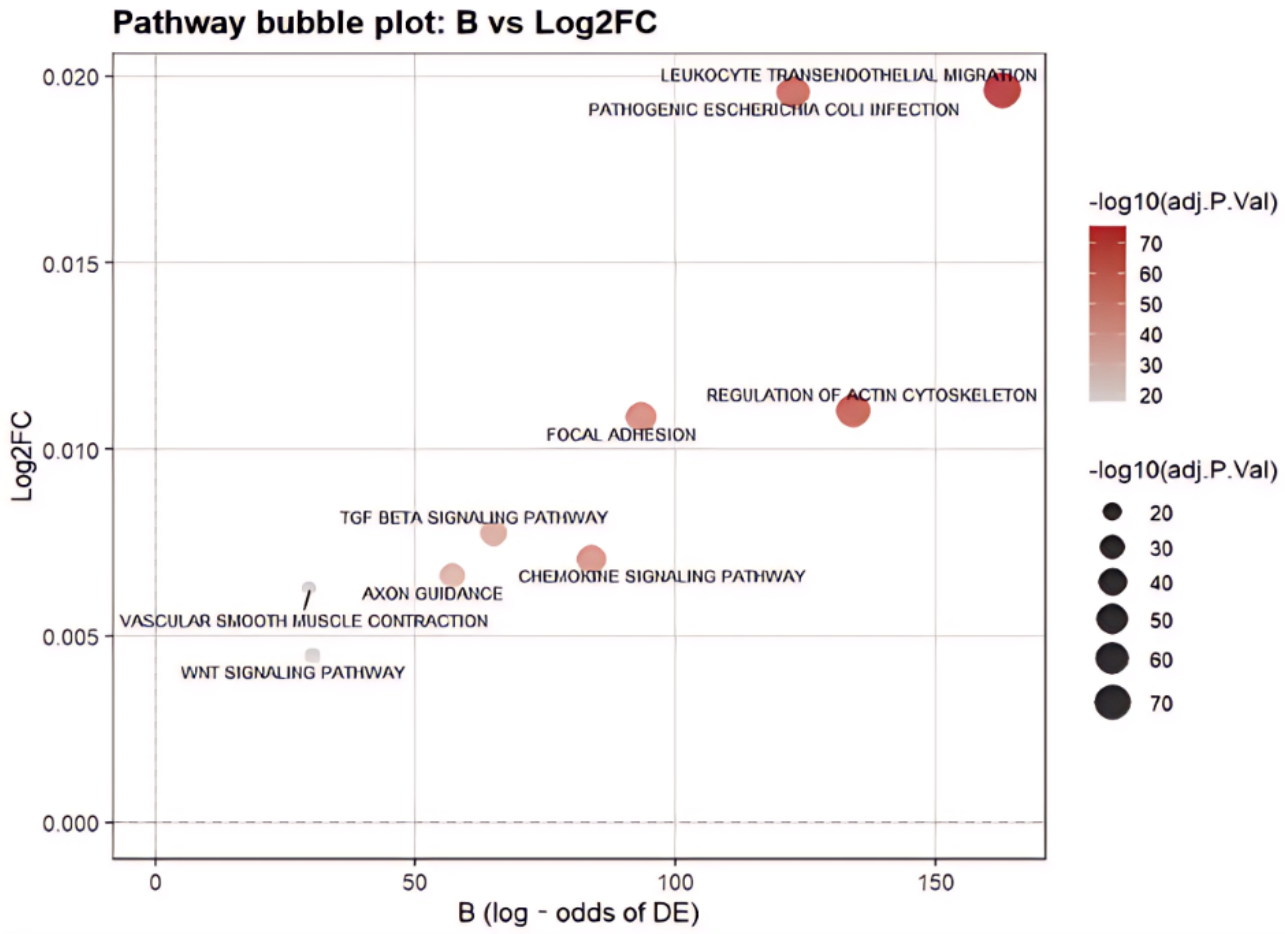

Fig. S1. Unbiased pathway analysis connects RHO/ROCK activation to processes including leukocyte transendothelial migration, actin cytoskeleton reorganization, and focal adhesion.

Fig. S2 GSEA enrichment of angiogenesis regulation

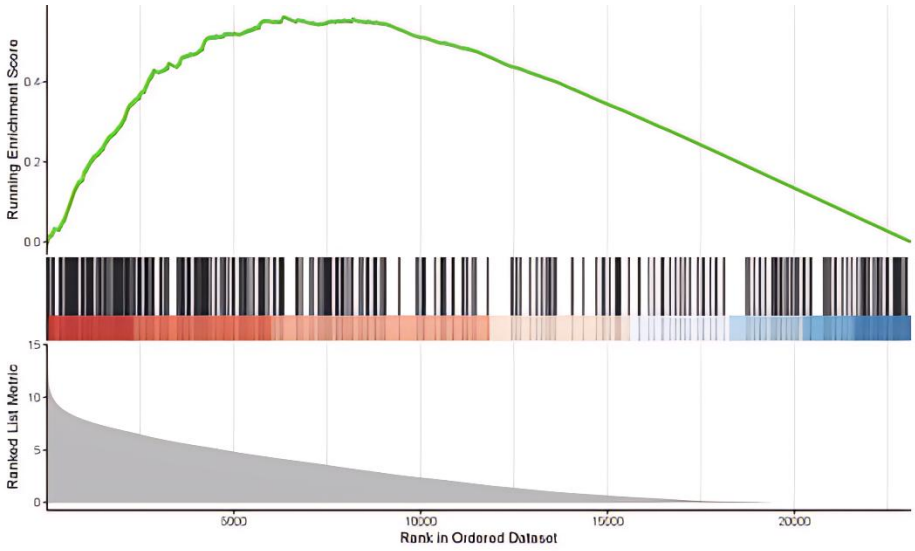

Fig. S2. Gene Set Enrichment Analysis (GSEA) shows significant enrichment of the 'regulation of angiogenesis' gene set. GO:0045765: regulation of angiogenesis.

Fig. S3 GSEA enrichment of endothelial cell migration

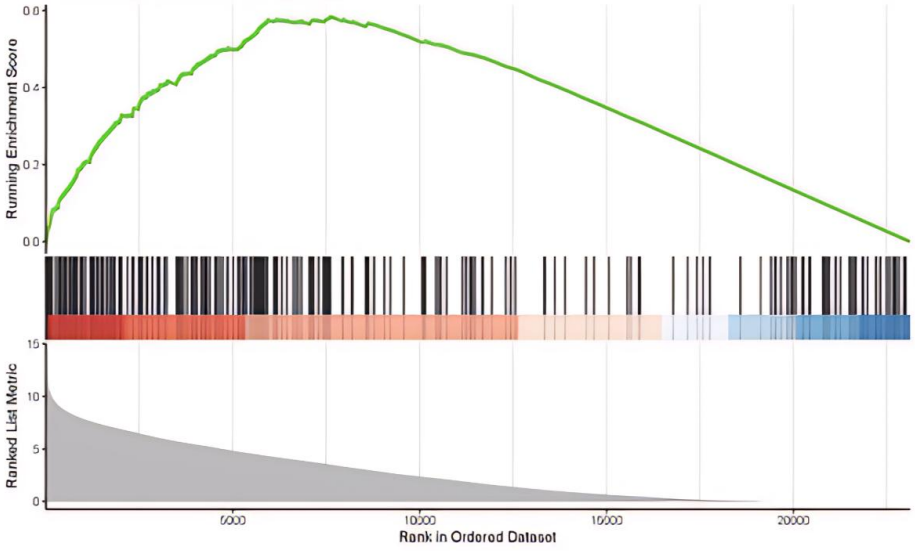

Fig. S3. Gene Set Enrichment Analysis (GSEA) shows significant enrichment of the 'endothelial cell migration' gene set. GO:0043542: endothelial cell migration.

Fig. S4 SEM morphology of Fasudil@PDA nanoparticles

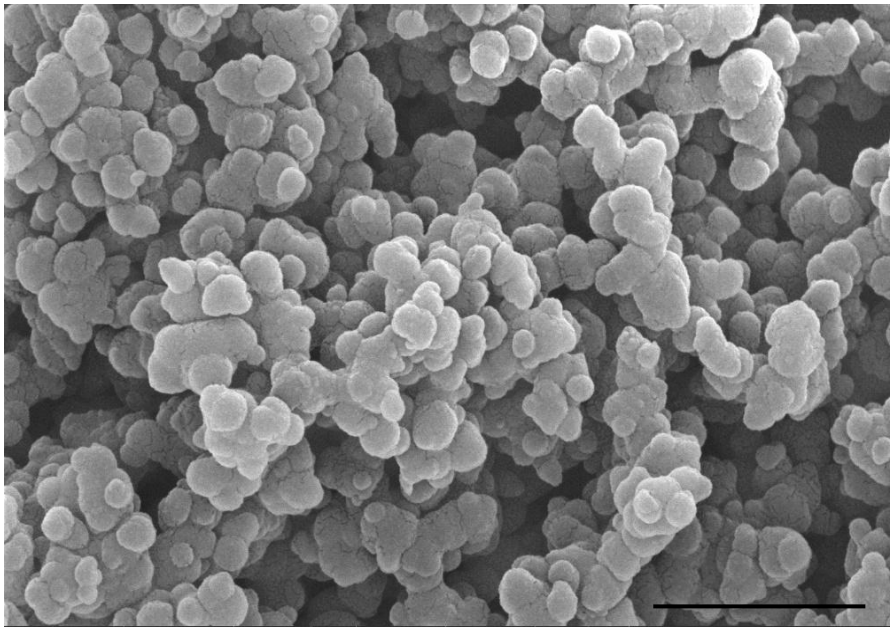

Fig. S4. Scanning electron microscopy (SEM) image of the surface morphology of Fasudil@PDA nanoparticles. Scale bar, 1 μm.

Fig. S5 Elemental mapping (C, N, O, S) of a single Fasudil@PDA

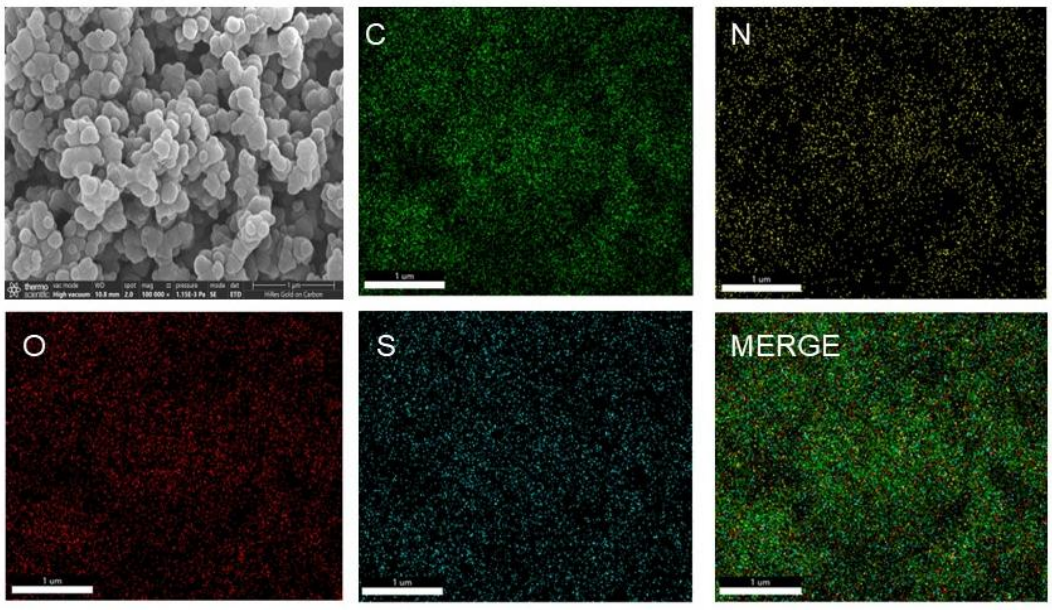

Fig. S5. Elemental mapping (C, N, O, S) of a single Fasudil@PDA obtained by energy-dispersive X-ray spectroscopy (EDS) in a scanning electron microscope (SEM). Scale bar, 1 μm.

Fig. S6 C1s XPS spectra of Fasudil, PDA, and Fasudil@PDA

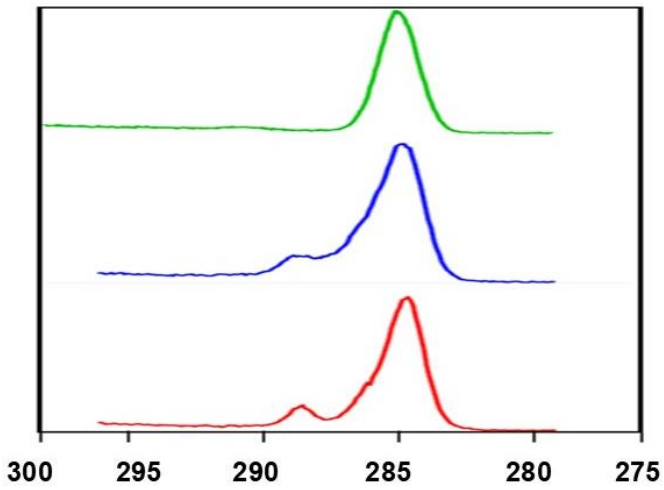

Fig. S6. High-resolution C1s XPS spectra of Fasudil (green), PDA (blue), and Fasudil@PDA (red). The spectra reveal the distinct chemical states of carbon in each sample, illustrating successful composite formation through characteristic binding energy shifts and peak profile changes.

Fig. S7 MS spectra of standard Fasudil and released Fasudil.

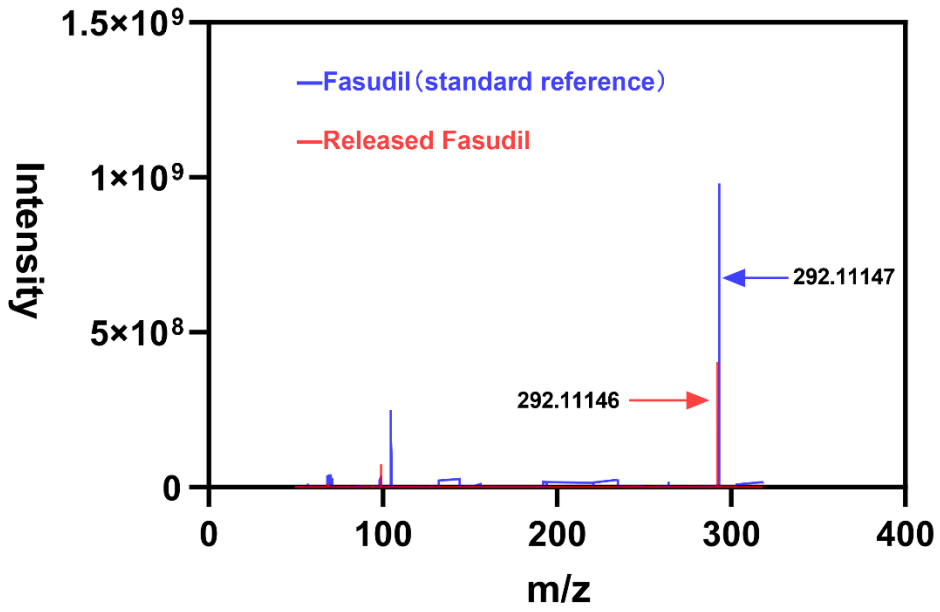

Fig. S7. MS spectra of standard Fasudil and released Fasudil. The peak at *m/z* 292.11 confirms the identity of the released drug.

Fig. S8 Size change of nanoparticles after H_2O_2 incubation

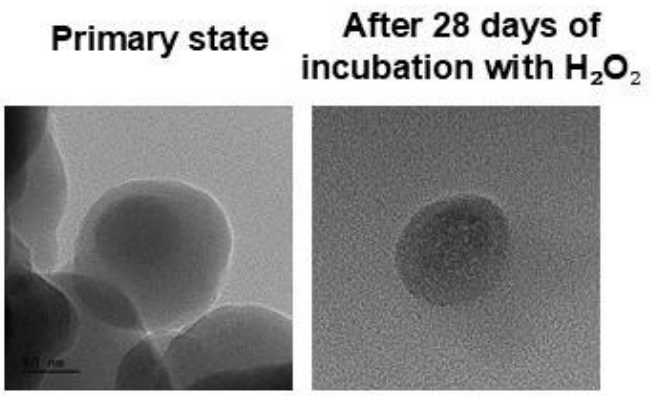

Fig. S8. Size change of nanoparticles after H_2O_2 incubation. Comparison of the primary state and after 28-day treatment with H_2O_2. Scale bar, 50 nm.

Fig. S9 EDS elemental mapping of Fasudil@PDA after H_2O_2 treatment.

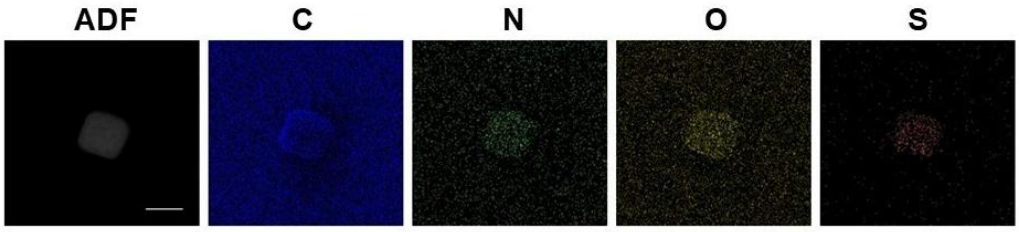

Fig. S9. EDS elemental mapping of Fasudil@PDA after H_2O_2 treatment. Elemental maps (C, N, O, S) of a nanoparticle incubated with H_2O_2 for 28 days, demonstrating maintained structural composition and successful drug retention (evidenced by S signal). Scale bar, 100 nm.

Fig. S10 *In vitro* tube formation assay

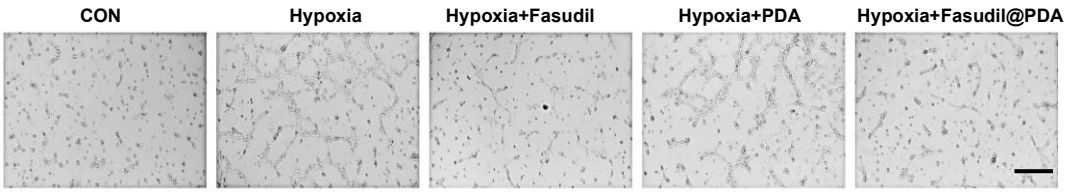

Fig. S10. *In vitro* tube formation assay under hypoxic conditions. Scale bar, 100 μm.

Fig. S11 BEND.3 cell viability after Fasudil@PDA treatment

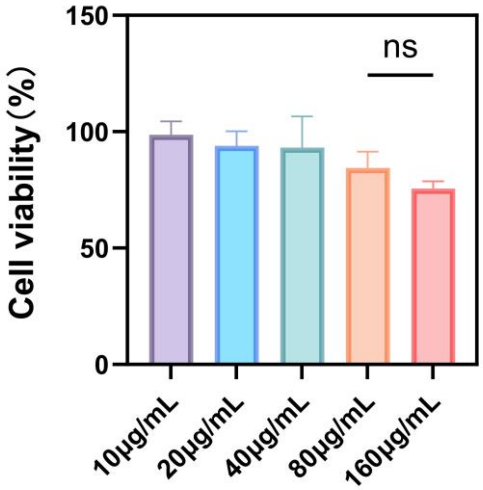

Fig. S11. Cell viability of BEND.3 cells after 24 h incubation with various concentrations of Fasudil@PDA NPs, as determined by the CCK-8 assay. ns denotes no significant difference ($p \geq 0.05$).

Fig. S12 BEND.3 cell viability after PDA treatment

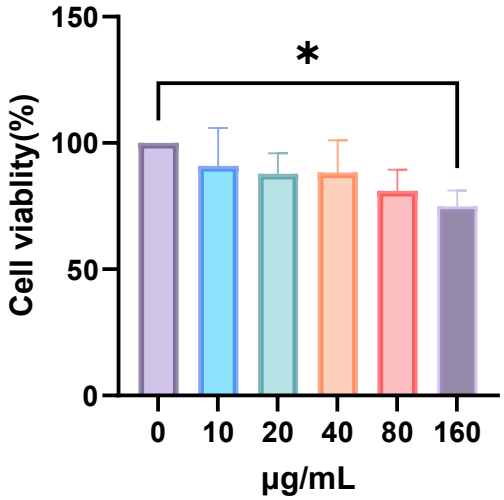

Fig. S12. Cell viability of BEND.3 cells after 24 h incubation with various concentrations of PDA, as determined by the CCK-8 assay. Data are presented as mean ± SD; *p < 0.05.

Fig. S13 BEND.3 cell viability after Fasudil treatment

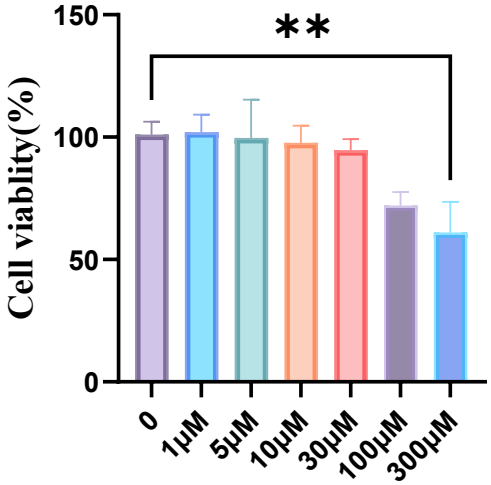

Fig. S13. Cell viability of BEND.3 cells after 24 h incubation with various concentrations of Fasudil, as determined by the CCK-8 assay. Data are presented as mean ± SD; **p < 0.01.

Fig. S14 Fluorescence images of Fasudil@PDA-CY5 nanoparticle uptake in retinal sections

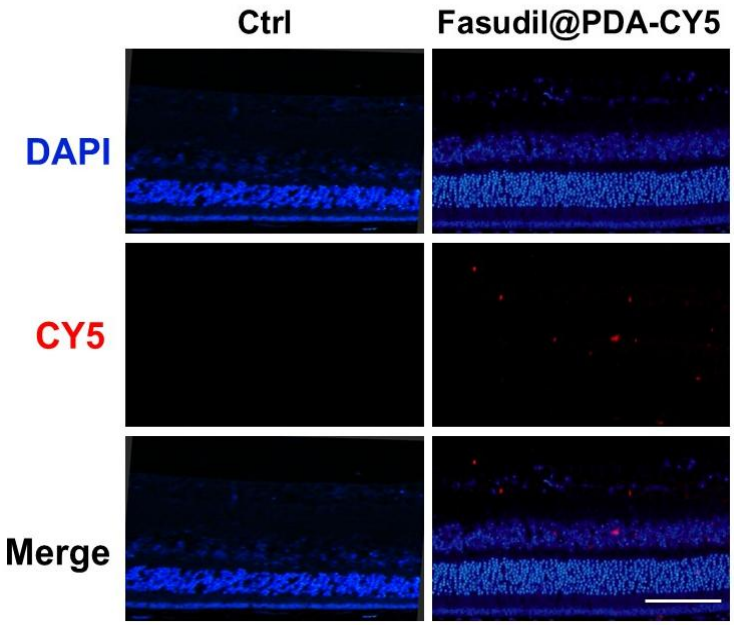

Fig.S14. Representative fluorescence images showing the **tissue uptake** of Fasudil@PDA-CY5 nanoparticles in retinal sections. Nuclei are stained with DAPI (blue), and the nanoparticles are labeled with CY5 (red). The merged image reveals the distribution and efficient accumulation of nanoparticles within the retinal tissue. Scale bar: 100 μm.

Fig. S15 H&E staining of retinal sections for Fasudil@PDA NPs histocompatibility

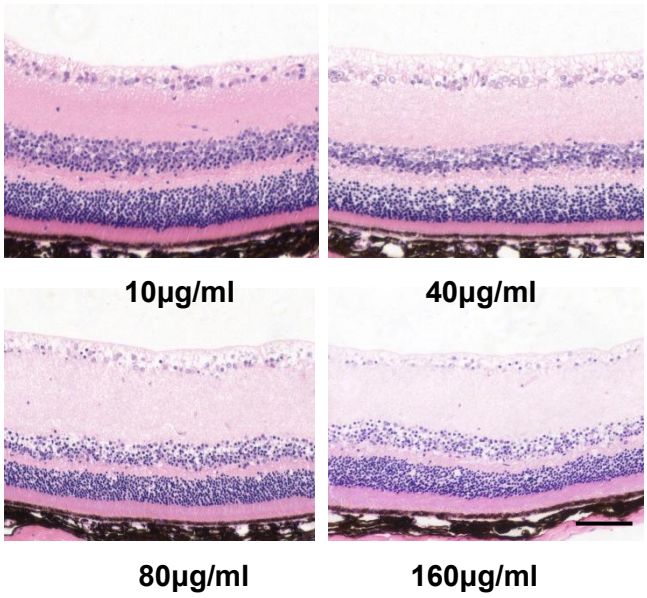

Fig.S15. Histocompatibility of Fasudil@PDA NPs after intravitreal administration. H&E staining of retinal sections following a two-month post-injection period at doses of 10, 40, 80, and 160 μg/ml. Scale bar, 50 μm.

Fig. S16 Quantitative analysis of retinal thickness after Fasudil@PDA NP administration

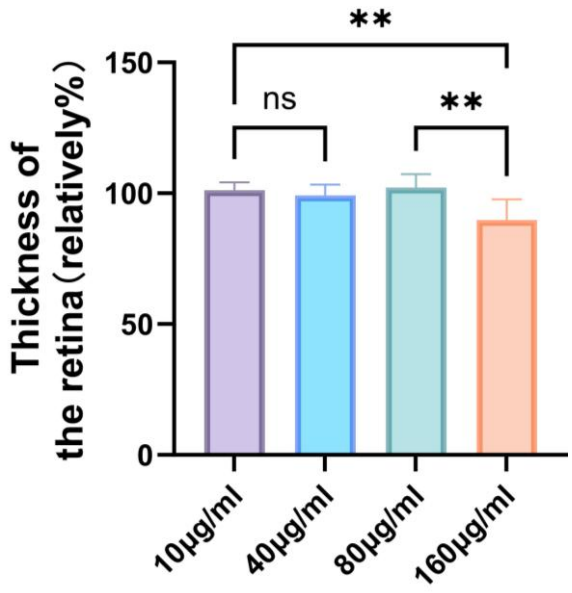

Fig. S16. Quantitative analysis of retinal thickness. Relative retinal thickness after intravitreal administration of Fasudil@PDA NPs at varying concentrations (40, 80, and 160 μg/ml). Data presented as mean ± SD. **p < 0.01 vs. control; ns denotes no significant difference (p ≥ 0.05).