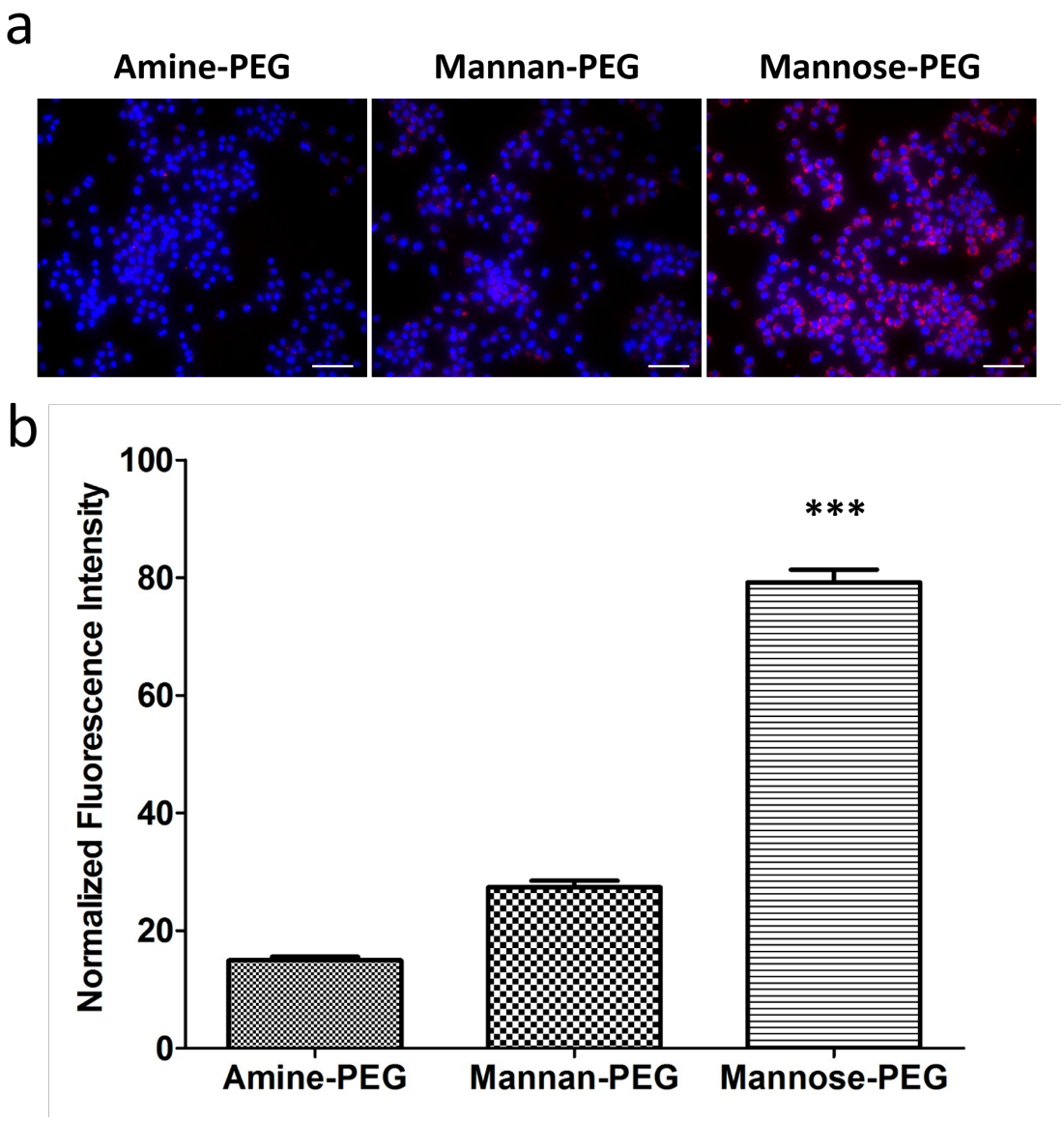
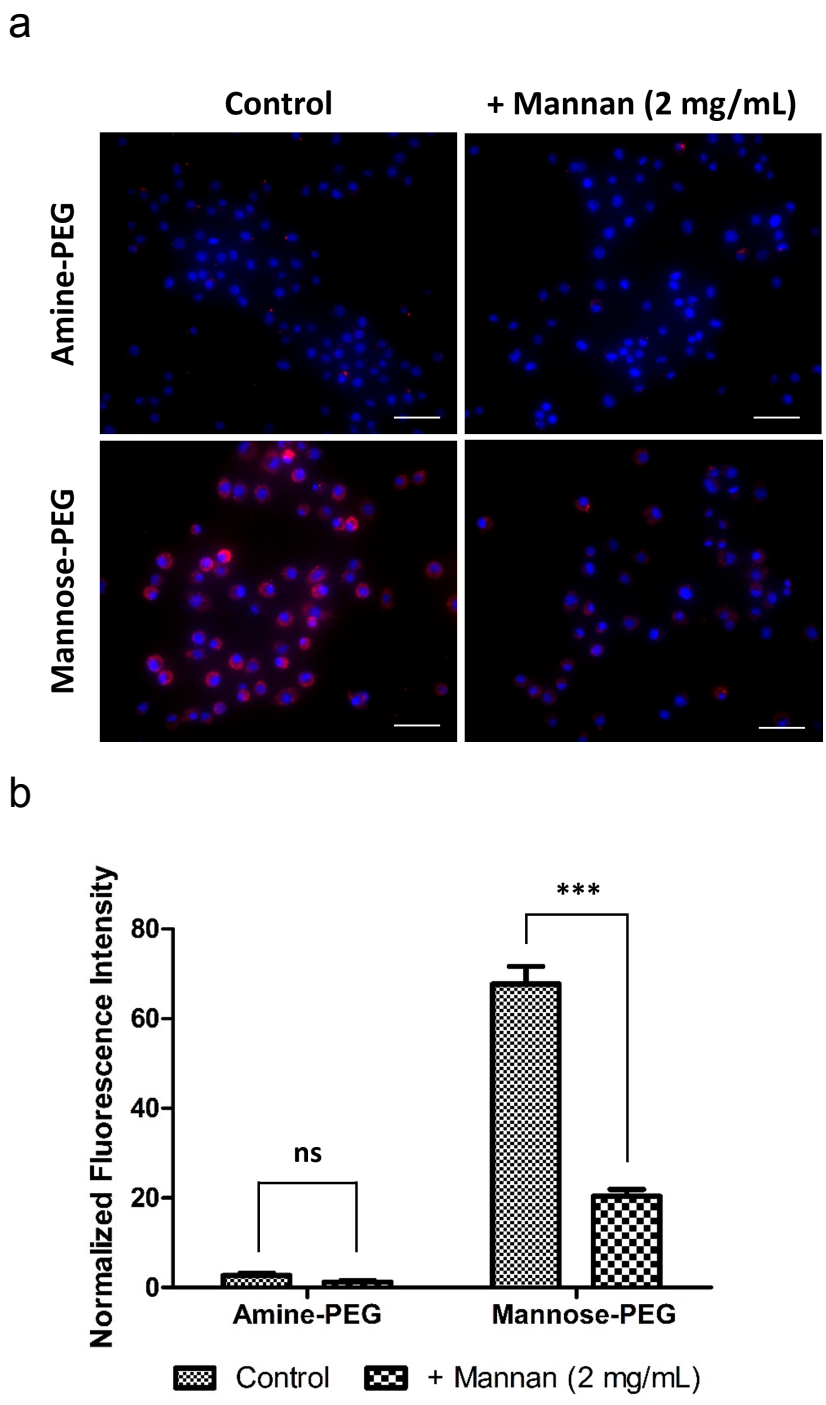
Electronic Supplementary Material (ESI) for Biomaterials Science.

Supplementary information

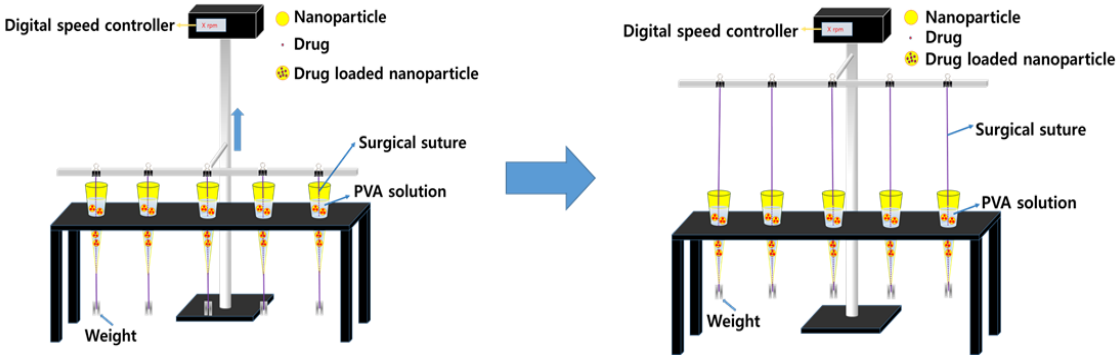
Supplementary Figures



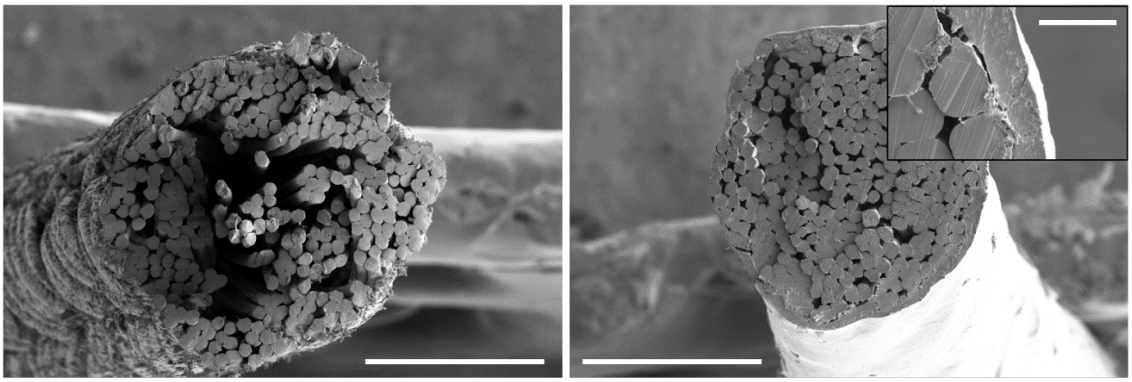
Supplementary Fig. 1 In vitro cellular uptake by surface engineering of nanoparticles. (a) Representative fluorescent images. Nuclei of Raw264.7 were stained by Hoechst 33342 (blue) and Nanoparticles were loaded with DiI (red). Scale bar: 50 μm. (b) Quantification of fluorescent intensity. (n=3, mean ± SEM; one-way ANOVA with Bonferroni post-test, ***$p < 0.001$)



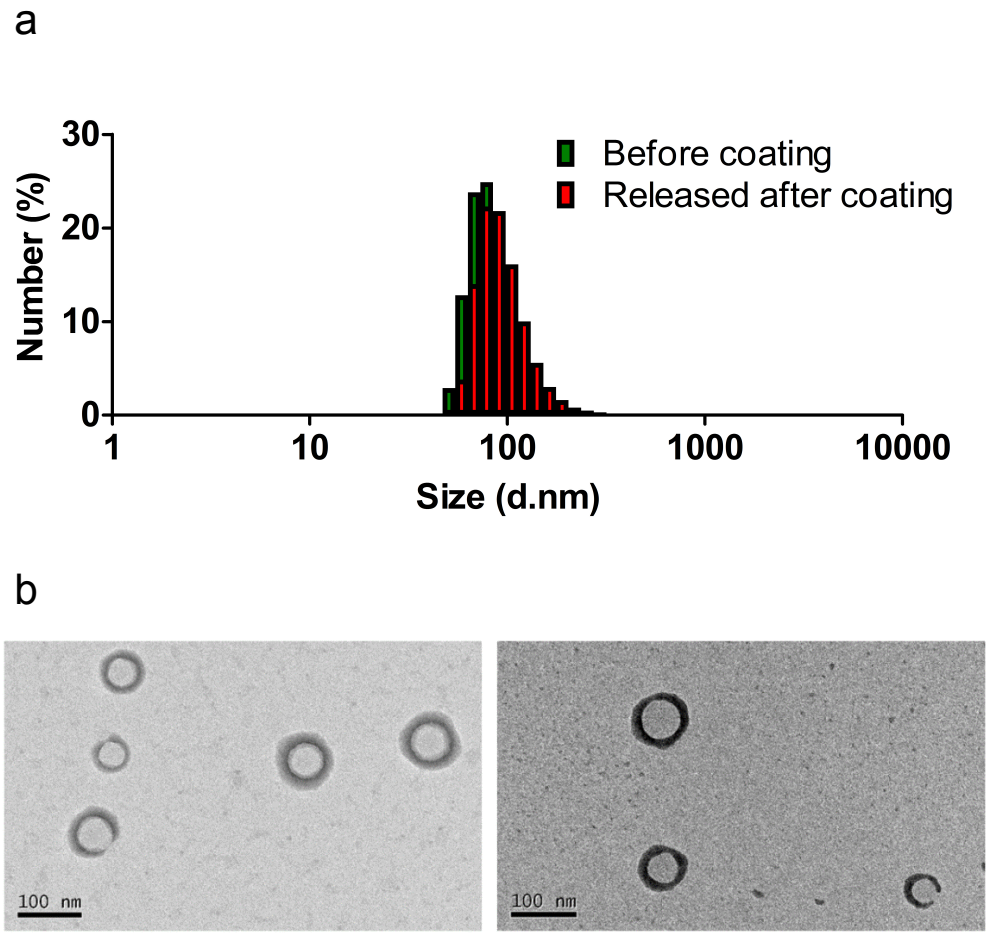
Supplementary Fig. 2 In vitro competitive binding test for cellular uptake. Mannan was treated to bind mannose receptor competitively. (a) Representative fluorescent images. Nuclei of Raw264.7 were stained by Hoechst 33342 (blue) and Nanoparticles were loaded with DiI (red). Scale bar: 50 μm. (b) Quantification of fluorescent intensity. (n=3, mean ± SEM; two-way ANOVA with Bonferroni post-tests, ***$p < 0.001$)



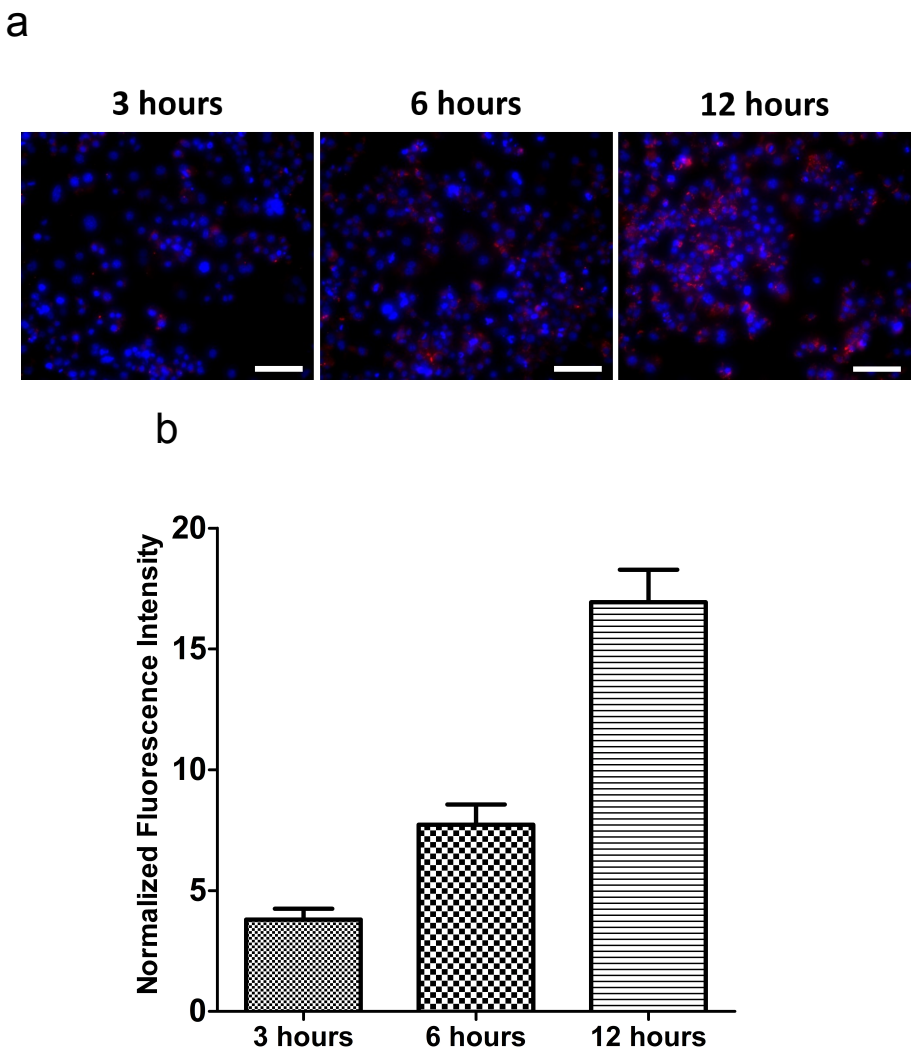
Supplementary Fig. 3 Schematic image of dip coating machine.



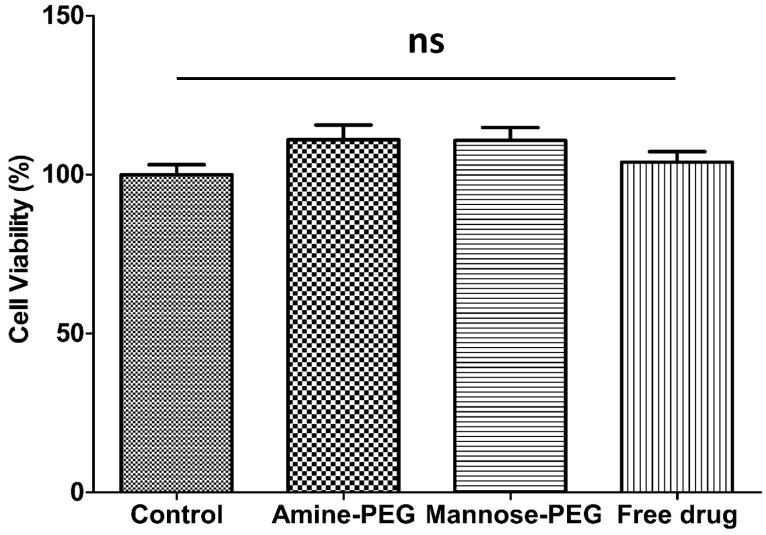
Supplementary Fig. 4 Cross-section SEM images of Mannose-PEG nanoparticle coated suture. The cross-section of uncoated commercial suture (left) and Mannose-PEG nanoparticle-coated suture (right) are shown. Scale bar: 200 μm in main images and 20 μm in an inset.



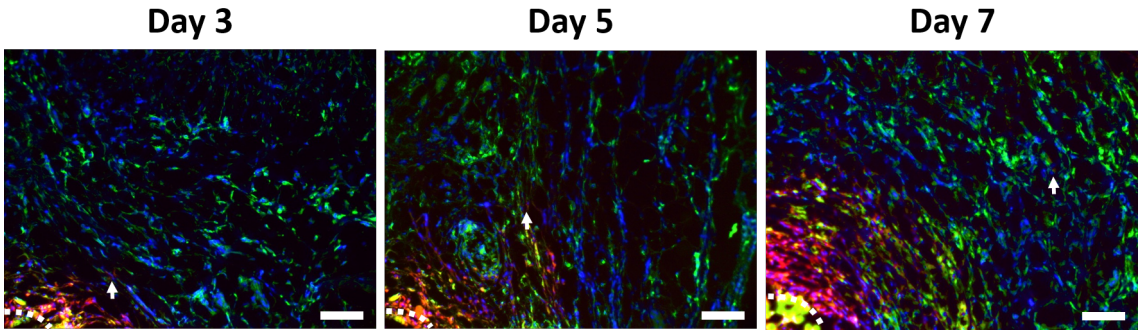
Supplementary Fig. 5 Characterization of Mannose-PEG nanoparticles released from suture. (a) Size Distribution of Mannose-PEG nanoparticles before and after coating was measured by dynamic light scattering. (b) Transmission electron microscopy images of Mannose-PEG nanoparticles before coating (left) and released after coating (right).



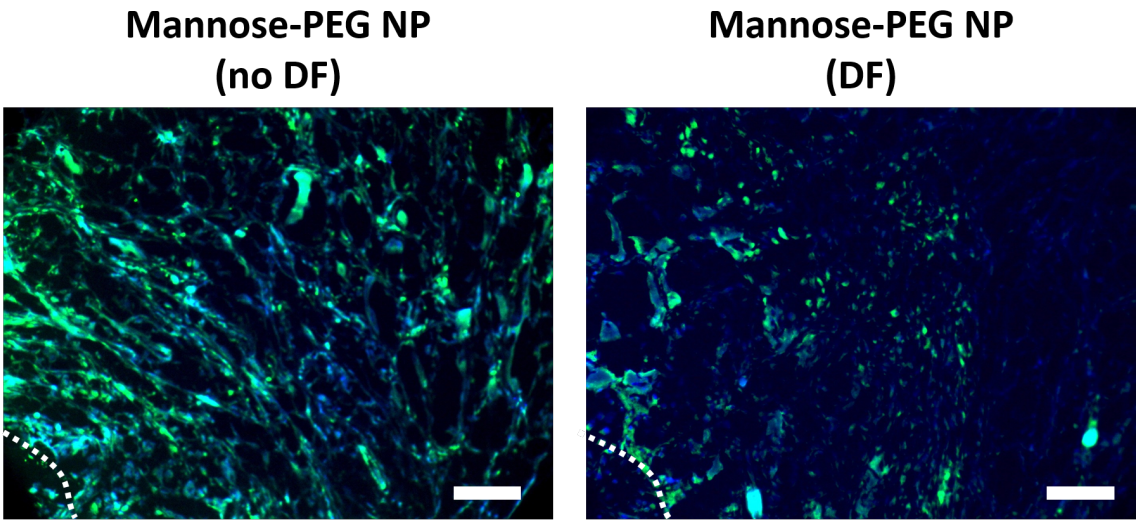
Supplementary Fig. 6 In vitro cellular uptake of Mannose-PEG nanoparticles released from suture in medium. (a) Representative fluorescent images. Nuclei of Raw264.7 were stained by Hoechst 33342 (blue) and Mannose-PEG nanoparticles were loaded with DiI (red). Scale bar: 50 μm. (b) Quantification of fluorescent intensity.



Supplementary Fig. 7 In vitro cytotoxicity of mannose-PEG nanoparticle-coated suture. As control groups, Amine-PEG nanoparticle-coated suture and free diclofenac-coated suture were prepared. (n=3, mean ± SEM; one-way ANOVA with Bonferroni post-test)



Supplementary Fig. 8 *In vivo* nanoparticle release from suture. Representative fluorescent images of 3, 5, and 7 days after surgery are shown, respectively. Mannose-PEG nanoparticles were loaded with DiI (red). Nuclei and macrophages were stained by DAPI (blue) and anti-CD68 antibody (green), respectively. White dash line indicates the location of suture and white single arrow means the farthest released nanoparticles. Scale bars indicate 100 μm.



Supplementary Fig. 9 *In vivo* macrophage infiltration around suture. Representative fluorescent images of 7 days after surgery are shown. Nuclei were stained by DAPI (blue) and macrophages were stained by anti-CD68 antibody (green). White dash line indicates the location of suture. Scale bars indicate 100 μm.

Supplementary Methods

Immunofluorescence (IF) staining

We performed IF staining for analysis of nanoparticle release and macrophage target function. We selectively stained the CD68 antigen to analyze monocyte and macrophage infiltration around the suture. Anti-CD68 mouse antibody (ab955, Abcam, 1:250) and secondary antibodies (anti-mouse antibodies, 1:2000) were diluted with 1 x PBS containing 1 % w/v bovine serum albumin (BSA) and 0.1 % v/v sodium dodecyl sulfate (SDS). For IF staining, tissue slides were paraffinized and rehydrated. Then, the slide blocking process was performed with antigen retrieval solution (Dako) and washed with 1X PBS. After that, the slide was treated with primary antibody mixture solution for 24 h at 4 ^{o}C and rinsed with 1 x PBS. Secondary antibody (FITC conjugated antibody) was treated for 1 hr at RT for fluorescent imaging. Slides are also washed with 1x PBS and dried perfectly. Finally, all slides were mounted and stained by DAPI with VECTASHIELD Mounting Medium containing DAPI (H-1200, Vector Lab, USA) to stain cell nuclei.