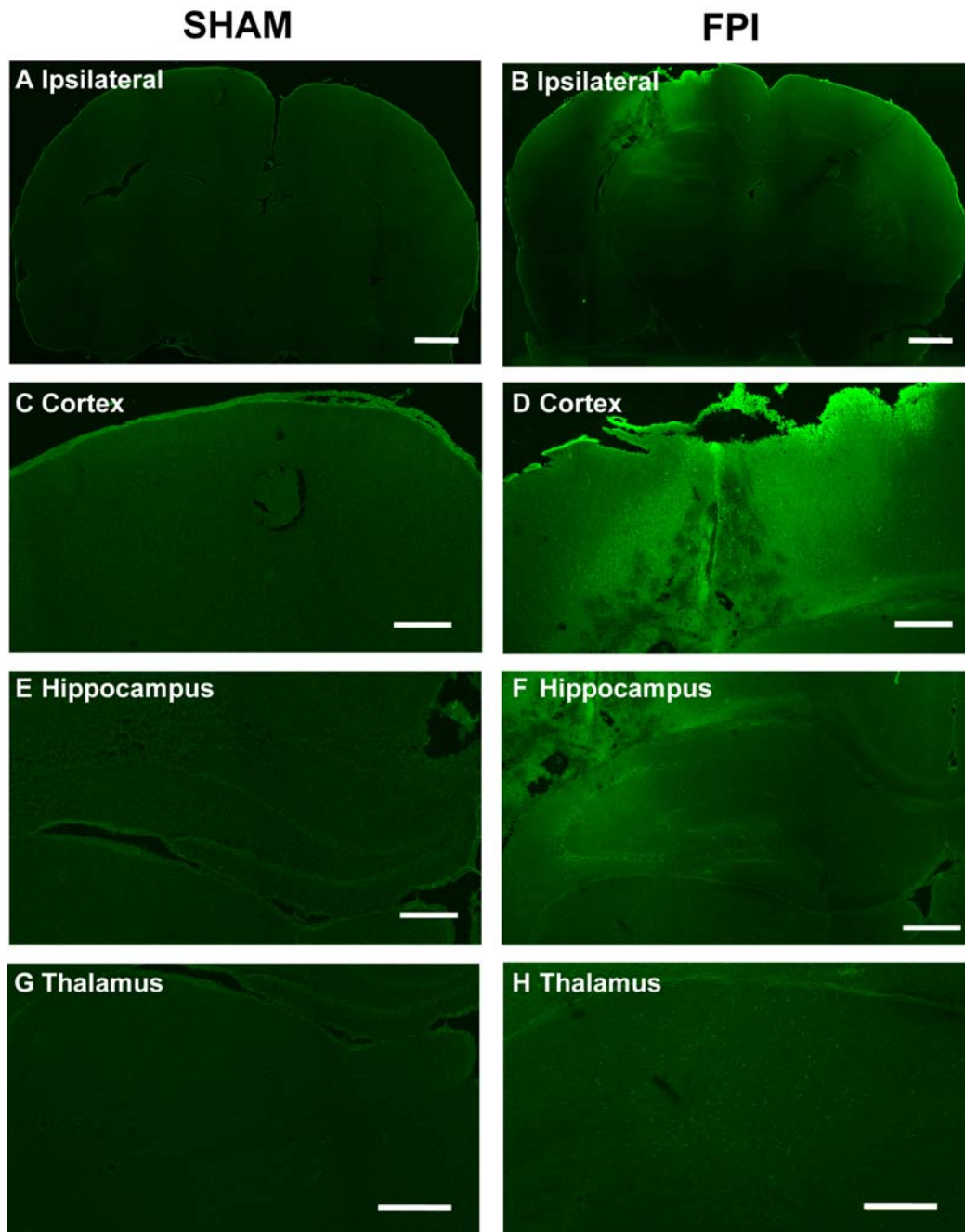**Supplementary Figure 1. Early pattermn of neuronal degeneration after FPI.**
A-B, Composite of confocal images of FluoroJade C labeled in coronal sections (-3.24 bregma) from a sham-control (A) and FPI rat (B) perfused 4 hours after injury. Note the lack of FluoroJade C stained cellular profiles in the sham (top

left) and the presence of FluoroJade C labeling in the cortex, hippocampus and thalamus on the injured (left) side of the FPI rat. C-H, Panels below show higher magnification images of FluoroJade C labeling in the cortex (C-D), hippocampus (E-F) and thalamus (G-H) in sham (C, E and F) and FPI sections (D, F and G) from the side of implant. Scale bar: 1 mm for A-B and 25 μM C-H.
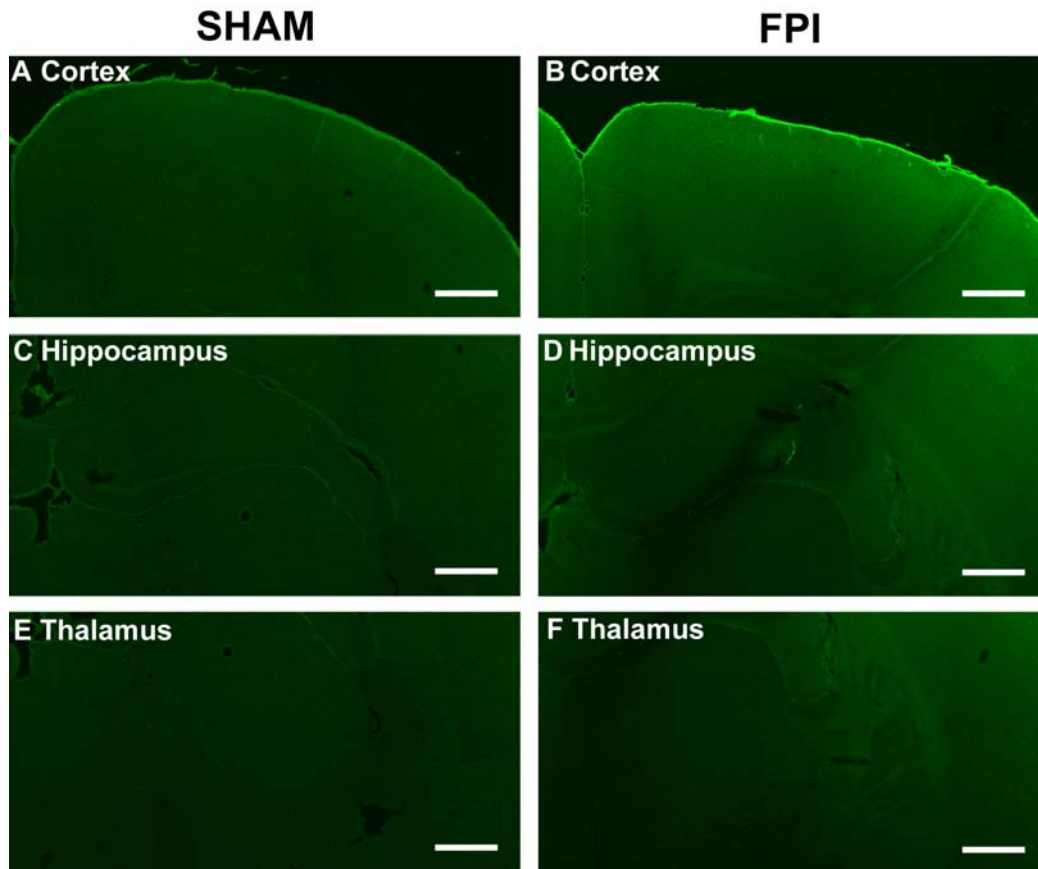
Supplementary Figure 2. Lack of neuronal degeneration contralateral to the side of injury.

A-F, Confocal images of the FluoroJade C labeling in the cortex (A-B), hippocampus (C-D) and thalamus (E-F) from the uninjured side of a sham (left panels, A, C and E) and FPI rat (right panel, B, D and F) perfused 4 hours after injury. Images are from sections shown in Supplementary Figure 1. Scale bar: 25 μM.
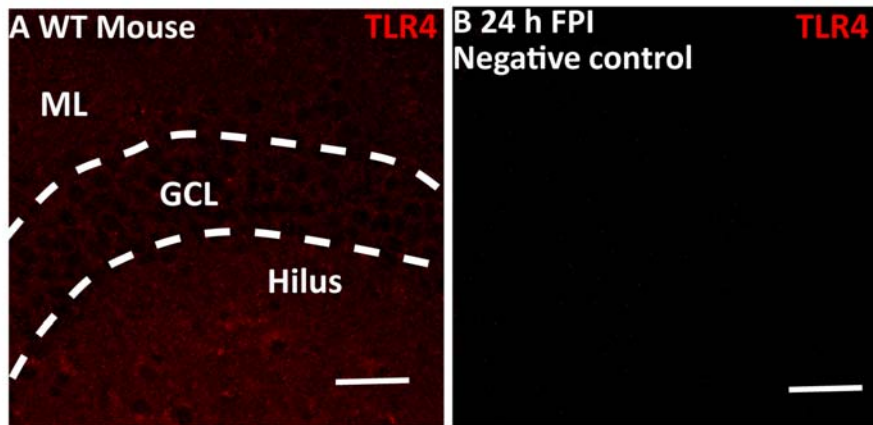
Supplementary Figure 3. Immunostaining in wild-type mice and negative controls illustrate antibody specificity.
A- B. Single plane confocal images show fluorescence immunostaining in sections from the dentate gyrus of a wild-type c57Bl/6 mouse dentate gyrus labeled with TLR4 antibody (A), image of a negative-control in a rat dentate section 24 hours post FPI in which the primary antibody was omitted (B). Note that the TLR4 immunostaining in wild-type mouse tissue is similar to that observed in sections from control rat in Fig. 2A. GCL: granule cell layer; ML: molecular layer. Scale bar: 25 μM.
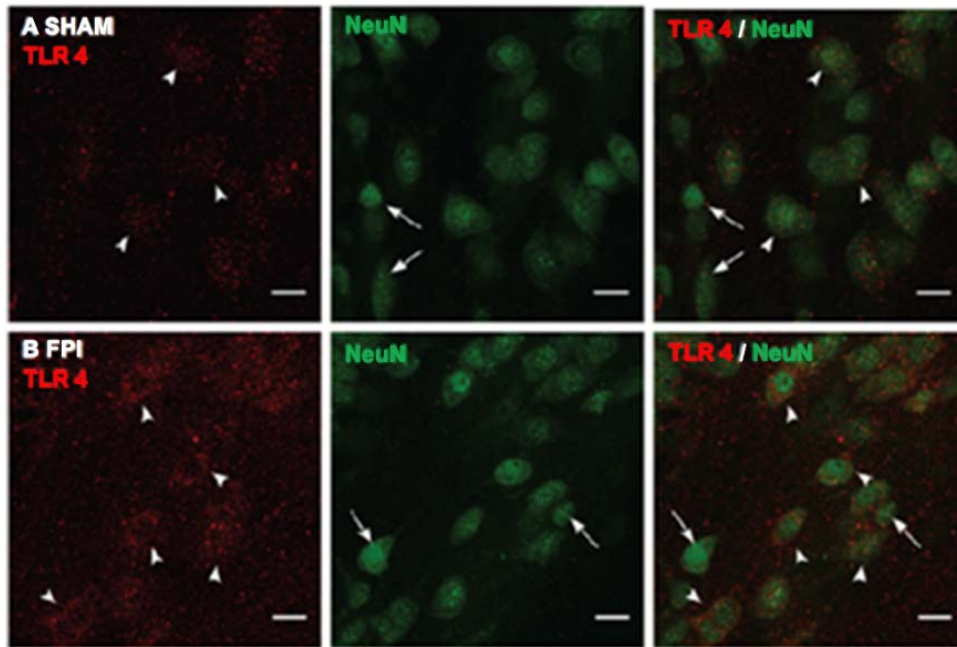
Supplementary Figure 4. Enhanced Neuronal expression of TLR4 after brain injury.
A- B. Maximum intensity projections of confocal image stacks of sections obtained 24 hours after sham (A) or FPI (B) show immunostaining for TLR4 (left), NeuN (center) and merged images (right). Scale bar: 20 μm. Arrowheads indicate TLR4 labeled cellular profiles. Arrows denote NeuN positive profiles.
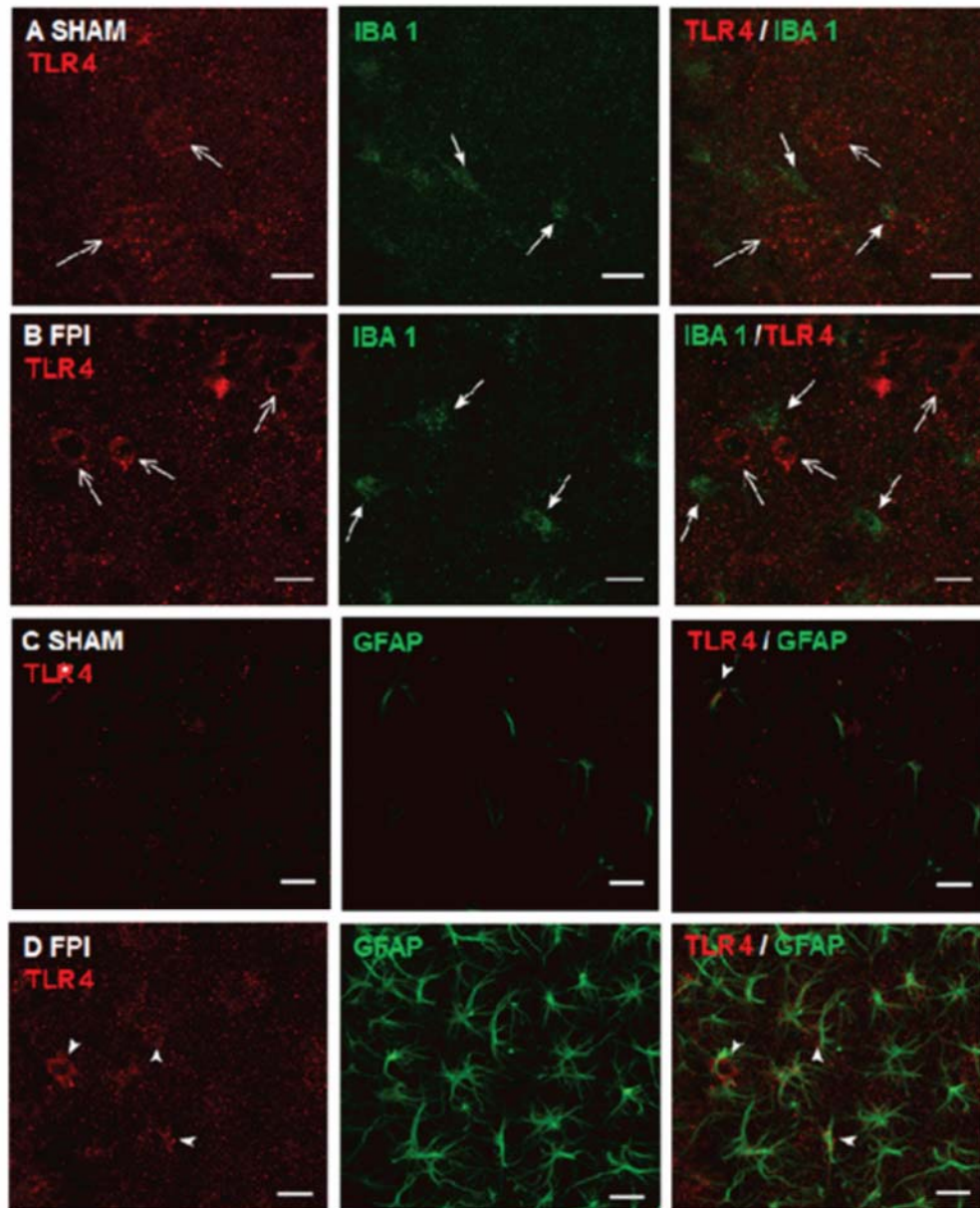
Supplementary Figure 5. Limited expression of TLR4 in glia.
A-B. Confocal images of the dentate hilus from sections obtained 24 hours after sham-injury (A) and FPI (B) show labeling for TLR4 (left, open arrows) and Iba1, a microglial marker (center, solid arrows). Merged image (right) shows the lack of co-labeling of cells stained for Iba1 and TLR4. C-D. Confocal images of the dentate hilus show immunostaining for TLR4 (left, arrowhead) and GFAP (center) and lack of co-labeling for GFAP and TLR4 in the merged image (right). Sections were obtained 24 hours after sham-injury (C) and FPI (D). Scale bar: 20 μm.