Supplemental Figures and videos
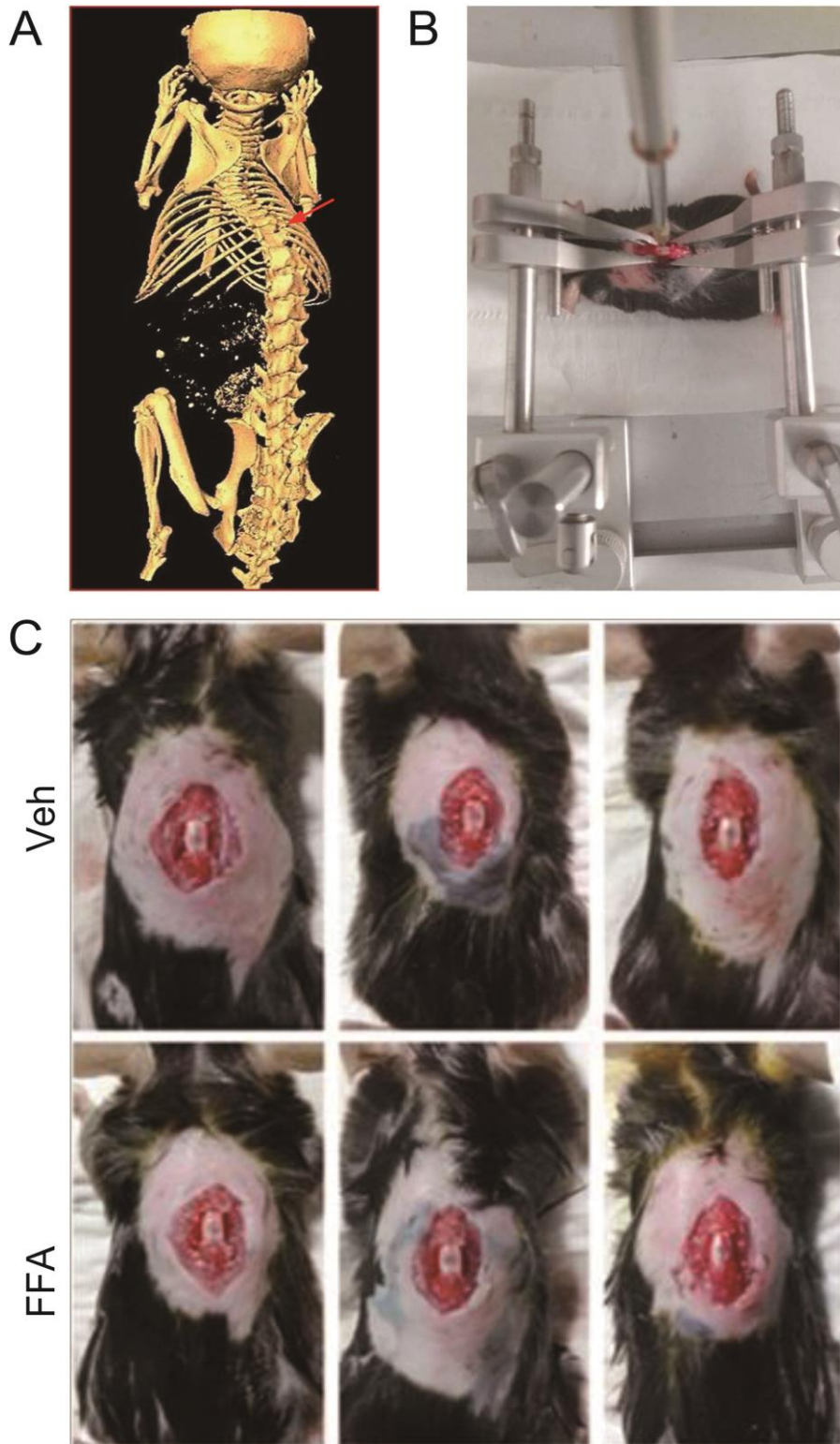
**Figure S1. The establishment of spinal cord injury. Related to Figure 1.**

(A)The Computed Tomography(CT) image of identifying the segment of spinal cord. Red arrow represent thoracic 10(T10) laminectomy.(B) Contusive spinal cord injury (SCI) was performed by using a blunt force impactor (modified NYU device (0.5-mm impactor head; 5 g weight dropped 12.5 mm).(C) The images of vehicle-control mice and FFA-treated mice damaged by the NYU device within 10 minutes.

Figure S2. The morphology changes of neurons at 1 d and 3 d after SCI. Related to Figure 1.
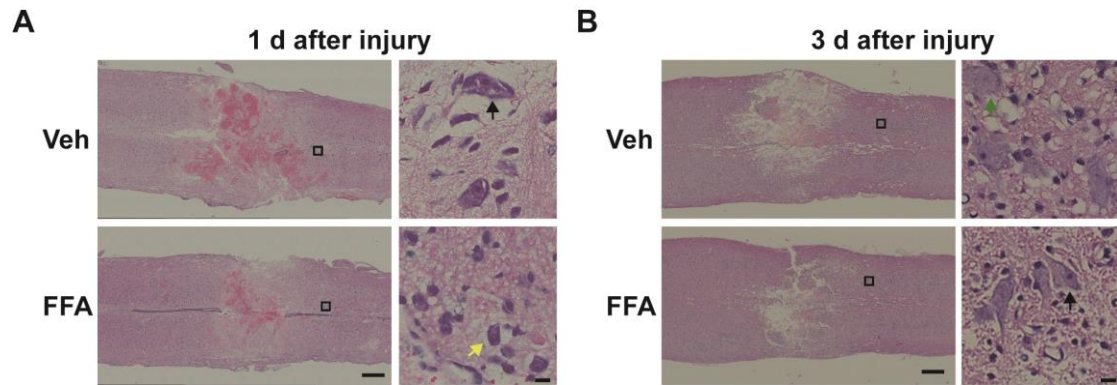

(A, B) Longitudinal sections of cords obtained at 1 d and 3 d, as indicated, after SCI. The cords were stained with hematoxylin and eosin (H&E). The black arrows point to the normal polygonal neurons, the yellow arrows point to the normal round neurons, and the green arrows point to the abnormal round swollen neurons. Scale bar=500 μm (left images show the whole spinal cords) and 50 μm (right images, as marked in a black box in the left spinal cords).

Figure S3. Immunohisto- chemistry showing Trpm4 localization at 1 d after injury in sham-operated, vehicle-control and FFA-treated mice, as indicated. Positive labeling is shown in primrose pseudocolor. Scale bar=300 μm. Related to Figure 3.
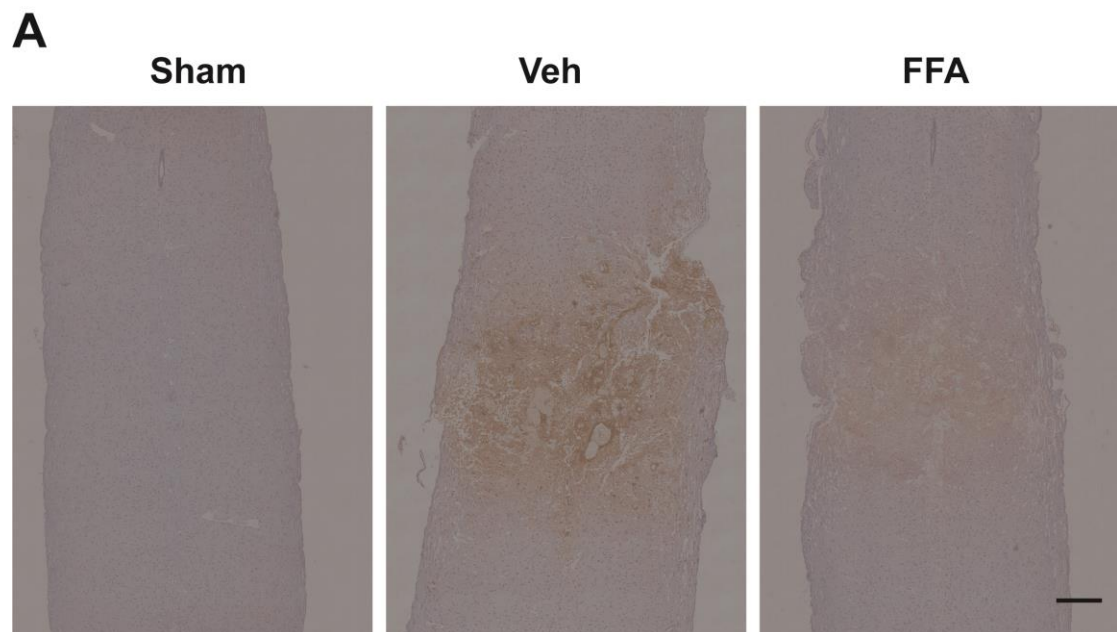
Figure S4. 20x objective confocal images of Evan's Blue extravasation at a position 1 mm caudal to the lesion epicenter. Related to Figure 4.
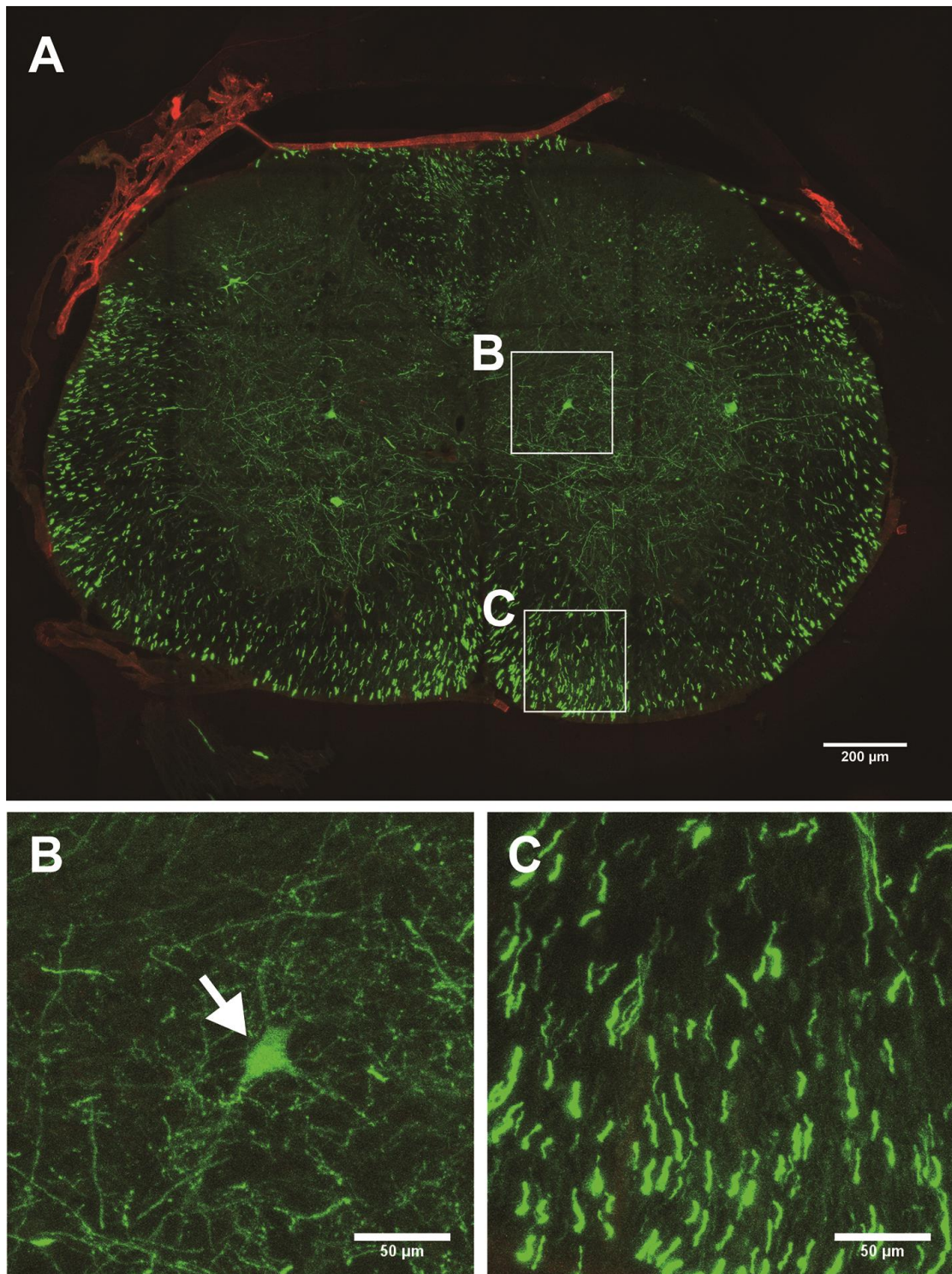
(A) 20x objective confocal images of sham-operated mice showing Evan's Blue extravasation at a position 1 mm caudal to the lesion epicenter at 1 d post injury. The green color represents the neurons or fibers labeled with GFP and the red color represents the Evan's Blue dye extravasation. (B) High magnification images in the gray matter marked by the white box in A. The white arrows indicate the GFP-positive neurons. (C) High magnification images in the white matter marked by the white box in A. The numerous green fluorescence signals were mainly fibers of GFP (projected from the brain stem).

Figure S5.Open-field test of mice at 1d,7d and 35d after SCI. Related to Figure 7.
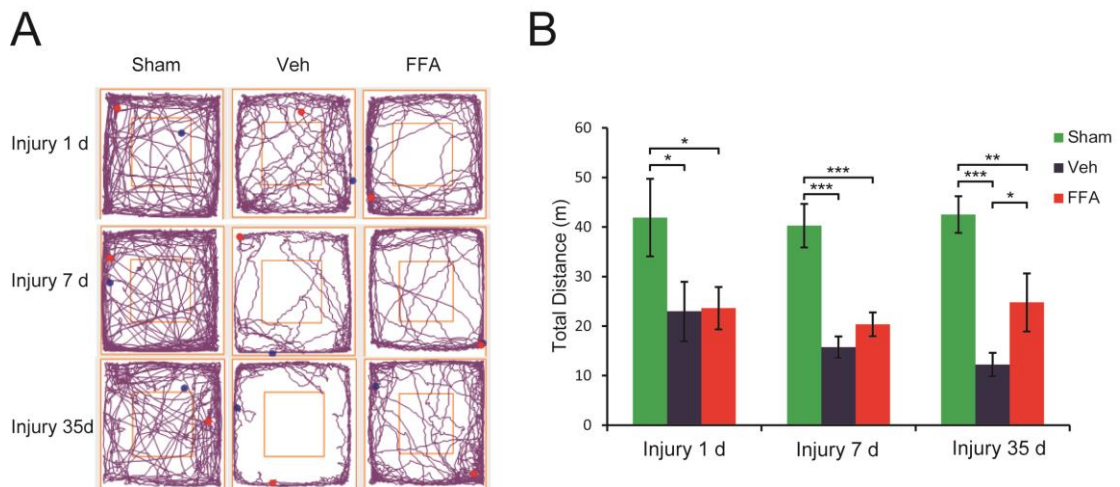
(A) Test's track plot(10 minutes) of sham-operated mice, vehicle-control mice and FFA-treated mice at 1d,7d and 35d after experiment. The track plot were obtained by the ANY-maze video tracking software.(B) Quantitative analysis(n=3/group) of the total distance within the same time frame(10 minutes). Error bars represent SD. *p<0.05, **p<0.01, and ***p<0.001 by one-way ANOVA followed by Tukey's post hoc analysis.

Supplemental video 1 (5x-10x-3 D imaging of motor neurons)-----The total motor neurons of lumbar cord with 5x objective and 10x objective ,which were scanned with confocal microscopy (LSM710, Zeiss)

Supplemental video 2 (Behavioral Assessments)------Observate the locomotor function and assess hindlimb locomotor activity