

Figure S1. (A) The low magnification images showing Tuj1 immunostaining in hUC-MSCs at 14 days after transfection with lentivirus overexpressing CA-CREB. Scale bars, 50 μ m. (B) The percentage of hUC-MSCs with a neuronal phenotype(Tuj1 positive) in total CREB1-expressing hUC-MSCs.

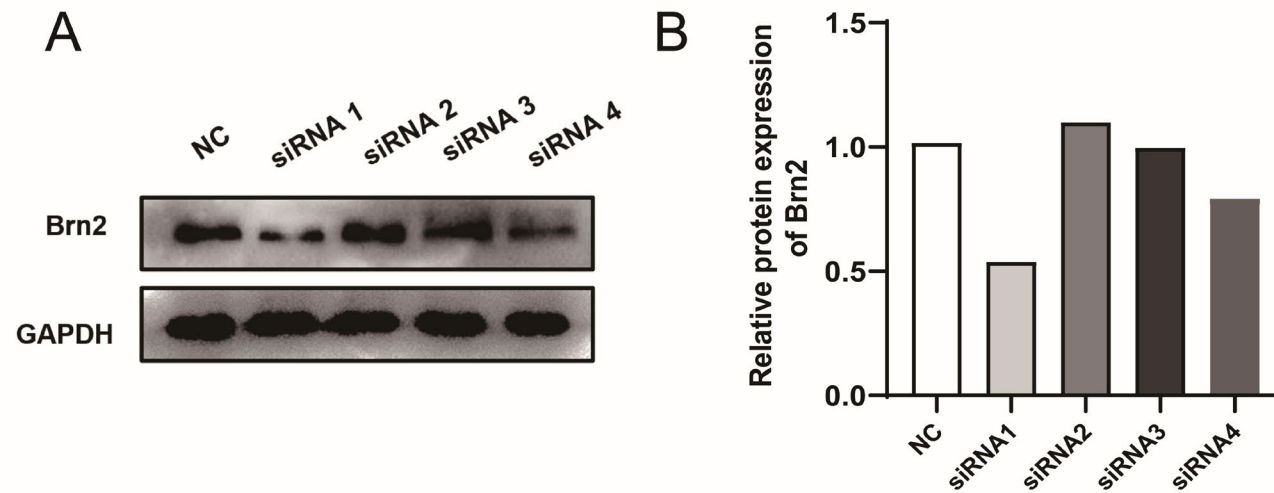


Figure S2. The knockdown efficiency of different siRNAs targeting BRN2. (A-B) Four candidate siRNAs for BRN2 were transfected to hMSCs to knock down BRN2 and then the protein expression of BRN2 was detected at 2 days of post-transfection. A western blot image and analysis showing BRN2 knock down by siRNAs.

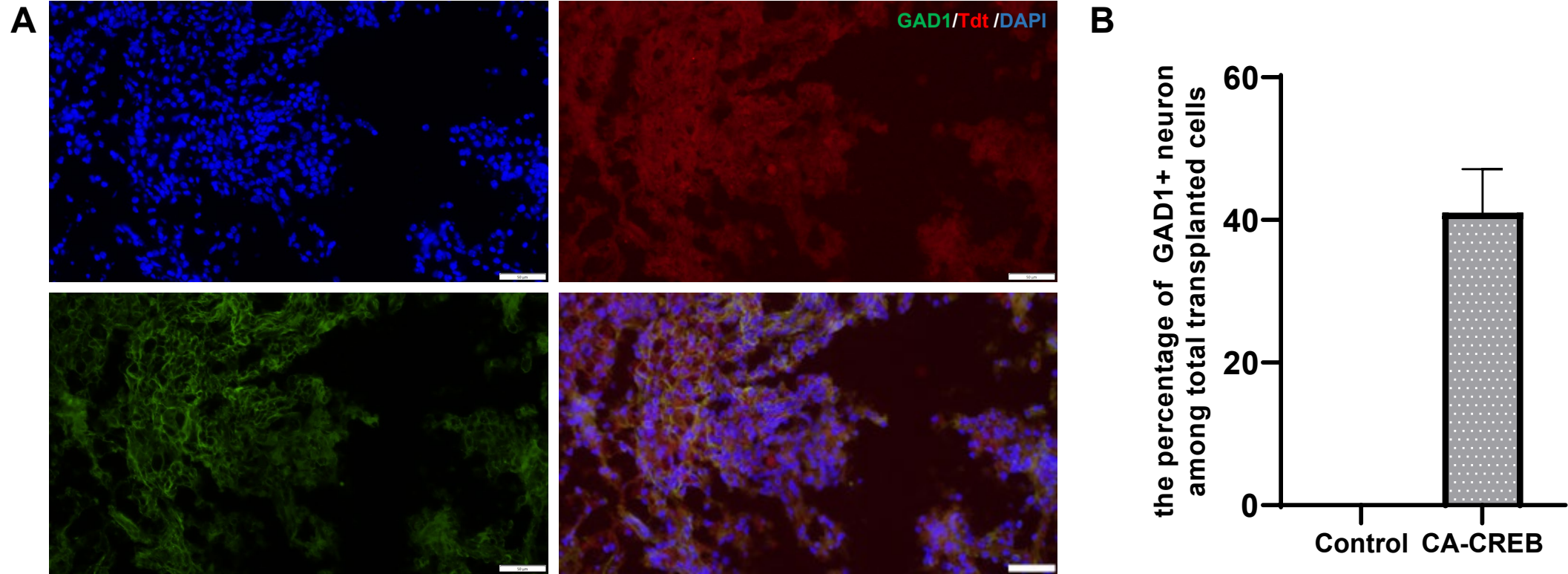


Figure S3. (A) Immunostaining for GAD1 (green) of spinal cord sections in each group at 4 weeks of transplanting iGNs labeled with tdTomato. scale bar, 50 μ m. (B) The percentage of hUC-MSCs with GABAergic neuronal phenotype (GAD1 positive) in transplanted cells from 3 mice.

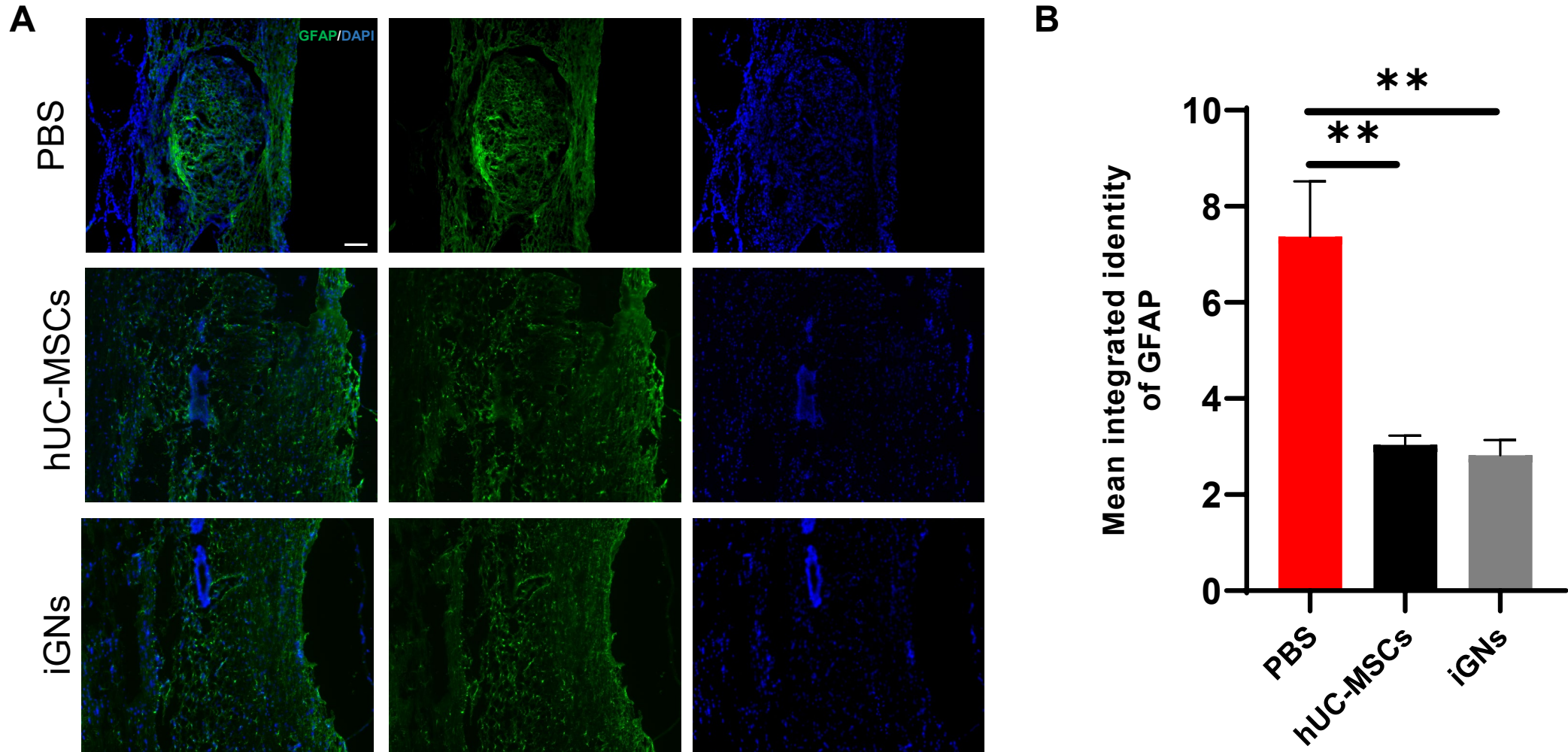


Figure S4. (A) The representative images showing GFAP (green) immunostaining of spinal cord sections in each group at 4 weeks of post-transplantation. scale bar, 100 μ m.

(B) the quantification of (A) from 3 mice. Results were analyzed by ANOVA post Student-Newman-Keuls. Statistical significance: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

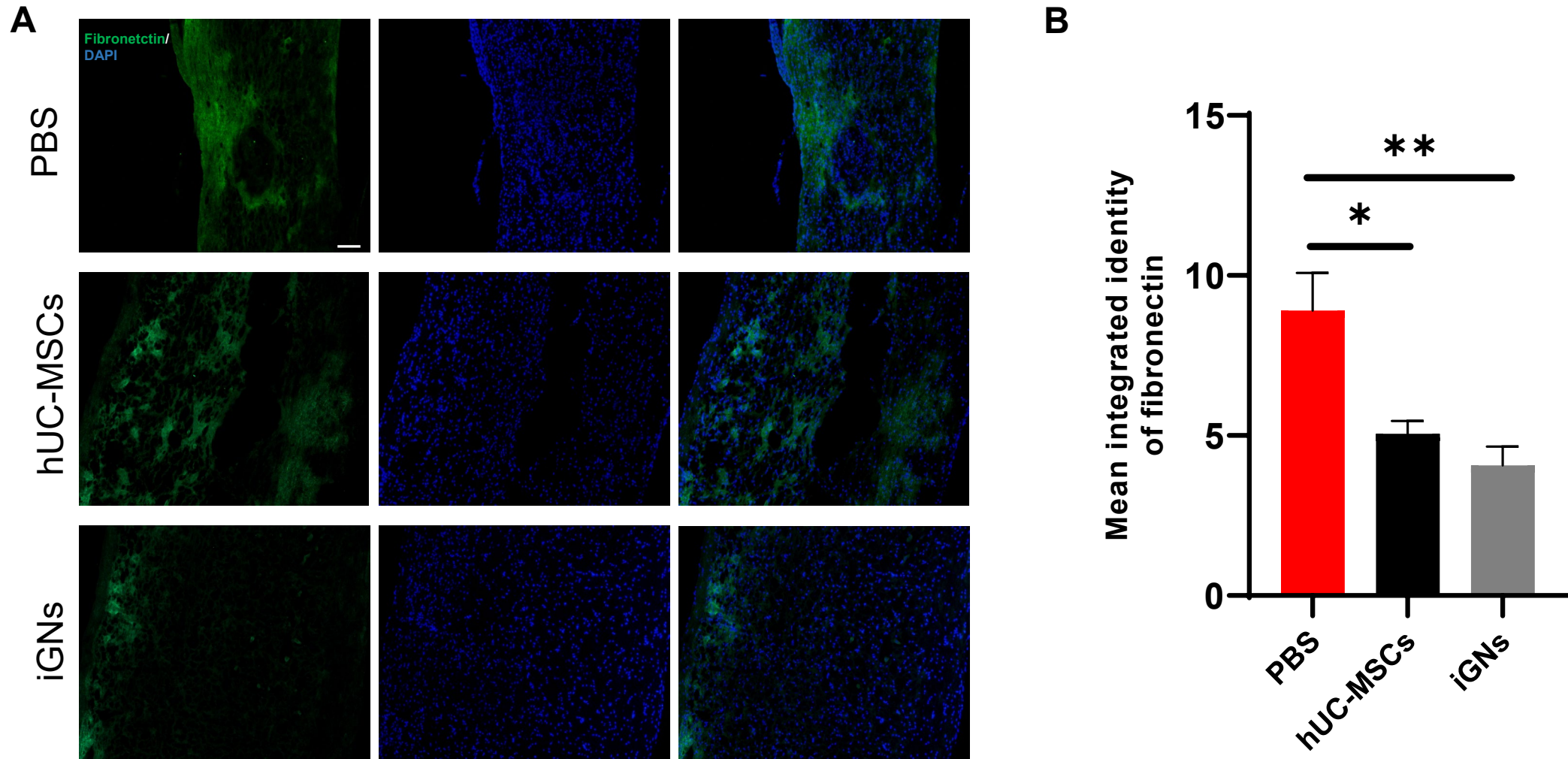


Figure S5. (A) The representative images showing Fibronectin (green) immunostaining of spinal cord sections in each group at 4 weeks of post-transplantation. scale bar, 100 μ m. (B) the quantification of (A) from 3 mice. Results were analyzed by ANOVA post Student-Newman-Keuls. Statistical significance: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

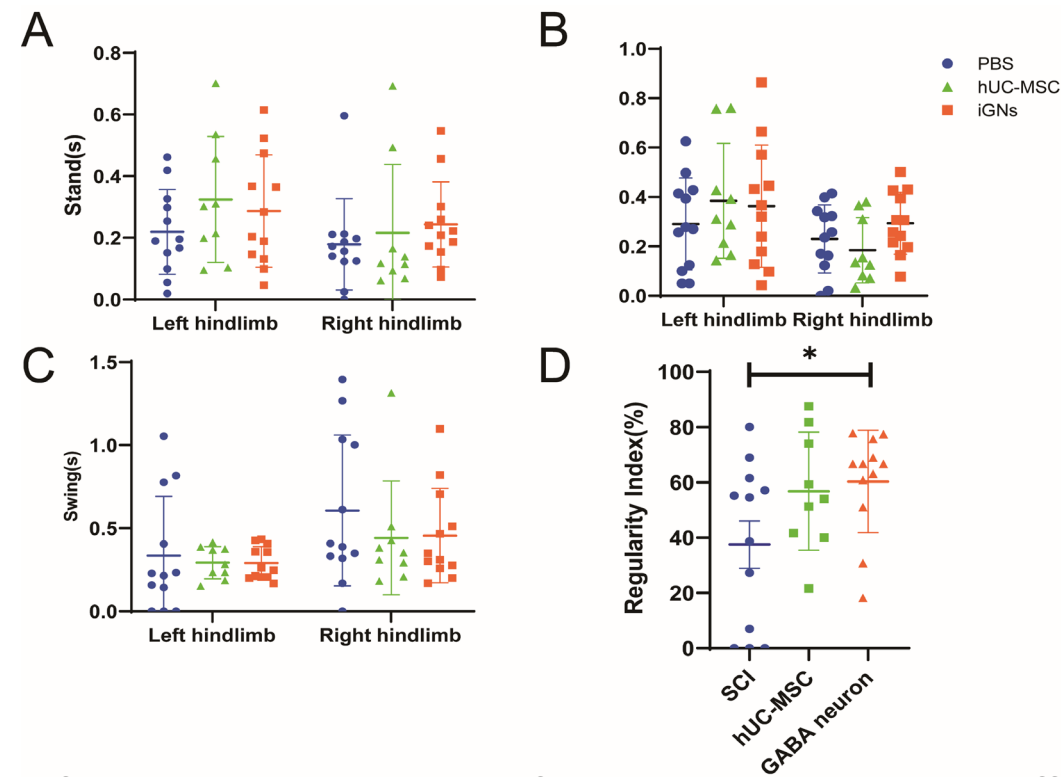


Figure S6. The functional parameters from gait recording in different treatment groups. The adult mice with spinal cord contusion injury were administered and received PBS, hUC-MSCs and iGNs injection. Four weeks after injection, the gait recording and analysis was performed. (A) Stand time of left and right hindlimb in different treatment groups at 4 weeks of post-injection. (B) Max contact area of left and right hindlimb in different treatment groups at 4 weeks of post-injection. (C) Swing time of left and right hindlimb in different treatment groups at 4 weeks of post-injection. (D) Regularity index in different treatment groups at 4 weeks of post-injection. Results were analyzed by ANOVA post Student-Newman-Keuls. Statistical significance: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

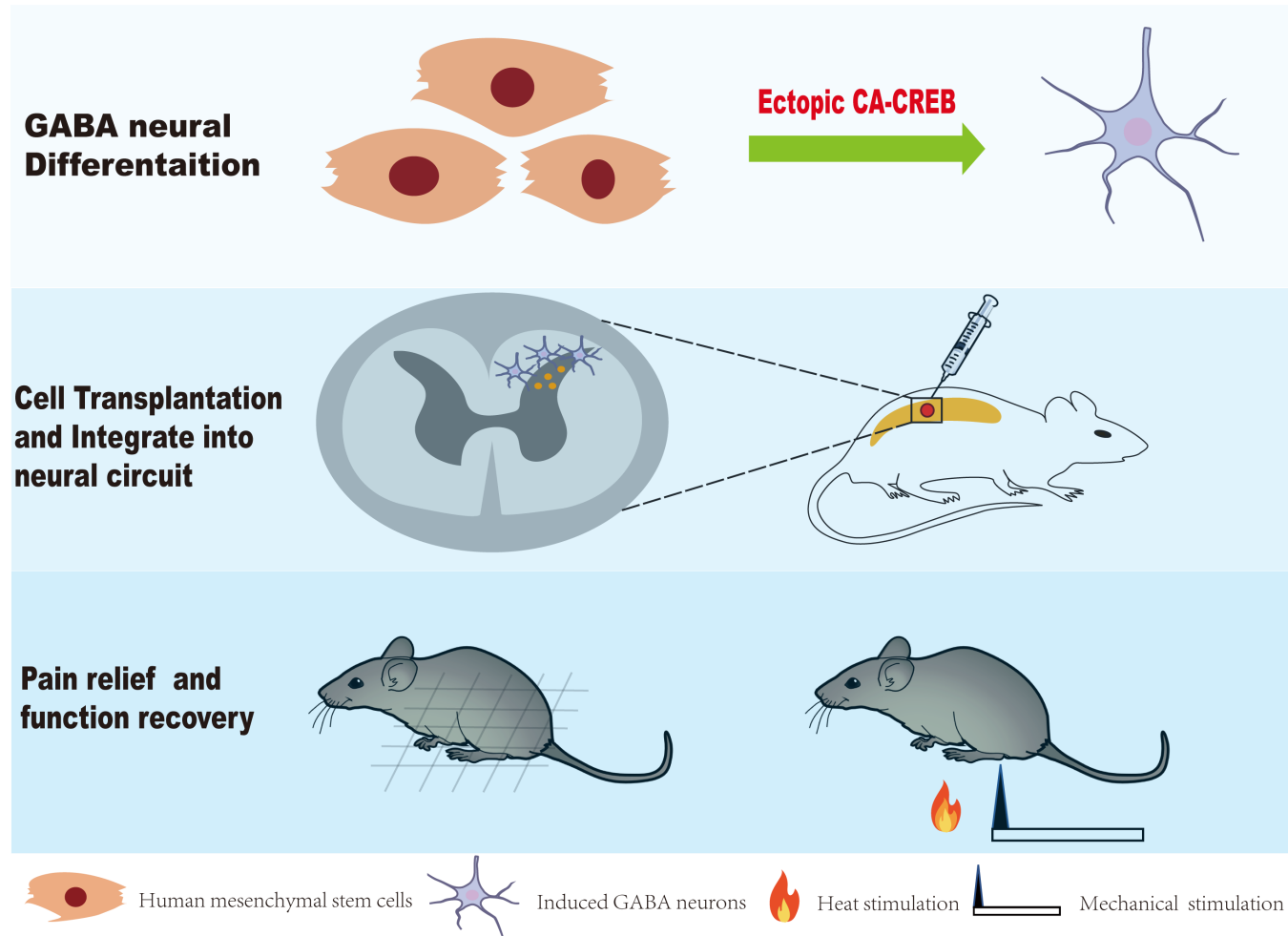


Figure S7. Schematic diagram of CREB1 facilitates GABAergic neural differentiation of hMSCs for pain alleviation and locomotion recovery after spinal cord injury