Combination of edaravone and neural stem cell transplantation repairs injured spinal cord in rats

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ABSTRACT. This study sought to observe the effect of the combination of edaravone and neural stem cell (NSC) transplantation on the repair of complete spinal cord transection in rats. Eighty adult female Sprague-Dawley (SD) rats were used to establish the injury model of complete spinal cord transection at T9. Animals were divided randomly into four groups (N = 20 each): control, edaravone, transplantation, and edaravone + transplantation. The recovery of spinal function was evaluated with the Basso, Beattie, Bresnahan (BBB) rating scale on days 1, 3, and 7 each week after the surgery. After 8 weeks, the BBB scores of the control, edaravone, transplantation, and combination groups were 4.21 ± 0.11, 8.46 ± 0.1, 8.54 ± 0.13, and 11.21 ± 0.14, respectively. At 8 weeks after surgery, the spinal cord was collected; the survival and transportation of transplanted cells were observed with PKH-26 labeling, and the regeneration and distribution of spinal nerve fibers with fluorescent-gold (FG) retrograde tracing. Five rats died due to the injury. PKH-26-labeled NSCs had migrated into the spinal cord. A few intact nerve fibers and pyramidal neurons passed the injured area in the transplantation and combination groups. The numbers
of PKH-26-labeled cells and FG-labeled nerve fibers were in the order: combination group > edaravone group and transplantation group > control group (P < 0.05 for each). Thus, edaravone can enhance the survival and differentiation of NSCs in injured areas; edaravone with NSC transplantation can improve the effectiveness of spinal cord injury repair in rats.

**Key words:** Spinal injury; Neural stem cell; Edaravone; Injury repair