# SOD3

Ischemic stroke is a deadly disease that poses a serious threat to human life. Superoxide dismutase 3 (SOD3, ECSOD) is the main antioxidant enzyme that removes superoxide anions from cells. This study aimed to investigate the effect of SOD3 overexpression on cerebral ischemia-reperfusion injury in rats.

GV230-EGFP-ECSOD, the recombinant SOD3-overexpressed vector, was constructed by genetic engineering technology, and mesenchymal stem cells (MSCs) were infected with lentiviral packaging. In animal experiment, cerebral ischemia-reperfusion injury model rats were successfully established. ECSOD-MSCs are the MSCs that successfully transfected with SOD3 overexpression vector. The animals were injected with ECSOD-MSCs (ECSOD-MSC group), normal MSCs (MSCs group), PBS (PBS group), and not do any processing (Model group) via the tail vein. Then MRI was used to detect the infarct volume of rats, modified Neurological Severity Scores (mNSS), and immunohistochemistry were used to evaluate the expression of neurological function and apoptosis-related genes in rats.

RESULTS: Western blot analysis revealed that the SOD3 was highly expressed in MSCs. Animal experiments showed that the transplantation of ECSOD-MSCs significantly reduced the infarct volume of ischemic stroke rats ($p < 0.05$), significantly improved neurological function in rats ($p < 0.05$), and found proapoptotic gene, Bax, expression was significantly decreased ($p < 0.05$), the expression of anti-apoptotic gene, Bcl-2, was significantly increased ($p < 0.05$). The highly expressed SOD3 has no correction with brain infarct volume, and the highly expressed SOD3 has a positive correlation with cell apoptosis. It is speculated that overexpression of SOD3 affects the expression of Bax and Bcl-2, and improves apoptosis to alleviate ischemic stroke.

CONCLUSION: Our results indicated that MSCs transfected with SOD3 can effectively alleviate cerebral ischemia-reperfusion injury in rats [1)].

1)
Sun S, Gao N, Hu X, Luo H, Peng J, Xia Y. SOD3 overexpression alleviates cerebral ischemia-reperfusion injury in rats. Mol Genet Genomic Med. 2019 Aug 28:e831. doi: 10.1002/mgg3.831. [Epub ahead of print] PubMed PMID: 31461803.