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Letter to Editor

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The Combination of N-methyl-D-aspartate Receptor Antagonists and MSCs Therapy may have a Multiplier Effect in Spinal Cord Injury

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To the Editor;

We read with great interest that the article by Dogan and Karaca entitled "N-methyl-D-aspartate Receptor Antagonists may Ameliorate Spinal Cord Injury by Inhibiting Oxidative Stress: An Experimental Study in Rats" in Turkish Neurosurgery 30(1):60-68, 2020 (2). In this article, Dogan and Karaca drawed the conclusion that "N-methyl-D-aspartate (NMDA) receptor antagonists, especially amantadine, may ameliorate spinal cord injury (SCI) by inducing angiogenesis, affecting inflammation and apoptosis, which inhibit oxidative stress and the signaling pathways following SCI in rats".

We agree with the conclusions drawn from Dogan and Karaca (2), and we will give a promising and potential treatment that may have a synergistic effect in SCI - Mesenchymal stem cells (MSCs)-therapy. Stem cell therapy is another medical revolution after drug and surgical medication (10). MSCs are a class of cells with significant self-renewal and multi-lineage differentiation properties and MSCs characterized by immune regulation, suppression of inflammation and promotion of angiogenesis (3-5,8,10). They are favorable for the treatment of various diseases and injuries. It could be envisioned that MSCs transplantation may be a promising treatment for SCI. MSCs therapies were anticipated to repair the structure and function of diseased or damaged tissues via direct cell replacement and/or pretended by-stander effect (7).

It had been long-known that MSCs could secrete bio-active cytokines and growth factors in abundance, which could modulate the immune system, limit inflammation,and aid the healing (1,6,9,11). MSCs could be differentiated into neurons and glial cells and could ameliorate extracellular microenvironment, promote axonal regeneration and suppress cell apoptosis by expressing neurotrophic factors in vivo (5,8).

It is indicated that the inflammatory reaction caused by SCI is a crucial factor (6), MSCs can affect immune cells proliferation, differentiation, activation and inflammatory cytokine secretion by cells interaction and secretion of soluble immune regulatory factors and inhibit the proliferation of Tcells and microglia, regulate dendritic cells, monocytes and macrophages and natural killer (NK) cells to Suppress the inflammatory response. MSCs secret a variety of cytokines and growth factors through paracrine, including vascular endothelial growth factor (VEGF), basic fibroblast growth factor (BFGF), hepatocyte growth factor (HGF), that could stimulate peripheral mature endothelial cells proliferation and migration, improve the microenvironment of ischemic tissue to participate in angiogenesis. For all the above reasons, the combination of N-methyl-D-aspartate Receptor Antagonists and MSCs therapy may have a multiplier effect in SCI.

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REFERENCES

1. Deskins DL, Bastakoty D, Saraswati S, Shinar A, Holt GE, Young PP: Human mesenchymal stromal cells: Identifying assays to predict potency for therapeutic selection. Stem Cells Translational Medicine 2:151-158, 2013
2. Dogan G, Karaca O: N-methyl-D-aspartate receptor antagonists may ameliorate spinal cord injury by inhibiting oxidative stress: An experimental study in rats. Turk Neurosurg 30:60-68, 2020
3. Dong H, Li G, Ding H, Luo Y, Zhao M, Lin L: The potential value of adipose tissue-derived (rAT) mesenchymal stem cells (MSCs). Turk Neurosurg, 2017 (Online ahead of print)
4. Dong HJ, Shang CZ, Li G, Niu Q, Luo YC, Yang Y, Meng HP, Yin HJ, Zhang HX, Zhao ML, Lin L: The distribution of transplanted umbilical cord mesenchymal stem cells in large blood vessel of experimental design with traumatic brain injury. Journal of Craniofacial Surgery 28:1615-1619, 2017
5. Dong HJ, Zhao MI, Li XH, Chen YS, Wang J, Chen MB, Wu S, Wang JJ, Liang HQ, Sun HT, Tu Y, Zhang S, Xiong J, Chen C: Hypothermia-modulating matrix elasticity of injured brain promoted neural lineage specification of mesenchymal stem cells. Neuroscience 377:1-11, 2018
6. Gong W, Han Z, Zhao H, Wang Y, Wang J, Zhong J, Wang B, Wang S, Wang Y, Sun L, Han Z: Banking human umbilical cord-derived mesenchymal stromal cells for clinical use. Cell Transplant 21:207-216, 2012
7. Huajiang D, Dingwei P, Xiping Y, Yuetong H, Lei W, Chongzhi S, Keqiang W: Cell-free therapy may experience more rapid advancement - Pretended Bystander Effects" in cell-based therapy for treating diseases. Turk Neurosurg 30(2):315-316, 2020
8. Huajiang D, Ping W, Dingwei P, Chongzhi S, Lei W: Study on umbilical cord-matrix stem cells transplantation for treatment of acute trauma brain injury in rats. Turk Neurosurg 29(5):750-758, 2019
9. Kean TJ, Lin P, Caplan AI, Dennis JE: MSCs: Delivery Routes and Engraftment, Cell-Targeting Strategies, and Immune Modulation. Stem Cells International 2013:732742, 2013
10. Li G, Yang Y, Dong HJ, Lin L: The research progress of mesenchymal stem cells in the treatment of Traumatic brain injury. Turk Neurosurg 2017 (Online ahead of print)
11. Uccelli A, Moretta L, Pistoia V: Mesenchymal stem cells in health and disease. Nat Rev Immunol 8:726-736, 2008