Turk Neurosurg 36(1):175-177, 2026
DOI: 10.5137/1019-5149.JTN.49202-25.0

Letter to Editor

Received: 04.06.2025
Accepted: 17.07.2025
Published Online: 16.01.2026

Perseus-The Protector of Mankind: Mesenchymal Stem Cell Transplantation may be a Promising Treatment for Neurological Diseases

Yanmin WANG[1]*, Bo HUANG[2]*, Huajiang DONG[2]

[1]Tianjin Beichen Hospital, Tianjin 300000, China
[2]Logistics University of Chinese People's Armed Police Forces, Tianjin 300309, China

*Equal to this work.

Corresponding author: Huajiang DONG ✉ donghj424@163.com

To the Editor;

We read with great interest that the article by Bozkaya et al. entitled "A New Hope in the Treatment of Intraventricular Haemorrhage in Preterm Infants: Mesenchymal Stem Cells" in Turkish Neurosurgery 32(2):344-346, 2022. https:// doi.org/ 10.5137/1019-5149.JTN.34850-21.2" (2). In this article, Bozkaya et al. drawed the conclusion that "Mesenchymal stem cell (MSC) transplantation may be a promising treatment for premature infants to reduce morbidity and mortality after intraventricular bleeding (IVH). However, a need exists for studies that evaluate the optimal application route, dose and time of administration, as well as its efffcacy and safety" .

MSCs are widely used in clinical applications (11,12). It could be envisioned that MSCs transplantation may be a promising treatment for Neurological diseases. Current research highlights MSCs applications in modulating neurogenesis, angiogenesis, and immune regulation, particularly through their capacity to promote progenitor cell differentiation. Notably, preclinical and clinical trials demonstrate therapeutic efficacy in premature infants with bronchopulmonary dysplasia (BPD) and hypoxic-ischemic encephalopathy (HIE). For instance, human umbilical cord blood-derived MSCs (UCB-MSCs) have shown marked neuroprotective effects in severe intraventricular hemorrhage (IVH) models, significantly reducing brain injury and post-hemorrhagic hydrocephalus (PHH) incidence in rodent studies (1-3). These findings underscore MSC therapy's potential to mitigate morbidity and mortality in IVH patients.

Stem cell therapy is another medical revolution after drug and surgical medication (11,12). Emerging evidence suggests MSCs transplantation holds significant promise for treating neurological diseases. MSCs are a class of cells with signiffcant self-renewal and multi-lineage differentiation properties and MSCs characterized by immune regulation, suppression of inffammation and promotion of angiogenesis. They are favorable for the treatment of various diseases and injuries (4-8,11). 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 (9). MSCs suppress T-lymphocyte proliferation and the infflammatory response, changing in the cytokine release of T cells (3,6). Due to, MSCs increase the production of anti-infflammatory cytokines, such as IL-10, while reducing the infflammatory cytokine release from dendritic cells, such as TNF-α, interleukin12 (IL-12) and interferon-γ, in IVH patients (1,10). It is indicated that the infflammatory reaction caused by Neurological injury disease is a crucial factor (6,11), MSCs can affect immune cells proliferation, differentiation, activation and infflammatory cytokine secretion by cells interaction and secretion of soluble immune regulatory factors and inhibit the proliferation of T cells and microglia, regulate dendritic cells, monocytes and macrophages and natural killer (NK) cells to Suppress the infflammatory response. MSCs secret a variety of cytokines and growth factors through paracrine, including vascular endothelial growth factor (VEGF), basic firoblast 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 (11,12).

Yanmin WANG : 0009-0007-9112-5691 Bo HUANG : 0009-0000-3725-8185 Huajiang DONG : 0000-0002-4141-3077

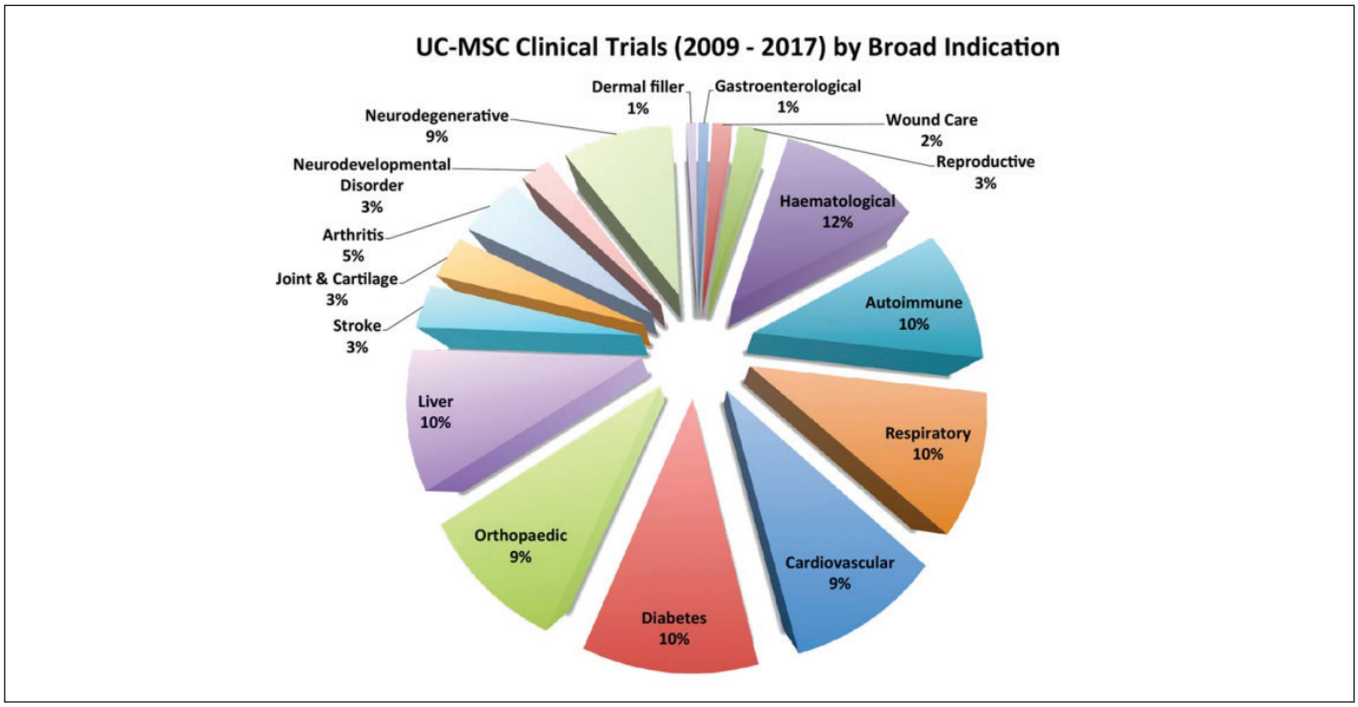

Figure 1: Representative applications of UCB-MSCs (Quoted from Reference #2).

We agree with the conclusions drawn from Bozkaya et al., and propose these questions to advance MSC research. Elucidating these aspects will facilitate protocol standardization and enhance therapeutic outcomes. Further investigation into dosage optimization, treatment timing, and mechanism validation remains imperative for clinical translation. Some challenges require resolution to standardize MSC therapeutics, such as administration optimization: Is intravenous infusion the optimal delivery route? Potential pulmonary sequestration may reduce therapeutic efficacy. Have recent studies explored alternative administration strategies? And the next question: what is the mechanism behind the therapeutic effect of MSCs? Cell replacement or paracrine-mediated microenvironment modulation? or something else? We look forward the reply. These questions awaiting to reply so as to better conduct relevant research and provide support for the application of MSCs. To solving these problems will benefit the further standardization of MSCs therapy and to improve MSCs therapy.

Despite the positive features of MSCs, there are many unanswered questions concerning IVH cases, such as the method of administration, dose and optimal timing, the mechanism of MSCs therapeutic effect, is cell replacement or something else? These all need to be studied in depth.

Declarations

Funding: This work was supported by the National Natural Science Foundation of China (81801240) and the High-level Scientific and Technological Innovation Talent Cultivation (ZZKY20222420).

Availability of data and materials: The datasets generated and/or analyzed during the current study are available from the corresponding author by reasonable request.

Disclosure: The authors declare no competing interests.

AUTHORSHIP CONTRIBUTION

Study conception and design: HD

Draft manuscript preparation: HD, YW, BH

Critical revision of the article: HD

Other (study supervision, fundings, materials, etc...): HD, YW

All authors (HD, YW, BH) reviewed the results and approved the final version of the manuscript.

REFERENCES

1. Ahn SY, Chang YS, Park WS: Mesenchymal stem cells transplantation for neuroprotection in preterm infants with severe intraventricular hemorrhage. Korean J Pediatr 57:251-256, 2014. https:// doi.org/ 10.3345/kjp.2014.57.6.251
2. Bozkaya D, Ceran B, Ozmen E, Okman E, Alyamac Dizdar E, Oguz SS, Ok Bozkaya I: A new hope in the treatment of intraventricular haemorrhage in preterm infants: Mesenchymal stem cells. Turk Neurosurg 32:344-346, 2022. https:// doi.org/ 10.5137/1019-5149.JTN.34850-21.2
3. Davies JE, Walker JT, Keating A: Concise review: Wharton's Jelly: The Rich, but enigmatic, source of mesenchymal stromal cells. Stem Cells Transl Med 6:1620-1630, 2017. https:// doi.org/ 10.1002/sctm.16-0492
4. 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 28:849-850, 2018. https:// doi.org/10.5137/1019-5149.JTN.21566-17.0

5. 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. J Craniofac Surg 28:1615-1619, 2017. https:// doi.org/ 10.1097/SCS.0000000000003563
6. 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 speciffcation of mesenchymal stem cells. Neuroscience 377:1-11, 2018. https:// doi.org/ 10.1016/j.neuroscience.2018.02.013
7. 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. https:// doi.org/ 10.3727/096368911X586756
8. 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 30:315-316. https:// doi.org/ 10.5137/1019-5149.JTN.27196-19.2
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. https:// doi.org/ 10.1155/2013/732742
10. Kim ES, Chang YS, Choi SJ, Kim JK, Yoo HS, Ahn SY, Sung DK, Kim SY, Park YR, Park WS: Intratracheal transplantation of human umbilical cord blood-derived mesenchymal stem cells dose-dependently attenuates hyperoxia-induced lung injury in neonatal rats. Cell Transplant 20:1843-1854, 2011. https:// doi.org/ 10.3727/096368911X565038
11. Li G, Yang Y, Dong HJ, Lin L: The research progress of mesenchymal stem cells in the treatment of Traumatic brain injury. Turk Neurosurg 28:696-702, 2018. https://doi.org/10.5137/1019-5149.JTN.20829-17.1
12. Uccelli A, Moretta L, Pistoia V: Mesenchymal stem cells in health and disease. Nat Rev Immunol 8:726-736, 2008. https://doi.org/10.1038/nri2395
13. Wang Y, Peng D, Yang X, Huang P, Ye H, Hui Y, Wang X, Sun W, Wu H, Zhang S, Wang L, Sha H, Shang C, Dong H, Hu Q: Study on umbilical cord-matrix stem cells transplantation for treatment of acute trauma brain injury in rats. Turk Neurosurg 29:750-758, 2019. https://doi.org/10.5137/1019-5149.JTN.25463-18.2