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Stem cell and neurological diseases-from basis to clinic, how to make it work?

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Cell transplantation, as a candidate strategy for the treatment of several diseases, has well been documented as transplanted cells possesses the capacity to self-renew, proliferate and differentiate toward target cells in host tissue under suitable milieu or niche. In nervous system, neurons shared more venerable insult character than non-neurons in peripheral tissue, therefore, to pursue an optimal strategy to replaced damaged neurons is always on the way. The previous evidences have addressed that stem cells could be as an candidator for the replacement of damaged neurons after injury, and the biological characters of several type of stem cells, like neural stem cell (NSC), bone mesenchymal stem cells (BMSC), hemopoietic stem cells (HSC), embryonic stem cells (ESC) and recent research hot spot rich as induce pluripotent stem cells (IPS), as well as other cells that could be as seed cells for stem cell survival like Schwann cells (SC) and olfactory ensheath cells (OEC), have been well identified. During past ten years, our laboratory mainly focused on the study involving in biology of stem cells and transplanted effects for several neurological diseases including spinal cord injury, traumatic brain injury, Alzheimer disease and brain ischemia, in addition to lung injury, etc. We answered next several issues: Among several Stem cells and seed cells, whether or not has the single or combined strategy that could be as the best optimal method to succeed the effect on neurological diseases like SCI in central nervous system. What is the fate for transplanted stem cells in host tissue? How to communicate or cross-talk between implanted cells and host cells? Whether or not there is vital molecule released from stem cells in order to regulate host cells fate. How about do the systemic networks work during neural remodeling or after transplantation? Whether or not neural remodeling shares crucial or co-signal pathway in different neurological diseases. Together, based on the trends of stem cell field and our findings in last ten years, we discussed several issues and progresses in stem cell transplantation for the treatment of neurological diseases. By this way, we introduced the trends of stem cell therapy in primate model like tree shrew and monkey. Furthermore, we explore the possibility of stem cell transplantation depending on evaluation of the biological safety. All the information may help to understand, that is, stem cells, how to make it work, from basis to clinic.

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