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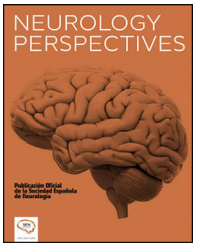

EDITORIAL

Biomaterial- and stem cell–based treatment strategies for diseases of the central nervous system

Estrategias terapéuticas basadas en biomateriales y células madre en patologías del sistema nervioso central

The research topic "Biomaterial- and stem cell– based treatment strategies for diseases of the central nervous system," including 7 articles, seeks to underscore the importance of translational research in the area of cell therapy and tissue engineering.

Today, the generation of novel treatment strategies for diseases of the central nervous system, such as vascular (stroke, hypoxia), oncological (gliomas), infectious, or neurodegenerative diseases (Parkinson's disease, amyotrophic lateral sclerosis, etc.), has created new areas of research involving close collaboration between the fields of basic and clinical research.

The path forward is promising, and bioengineering is evolving day by day, with the development of new materials biocompatible with nervous tissue, enabling the design of in vitro systems to study pathophysiological mechanisms in tumoural or infectious diseases of the nervous system. As well as serving as a platform for the development of personalised in vitro models of complex diseases, these models also help elucidate their structural formation and cell-biomaterial integration, as a basis for the future development of biomaterials preloaded with pluripotent stem cells or as vehicles for drugs and bioactive compounds. The development of these constructs aims to promote endogenous restoration of neural tissue lesions and to promote axonal connection.[1–4]

Alongside the development of tissue engineering, cell therapy has evolved over the last 3 decades, seeking new ways to restore or promote regeneration, cell plasticity, or the action of implanted cells as small trophic pumps in such lesions as stroke, hypoxia, spinal injury, and gliomas. One of the most successful strategies, as evidenced by the number of clinical and preclinical trials, is the use of mesenchymal stem cells, which have shown benefits and therapeutic potential in diseases involving inflammatory mechanisms, such as stroke and neonatal hypoxia.[5]

In the context of neurodegenerative disease, such as Parkinson's disease, several study groups have explored the potential of a range of cell types to increase the number of dopaminergic neurons and to promote their projections to the striatum, or as trophic pumps to increase baseline dopamine levels, as has already been demonstrated with the implantation of cells from the carotid body. Furthermore, several preclinical trials have used biomaterial bridges preloaded with glial or stem cells to promote or orient axonal projections from the substantia nigra to the striatum, with promising results.[6]

Finally, cell therapy with mesenchymal stem cells is a promising strategy in amyotrophic lateral sclerosis, and has been demonstrated to modulate inflammation and delay the onset of symptoms of the disease.[7]

We are confident that the path forward in this area of biomedical research may generate more projects and greater interest in the scientific community through synergy between different disciplines, benefiting the population in the short term.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.neurop.2021.11.003.

https://doi.org/10.1016/j.neurop.2021.11.003

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