Regenerative medicine during the pandemic period

The year 2020 will be marked with an asterisk to designate a time in our world’s history when almost all work stopped due to COVID-19. Despite the challenges to conduct research in the laboratory and the clinic, science has shown its creativity and perseverance. Science continues to prevail during this difficult time, with rotating access to the research facilities and remote collaborative efforts across the globe. This special issue is a testament to the many scientific achievements in regenerative medicine for neurological disorders that occurred in 2020.

While the focus of stem cell therapy has been on adult neurological disorders, neonatal brain injury remains a significant unmet need. Park et al. review the literature that supports extending the application of stem cells in neonatal hypoxic-ischemic injury in the paper “Cell-based treatment for perinatal hypoxic-ischemic encephalopathy.” Here, they show compelling evidence that a unique stem cell type affords a multi-pronged neurorepair properties that include both bystander effect and cell replacement.

In probing the many facets of regenerative capabilities of stem cells, Blaise and co-workers describe the key role of the cell’s powerhouse, mitochondria, in their article “Mitochondrial activity of human umbilical cord mesenchymal stem cells.” They show that different populations of human umbilical cord mesenchymal stem cells contain healthy mitochondria that appear resistant against stroke-like conditions, making them appealing donor cells for transplantation in stroke.

In an effort to further understand the stem cell regenerative features, Kingsbury and Stuppia present evidence that stem cells manifest a specialized secretory signature in their paper “Stem cell secretome in stroke.” Analyses of human amniotic fluid stem cells reveal that their secretome contain microRNAs that modulate signaling molecules to confer pro-survival and pro-apoptotic under pathological condition, such as stroke.

Relevant to the secretome, the paper “Extracellular vesicle-based therapy for amyotrophic lateral sclerosis” implicates the secretory function of stem cells. The paper by Sadanandan et al. demonstrate that human bone marrow-derived endothelial progenitor cells can release angiogenic factors important for repair of damaged endothelial cells in amyotrophic lateral sclerosis.

Along this line of identifying potent molecules that possess regenerative properties against neurodegeneration, in the paper “The unsolved mystery of hippocampal cholinergic neurostimulating peptide: A potent cholinergic regulator,” Cho and Matsukawa highlight the cholinergic activity produced by hippocampal cholinergic neurostimulating peptide that may reduce cognitive deficits in Alzheimer’s disease.

A similar campaign to identify novel small molecules for regenerative medicine is advanced by Gonzales-Portillo and collaborators in their paper “MHC-Class II-based therapy for stroke.” Here, they show evidence that MHC class II constructs serve as safe and effective stroke therapeutics by sequestering the damaging inflammation that ensues during the secondary cell death after stroke.

The paper by Farooq and Lee entitled “Vascular tortuosity in endovascular mechanical thrombectomy” discusses the application of a novel image analysis that may closely approximates the functional outcomes of neuroendovascular thrombectomy in acute ischemic stroke patients. Here, they propose that such image analysis could optimize the safe and effective use of neuroendovascular thrombectomy in ischemic stroke.

Wang and Yasuhara present in their paper “An examination of mobile spinal cord stimulators on treating Parkinson Disease” a modified spinal cord stimulator as portable yet effective device in providing stimulation. This small and mobile device allows continuous spinal cord stimulation for Parkinson’s disease.

These interesting papers capture the resilience of science in advancing the therapeutic potential of regenerative medicine in brain disorders. Recent cases of COVID-19 long haulers have identified an increase in neurological symptoms, such as stroke. These unusual cases of neurological consequences of COVID-19 necessitate the need that we forge ahead with rigorous science and aggressive but well-thought through clinical applications of regenerative medicine.
Conflicts of interest
Prof. Cesario V. Borlongan is Associate Editor of Brain Circulation.

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