MicroRNA-124-3p-enriched small extracellular vesicles as a promising therapeutic approach for Parkinson's disease.

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Abstract

Background: The Mesenchymal stem cells have regenerative activity due to the self-renewal property and its differentiation potential, the bone marrow is one of the main sources of mesenchymal stem cells used clinically, the aim of this study that to test the migration of mesenchymal stem cells in the damaged tissue of the kidney causing regeneration for it by secreting specific cytokines, inflammatory mediators and immune response.

Methods: Using 30 albino rats, rats were randomly assigned to five equal groups, (group 1) which is the control group receiving 1 ml normal saline, (group2) is a diseased group receiving 5 mg/kg intraperitoneal injection of cisplatin to induce (AKI), (group3) receiving 2mg/kg trosemide, (group4) receiving the isolated MCS through the rat tail vein and (group5) receiving both the MSC and trosemide, rats were sacrificed at different time intervals, Serum creatinine, BUN, and renal tissue oxidative stress parameters were measured. Renal tissue was scored histopathologically for evidence of injury, regeneration, and chronicity. Immunohistochemistry and ELISA were also done.

Results: MSCs of bone marrow of healthy rats were able to recover cisplatin induced acute kidney injury and tissue damage, rats that treated by isolated MSCs shows high proliferative activity and they are able to decrease the level of oxidative stress and improving all renal functions (serum creatinine, BUN), renal histopathology shows higher regenerative activity in renal cortex with the least necrotic lesions, also found that trosemide potentiate the activity of MSCs, and by using the ELISA low expression of interleukins and tumor necrosis factor alpha was found.

Conclusion: In conclusion, there are treatment options offered for AKI. This study suggest that mesenchymal stem cells are promising candidate that could be more beneficial for AKI patients, despite the controversy regarding its use, but MSCs alone showed very promising recovery signs, even when it was combined with the usual AKI treatments, it was capable of offering better recovery then the usual drugs and also reducing the side effects of those drugs.

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Biography:

In 2003, Liliana Bernardino obtained the BSc in Biology and, in 2008, received a Ph.D. in Molecular Biology at the University of Coimbra. During the doctoral studies, she explored the impact of inflammatory molecules (e.g., TNF-α, IL-1β) in neuronal survival. The experimental work was conducted at the Center for Neuroscience and Cell Biology (Coimbra), Mario Negri Institute for Pharmacological Research (Milan), and at the University of Southern Denmark, Odense (Denmark). During her postdoctoral studies, she disclosed several cellular and molecular processes that trigger the differentiation of neural stem cells into new neurons. She received a Calouste Gulbenkian Foundation Research prize (2008) and the L'Oréal Portugal Medals of Honor for Women in Science (2010). From 2010 to 2012, she was an Assistant Professor at the Catholic University of Portugal. Currently, she is an Assistant Professor at the University of Beira Interior. The main scientific interests of Dr. Bernardino's research group are to identify and develop novel brain repair therapies for Parkinson's disease (PD). Dr. Bernardino coordinated several projects aiming to investigate the role of several molecules (TNF-alpha, histamine, retinoic acid, microRNAs) in the context of PD. These studies focused on the ability of these molecules to induce neuroprotection while boosting neurogenesis, neuronal maturation, and function (Bernardino et al., 2012, Stem Cells; Ferreira et al., 2012, J Neuroinflammation; Rocha et al., 2016, Journal of Neuroinflammation; Saraiva et al., 2019, Scientific Reports). Dr. Bernardino's team was also involved in the characterization of drug delivery systems for the controlled release of these molecules, aiming to boost their therapeutic effects in the brain (Santos et al., 2012, ACS Nano; Esteves et al., 2015, Frontiers in Aging Neuroscience; Ferreira et al., 2016, Nanoscale; Saraiva et al., 2016, J Control Rel). As a result of these research projects, Dr. Bernardino was able to be the first and co-author of several publications in renowned journals from the field (e.g., Nature Communications, Stem Cells, Journal of Neuroscience, ACS Nano, PloS One, Journal of Controlled Release, Journal of Neuroinflammation, among others)..

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