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Non-Invasive imaging of targeted Glial progenitors in a stroke model

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Cell therapy offers a promising approach for the treatment of neurological disorders. Non-invasive imaging enables real-time assessment of cell engraftment, which is critical for the application of intra-carotid cell delivery as a novel route of cell transplantation.

We have shown that over-expression of the VLA-4 adhesion molecule on human glial progenitors results in significantly increased adhesion to activated endothelium. Short-term MRI assessment revealed broad homing of SPIO-labeled cells to LPS-activated endothelium in rats. However, follow-up MRI and histology revealed that injected cells clear from brain vasculature within a few days. In contrast to LPS-mediated inflammation, cell engraftment in a rat stroke model was immediate and confined to the lesion site. MRI revealed that the SPIO-induced hypointense signal, confirmed by histology, persisted within the lesion but no surviving cells were detected histologically.

MRI data suggest that disappearance of cells in the LPS model is related to inefficient extravasation into parenchyma and subsequent washout into circulation. However, the persistence of SPIO signal in stroke is encouraging and indicates extravasation and homing to stroke lesion. The lack of long-term survival of human cells is likely due to the process of immune rejection of the xenograft. In conclusion, non-invasive imaging provides a platform for real-time evaluation of intra-arterial delivery of cells genetically engineered to express adhesion molecules. This approach is relevant to a variety of neurological diseases where intra-arterial cell transplantation could offer a promising therapeutic approach.

Biography

Miroslaw Janowski has graduated from Medical University of Warsaw, Poland earning MD degree. He then entered into residency program in neurosurgery and since 2009 he is board certified neurosurgeon. Later he earned PhD degree SUMMA CUM LAUDE from Mossakowski Medical Research Centre, Warsaw. Currently he is appointed as a visiting scientist at the Department of Radiology and Institute of Cell Engineering at Johns Hopkins University. He has published 17 papers in peer-reviewed journals both in the field of neurosurgery and stem cell research and serves as an editorial board member of Stem Cell Studies and World Journal of Experimental Medicine.