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In aim to obtain enhanced crossing of blood brain barrier - adhesion properties of modified human bone marrow mesenchymal stromal cells

A.Andrzejewska[1], A.Nowakowski[1], M.Janowski[1,2], P.Walczak[1], T.Grygorowicz[1], A.Jablonska[1,2] and B. Lukomska[1]
[1]Mossakowski Medical Research Centre, Poland
[2]The Johns Hopkins University School of Medicine, USA

Application of mesenchymal stromal cells (MSCs) is a new and promising approach in neurological disorders. The success of clinical application of MSCs relies upon the efficient recruitment of these cells into appropriate tissues. Systemic infusion of MSCs is preferred as a minimally invasive method of transplantation however cell migration from the vasculature into injured brain is inefficient. *The aim of our study* is to improve MSCs homing by genetic cell engineering leading to VLA-4 overexpression. This is expected to cause extensive adhesion of MSCs to the endothelial cells assessed in this project using microfluidic devices.

Materials and Methods: hBM-MSCs (Lonza) were selected for the study. Overexpression of α_4 subunit of VLA-4 integrin in hBM-MSCs was obtained by mRNA-ITGA4 based transfection. The naïve (non-transfected)and modified (mRNA-ITGA4 transfected) hBM-MSCs were stained with iron nanoparticles coupled with rhodamine (Molday, BioPAL) and used in microfluidic assay with microchannels coated with rat brain endothelial cellline (RBE-4).

Results and Conclusions: During the *in vitro* observation naïve hMSCs interacted with rat brain endothelial cells. After the pressure-driven MSCs perfusion in microfluidic channels that can mimic blood flow in capillaries, the naïve cells were observed to roll, capture or arrest at the surface of endothelial cells layer. The efficiency of modified MSCs adhesion is in progress. The model of microfluidic assay is a useful tool which can be used to assess the adhesive properties of engineered MSCs before their intravenous or intra-arterial transplantation.

Biography

Anna Andrzejewska has completed her studies in Faculty of Biology at University of Warsaw at the age of 24. She obtained her master degree in biotechnology with specialization in molecular biology in 2012 and then started her PhD studies in Mossakowski Medical Research Centre Polish Academy of Sciences at NeuroRepair Department under supervision of Barbara Łukomska Professor of Immunology and Transplantology. She has already attended 5 conferences including 2 international conferences where she presented short communication of her results. She has published one paper and currently 2 more publications are in preparation.

aandrzejewska@imdik.pan.pl