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Molecular and cellular mechanisms of human mesenchymal stem cell homing

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Mesenchymal stem cells are released into the bloodstream in response to injury and participate in wound healing and tissue regeneration processes. In our studies we focused on the interaction of mesenchymal stem cells with endothelial cells as a primary gateway for homing of cells circulating in the bloodstream. It appeared that mesenchymal stem cells poorly recognize endothelial cells activated by inflammatory factors, primarily due to the lack of CXCR4 expression and, subsequently, inability to activate integrins in response to SDF1 expressed on the surface of activated endothelial cells. Instead, mesenchymal stem cells survey changes in mitochondrial transmembrane potential of endothelial cells and specifically adhere to distress/apoptotic endothelial cells. We have shown that, in part, the adhesion of mesenchymal stem cells to endothelium is regulated by von Willebrand factor secreted by endothelial cells and mediated by the activation of p38 MAPK kinase in endothelial cells. Development of apoptosis in distressed endothelial cells drastically potentiates mesenchymal stem cell adhesion in caspase(s) dependent manner. Overall the mechanism of mesenchymal stem cell adhesion to endothelial cells is distinct from that postulated for the adhesion of leukocytes.

Biography

Sergey V. Doronin is a Research Assistant Professor at the Department of Physiology and Biophysics at the State University of New York at Stony Brook. He has completed his PhD in 1991 from Novosibirsk Institute of Bioorganic Chemistry in the field of Biochemistry and Organic Chemistry of Biologically Active Compounds. He is an author of 36 publications on the mechanism action of enzymes, molecular mechanisms of signal transduction pathways and stem cell assisted tissue regeneration. His current research interests include the role of paracrine factors secreted by stem cells in the regulation of tissue microenvironment and mechanisms of stem cell homing to injured tissues

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