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Mesenchymal stromal cells in blood vessels and axons growth

Vsevolod A Tkachuk

Moscow State University, Russia

We investigated effects of adipose derived human mesenchymal stromal cells (MSC) on ischemic limbs of nude mice. Data obtained demonstrate formation of new arterioles and nerve growth with cells and proteins originating from mice. Using of the medium obtained after MSC growing had the same effect on ischemic limbs but stability of new formed arterioles and nerves was much less than after using MSC. It means that MSC stimulates angiogenesis and nerve formation via secretory mechanism, but direct interaction of MSC with ischemic tissue stabilizes regenerated tissue. Proteomic analysis demonstrated secretion by MSC number of angiogenic and neurotrophic factors, as well as matrix metalloproteases and matrix proteins, anti-inflammatory cytokines and chemokines. Using neutralized antibodies, we demonstrated involvement of some of these proteins in angiogenesis and axons growth. At the same time, exclusion of microvesicles and exosomes from this medium blocked both angiogenic and neurotrophic effects, and using of exosome fraction reconstruct action of medium on ischemic limb regeneration. Such phenomenon can be explained by action of microRNA included in exosomes, since some anti-microRNA block physiological action of exosomes. Treatment of MSC with PDGF or bFGF dramatically changes spectrum of proteins secreted by MSC and spectrum of microRNA included in exosomes as well as physiological effects exosome fraction on blood vessel growth and stability. In our report, we will also discuss the role of MSC in stroma formation of tissues, effect of MSC on some adult stem cells and T-lymphocytes.

Biography

Vsevolod A Tkachuk has completed his PhD from Moscow State University and DSc from Russian Cardiology Research Center, Moscow. He is a Professor of Biochemistry, Director of Institute of Regenerative Medicine and Chair of Biochemistry and Molecular Medicine in Moscow State University. He has published more than 250 papers in reputed journals and has been serving as an Editorial Board Member of repute.

tkachuk@fbm.msu.ru

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