

Smooth muscle cells in Atherosclerosis: Possible role of stem cells and osteoblasts

Yuri V. Bobryshev, Alexander N. Orekhov, Igor A. Sobenin and Vasilii P. Karagodin

Institute of Atherosclerosis Research, Russia

Vascular smooth muscle cells (SMCs) play a key role in blood vessel physiology and participate in the development of cardiovascular diseases including atherosclerosis. The origin of SMCs in developing atherosclerotic lesions is a controversial topic with accumulating evidence indicating that at least some arterial SMCs might originate from bone marrow-derived precursors circulating in the blood. Our findings support a possibility that Musashi-1 positive cells might intrude into the arterial wall from the blood stream and might even represent circulating SMC precursors. Other data indicate the existence of resident progenitor cell subpopulation(s) that is involved in the response of the arterial wall in cardiovascular diseases. Proteomics could be used for the characterization of cell populations and, utilizing this approach, we characterized some stem cells and showed that they are capable to acquire characteristics of mature SMCs. The local microenvironment affects the differentiation of stem cells and may be responsible for fibrosis of the intima as well as events of chondrogenesis and osteogenesis that could lead to arterial calcification. Atherosclerotic lesions contain osteoblast-like cells that share ultrastructural features with SMCs. Osteoblasts might originate either from stem cells that penetrate atherosclerotic plaques from the blood stream or from pluripotent mesenchymal cells that have remained in the arterial wall from embryonic stages of the development. Using proteomics we strived for more complete insight into the changes taking place by mimicking set environments, in particular that of stem cell niche. Future studies would analyse the simultaneous dynamics of SMCs, stem cells and osteoblasts in atherogenesis

Biography

Alexander N. Orekhov has completed his Ph.D. at the age of 28 years from Moscow State University, Russia and the second doctoral degree (D.Sc. in Biochemistry) at 49 years. Dr. Orekhov is Full Professor in Biochemistry. He is the director of Institute for Atherosclerosis Research (Skolkovo, Russia). He has published more than 250 papers in reviewed journals. His number of citations is 4565 and the h-index is 38

Y.Bobryshev@unsw.edu.au