

Different behavior of human adipose tissue-derived stem cells isolated by liposuction at higher and lower negative pressure

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Adipose-derived stem cells (ASCs) are promising for engineering of various tissues such as bone, cartilage, blood vessels, heart, skeletal muscle, neural tissue, skin, liver or pancreatic islet cells. ASCs have been already clinically applied for cell assisted lipotransfer for tissue augmentation for healing the wound after radiation therapy and for skin rejuvenation. Due to their immunosuppressive and immunomodulatory function, ASCs have been clinically tested and applied for treatment of inflammatory and autoimmune diseases. The adipose tissue can be obtained by a relative non-invasive method, i.e., liposuction. The quality and quantity of isolated ASCs can be influenced by parameters of liposuction such as the type of anesthesia, composition of the tumescent solution and particularly the amount of negative pressure. In this study, we focused on ASCs isolated from lipoaspirates taken from the same patient (a 43-year-old woman) under low negative pressure (-200 mmHg, LP) or high negative pressure (-700 mm Hg, HP). The number of isolated ASCs and their subsequent proliferation activity *in vitro* was higher in cells obtained under HP. These differences persisted in passaged cells (tested up to 3 passages) and also after cryopreservation of cells. However, when confluent ASCs were exposed to an osteogenic medium for 5 days, the osteogenic cell differentiation measured by intensity of fluorescence of collagen I, alkaline phosphatase and osteocalcin was more pronounced in cells obtained under LP. Thus, ASCs obtained under both pressures have specific advantages and their choice depends on their application, i.e., if their rapid growth or early osteogenic differentiation is required.

Biography

Lucie Bacakova has graduated from the Faculty of General Medicine, Charles University, Prague, Czechoslovakia in 1984. She has completed her PhD from the Czechoslovak Academy of Sciences and became Associate Professor at the 2nd Medical Faculty, Charles University. She is the Head of the Department of Biomaterials and Tissue Engineering, Institute of Physiology, Academy of Sciences of the Czech Republic. She is a Specialist for studies on cell-material interaction and vascular, bone and skin tissue engineering. She has published more than 150 papers in reputed journals (h-index 26).

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