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Transplantation of endothelial progenitor cells for therapeutic neovascularization

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Abstract

Endothelial progenitor cells (EPCs), which were first identified in adult peripheral blood mononuclear cells (MNCs), play an important role in postnatal neovascularization. Tissue ischemia augments mobilization of EPCs from bone marrow into the circulation and enhances incorporation of EPCs at sites of neovascularization. Two methods to obtain EPCs from bone marrow, peripheral blood or cord blood MNCs have been evaluated for therapeutic neovascularization: (1) fresh isolation using anti-CD34, anti-KDR or anti-AC133 antibody, and (2) ex vivo expansion of total MNCs. In an immunodeficient mouse model of hindlimb ischemia, systemic transplantation of human ex vivo expanded EPCs improves limb survival through the enhancement of blood flow in the ischemic tissue. A similar strategy also leads to histological and functional preservation of ischemic myocardium of nude rats. Recently, a preclinical study of catheter-based, intramyocardial transplantation of autologous EPCs in a swine model of chronic myocardial ischemia

demonstrated the therapeutic potential of cell-based therapy, with attenuation of myocardial ischemia and improvement in left ventricular function. These favorable outcomes strongly suggest a therapeutic impact of EPC transplantation in clinical settings. Further basic research, with improved understanding of the mechanisms governing homing and incorporation of EPCs, will be still necessary to optimize the methodology of the cell therapy.

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Keywords

Coronary artery disease; Endothelial progenitor cell; Ischemia; Therapeutic neovascularization; Transplantation; Peripheral artery disease

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