

**V.M.Shkuropat
I.V.Tverdokhle
I.V.Baranov
N.A.Safronkov**

¹ Dnipropetrovsk City
Clinical Hospital №4

² State institution
“Dnipropetrovsk
medical academy of
the Ministry of Health
of Ukraine”

Key words: ischemia
of the lower limb,
revascularization,
postoperative period,
immunohistochemistry,
VEGF, CD34.

*Received: 15.10.2014
Accepted: 28.11.2014*

UDC 616.36-089.87

IMMUNOHISTOCHEMICAL CHARACTERISTICS OF MUSCULAR TISSUE DURING SURGICAL TREATMENT OF PATIENTS WITH III DEGREE CHRONIC ISCHEMIA OF LOWER LIMB

ABSTRACT. Background. Of particular note is the analysis of immunohistochemical features of compensatory repair capabilities in terms of muscle ischemic injury developing in several ways: 1) direct induction of angiogenesis; 2) increased survival of muscle fibers; 3) mediated stimulation of muscle-typical differentiation; 4) resistance to apoptotic mechanisms. **Objective.** The purpose of research was the immunohistochemical analysis of anterior tibial muscle in patients with III degree chronic ischemia of lower limb after direct, indirect and composite revascularization in near-term and long-term postoperative periods. **Methods.** Patients have been divided into three groups: 1) 37 patients after femoral-tibial reconstruction; 2) 57 patients after indirect revascularization with autotransplantation of bone marrow; 3) 50 patients after composite revascularization of distal part of lower limb. The observation was carried out in the near-term postoperative period and in 2 years. Immunohistochemical study of tissue samplings of anterior tibial muscle taken between superior and middle one thirds was carried out. **Results.** It have been determined that direct revascularization causes the significant improvement immunohistochemical characteristics of muscle fibers of anterior tibial muscle in all age groups during 6 months after operation, however does not provide the stabilization of positive changes in long-term postoperative period. Indirect revascularization does not change significantly structurally-functional condition of components of muscle in near-term postoperative period, however causes the stable normalization of parameters of tissue components due to initiation of neovasculogenesis at patients till 75 years. **Conclusion.** Composite revascularization allows to receive near-term normalizing effect concerning the studied immunohistochemical criteria and to provide its stabilization in the long-term postoperative period.

© V.M.Shkuropat, I.V.Tverdokhle, I.V.Baranov,
N.A.Safronkov, 2015
✉ angios@i.ua

Citation:

Shkuropat VM, Tverdokhle IV, Baranov IV, Safronkov NA. [Immunohistochemical characteristics of muscular tissue during surgical treatment of patients with III degree chronic ischemia of lower limb]. *Morphologia*. 2015;9(1):71-7. Ukrainian.

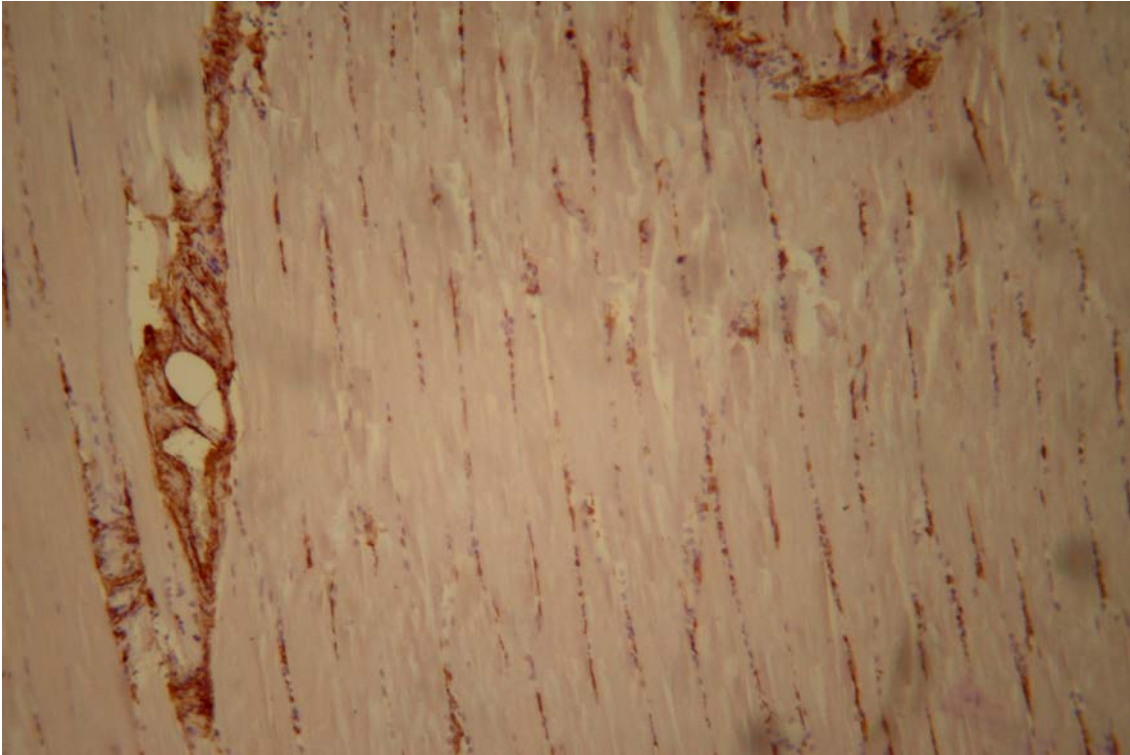


Fig. 1. Distribution of VEGF marker in the interior division of the anterior tibial muscle in the control group 78-years old patient. Intraoperative biopsy. Immunohistochemical reaction. Additional staining with hematoxylin. $\times 200$.

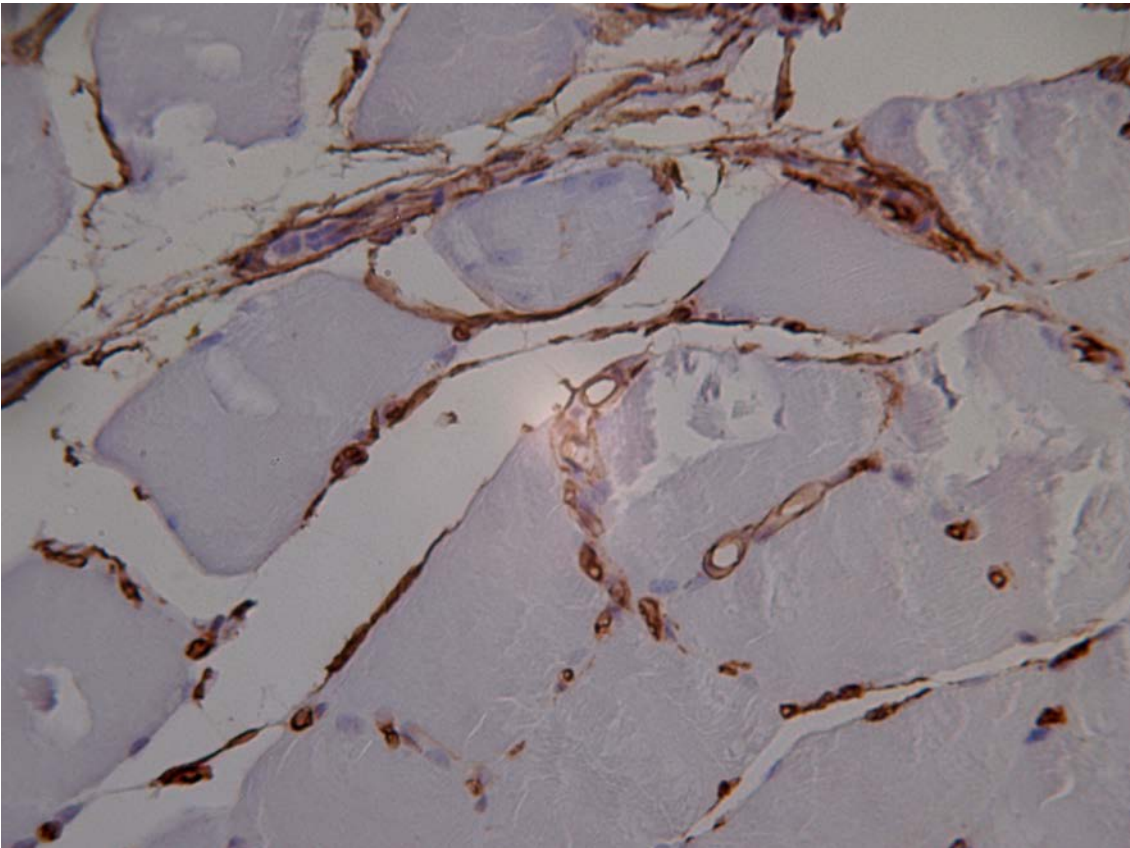


Fig. 2. Distribution of CD34 marker in the interior division of the anterior tibial muscle in 46-years old patient. Intraoperative biopsy. Immunohistochemical reaction. Additional staining with hematoxylin. $\times 600$.

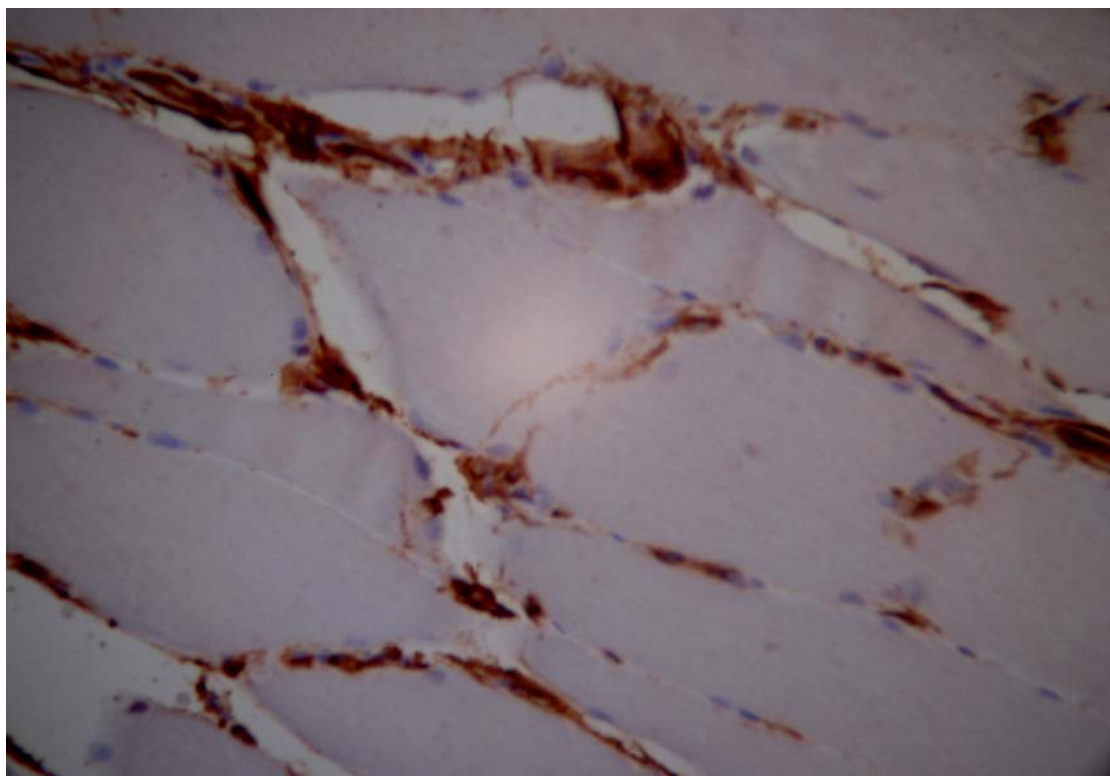


Fig. 3. Distribution of CD34 marker in the interior division of the anterior tibial muscle in 32-years old patient, 1 month after direct revascularization. Immunohistochemical reaction. Additional staining with hematoxylin. $\times 600$.

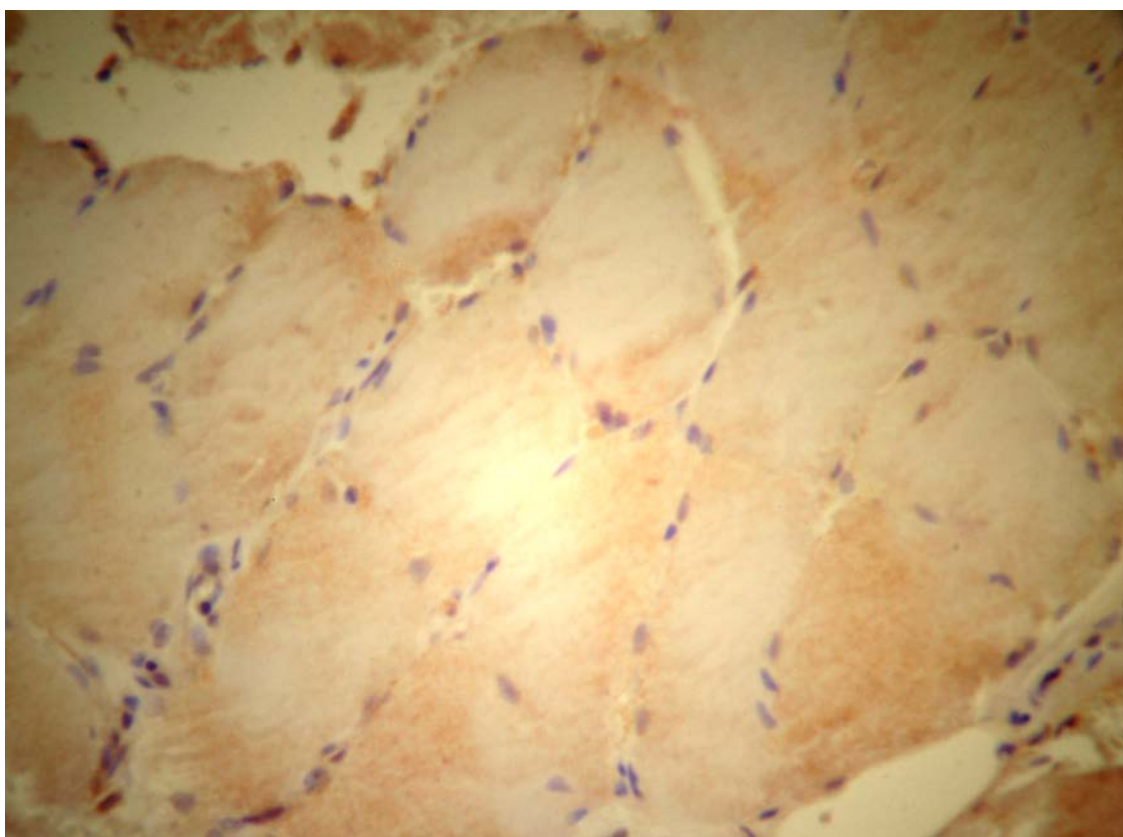


Fig. 4. Distribution of VEGF marker in the interior division of the anterior tibial muscle in 46-years old patient, 1 month after indirect revascularization. Immunohistochemical reaction. Additional staining with hematoxylin. $\times 600$.

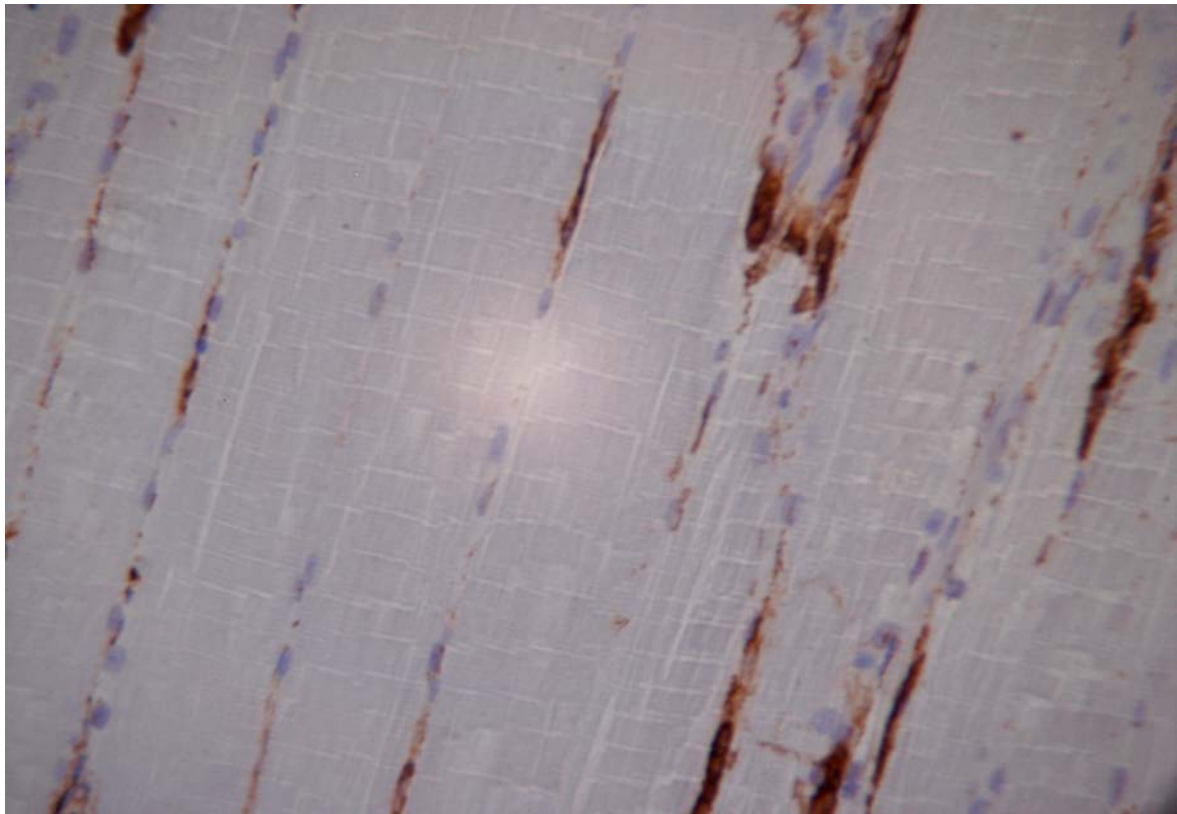


Fig. 5. Distribution of CD34 marker in the interior division of the anterior tibial muscle in 46-years old patient, 1 month after indirect revascularization. Immunohistochemical reaction. Additional staining with hematoxylin. $\times 200$.

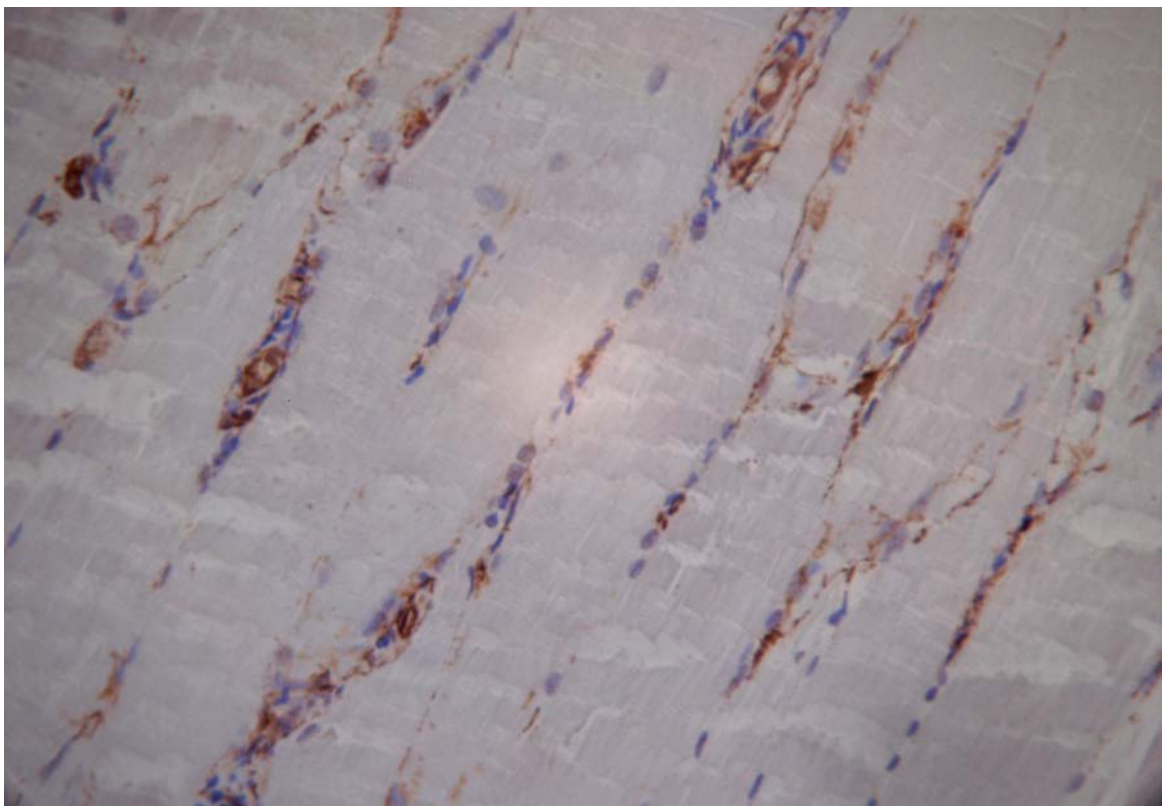


Fig. 6. Distribution of CD34 marker in the interior division of the anterior tibial muscle in 31-years old patient, 3 months after composite revascularization. Immunohistochemical reaction. Additional staining with hematoxylin. $\times 200$.

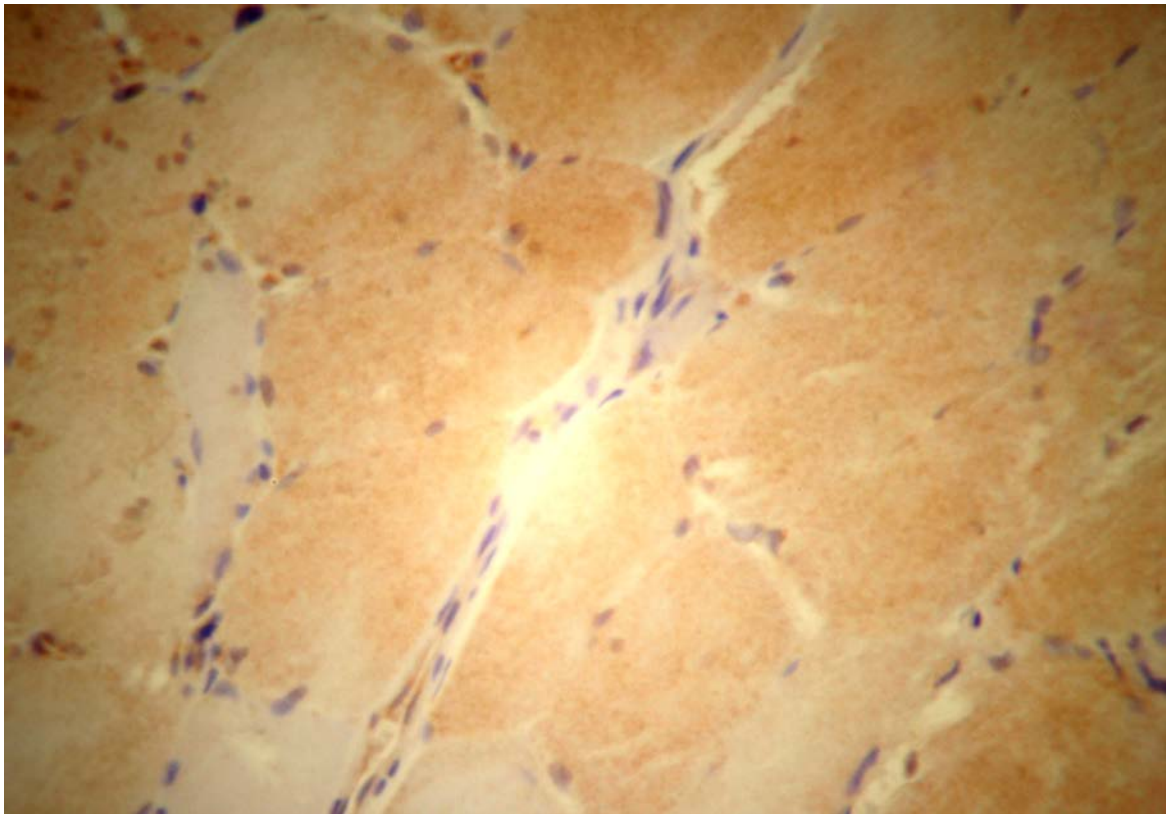


Fig. 7. Distribution of VEGF marker in the interior division of the anterior tibial muscle in 63-years old patient, 6 months after composite revascularization. Immunohistochemical reaction. Additional staining with hematoxylin. x600.

References

1. Takeshita S, Weir L, Chen D. Therapeutic angiogenesis following arterial gene transfer of vascular endothelial growth factor in a rabbit model of hindlimb ischemia. *Biochem Biophys Res Comm.* 1996;227(2):628-35.
2. Matsubara H. Therapeutic angiogenesis for patients with critical limb ischemia using autologous bone marrow cell transplantation. *Nippon Naika Gakkai Zasshi.* 2003;10:877-83.
3. I. Baumgartner A, Pieczek P, Manor O. Constitutive expression of phVEGF165 after intramuscular gene transfer promotes collateral vessel development in patients with critical limb ischemia. *Circulation.* 1998;97:1114-23.
4. Shen BQ, Lee DY, Gerber HP. Homologous up-regulation of KDR/Flk-1 receptor expression by vascular endothelial growth factor in vitro. *J Biol Chem.* 1998;273:29979-85.
5. Li W, Keller G. VEGF nuclear accumulation correlates with phenotypical changes in endothelial cells. *Cell Sci.* 2000; 113:1525-34.

6. Arbiser JL, Larsson H, Claesson-Welsh L. Overexpression of VEGF 121 in immortalized endothelial cells causes conversion to slowly growing angiosarcoma and high level expression of the VEGF receptors VEGFR-1 and VEGFR-2 in vivo. *Am J Pathol.* 2000;156:1469-76.

7. Jiang BH, Aoki M, Zheng JZ. Myogenic signaling of phosphatidylinositol 3-kinase requires the serine-threonine kinase Akt/protein kinase B. *Proc Natl Acad Sci USA.* 1999;96:2077-81.

8. Jiang BH, Zheng JZ, Aoki M, Vogt PK. Phosphatidylinositol 3-kinase signaling mediates angiogenesis and expression of vascular endothelial growth factor in endothelial cells. *Proc Natl Acad Sci USA.* 2000;97:1749-53.

9. Rissanen TT, Vajanto I, Hiltunen MO. Expression of vascular endothelial growth factor and vascular endothelial growth factor receptor-2 (kdr/flk-1) in ischemic skeletal muscle and its regeneration. *Am J Pathol.* 2002;160(4):1393-403.