

The induction of angiogenesis by the implantation of autologous bone marrow cells: A novel and simple therapeutic method

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Background. Bone marrow contains many kinds of primitive cells that could differentiate to endothelial cells and secrete several growth factors. In the current study, we attempted to induce therapeutic angiogenesis by implanting autologous bone marrow cells (BMCs) and using a rat ischemic hind limb model. **Methods.** BMCs were prepared by removing red blood cells. A rat ischemic hind limb model was made by the ligation of the left femoral artery and its branches. BMCs were injected into 7 points of the ischemic muscles. To assess angiogenesis, a microangiogram, laser Doppler, and histologic evaluation were performed after the surgical procedure.

Results. A microangiogram and histologic evaluation showed that angiogenesis was significantly induced in the ischemic hind limb by the implantation of BMCs. Laser Doppler imaging analysis showed that blood flow was significantly increased after implantation of BMCs. Some implanted BMCs were stained positively with CD31 and vascular endothelial-cadherin (VE-cadherin), which might have been incorporated into the vasculature. The condition of ischemia caused an elevation in the level of basic fibroblast growth factor in the ischemic muscle and also in interleukin-1 β derived from the implanted BMCs, which might contribute to angiogenesis.

Conclusion. These findings indicate that autologous bone marrow implantation may be a novel and simple method for inducing therapeutic angiogenesis. (Surgery 2001;130:44-54.)

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