New method to grow and transplant muscle stem cells holds promise for treatment of MD

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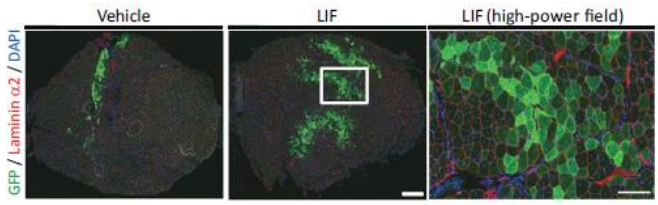

Representative immunohistochemistry of GFP-positive fibers in transplanted muscles at two weeks after transplantation. Newly grown muscle fibers formed by transplanted cells appear in green. The amount of fibers in the LIF-treated muscles is much greater than in the untreated (vehicle) muscles. Low-power field images were shown in left and center. Scale bar: 300 ?m. High-power field image was shown in right. Scale bar: 100 ?m. Credit: ©IOS Press, 2016

Satellite cells are stem cells found in skeletal muscles. While transplantation of such muscle stem cells can be a potent therapy for degenerative muscle diseases such as Duchenne muscular dystrophy, these cells tend to lose their transplantation efficiency when cultured in vitro. In a study in the current issue of the *Journal of Neuromuscular Diseases*, researchers treated these stem cells with leukemia inhibitory factor (LIF), which effectively maintained the undifferentiated state of the satellite cells and enhanced their transplantation efficiency.

To have enough cells for transplantation, they must be grown in vitro and prevented from differentiating before transplantation. Several growth factors, cytokines, and chemicals have been used in muscle stem cell cultures, but the optimal culture conditions required to maintain the undifferentiated state, inhibit differentiation, and enhance eventual transplantation efficiency have not yet been established.

LIF is thought to be involved in muscle regeneration. The investigators found that when LIF-treated muscle stem cells were transplanted to skeletal muscle, they formed two to three times more muscle fibers as control cells did.

"To the best of our knowledge, this study provides the first report of the effect of LIF on the transplantation efficiency of primary satellite cells," explained Shin'ichi Takeda, MD, PhD, of the Department of Molecular Therapy, National Institute of Neuroscience, National Center of Neurology and Psychiatry, Kodaira, Japan. "This research enables us to get one step closer to the optimal culture conditions for muscle stem cells."

Dr. Takeda added, "However, precise mechanisms of LIF for the enhancement of transplantation efficiency remain unknown. Investigations aimed at determining the downstream targets of LIF would help to clarify the functional importance of LIF in muscle regeneration, and further its potential application in cell transplantation therapy."

More information: N. Ito et al, Enhancement of Satellite Cell Transplantation Efficiency by Leukemia Inhibitory Factor, *Journal of Neuromuscular Diseases* (2016). DOI: 10.3233/JND-160156

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