

Implantation of autologous adipose tissue-derived mesenchymal stem cells in foot fat pad in rats

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Abstract

Introduction: The foot fat pad (FFP) bears body weight and may become a source of foot pain during aging. This study investigated the regenerative effects of autologous adipose tissue derived mesenchymal stem cells (AT-MSCs) in the FFP of rats.

Methods: Fat tissue was harvested from a total of 30 male Sprague-Dowley rats for isolation of AT-MSCs. The cells were cultured and induced adipogenic differentiation for one week and labeled with fluorescent dye before injection. AT-MSCs (5×10^4 in 50 μ l saline) were injected into the second infra digital pad in right hind foot of the rat of origin. Saline only (50 μ l) was injected into the corresponding fat pad in the left hind paw of each rat. Rats (n=10) were euthanized at 1, 2 and 3 weeks and the second infra digital fat pads were dissected for histology.

Results: The fluorescence-labeled AT-MSCs were present in the foot fads throughout the 3-week experimental period. On histology, the area of fat pad units (FPU) in the fat pads that received AT-MSC injections was greater than that in the control fat pads. Although the thickness of septae was not changed by AT-MSC injections, the density of elastic fibers in the septae was increased in the fat pads that implanted AT-MSCs.

Conclusion: The implanted AT-MSCs largely survived in the weight bearing FFP. There was no evidence that AT-MSCs formed new FPUs, but they stimulated the growth of individual FPUs and formation of elastic fibers in FFP. These data are promising for developing stem cell therapies for aging-associated degeneration in FFP.

Biography

Zijun Zhang obtained his PhD/MD degree from Military Postgraduate Medical School, Beijing, China and completed his Post-doctoral training at University of Melbourne, University of Auckland and the NIH. He is the Director of Ortho-biologic Laboratory, MedStar Union Memorial Hospital. He has published more than 50 papers in peer-reviewed journals.