

Allogeneic adipose -derived mesenchymal stem cell transplantation enhanced the expression of angiogenic factors on mouse acute hindlimb ischemia model

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Abstract

The cell migration and/or molecular mechanism in healing of damaged vascular or muscle tissue are emerging field with strong research interest worldwide. This study focuses on evaluating the role of allogenic adipose-derived mesenchymal stem cells (ADMSCs) in restoring damaged tissue through the migration of cells and the expression of genes related to myocyte regeneration and angiogenesis on hindlimb ischemic mouse model. ADMSCs were labeled with GFP (ADMSC-GFP). The proximal end of the femoral blood vessel of mice (over 6 months old) were ligated at 2 position then cut between the two ties. Hindlimb ischemic mice were randomly divided to 2 groups. Group 1 (n=36) was injected PBS (100 µl), group 2 (n=36) was transplanted ADMSC-GFP (10⁶ cell/100 µl PBS) near the cutting position. The migration of ADMSC-GFP in hindlimb was analyzed by UVVis system. The expression of genes related to angiogenesis and muscle tissue repairing was quantified by real time RT-PCR. Muscle tissue structure was histological analyzed by H&E staining. The result showed that ADMSC existed in grafted hindlimb during 7 days. Grafted cells migrated to other damaged areas such as thighs and heels. Ischemic hindlimb were stimulated to increasing expression of several angiogenic genes including Flt-1, Flk-1 Ang-2 in both group. Especially, the expression of Ang-2 and myogenic-related gene MyoD were significantly increased in ADMSC-treated group compared to non-treated group; and increased at 28th day compared to 3rd day. The other factors such as HGF, CD31, Myf5, TGF-β also expressed much more in ADMSC treated group than the another one. Muscle histological structure in ADMSC group were similar the normal mouse after 28 day. Thus, grafted-ADMSC was able to migrate to other area in injured hindlimb, existed for about 7 days and have significant positive effects on stimulating the expression of myogenic and angiogenesis- related genes.

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mesenchymal stem cell, adipose tissue, hindlimb ischemia, angiogenesis, muscle cell regeneration

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References