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Publication date:
2012

Document Version
Early version, also known as pre-print

EFFECT OF UNIAXIAL CYCLIC STRAIN ON MYOGENESIS OF ADIPOSE-DERIVED STEM CELLS

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Abstract:
Adipose-derived stem cells (ASCs) hold potential for engineering of muscle tissue due to their ability to differentiate into the skeletal myogenic lineage. Current approaches to induce *in vitro* skeletal muscle differentiation require long culturing time and result in a poor yield. Previously, we have established the role of uniaxial cyclic tensile strain (CTS) in driving the assembly and differentiation of skeletal myocytes *in vitro* using mouse model system. The aim of the current work was to explore the effect of CTS on the skeletal myogenic differentiation of ASCs.
ASCs were cultured on flexible-bottomed culture plates (Flexcell). After confluence, the cells were incubated in reduced serum conditions and subjected to uniaxial CTS for 48 h. Differentiation profiles were assessed by morphological and biomolecular indicators.
The CTS protocol produced an array of cells aligned perpendicularly to the axis of strain. In addition, mechanical stimulation induced a significant increase in the number of multinucleated cells. Immunofluorescence staining revealed the presence of a large percentage of myosin heavy chain positive myotubes. Furthermore, the myofibrillogenesis was confirmed by the presence of actin/myosin cross striations.
These results indicate that mechanical stimulation increases the rate of myogenic differentiation of ASCs *in vitro*. This opens the perspective of using mechanically preconditioned ASCs for tissue engineering applications involving muscle tissue.
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