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Citation for published version (APA):

Document status and date:
Published: 01/01/2005

Document Version:
Publisher’s PDF, also known as Version of Record (includes final page, issue and volume numbers)

Please check the document version of this publication:
• A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher’s website.
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Using adult stem cells for *in vitro* muscle tissue construction

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**Introduction**

Recently, the use of adult stem cells in regenerative medicine has become the focus of a lot of research efforts. In a number of cases this population of cells has been successfully applied in patients suffering from cardiac infarction to regain at least partial function of the affected myocardium.

In a research project that was started this year in close cooperation with the University of Utrecht and the University of Amsterdam we plan to use a population of adult stem cells to make high quality muscle construct, mimicking native muscle tissue.

**Aim of the project**

In this project we aim to make a high quality 3D muscle construct that both in structure as in function is a close approximation of native muscle. To this end, we will use cells that are derived from matured muscle tissue and that possess stem cell like capacities. Those cells are called Muscle Derived Stem Cells or MDSC’s. Culturing, expanding and differentiating of the MDSC’s will be done in conditions that exclude the use of potentially pathogenic agents as much as possible. This implies that ultimately, no animal derived sera will be used, that differentiation will be provoked by mechanical and physical stimuli rather then by biochemical means and that monitoring of proliferation and differentiation must be done in a non-invasive way using non toxic or biodegradable agents.

**Methods**

Cells are obtained from a patch of muscle tissue of a pig, and purified using a preplate technique described by Lee *et al.* Cells of each preplate have specific properties and the cells obtained in PP 6 are described to be MDSC’s.

**Results**

The first results obtained show that the PP6 cells do react distinctly different to different growth media. The cells used in this study were analyzed using FACS to ensure they were CD56+, indicative for muscle progenitor cells. Expanding this population in normal growth medium resulted in a rather dense population of cells with a heterogeneous morphology (fig. 2A). Contrary to this, when the cells were cultured in a medium that is specifically developed for expanding bone marrow derived progenitor cells the population was much more homogenous (fig. 2B) and high cell morbidity in the first days of culture suggested a selection towards a single cell type.

**Conclusions**

In theory, MDSC’s can be a cell population of great interest in the engineering of tissue constructs. There is however a lot of work to be done in purifying and culturing these cells before they can be used in successful and reproducible tissue engineering experiments.

**References:**