TU/e EINDHOVEN UNIVERSITY OF TECHNOLOGY

Stimulation and characterisation of muscle progenitor cell differentiation

Citation for published version (APA):
Boonen, K. J. M., Hesselink, R. P., Bouten, C. V. C., & Post, M. J. (2006). *Stimulation and characterisation of muscle progenitor cell differentiation*. Poster session presented at Mate Poster Award 2006 : 11th Annual Poster Contest.

Document status and date:
Published: 01/01/2006

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.
• The final author version and the galley proof are versions of the publication after peer review.
• The final published version features the final layout of the paper including the volume, issue and page numbers.

Link to publication

General rights
Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

• Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
• You may not further distribute the material or use it for any profit-making activity or commercial gain
• You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

www.tue.nl/taverne

Take down policy
If you believe that this document breaches copyright please contact us at:

openaccess@tue.nl

providing details and we will investigate your claim.

Download date: 17. Nov. 2023

Stimulation and Characterisation of Muscle Progenitor Cell Differentiation

K.J.M. Boonen, R.P. Hesselink, C.V.C. Bouten, M.J. Post
Eindhoven University of Technology, Department of Biomedical Engineering

Introduction

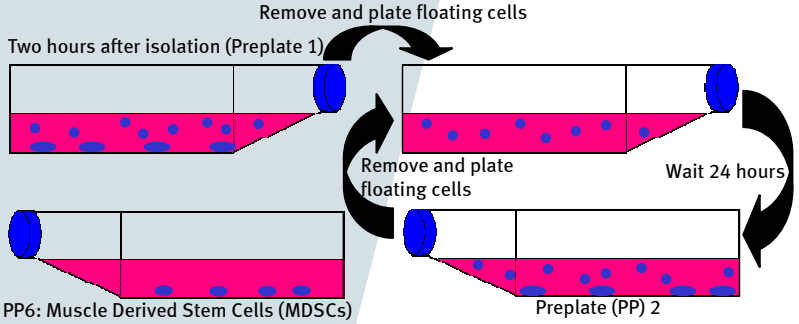
Muscle is the largest metabolic organ and the main storage site of proteins in the body. Moreover, animal muscle tissue is the main source of dietary protein intake in a large part of the world. Both properties make muscle an organ of interest for tissue engineers. We aim to produce high quality muscle tissue from muscle progenitor cells in a cost efficient, reproducible way.

Currently, our main concern is isolating a cell population from adult muscle that has a high proliferation capacity while preserving the ability to differentiate into muscle.

Methods for cell isolation

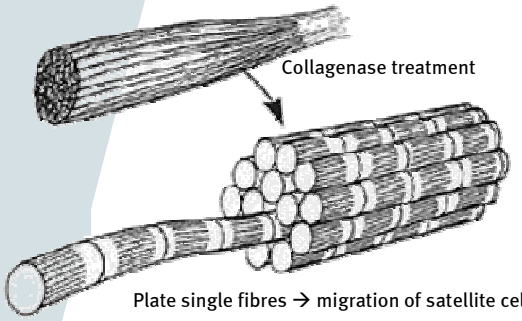
Preplating technique[1]

Pig muscle tissue is minced, treated with 0.2% collagenase type I, 4 ug/ml prot. K and 0.1% trypsin consecutively, and cultured in gelatin-coated flasks in a series of preplates.



Single fibre isolation[2]

Mouse Extensor Digitorum longus (EDL) is treated with 0.2% collagenase type I, triturated and cultured in 1mg/ml matrigel-coated wells.



Results

Muscle derived stem cells

The cells isolated with the preplating technique (figure 1) have a high proliferation capacity, showing no sign of slowing down after twelve passages. However, the population of cells present in preplate six is still a very heterogeneous population and has not yet been successfully differentiated to myotubes under low serum conditions.

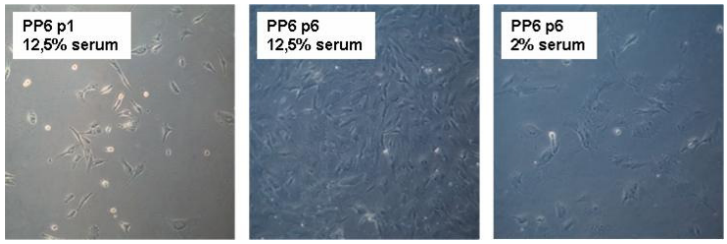


Figure 1 *Preplating technique*

Satellite cells

When single muscle fibres are isolated and cultured, satellite cell migrate out of the fibres and start proliferating (figure 2). The proliferation capacity of these cells has been shown to be quite poor *in vitro* compared to the *in vivo* situation[3], but they do spontaneously differentiate and fuse into myotubes.

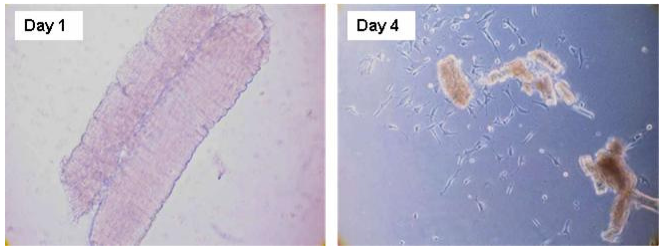


Figure 2 *Single fibres in culture*

Conclusion

MDSCs have a high proliferation capacity, but do not easily differentiate to myotubes. In contrast, isolated satellite cells spontaneously differentiate to myotubes, but have a low proliferation capacity. However, *in vivo,* the number of population doublings does not seem to be limited[3].

Future plans

We will focus on satellite cells isolated from single fibres, because their differentiation potential is much better compared to the MDSCs. We want to improve the proliferation capacity of these cells by mimicking their *in vivo* milieu making use of different coatings and additives to the culture medium.

References:

[1] *Qu, Z., L. Balkir, et al. (1998). "Development of approaches to improve cell survival in myoblast transfer therapy." Journal of Cell Biology 142(5): 1257-1267.*

[2] *Shefer G, Yablonka-Reuveni Z. 2005. Isolation and culture of skeletal muscle myofibers as a means to analyze satellite cells. Methods Mol Biol 290: 281-304.*

[3] *Collins, C. A., I. Olsen, et al. (2005). "Stem Cell Function, Self-Renewal, and Behavioral Heterogeneity of Cells from the Adult Muscle Satellite Cell Niche." Cell 122(2): 289-301.*