Impact of patient age or gender on bioengineering of functional muscle tissue using Muscle Precursor Cells

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Introduction

Muscle bioengineering using Muscle Progenitor Cells (MPCs) is proposed as a treatment option for various conditions, including stress urinary incontinence (SUI). Urinary Incontinence is a common condition in the elderly defined as an involuntary loss of urine leading to social or hygienic problems¹. It affects around half of the female population over 45 years² and 17% of men after 70 years². Current literature has demonstrated limitations regarding cell growth and muscle formation³. The goal of this research was to assess the effect of gender and age on the ability of human MPCs to form functional bioengineered muscle.

Materials and Methods

Upon ethical approval human MPCs were harvested from the rectus abdominalis of 15 males and 15 female patients undergoing abdominal surgery of various ages [23-82y]. Growth curve standards were drawn and muscle phenotype was analyzed by FACS analyses, fiber formation assay and immunohistochemistry. MPCs were injected with a collagen carrier in subcutaneous space of nude mice. After retrieval, histology and organ bath of bioengineered muscle were performed.

Results

Samples isolated from female patients tended to grow faster than male (p=0.0672) and produce better contraction upon electrical stimulation (p=0.01937), while the male samples had, upon induction, an increased differentiation ratio (fig.2). While MPCs of all ages were able to form muscle, there was a step decline in contractile response to electrical stimulation in samples from patients above 75 years. However, we were able to confirm the myogenic phenotype (IHC and FACS), a great expansion potential and fiber formation in all ages and both gender.

Discussion and Conclusions

Our results suggest that human MPCs can be successfully isolated and grown from patients of all ages and gender. Despite the differences presented all samples formed muscle tissue in vivo. However, we found a significant limitation for the engineering of contractile muscle tissue if the donor was older then 75 years.

References


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Disclosures

Authors have nothing to disclose.