Cell Growth and Matrix Gene Expression of Human Myofibroblasts of Different Patients and During Cell Expansion – Implications for Cardiovascular Tissue Engineering

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Introduction

Human saphenous vein myofibroblasts have proven their suitability as matrix producing cells in heart valve and small-diameter vessel tissue engineering (TE) [1,2]. Tissue outcome differs between studies, which might be due to differences between patients. Insight into these differences is important to obtain reproducible tissues for all patients. Further, it is of importance that the cells do not lose their matrix production capabilities during cell expansion. The objective of this study is twofold: (1) study differences in growth and matrix gene expression levels between patients and (2) changes during cell expansion.

Materials and Methods

Saphenous vein myofibroblasts were isolated from 3 patients and cultured up to passage 10. For each patient and at each passage, cell growth was quantified and expression of collagen matrix genes (collagen I, III and LOX) and elastic matrix genes (elastin, fibrillin-1 and -2), and the gene for the phenotypical marker α-SMA was quantified. To compare between patients, the expression per patient was averaged over all passages and one-way ANOVA was performed. To analyze changes during cell expansion, the expression per passage was normalized to the average expression for each patient and regression analyses were performed.

Results

Cell growth was similar for all patients (Fig. 1a), while the expression levels of all collagen matrix components and the elastic matrix components elastin (Fig. 1b) and fibrillin-1 differed. Interestingly, one patient always demonstrated a higher expression level of all these genes. Further studies are initiated to study these differences on protein level in TE experiments.

Discussion and Conclusions

While cell growth was similar, the expression of most of the matrix genes varied between patients, indicating that TE protocols may have to be adapted for each patient. Cell expansion reduces cell growth and induces dedifferentiation. The stable level of most of the matrix genes indicates that cell expansion most likely will not hamper tissue outcome.

Fig. 1. Cell growth (a) and elastin expression levels (b) of the three patients.

Fig. 2. Cell growth (a) and collagen III expression levels (b) during cell expansion.

References

1. Mol A et al. (2006) Circ, 114 (sI), I152.

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Disclosures

The authors have nothing to disclose.