Chondrogenic Differentiation of Immunoselected CD105+ subpopulation of Adipose-derived Stem Cells
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Introduction
Adipose-derived stem cells (ASC) are an attractive cell source for cartilage repair as they are easily available and abundant. Under standard culture conditions driven by TGF-β, ASC exhibit reduced chondrogenic potential in comparison to bone marrow-derived stem cells (BMSC). As CD105 forms a part in TGF-β receptor complex, the aim of our study was to characterize the immunoselected subpopulation of CD105+ cells for chondrogenic capacity in vitro.

Materials and Methods
Human ASC (passage 2) were expanded in DMEM/F-12 containing 10% human serum and 1 ng/ml bFGF (PeproTech). At 90% confluence cells were trypsinized, stained with anti-human CD105-FITC (EuroClone) and subjected to FACS analysis and cell sorting (BD FASC Aria). Pellet cultures of non-sorted and CD105+ subpopulation cells were prepared and cultured in chondrogenic medium containing 10 ng/ml TGF-β3 (PeproTech). Samples were collected after 3 weeks and gene expression for Runx2, Collagen type II (Col 2) and Aggrecan (Agr) was analyzed by quantitative RT-PCR method.

Results
The percentage of CD105+ cells in the ASC samples (n = 2) was about 60% before cell sorting. To investigate the hypothesis that the CD105+ subpopulation is more susceptible for TGF-β induced chondrogenesis, mRNA expression for chondrogenic markers Runx2, Col 2 and Agr was compared for CD105+ and non-sorted cells. Expression of Runx2 was about 1.2-fold, of Col 2 1.5-fold, and of Agr 2-fold higher in CD105+ cells (Fig. 2). This data corroborate the assumption that the CD105+ subpopulation has superior chondrogenic potential than whole ASC sample. To confirm our results, additional GAG analysis should be performed.

Discussion and Conclusions
ASC exhibit lower expression of CD105 in comparison to BMSC (1). To overcome this unfavorable characteristic for efficient chondrogenic differentiation, application of growth factors other than TGF-β (2) or more potent subpopulations of cells have to be investigated.

Based on our results obtained so far, CD105+ subpopulation of ASC seems to have better predisposition to undergo chondrogenesis. However, additional experiments on larger number of samples are currently being performed.

References

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Disclosures
Authors have nothing to disclose.