

Ability of BMP-6 and FGF-2 to induce Chondrogenic Differentiation in Adipose-Derived Stem Cells

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INTRODUCTION: Micromass cultures of human adipose-derived stem cells (ASC) show the ability to express chondrocyte specific genes and to form cartilage-like matrix [1-2]. Enhancing effects can be gained by addition of different growth factors to the medium.

METHODS: Liposuction material was digested with collagenase and ASC were expanded up to passage 4. For differentiation cells were pelleted and cultured in chondrogenic differentiation medium (Cambrex) for 4 weeks. Fibroblast growth factor-2 (FGF-2), bone morphogenetic protein-6 (BMP-6) or a combination of these two were added to the medium at a concentration of 10 ng/mL. Cartilage specific matrix formation was investigated by measuring the sulfated glycosaminoglycan (S-GAG) content using the 1,9-dimethyl-methylene blue (DMMB) assay. Gene expression was examined by quantitative RT-PCR and the pellet size was evaluated.

RESULTS: FGF-2 and a combination of FGF-2 and BMP-6 show inducing effects on the synthesis of S-GAG in 3D micromass cultures. Chondrospecific gene expression could be confirmed by quantitative RT-PCR. FGF-2 and BMP-6 in combination yielded a larger pellet diameter compared to single treated cultures.

DISCUSSION & CONCLUSIONS: Fat tissue represents a promising source for mesenchymal stem cells. Treatment with BMP-6 and FGF-2 enhances chondrogenic differentiation compared to control cultures. Differentiation could be demonstrated by the detection of S-GAG and quantitative RT-PCR.

REFERENCES: ¹ Huang, J. I., et al. *Chondrogenic potential of multipotential cells from human adipose tissue.* *Plast.Reconstr.Surg.* 113.2 (2004): 585-94.
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