

FETAL SPINE CELLS FOR INTERVERTEBRAL DISC REGENERATION: PRELIMINARY CHARACTERIZATION

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INTRODUCTION

Degeneration of the intervertebral disc (IVDD) is thought to be one main causes of low back pain. IVDD begins early in the nucleous pulposus (NP) with decreased cellular content and a loss of proteoglycan and water. Our hypothesis is that matrix synthesis could be stimulated by proteoglycan producing cells. Fetal disc cells could be a promising cell source for regeneration of the degenerated disc. The aim of this study was to study the feasibility of using fetal disc cells for disc tissue engineering.

METHODS

Fetal spinal column tissues (1cm) were obtained from fetuses after voluntary interruption of pregnancy at 14-16 weeks of gestation (n=3). The spinal tissue was cleared of adherent tissue dissected and put into culture in tissue culture dishes. Alcian blue staining was performed on tissue section. Cell proliferation in monolayer was measured with the CellTiter colorimetric method and compared to adult NP cells (individual aged 30 to 40 years). mRNA expression was measured with real time PCR.

RESULTS

Histology of fetal spine showed vascularized cartilaginous vertebrae. Disc annulus consisted of concentric lamellae, containing proteoglycans (blue stain) and more or less collagen (pink stain) according to the age, with numerous isolated cells. The NP, representing 1/5 of the total disc surface, had a less organised matrix, which stained only for proteoglycans and was populated by cells in clusters. Isolated cells proliferated two times faster than adult NP cells. They expressed mRNA for proteins identified in NP cells, aggrecan, SOX9, Hypoxia-Inducible Factor-1 and Glucose Transporter.

DISCUSSION

Fetal spine cells proliferate fast and express critical protein mRNA for survival in a disc environment. These cells seem to be a good source for disc tissue engineering