Meniscus maturation in the swine model: role of endostatin in cellular differentiation

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The development of an engineered meniscus derives from the need to regenerate a tissue which is largely unable to self-repair with consequent loss of functionality. Hence a deeper knowledge of the native meniscus morphology and biomechanics in its different regions, including molecules involved in regulation of the maturation process, is essential. The meniscus is a complex tissue, displaying great regional variation in extracellular matrix components and in vascularization, as a result of several biomechanical stimuli. Its biochemical composition is modulated to adapt the tissue to the different functions that are required throughout growth, until a “mature” phase is reached in adulthood. The aim of this work is to evaluate the biological role of Endostatin in the regulation of angiogenesis as in the fibro-chondrogenic differentiation of neonatal meniscal cells in the pig. The swine is an attractive model for meniscal repair studies, as its knee joint is closely comparable to the human one in terms of anatomical structure, vascularization, and healing potential. Our preliminary data show that Endostatin contributes to the acquisition of chondrocyte phenotype in an undifferentiated but committed cellular population. Thus, a better understanding of the role of Endostatin in cell metabolism might lead to a deeper knowledge of the events regulating meniscus maturation. These findings may be crucial for the development of an engineered scaffold able to induce meniscal cell differentiation by releasing Endostatin-rich microspheres.