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Effect of a collagen-based medical device on morpho-functional properties of cultured human tenocytes

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Tenocytes are specialized fibroblasts playing a key role in the maintenance of tendon extracellular matrix (ECM) homeostasis and, therefore, determining the tendon ability to resist mechanical forces and repair in response to injury [1, 2]. A medical device containing collagen type I (MD-Tissue, Guna) has been released on the market with the ambition to counteract the physiological and pathological degeneration of tendon connective tissue.

In this study we aimed at characterizing the effect this medical device on cultured human tenocytes, especially focusing on the collagen turnover pathways, in order to understand how the medical device could influence tendon biology.

For this purpose, gluteal tendon fragments were obtained from 8 healthy patients (mean age 64,8 ± 7,2 years) undergoing total hip replacement through an anterior approach, and tenocytes were obtained by outgrow from tendon fragment. Cell proliferation and migration were investigated by growth curves and wound healing assay, respectively. The expression of genes and proteins involved in collagen turnover were analysed by real time PCR, Slot blot and SDS-zymography.

Our data show that tenocytes cultured on MD-Tissue have increased proliferation rate and migration potential. MD-Tissue induced collagen type I (COL-I) synthesis, the main protein of tendon ECM, but matrix metalloproteinases (MMP) 1 and 2 involved in collagen degradation were not affected, suggesting that tenocytes cultured on MD-Tissue have an anabolic phenotype.

Considered as a whole, our results suggest that MD-Tissue could favour tendon repair by inducing tenocyte proliferation and migration, and stimulating COL-I synthesis and deposition.

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Tendon, collagen turnover, matrix metalloproteinases.