**IL-1** and **iNOS** gene expression and NO synthesis in the superior region of meniscal explants are dependent on the magnitude of compressive strains

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Abstract

**Objective**

Partial meniscectomy is known to cause osteoarthritis (OA) of the underlying cartilage as well as alter the load on the remaining meniscus. Removal of 30–60% of the medial meniscus increases compressive strains from a maximum of approximately 10% to almost 20%. The goal of this study is to determine if meniscal cells produce catabolic molecules in response to the altered loading that results from a partial meniscectomy.

**Method**

Relative changes in gene expression of *interleukin-1 (IL-1)*, *inducible nitric oxide synthase* (*iNOS*) and subsequent changes in the concentration of nitric oxide (NO) released by meniscal tissue in response to compression were measured. Porcine meniscal explants were dynamically compressed for 2 h at 1 Hz to simulate physiological stimulation at either 10% strain or 0.05 MPa stress. Additional explants were pathologically stimulated to either 0% strain, 20% strain or, 0.1 MPa stress.
Results

*iNOS* and *IL-1* gene expression and NO release into the surrounding media were increased at 20% compressive strain compared to other conditions. Pathological unloading (0% compressive strain) of meniscal explants did not significantly change expression of *IL-1* or *iNOS* genes, but did result in an increased amount of NO released compared to physiological strain of 10%.

Conclusion

These data suggest that meniscectomies which reduce the surface area of the meniscus by 30–60% will increase the catabolic activity of the meniscus which may contribute to the progression of OA.

**Key words:** Fibrochondrocyte; Osteoarthritis; Mechanotransduction; Unconfined compression