

学位論文内容の要旨

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学位論文題名

**A study of the chondroprotective effects of high molecular weight cross-linked
hyaluronic acid in a rabbit knee osteoarthritis model**
(家兔関節症モデルにおける高分子ヒアルロン酸の軟骨保護作用に関する研究)

Objectives:

Recent reports show the efficacy of high-molecular-weight (MW) hyaluronic acid (HA) in treating osteoarthritis. However, its mechanism remains unclear. In this study, I examined the histopathological changes and friction coefficients in osteoarthritic knee joints after injecting high-MW cross-linked (CL) HA.

Design:

A bilateral anterior cruciate ligament transection model in Japanese white rabbits was used (n = 20). From week 5 after transection, low-MW HA (0.8×10^6 Da; HA80) or high-MW CL HA (6×10^6 Da; HA600) was injected weekly into the right knee for three weeks; normal saline (NS) was injected into the left knee (n = 10 in each group). A bilateral sham operation was undertaken to exclude spontaneous osteoarthritis (n = 3). Results were evaluated with macroscopy (India ink), histopathology (Kikuchi's score), biomechanical testing, and rheological assessment of the joint fluid viscoelasticity. Statistical analysis was performed using one-way analysis of variance with a 95% confidence interval ($P < 0.05$).

Results:

The macroscopic findings showed severely damaged cartilage in 30% of the NS group and

20% of the HA80 and HA600 groups and intact cartilage in 100% of the sham group. The histological scores and friction coefficients of the HA600 group were significantly lower than those of the NS group ($P=0.007$ and $P=0.002$, respectively). Viscoelasticity measurements of the joint fluid showed no significant differences between the three groups.

Conclusion:

High-MW CL HA exerts potential chondroprotective effects and produces superior friction coefficients. Our results suggest that HA600 delays the progression of osteoarthritis effectively and improves joint lubrication significantly.