

stained by Fast Green and Safranin-O, and assessed by OARSI recommendation for histological scoring of OA in mice.

Results: IAI-HA groups showed similar gait patterns to that of sham group, while saline injected group showed gait disturbance at 12 and 16 weeks after the DMM surgery. In saline group, stand phase and single stance phase were statistically shorter, and swing phase was statistically longer than IAI-HA groups. There were no statistical differences in gait parameters between 800-HA group and 6000-HA group.

Histological changes were similar among 800-HA, 6000-HA and saline group, demonstrating OA progression throughout all three evaluating time points. IAI groups showed higher histological score, suggesting more cartilage degradation than sham group, but there seemed to be no differences between each IAI group.

Conclusions: Histological evaluation showed that OA has progressed at the time point of 8 weeks after the DMM surgery even in IAI-HA groups, but gait disturbance was started to be detected 12 weeks after the surgery only in saline groups. This result suggests that symptomatic changes develop after histological changes and it also support the effect of pain relief by IAI-HA. CatWalk could be of use to objectively quantify gait disturbance in DMM model and could be a useful tool for assessing the effect of other interventions against rodent OA models.

110 THE INTRA-ARTICULAR INJECTION OF A NEW CHITOSAN BIOMATERIAL PREVENTS THE PROGRESSION OF OSTEOARTHRITIS IN ACLT RABBIT MODEL

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Purpose: To evaluate the effects of a single intra-articular injection of a new biomaterial consisting in a mix of alginate-chitosan (AC) beads and a viscous thermogelling chitosan-based (H) hydrogel on cartilage lesion in osteoarthritis (OA) rabbit model. These effects were compared to those obtained with the intra-articular injection of either chitosan-based (H) hydrogel without the AC bead or saline solution.

Methods: OA was surgically induced by the transection of the anterior cruciate ligament (ACLT) in Hyla albino rabbits. One week after surgery, animals were randomly divided into 3 groups: group I (n=7): mix of AC beads and H hydrogel; group II (n=7): H hydrogel alone; group III (n=7): saline solution (control). The treatments (900 µl) were injected intra-articularly. X-rays from the right knee were performed before surgery, at the time of injection and at sacrifice. The standard radiographs were acquired in extension and scored by the Kellgren and Lawrence (K&L) scale. After 6 weeks, animals were euthanized and the right joint was dissected. The macroscopic evaluation of cartilage from femoral condyles and tibial plateaus stained with India ink was done. Histological sections stained with Safranin-O/fast green from bearing areas of each compartment were evaluated according to the OARSI histological score. Briefly, the evaluation considered: staining of the cartilage matrix (0-6), cartilage structure (0-11), chondrocyte density (0-4) and cluster formation (0-3), where 0 represented a normal situation and 24 points the maximum severity score. Blood samples were collected the day of injection and prior the sacrifice. Prostaglandin E₂ (PGE₂) and C-reactive protein (CRP) were measured in serum using immunoassays.

Results: The X-rays analysis showed a significant decrease ($p < 0.05$) of the K&L score in group I (AC beads and H hydrogel; 1.5 ± 0.2) compared with group II (H hydrogel; 2.2 ± 0.5) and group III (saline solution; 3.0 ± 0.4). The size and the severity of the macroscopic OA cartilage lesion tended to decrease in group I compared to the other groups. The histological global score that refers to all compartments of the knee joint was significantly decreased in group I (11.0 ± 0.7) compared to group II (14.4 ± 0.6 , $p < 0.01$) and group III (14.8 ± 0.6 , $p < 0.001$). No significant variation of PGE₂ and CRP serum levels were observed in each after 6 weeks follow-up whatever the treatment injected.

Conclusions: This study showed that a biphasic hydrogel composed by AC beads and H hydrogel prevented OA in rabbit with ACL transection. This effect was not observed with the hydrogel alone, suggesting that AC beads play a role in joint protection. The preventive effect was observed in all joint compartments indicating a global protective effect of this new viscosupplementation.

111 OSTEOARTHRITIS IN NATURE: OSTEOARTHRITIS PHENOTYPES ARE SEXUALLY DIMORPHIC IN MOOSE (*ALCES ALCES*)

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Purpose: The natural history of osteoarthritis (OA) in moose and other species involves patterns and processes that may inform OA research in humans. The isolated and genetically uniform moose population in Isle Royale National Park (MI, USA), where predation by wolves (*Canis lupus*) is intense, exhibits a high prevalence of OA that fluctuates over time in synchrony with changing levels of early nutrition. We sought a population-wide assessment of OA prevalence in moose, and in particular a description of OA phenotype specific to sex and age, in order to better understand the significance of OA in the population dynamics of a wild mammal.

Methods: Complete dry skeletons from 541 moose were examined during 1996–2011 for pathology associated with OA. The moose all died in 1996 of winter starvation, during a natural catastrophe in which mortality was relatively non-selective. Gender of each moose was determined from skull morphology, age (years) from counts of cementum annuli in teeth, and OA pathology was scored by the senior author as slight, moderate, or severe based on the size of osteophytes and degree of erosion and modification of the joint surface.

Results: OA was identified in 107 moose, exclusively in the hip, sacrum and non-sacral vertebrae. Prevalence of OA was age-related, limited to moose older than nine years of age and increasing with age. While the sample-wide frequency of OA in males (27%) and females (22%) did not differ significantly ($P=0.31$), the frequency of location-specific OA differed between males and females. In particular, hip OA affected 16% of males but only 4% of females ($P < 0.01$). However, OA prevalence in sacrum and vertebrae was similar in males and females ($P > 0.10$).

Conclusions: OA is an obvious debilitating condition in prey animals subjected to predation pressure from hunting wolves. The distinctive OA phenotype of male moose, with a higher prevalence of hip OA, contributes to a reduced survival rate in the wild. Higher prevalence of hip OA in male moose may stem in part from a physiological syndrome characterized by faster body growth, higher rate of tooth wear, and higher frequency of osteoporosis and periodontal disease, ultimately leading to shorter average lifespan in males, the only sex in which antlers are grown annually. Environmental and genetic factors may both contribute to OA prevalence in moose, yet sexual dimorphism in OA phenotypes are observed as in the human species. A truly comprehensive understanding of OA should be sought which is applicable across species.



112 DEGENERATIVE CHANGES IN KNEE JOINTS AS DETERMINED BY OARSI RAT SCORING SYSTEM AND OSTEOARTHRITIS-RELATED JOINT PAIN IN SURGICALLY AND CHEMICALLY INDUCED RAT MODELS OF OSTEOARTHRITIS

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