SCANDINAVIAN JOURNAL OF
MEDICINE & SCIENCE
IN SPORTS

Physical activity ameliorates cartilage degeneration in a rat model of aging: A study on lubricin expression

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Date：2019-08-21

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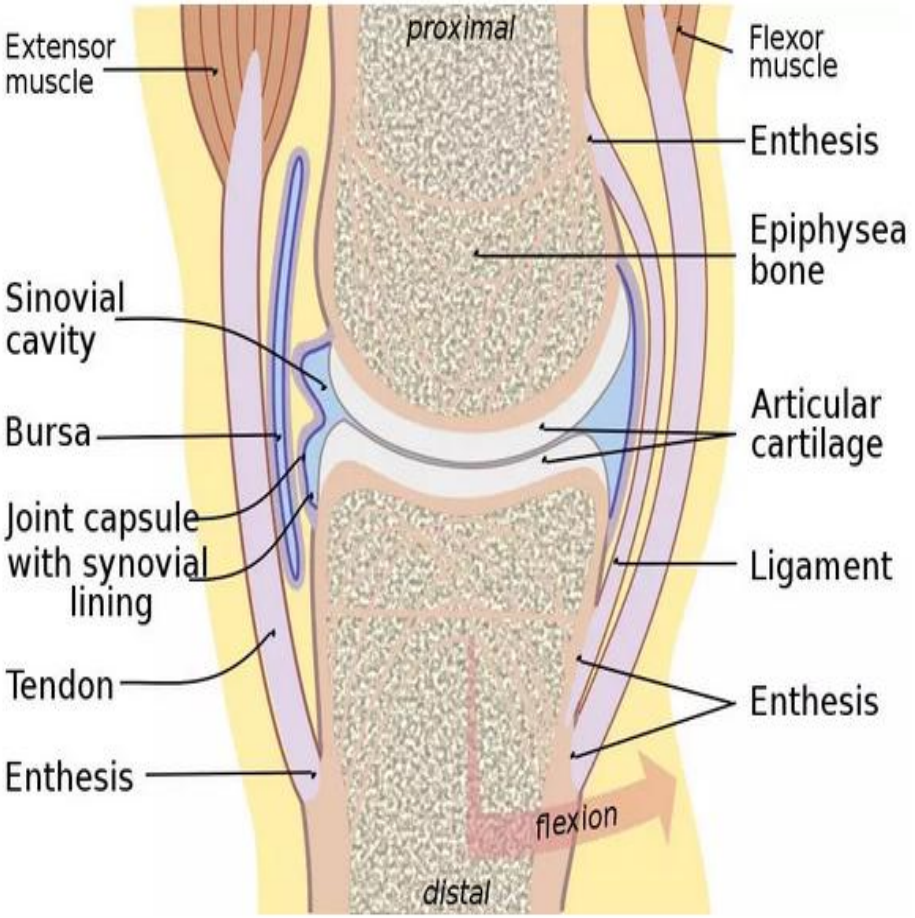
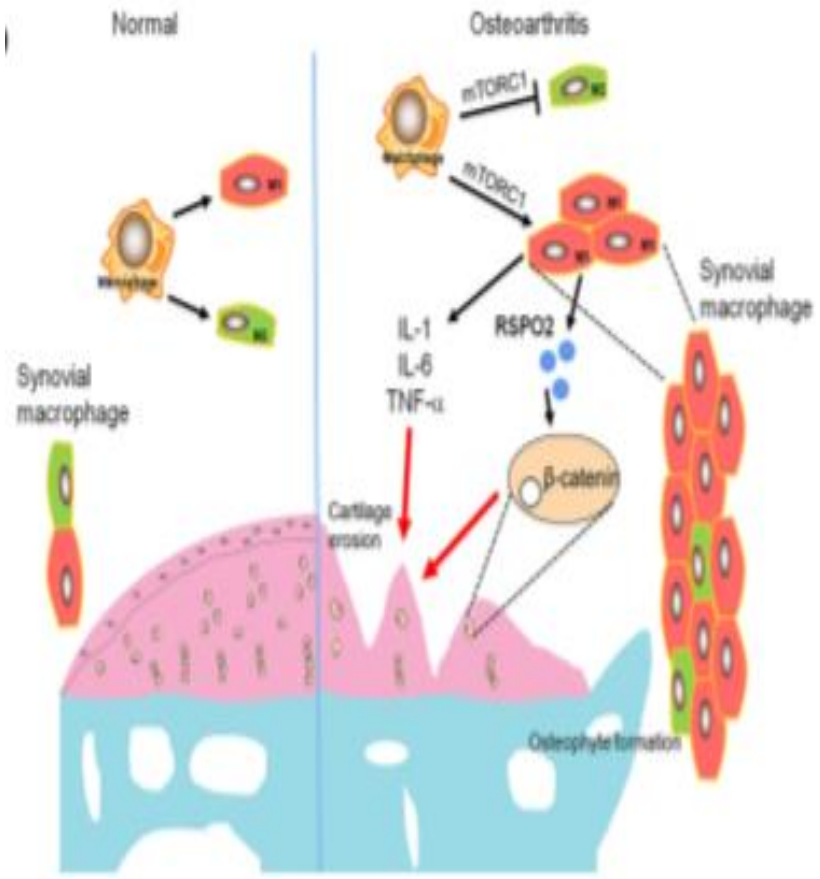
Introduction

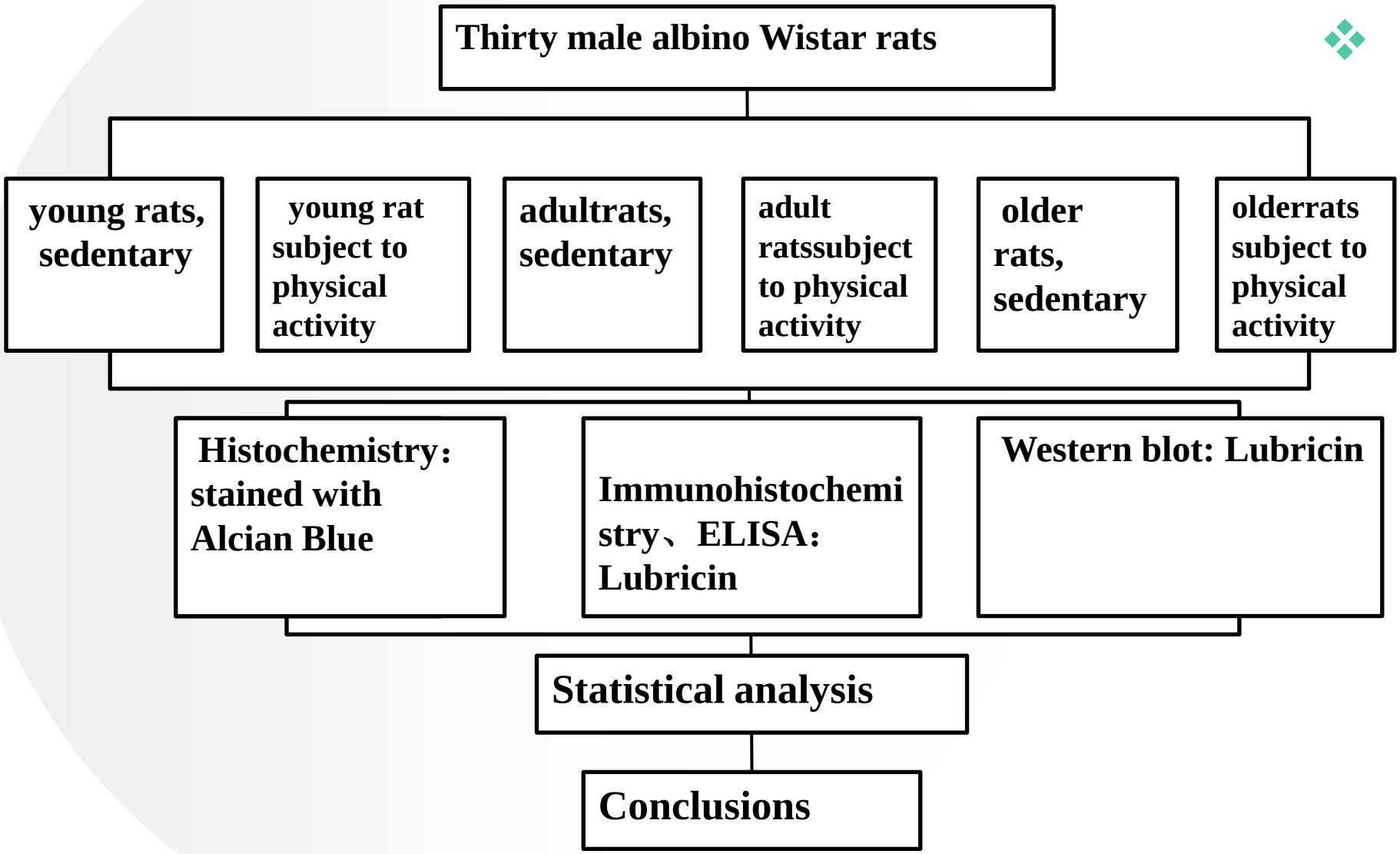




LUBRICIN

- **Lubricin is a boundary lubricant, present in synovial fluid and on the superficial layer of articular cartilage,producing low friction and protecting surfaces fromwear . This protein is expressed less with aging and during OA.**

Materials and Methods

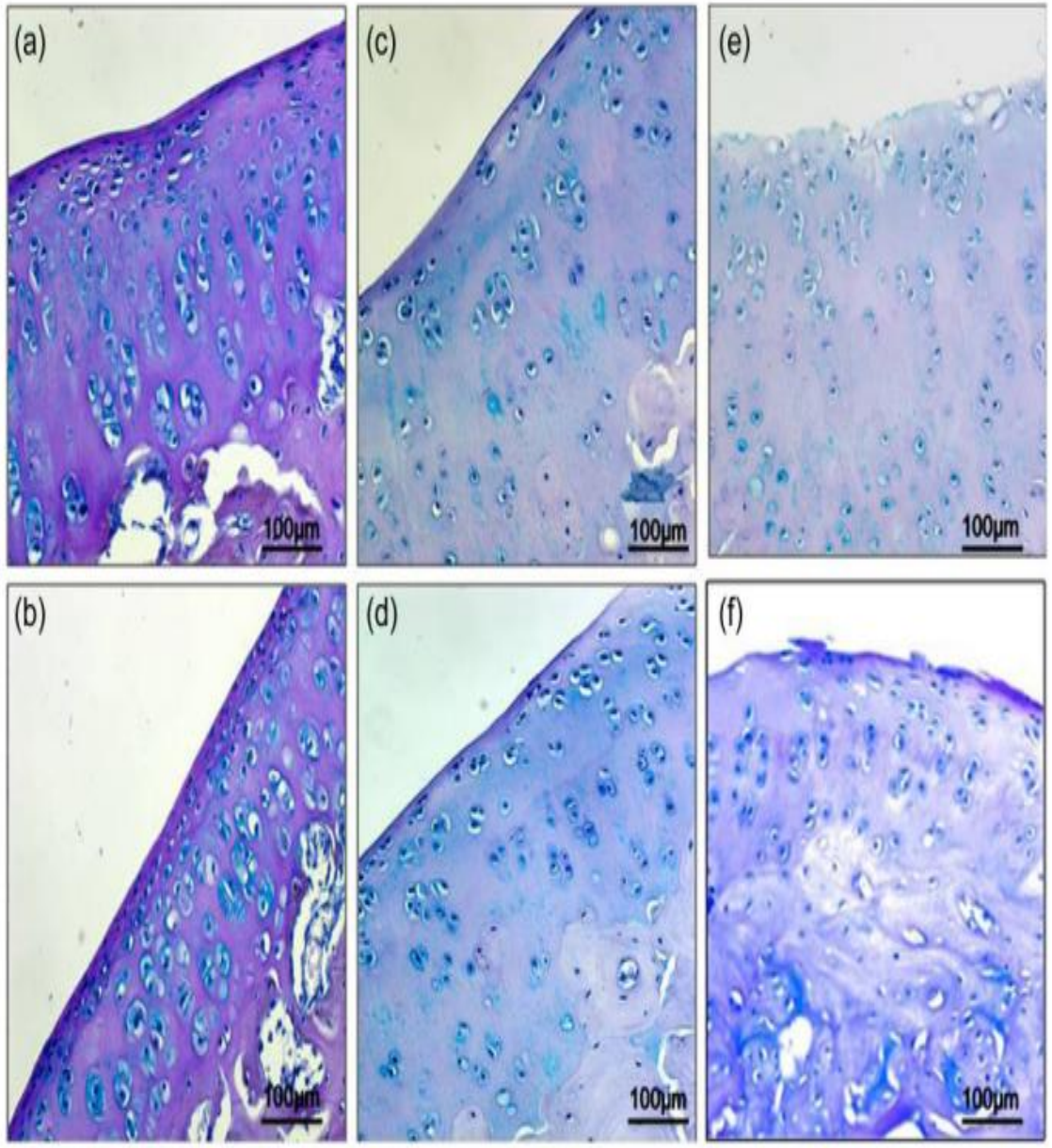


Results：(Alcian Blue)

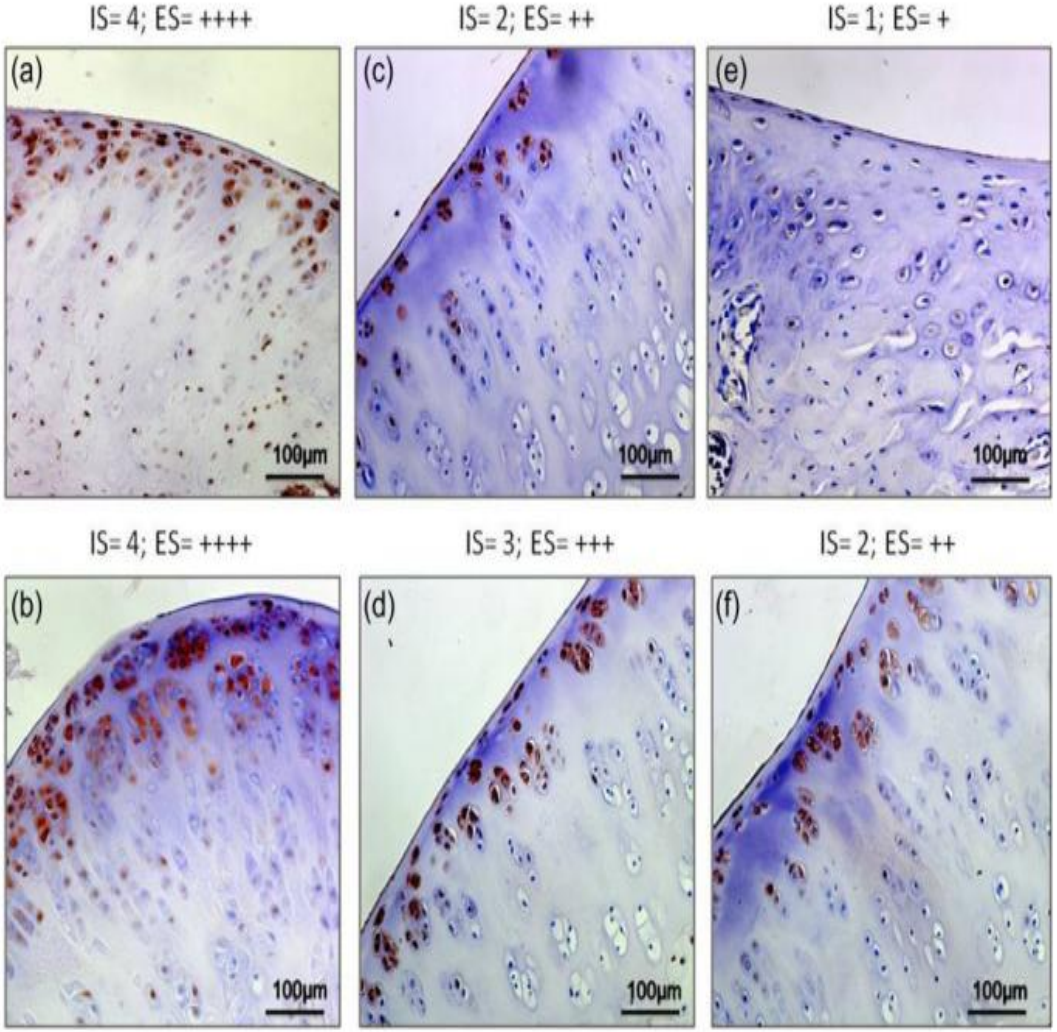
The chondrocytes from groups 1 and 2 (a,b)

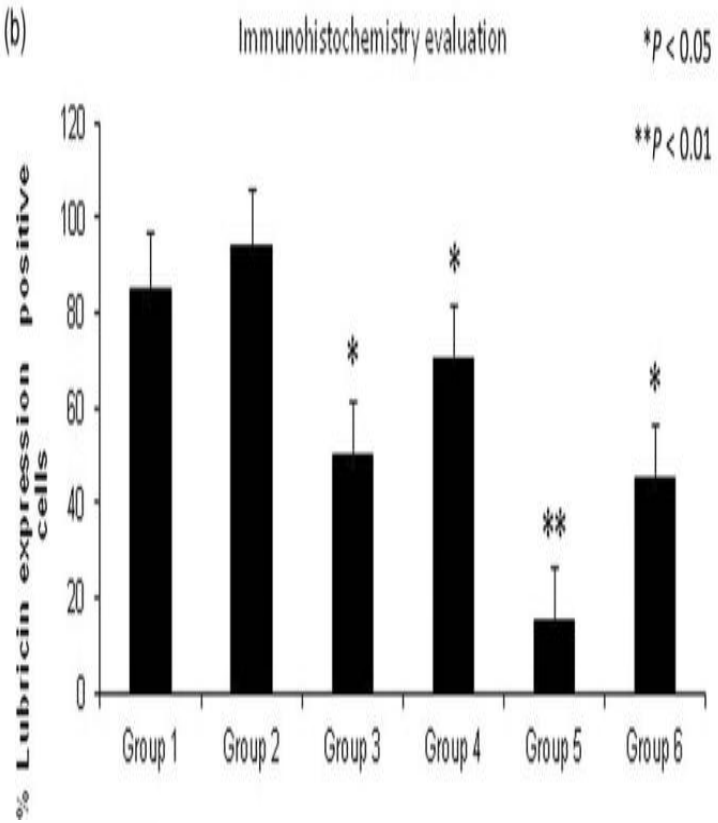
did not show any sign of cellular degeneration demonstrated by an intense staining, while the chondrocytes

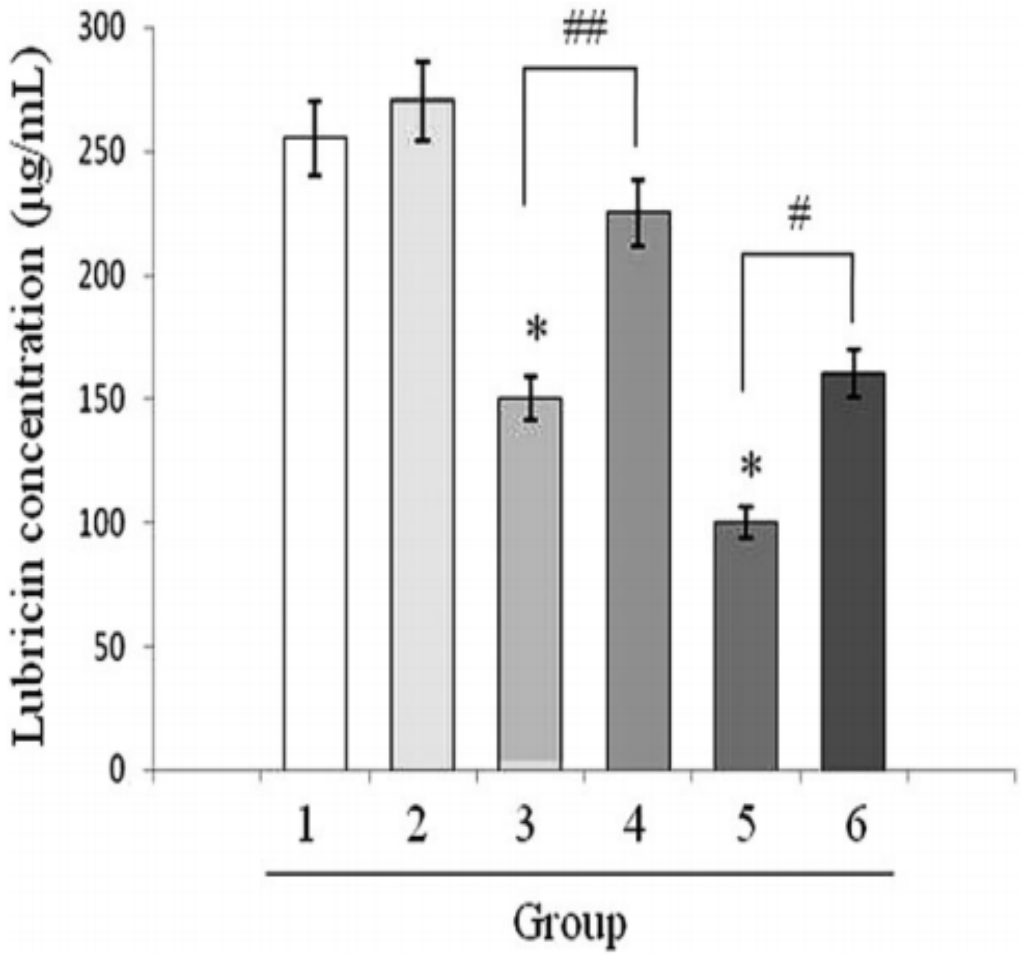
from groups 3 and 4 (c,d) showed early signs of cellular degeneration demonstrated by a moderate staining. The chondrocytes from group 5 (e) showed clear signs of cellular degeneration demonstrated byreduced/weak staining, although the chondrocytes from group 6 Fig(f) showed a moderate staining.



Immunohistochemical staining.



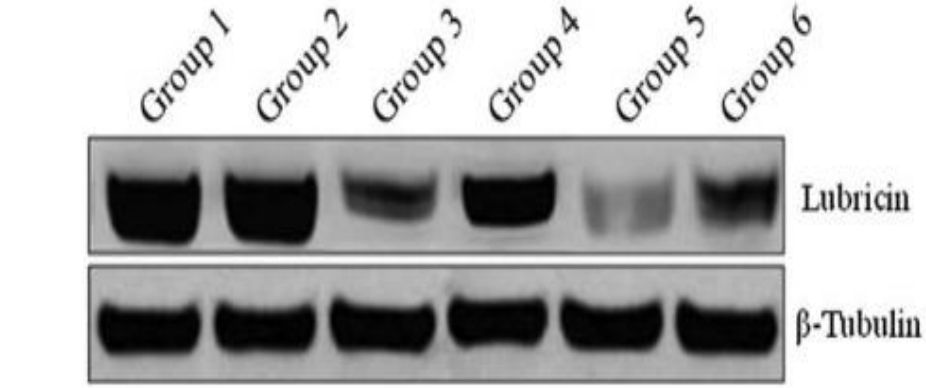


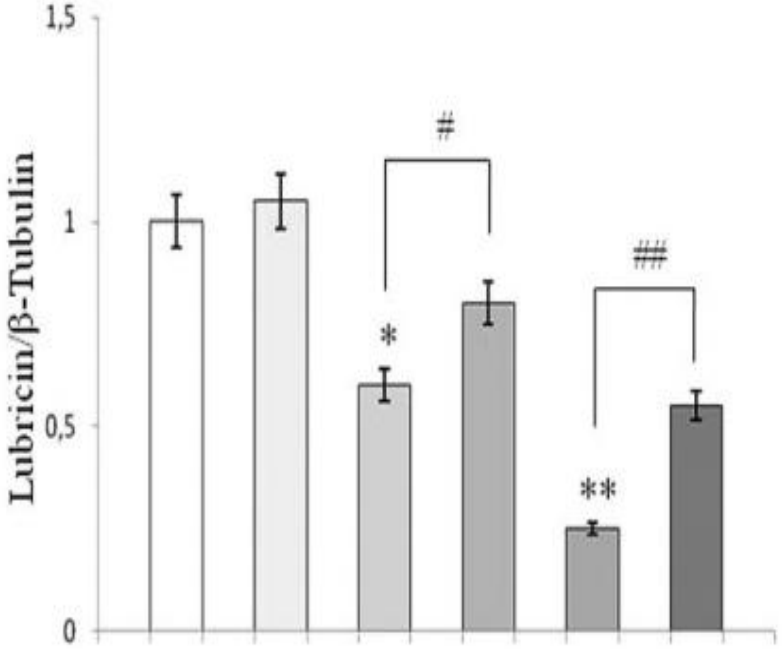


ELISA:. As indicated, group 1 showed higher lubricin levels (255 ± 13) when compared with groups 3 (150 ± 7.5) and 5 (100 ± 5). Interestingly, physical activity provoked a relevant enhancement of lubricin concentration as compared with synovial fluid of untrained rats. Such an increase, although less evident in group 2, reaches significant values both in group 4 and group 6.

Western blot:

Lubricin protein expression in cartilage from all groups was determined by western blot analysis. In groups 3 and 5, the expression of lubricin decreased compared with group 1. In groups 4 and 6, lubricin expression significantly increased when compared with groups 3 and 5, respectively.





Discussion

- 1.Cell senescence may be a mechanism to prevent the
- replication of cells with damaged DNA and thus tumor
- formation. OA is probably not a direct consequence of
- aging, but rather, aging affects the ability of the articular
- cartilage to maintain homeostasis when stressed. Age related oxidative stress and damage may play a central role in cartilage aging through modulation of cell
- signaling pathways that regulate anabolic and catabolic
- activity.
- 2.The impact of exercise on cartilage health depends on the extent of injury, the method, and the intensity of exercise.

Conclusions

- This study suggest that moderate physical exercise, normal joint loading, and mechanical stimulation in elderly rats improve lubrication and prevent cartilage degeneration, promoting lubricin synthesis in synovial fluid, compared with unexercised adult rats. Physical activity increases joint mobility, consequently, both synovial fluid and chondrocytes express more lubricin, resulting in enhanced lubrication of articular surfaces. This protective lubrication mechanism help to prevent the onset of OA in aging.

Thank you for your attention!