Degeneration of Intervertebral Disc: Correlation between MRI, Histological and Transcripts Analysis.
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Introduction
Intervertebral disc (IVD) degeneration is the major cause of chronic low back pain. A better understanding of the physiopathology of IVD degeneration is essential and correlation between tissular and cellular changes is poorly investigated [1]. In this context, the present work was focused on the physiopathological characterization of IVD aging in the rabbit in order to define a potential correlation between tissular (MRI and histological study) and cellular (transcripts analysis) changes.

Materials and Methods
New Zealand white rabbits (1-, 6- and 30-month-old) were used. IVD aging was determined by MRI and histological studies as well as by a phenotypic characterization of cells isolated from annulus fibrosus and nucleus pulposus, respectively the central and outer parts of IVD [2]. MRI was scored according to the Pfirrmann's classification. After alcian blue and masson's trichrome stainings, the histological samples were evaluated using a modified Boos's scoring [3]. The age-dependent phenotypic alterations of IVD cells were investigated after total mRNAs extraction by real-time PCR [2].

Results
MRI reveals a grading decrease in IVD signal intensity associated with a Pfirrmann's grade of 1, 2 and 3 after 1, 6 and 30 months respectively. At histological level, IVD aging was associated with a significant increase in the Boos's scoring as evidenced by the formation of tears and cracks, the reduction of cellularity and a marked mucous degeneration. These data indicate the existence of an aging process of rabbit IVD likely similar to that occurring in human IVD. In parallel with this histological aging, significant alterations in the expression of transcripts coding for type I and II collagens, aggrecan, BMP2, MMP13, HtrA1, MGP and P21 were observed. These changes in gene expression suggest a marked modification of cell phenotype as well as the existence of some compensatory mechanisms occurring during IVD aging.

Discussion and Conclusions
Our results indicate that age-associated IVD degeneration in the rabbit is likely comparable to that observed in humans with a correlation between dehydration of nucleus pulposus, disorganisation of the extracellular matrix and an intense alteration in cell phenotype.

References

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Disclosures
The authors have declared no conflict of interest.