



THE VITAMIN D PATHWAY: A PLAYER IN OSTEOARTHRITIS AND JOINT DISTRACTION

Introduction: Vitamin D seems to play a role in osteoarthritis (OA) and to this end it is unclear whether vitamin D oral supplementation has therapeutic effects. Our aim was therefore to investigate whether the vitamin D pathway is involved in OA and in joint distraction, a surgical treatment shown to have regenerative effects (tissue repair and long term clinical benefit) in OA joints ^(1,2).

Materials and methods: OA was induced in sixteen dogs with the aid of the Groove model. The contralateral untreated knees served as healthy controls. After 10 weeks, joint distraction was applied on half of the dogs for 10 weeks. Halfway the distraction period (i.e. at 4 weeks) and 25 weeks after initiation of the treatment cartilage from the tibial plateaus and the femoral condyles was harvested. The vitamin D pathway was examined at the transcriptional level at 4 weeks and vitamin D receptor (VDR) immunohistochemistry was performed at 4 weeks and 25 weeks follow up.

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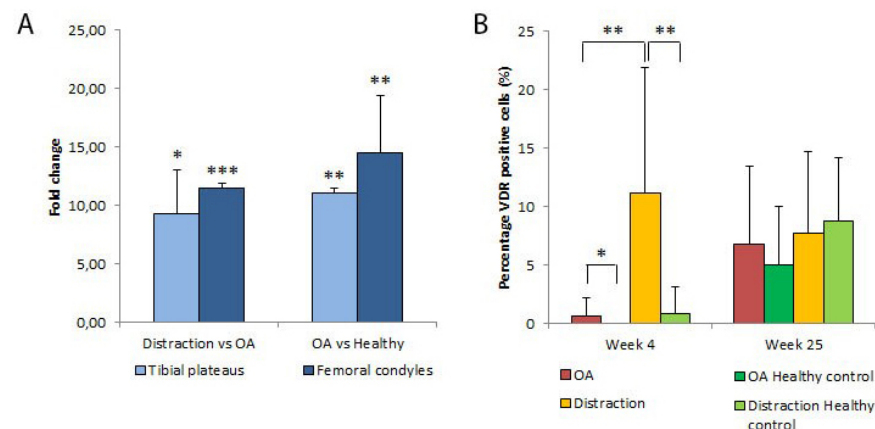


Figure 1. VDR gene and protein expression in cartilage. A) VDR gene expression after 4 weeks of distraction by means of qRT-PCR for tibial plateaus and femoral condyles (mean±SD). B) Semi-quantitative analysis of immunohistochemistry at 4 weeks and 25 weeks follow up after distraction. Week 4 contains cartilage from both tibial plateaus and femoral condyles, while week 25 only contains tibial plateau-samples.
* p<0,05; ** p<0,01; *** p<0,001

Results: VDR gene expression was induced by OA and further upregulated after 4 weeks of distraction of OA knees. In line with these findings, at 4 weeks after initiation of the distraction the VDR % of positive cells (PPCs) were significantly higher in distracted and in osteoarthritic cartilage compared to their healthy controls. Moreover, distracted cartilage showed a significantly higher VDR PPCs than the osteoarthritic one. After 25 weeks of distraction, no differences were found in the VDR PPCs between distracted dogs and their healthy control, neither between distracted and osteoarthritic cartilage (figure 1).

Conclusion: VDR is expressed in both distracted and osteoarthritic cartilage at a protein level, confirming the gene expression pattern found at week 4. Remarkably, the VDR is induced in the early phase of distraction, suggesting a role in the regenerative process of this promising treatment.

References

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