

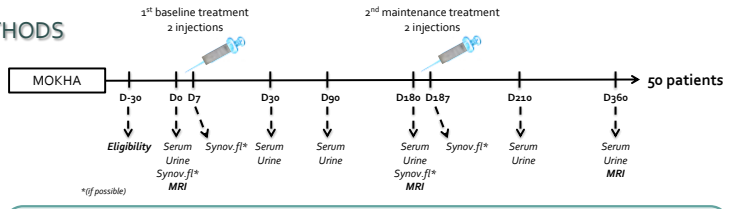
# Hyaluronan derivative Hymovis® increases cartilage volume and type II collagen turnover in osteoarthritic knee: data from MOKHA study.

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## OBJECTIVES

Intra-articular injections of hyaluronan represent one of the well-accepted standard of care for treating symptomatic knee osteoarthritis (OA). Until now, not much is known about the structural-modifying effect of this treatment justifying this pilot study.

## METHODS



- 7 MRI sequences were acquired on 1.5T or 3T scanner.
- 5 sequences were chosen for WORMS semi-quantitative scoring: coronal and sagittal TSE/FSE PDW FatSat, axial and sagittal TSE/FSE PD-T2 and sagittal TSE/FSE T1.
- Sagittal 3D FatSat DESS/CUBE sequence was used for cartilage morphology imaging
- Sagittal 2D Dual Echo FatSat sequences were acquired for T2 mapping

## RESULTS

Coll2-1 and PIIANP serum levels significantly increased overtime while Coll2-1NO2 levels were only increased at D360. Interestingly, the ratios Coll2-1/PIIANP and CTX-II/PIIANP decreased, indicating a decrease of cartilage catabolism (Table 1).

**Coll2-1:** type II collagen degradation biomarker  
**Coll2-1NO2:** type II collagen degradation and inflammation biomarker  
**CTX-II normalized:** type II collagen degradation biomarker  
**PIIANP:** type II collagen synthesis biomarker



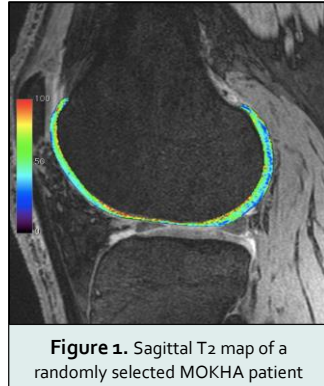
**Table 1.** Levels (mean (SD)) of soluble biomarkers in the Full Analysed Set (FAS) Population

	Do	D90	D180	D210	D360	
sColl2-1 (nM) P-value	522.06 (267.07)	618.41(270.96) <b>0.021</b>	683.53 (334.42) <b>&lt;0.001</b>	678.78 (289.84) <b>0.01</b>	689.73 (304.12) <b>&lt;0.001</b>	↗
sColl2-1NO2 (pg/ml) P-value	447.30 (431.62)	411.35 (367.83) 0.907	396.6 (206.11) 0.225	458.48 (238.85) 0.272	544.48 (449.14) <b>0.027</b>	↗
uCTX-II normalized (ug/mmol) P-value	0.014 (0.009)	0.012 (0.006) 0.924	0.013 (0.007) 0.882	0.029 (0.090) 0.924	0.014 (0.008) 0.910	-
sPIIANP (ng/ml) P-value	672.75 (240.47)	733.55 (265.4) <b>0.038</b>	801.75 (269.6) <b>&lt;0.001</b>	901.74 (315.62) <b>&lt;0.001</b>	1083.87(446.76) <b>&lt;0.001</b>	↗
Coll2-1(nM)/PIIANP (ng/ml) P-value	0.799 (0.359)	0.935 (0.681) 0.677	0.864 (0.387) 0.257	0.798 (0.396) 0.678	0.643 (0.273) <b>0.005</b>	↘
CTX-II (ng/mmol)/PIIANP(ng/ml) P-value	0.024 (0.020)	0.018 (0.011) <b>0.041</b>	0.018 (0.010) <b>0.01</b>	0.034 (0.103) <b>0.004</b>	0.013 (0.007) <b>&lt;0.001</b>	↘

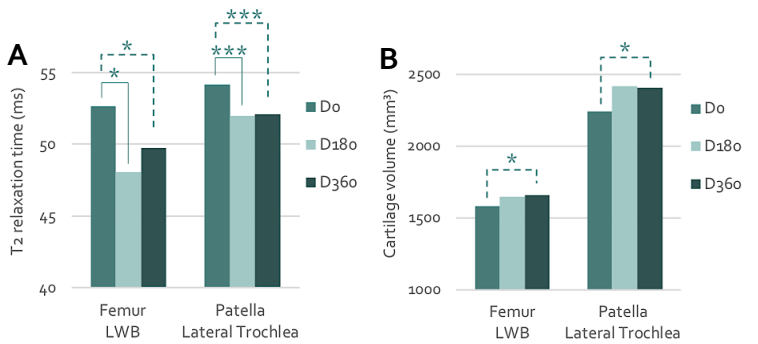
**T2 mapping** showed an improvement of cartilage composition in lateral weight bearing femoral compartment and in patella lateral trochlea compartment (Figures 1 & 2A). Mean T2 relaxation times decreased significantly.

**Cartilage volume** was significantly increased at D360 compared to baseline value in those same regions (Figure 2B).

**Knee morphology** evolution was assessed by WORMS. WORMS total score showed a light albeit significant increase at D360. This increase is probably due to cartilage and cysts features. Interestingly, effusion score was significantly decreased (improvement) at D180 but that was not maintained at D360 (Table 2).



**Figure 1.** Sagittal T2 map of a randomly selected MOKHA patient



**Figure 2.** Mean T2 relaxation time (A) and cartilage volume (B) (FAS) Median values for Lateral Weight Bearing Femur and Patella Lateral Trochlea \* P-value ≤ 0.05; \*\*\* P-value ≤ 0.001

**Table 2.** WORMS total score and by features (mean (SD)) (FAS)

	Do	D180	D360	
Total score Change from baseline P-value	63.95 (27.78)	64.33 (27.71) 0.38 (1.77) 0.183	64.08 (28.03) 0.96 (2.75) <b>0.037</b>	↗
Cartilage Change from baseline P-value	22.83 (11.27)	23.01 (11.13) 0.18 (0.70) 0.188	23.03 (11.45) 0.45 (1.21) <b>0.025</b>	↗
Cyst Change from baseline P-value	2.73 (2.65)	2.83 (2.65) 0.10 (0.30) 0.125	2.90 (2.62) 0.23 (0.63) <b>0.047</b>	↗
Effusion Change from baseline P-value	0.93 (0.69)	0.76 (0.54) -0.17 (0.38) <b>0.016</b>	0.77(0.54) -0.15 (0.54) 0.148	↘

## CONCLUSION

HYMOVIS®, a well-tolerated intra-articular treatment, significantly enhanced type II collagen turnover as suggested by the increase of Coll2-1 and PIIANP levels ratio and cartilage volume observed by MRI in lateral knee compartment. These observations are corroborated by a decrease of T2 relaxation times.