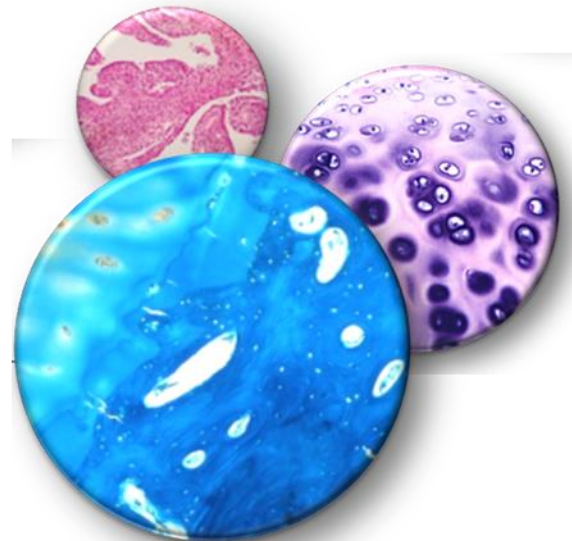


Novel Chitosan Hydrogel for the treatment of osteoarthritis: Mechanical support, Lubrication and Prevention of Cartilage degradation in a rabbit Model of osteoarthritis.

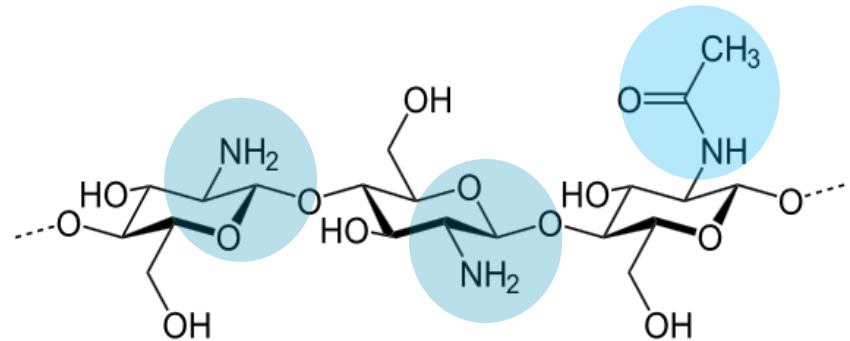


Y. Henrotin
F. Oprenyeszk
F Comblain
J-E Dubuc
C. Boileau
M. Chausson
R. Lecler
G. Rocasalbas
P. Douette
S. Gautier

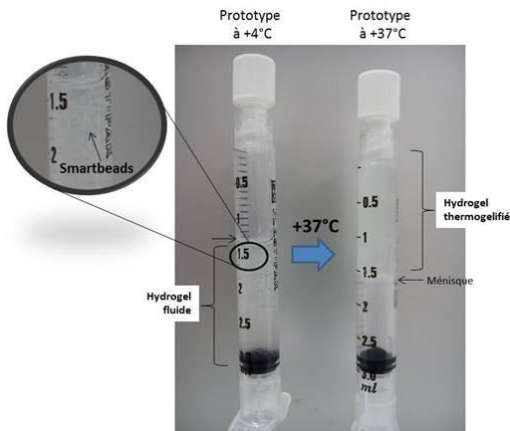
Chitosan hydrogel



Agaricus Bisporus



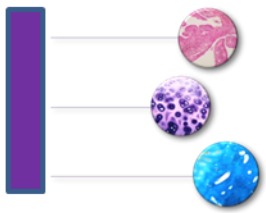
Glucosamine **N-acetyl glucosamine**



Chitosan hydrogel

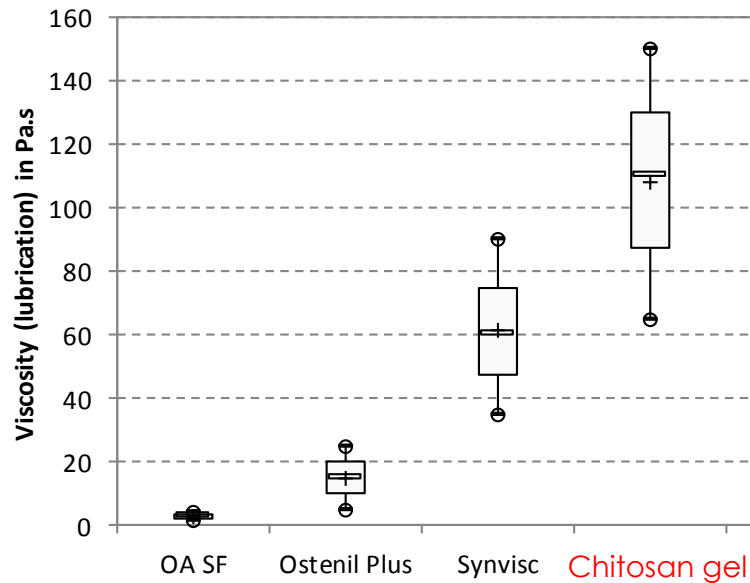
Chitosan hydrogel

- Thermo-sensitive
- Easily injectable
- Extended residency time (> 4 weeks in the rabbit)

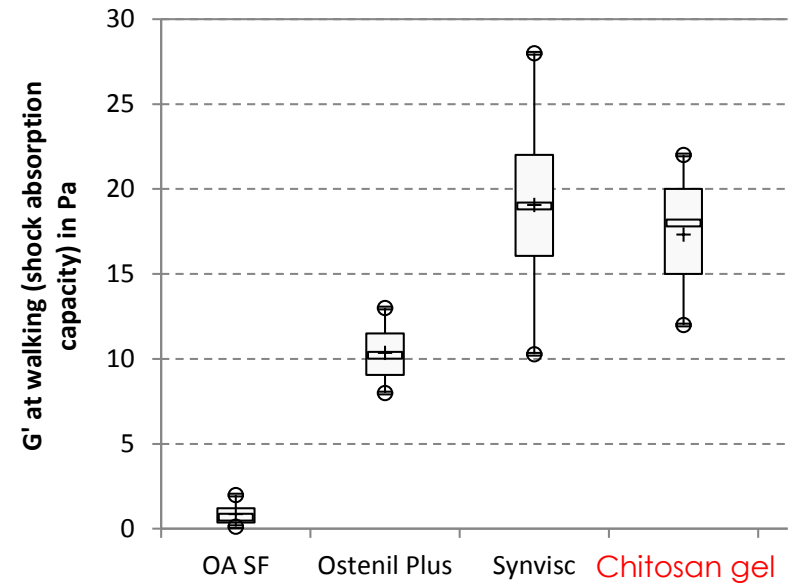


Rheological properties

Viscosity (Lubrication)



Viscoelasticity at walk (G')



Chitosan hydrogel improves the lubrication and shock absorption capacity of OA SF

Material & Methods

- 20 HYLA albino adult rabbits
- ACLT induced OA
- A single intra-articular injection of :
 - Chitosan hydrogel gel
 - Saline solution

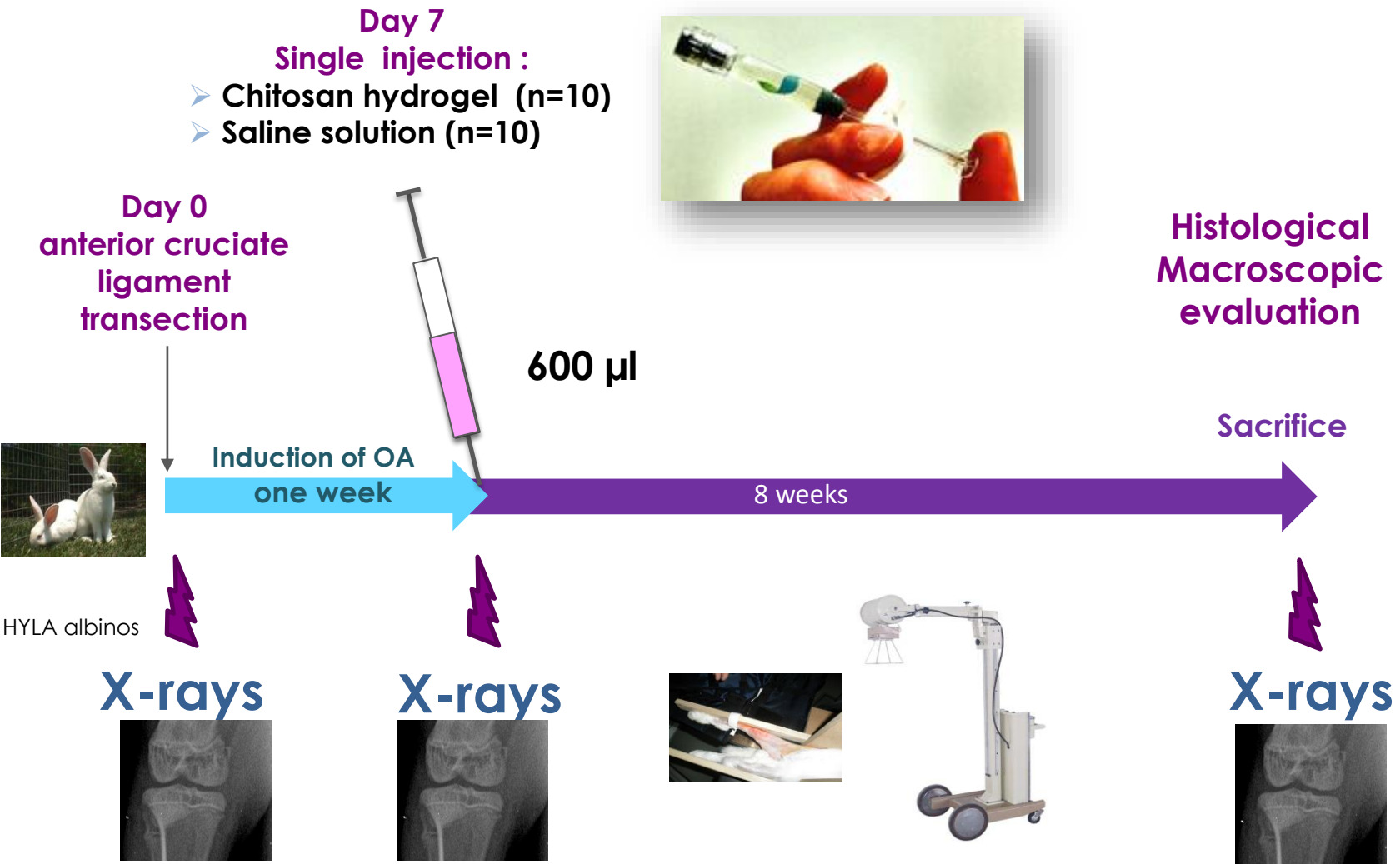
The study endpoints were:

- Radiological Kelgren and Lawrence score
- Macroscopic evaluation of cartilage
- Histological evaluation of synovial membrane and cartilage (OARSI)

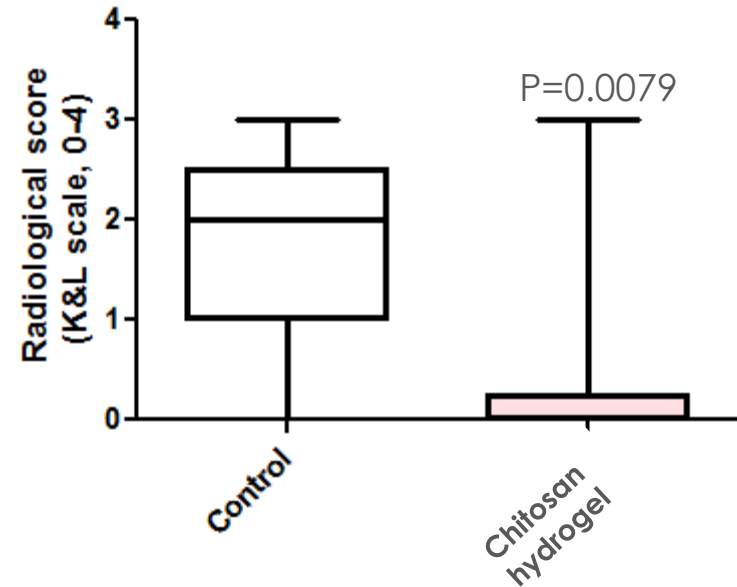
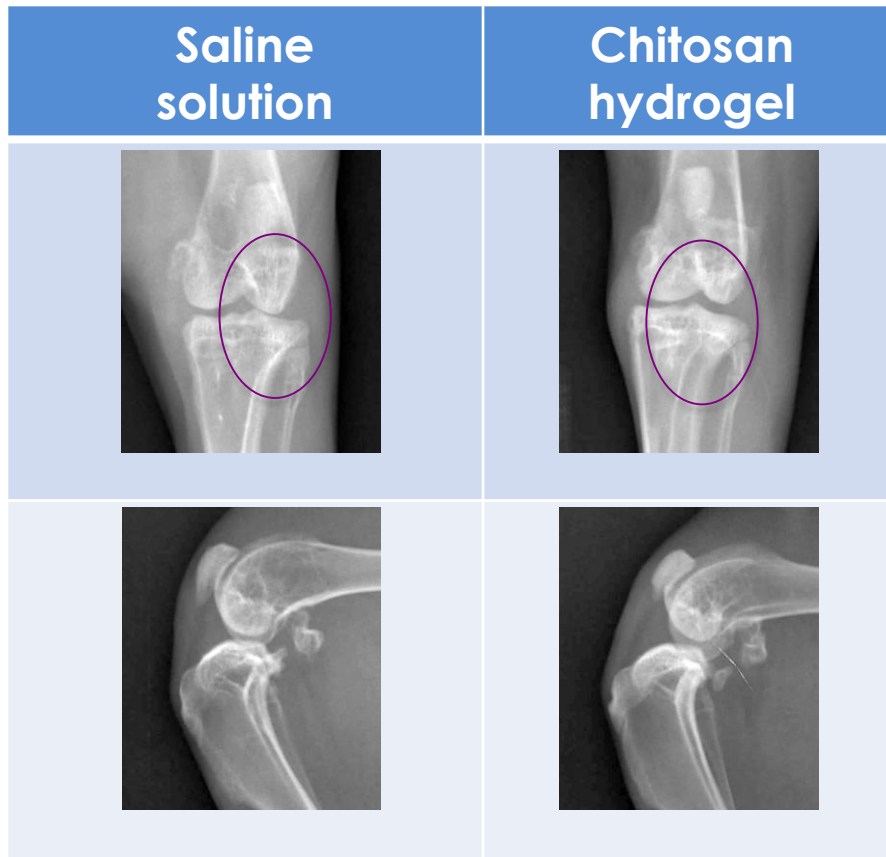




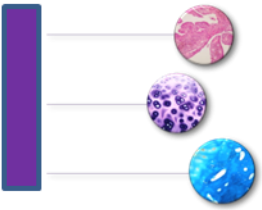
Study design



X-ray – K&L score



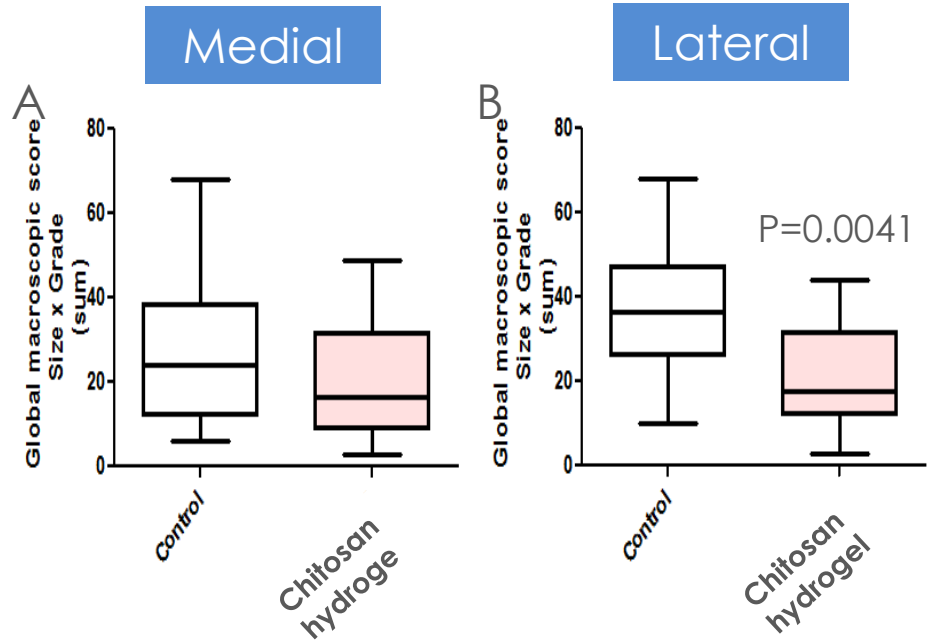
Mann and Whitney U test
 $P < 0.05$ is considered significant



Macroscopy

	Saline solution	Chitosan hydrogel
Femoral condyles		
Tibial plateaus		

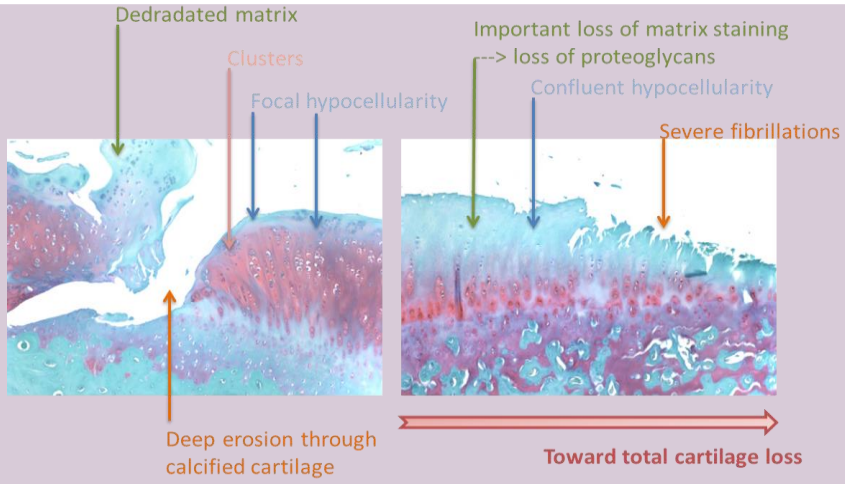
OARSI Global score
Size x Severity



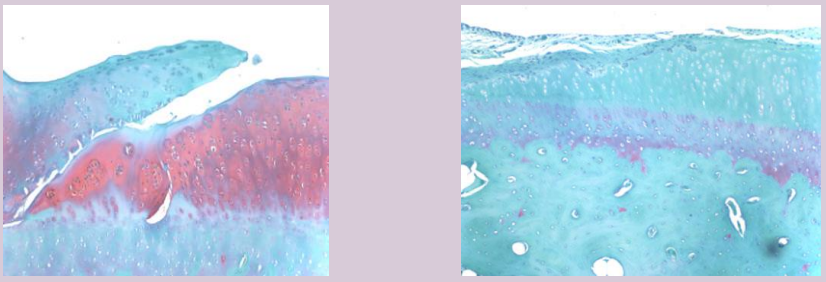
Mann and Whitney U test
P<0.05 is considered significant

Histology - cartilage

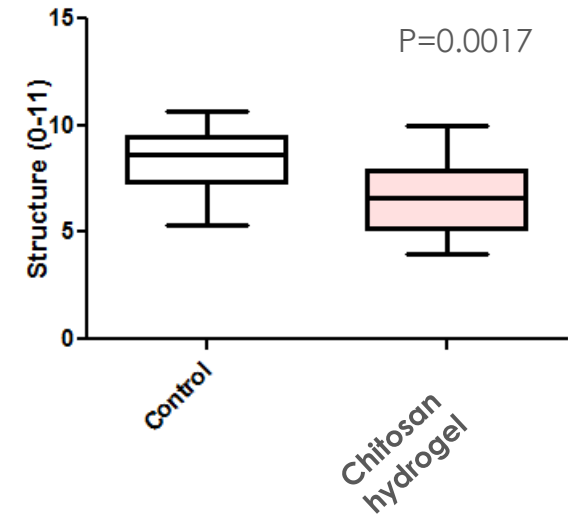
Saline solution



Chitosan hydrogel



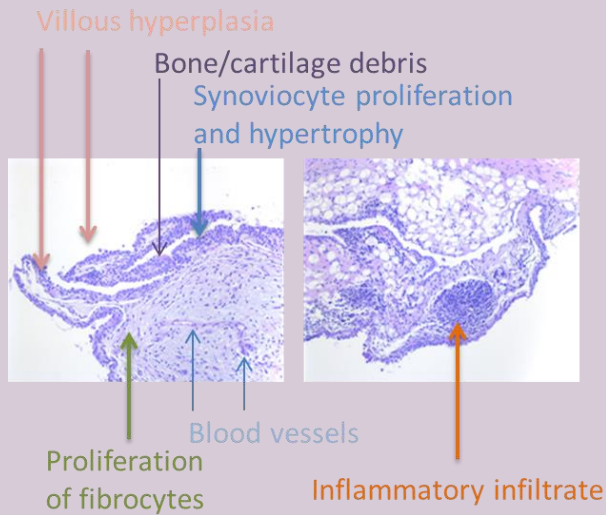
Structural changes



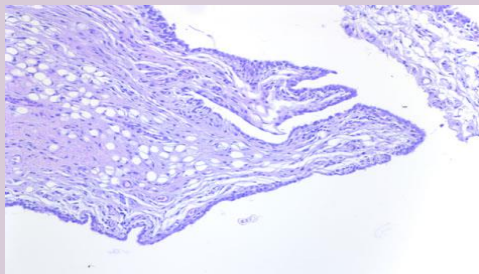
Mann and Whitney U test
 $P < 0.05$ is considered significant

Histology – Synovial membrane

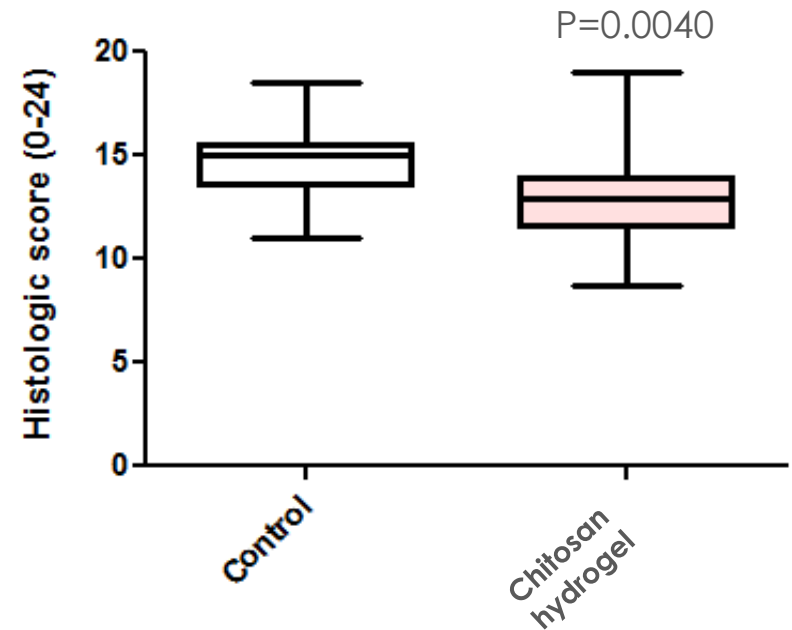
Control



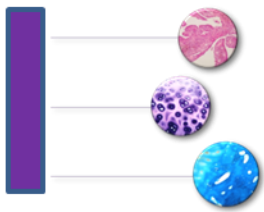
Chitosan hydrogel



Global score



Mann and Whitney U test
P<0.05 is considered significant

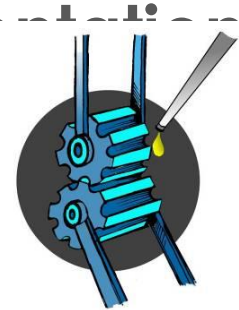


Conclusions

- A single injection of a thermo-sensitive chitosan gel prevents cartilage degradation and synovial membrane inflammation in ACTL-induced OA in rabbit.

→ **A good candidate for viscosupplementation**

- ✓ Ultrapure, animal-free & well tolerated
- ✓ Easy to inject (thermo-sensitive)
- ✓ High lubrication & viscoelasticity
- ✓ Extended intra-articular residency
- ✓ Resistant to oxidative stress
- ✓ Bioadhesive (cartilage filling)





Thank you for your attention !

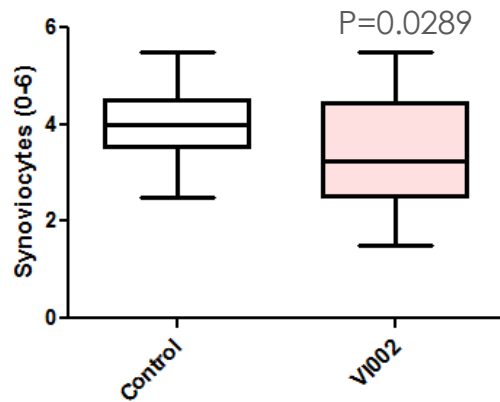
International collaborations:

- F Blanco (La coruna, Spain)
- T Conrozier (CHU Lyon, France)
- V Kraus (Duke University, USA)
- L Punzi (University of Padova, Italy)
- A Mobasher (University of Nottingham, UK)
- J Monfort (Hospital del mare (Spain)
- P Richette (Lariboisiere, France)
- J Runhaar (Erasmus MC, Rotterdam)

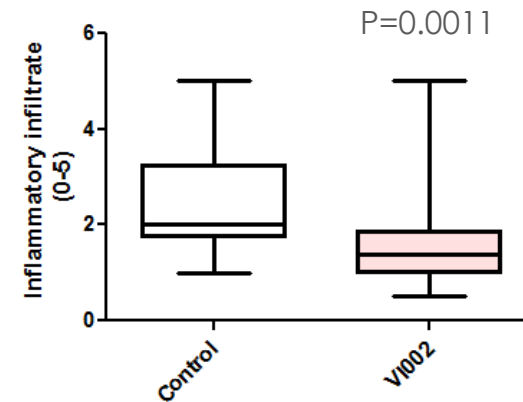


Histology- Synovial membrane

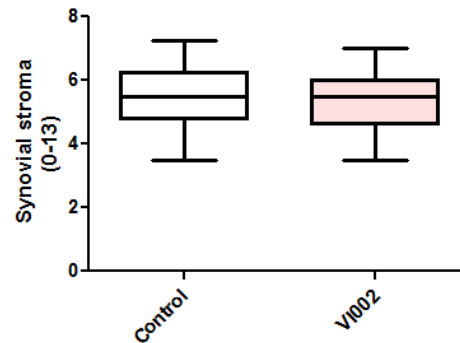
Synoviocytes proliferation/hypertrophy



Inflammatory infiltrate



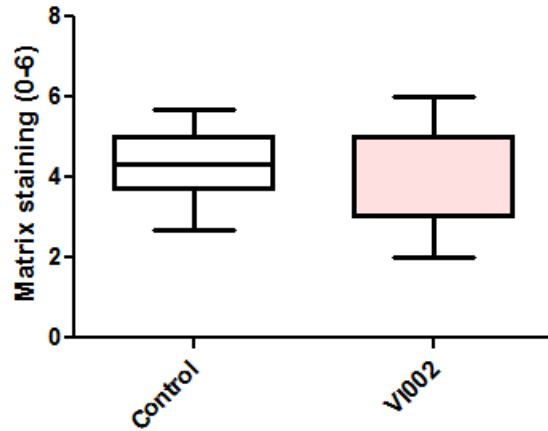
Synovial stroma Villous hyperplasia, blood vessels, cartilage/bone detritus



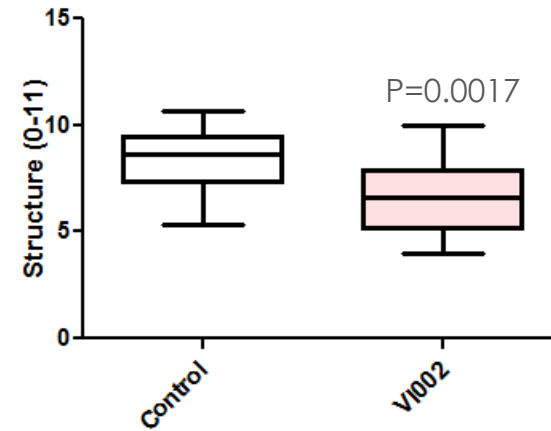
Mann and Whitney U test
P<0.05 is considered significant

Histology - cartilage

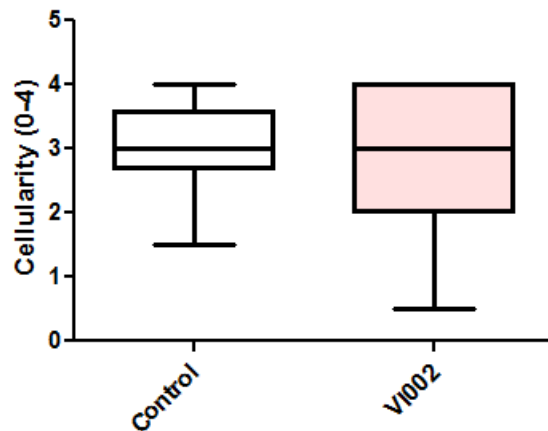
Matrix staining



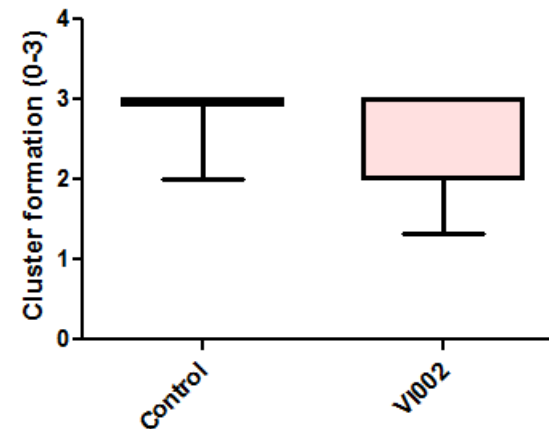
Structure



Cellularity



Cluster formation



*U test
significant*