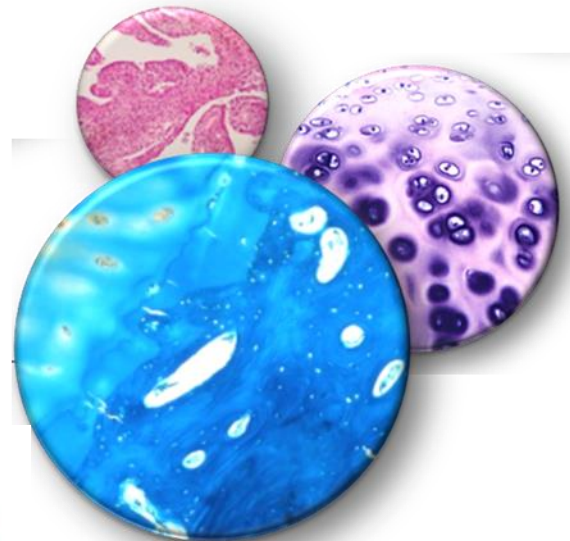




New alginate-chitosan hydrogel to repair cartilage



KitoZyme

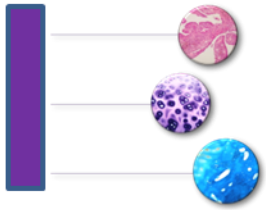


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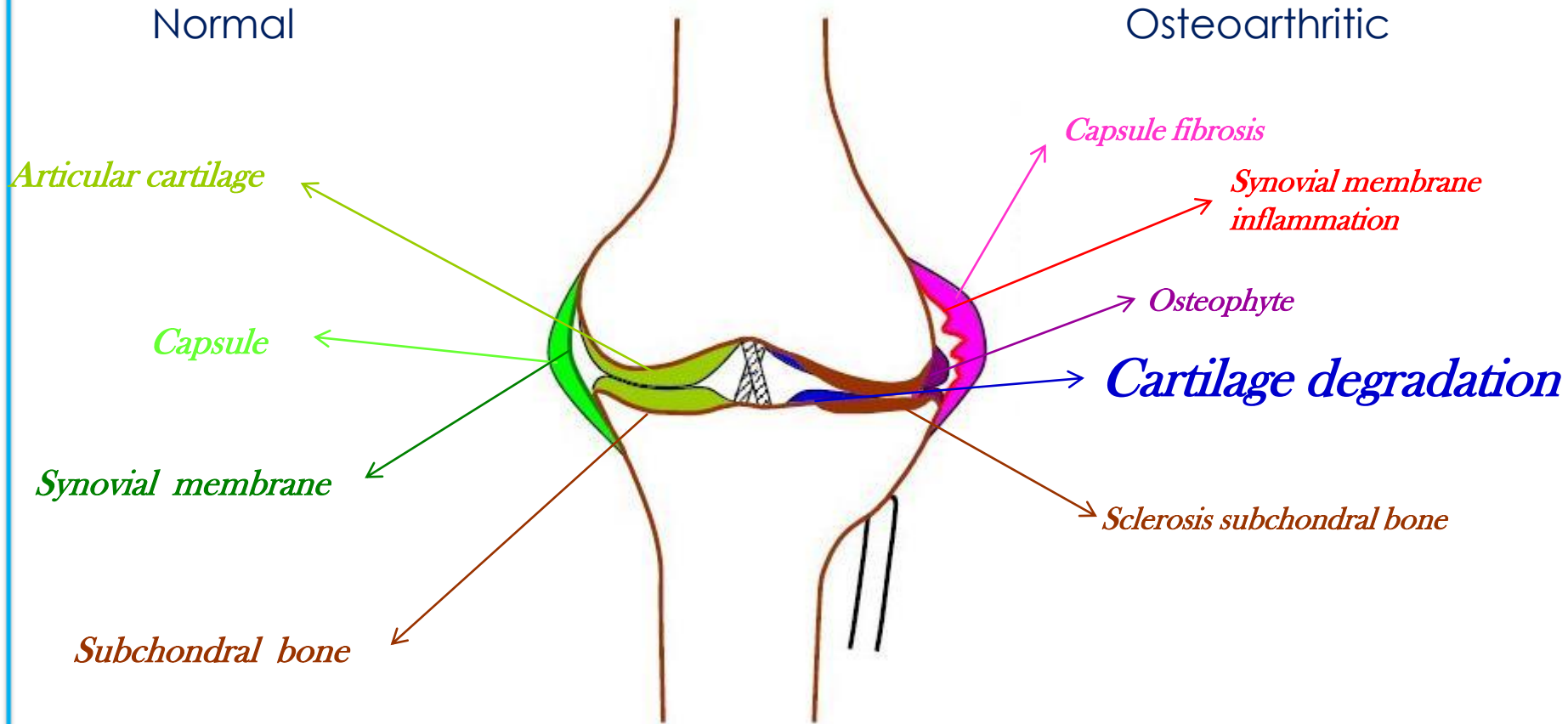
www.bcr.ucl.ac.uk





Osteoarthritis

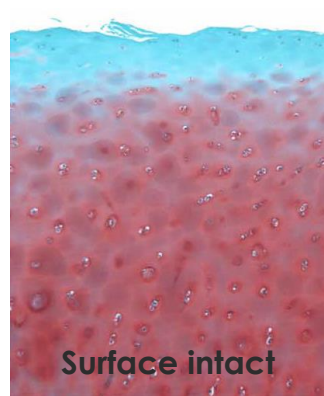
The joint



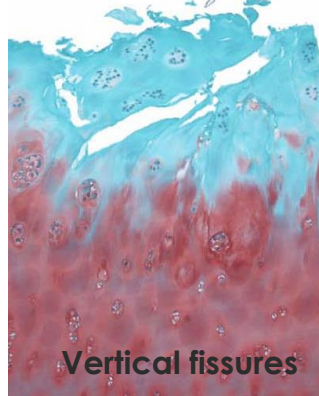
Osteoarthritis



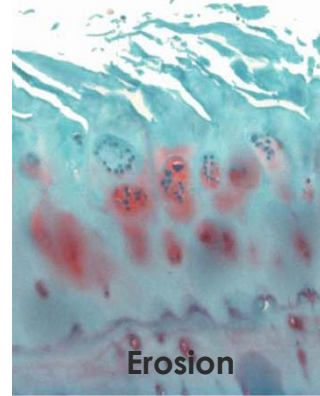
Normal articular cartilage
Safranin O stain



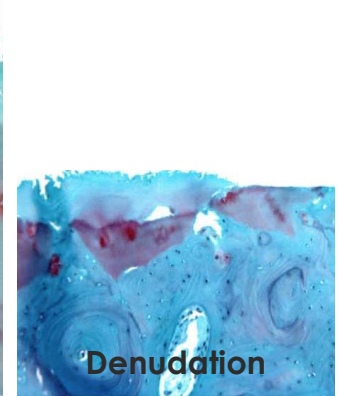
Surface intact



Vertical fissures



Erosion



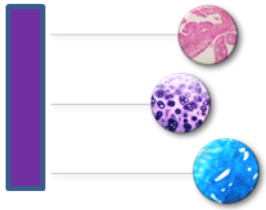
Denudation

OA cartilage pathology ⁽¹⁾

Articular cartilage once destroyed, is not repaired

New biomaterial

⁽¹⁾ OARSI histopathology grade



The biomaterial



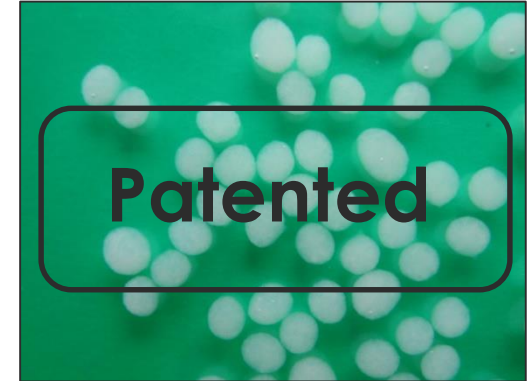
Paris mushrooms

→ **CHITOSAN**
D glucosamine
N-acetyl-D-glucosamine

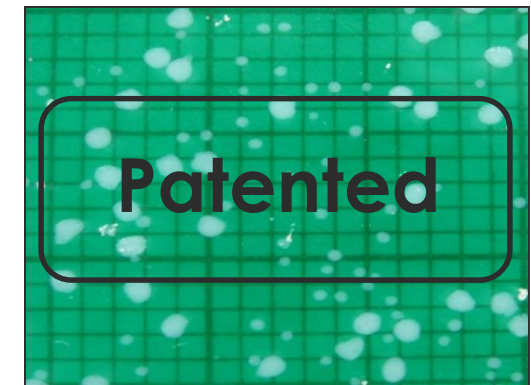


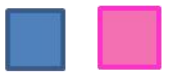
Brown algae

→ **ALGINATE**
mannuronic acid
guluronic acid

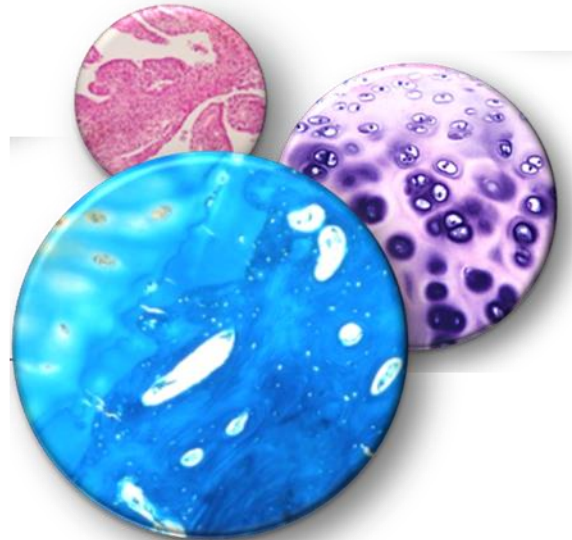


Alginate-chitosan beads



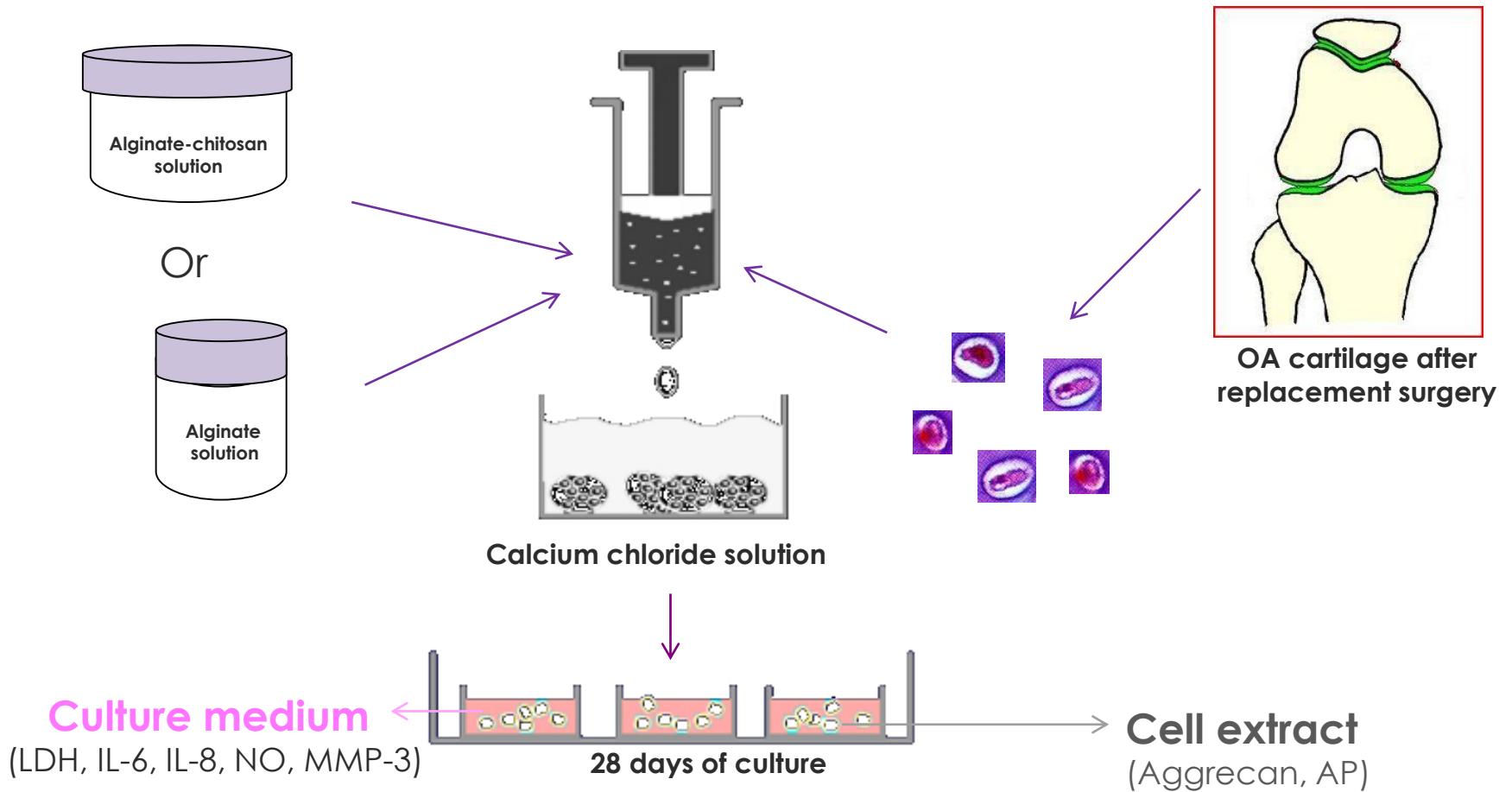


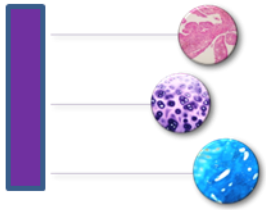
The effects of alginate-chitosan biomaterial on human osteoarthritic chondrocytes



The effects of alginate-chitosan biomaterial on human osteoarthritic chondrocytes

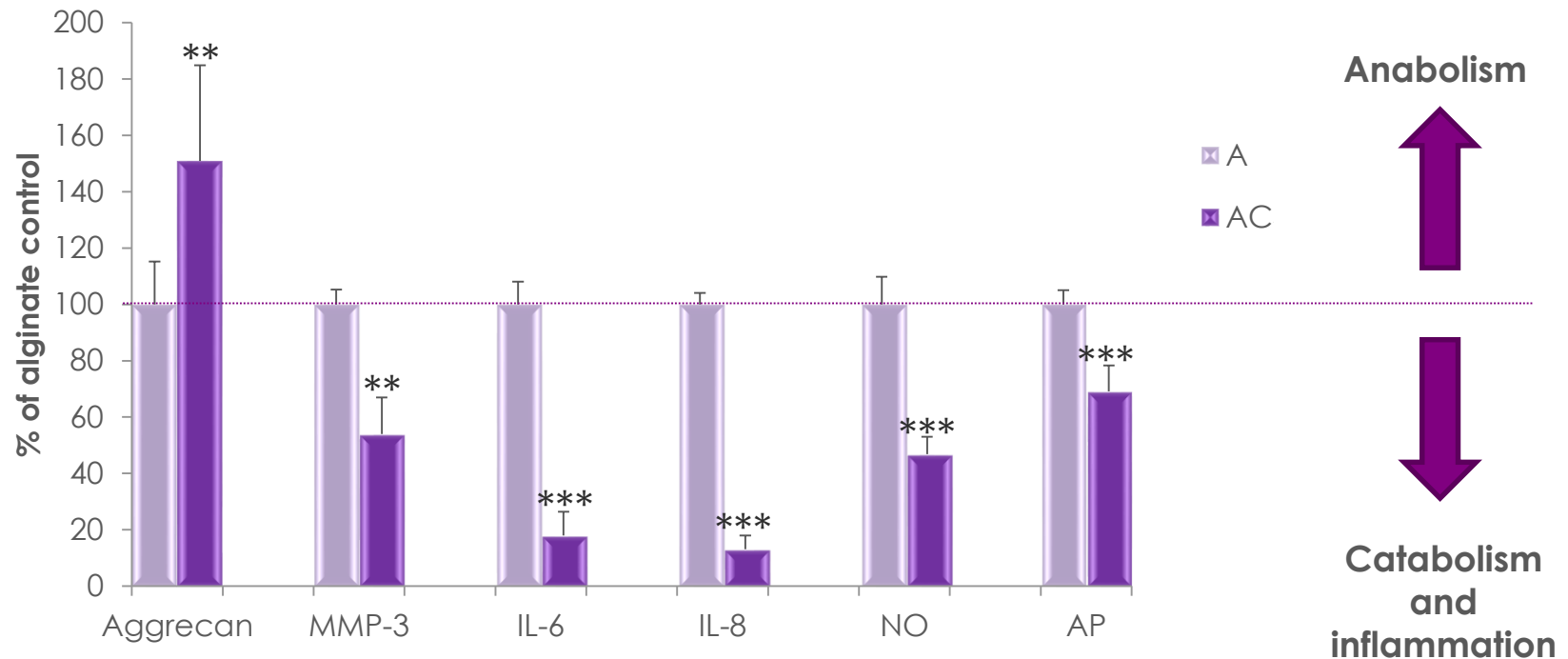
Methods



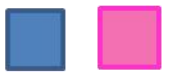


The effects of alginate-chitosan biomaterial on human osteoarthritic chondrocytes

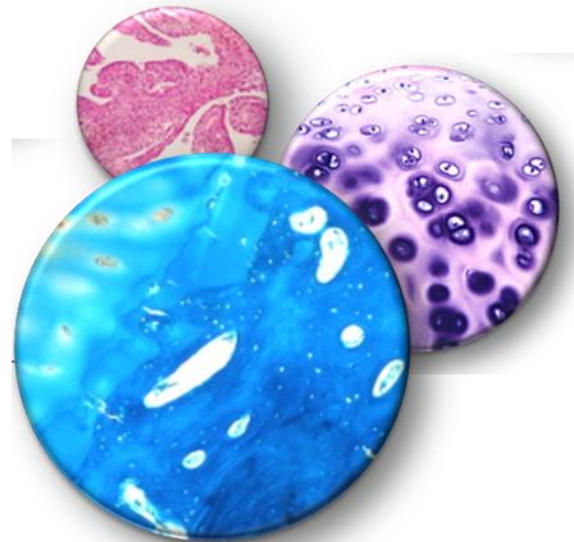
Results



Aggrecan, MMP-3, IL-6, IL-8, NO and AP production of chondrocyte in AC beads. Results were represented as % by production of chondrocytes in A beads. Results were expressed as mean \pm SEM of 3 independent experiments (n=9). Statistical significance in comparison to the control: A vs AC : *** $p < 0.001$; ** $p < 0.01$



Preliminary study of the behavior of this biomaterial in the rabbit





Preliminary study of the behavior of this biomaterial to the rabbit

Methods



New-Zealand rabbit,
white, red-eyes



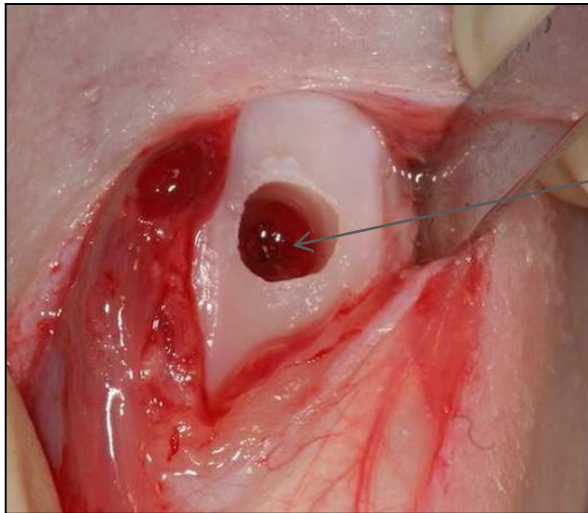
An osteochondral defect was done in both with an implant drill on the femoral condyle

Control rabbit :
Defect was filled only by chitosan hydrogel

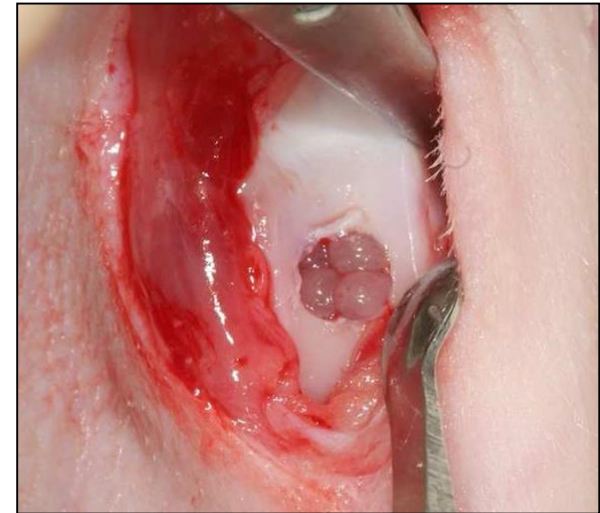
Test rabbit :
Defect was filled by alginate-chitosan beads included in a chitosan hydrogel

Preliminary study of the behavior of this biomaterial to the rabbit

Methods



Osteochondral defect

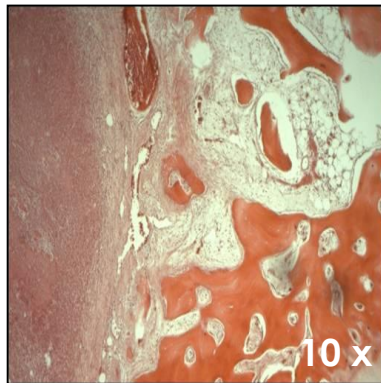
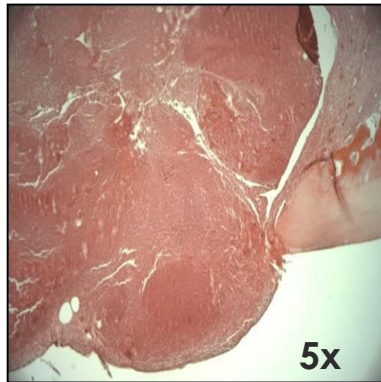


Preliminary study of the behavior of this biomaterial to the rabbit

Results

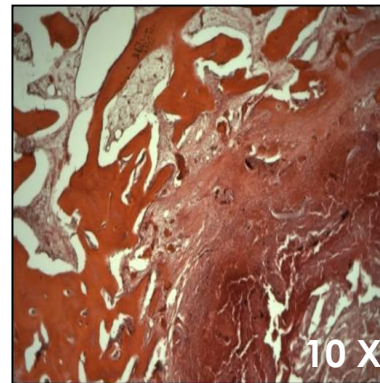
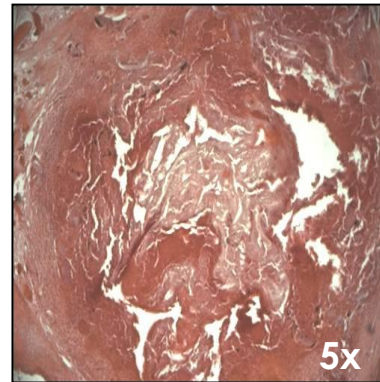
Control rabbit :

defect + hydrogel



Test rabbit :

defect+beads+hydrogel



After a month :

- Beads were still in the defect
- No signs of inflammation or infection



Summary

The *in vitro* tests highlighted beneficial and surprising effects of the alginate-chitosan beads on human OA chondrocytes. They were anti-inflammatory, anti-catabolic, not cytotoxic and promoting the synthesis of cartilage specific matrix component. The preliminary *in vivo* tests performed in the rabbit showed that the alginate-chitosan beads were well tolerated, being perfectly and easily integrated into an osteo-cartilaginous lesion and that it remained fixed in the lesion without additional suture.