

# **Freeze dried chitosan/platelet-rich-plasma implants improve marrow stimulated cartilage repair in rabbit chronic defect model**

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**Disclosures:** None

## **Purpose**

Marrow Stimulation (MS) by drilling or microfracture improves knee joint function but elicits incomplete repair. Liquid chitosan (CS)-glycerol phosphate/blood clots have previously been shown to promote cell recruitment, transient vascularization and subchondral bone remodeling and improve cartilage repair following MS in acute cartilage repair models [1, 2]. Platelet-rich-plasma (PRP) contains four-fold concentration of growth factors and cytokines and has been shown to improve recruitment and chondrogenic potential of subchondral mesenchymal stem cells (MSCs). We hypothesize that augmentation of MS with freeze-dried chitosan and PRP implants would improve repair response in a rabbit chronic defect model.

## **Methods and Materials**

Eight New Zealand White rabbits underwent two surgeries for creation and repair of chronic defect. In first surgery, bilateral trochlear chondral-only defects (4 mm<sup>2</sup>) were created. Knees were closed till second surgery 4 weeks later, during which defects progressed to chronic stage. In the second surgery, chronic defects were debrided and treated by MS by drilling to 6mm. Treatments included MS augmented with PRP alone (MS+PRP as Control) or with chitosan-PRP implants (MS+CS/PRP). Repair tissue was harvested 8 weeks later for macroscopic, histological and micro-CT assessment of quality of repair.

## **Results**

Macroscopic assessment showed evidence of fibrocartilagenous or fibrous repair in control defects and improved repair in defects treated with MS+CS/PRP indicated by higher ICRS scores (Fig.1a, 2a-d). Histological analysis confirmed an overall improvement in repair in MS+CS/PRP knees as indicated by higher O'Driscoll scores (Fig. 1b, 2e-h). Micro-CT analysis demonstrated better subchondral bone repair in MS+CS/PRP knees (Fig. 2i-j).

## **Conclusion**

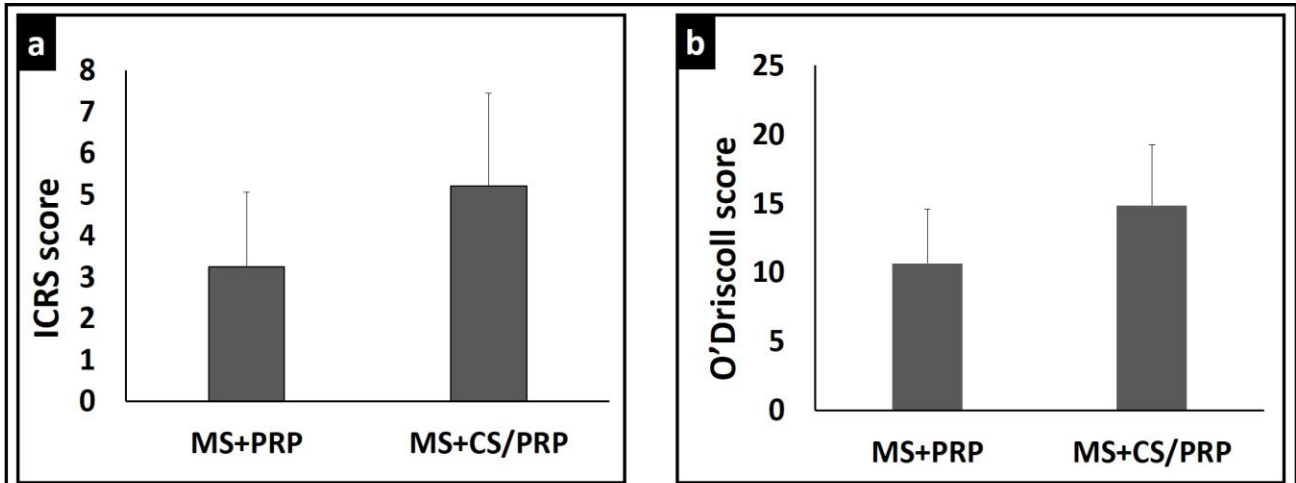
Augmentation of MS with freeze-dried chitosan-PRP implants in chronic defects improved cartilage repair compared with MS+PRP alone by increasing quantity and quality of repair tissue and by promoting subchondral bone repair

## **REFERENCES:**

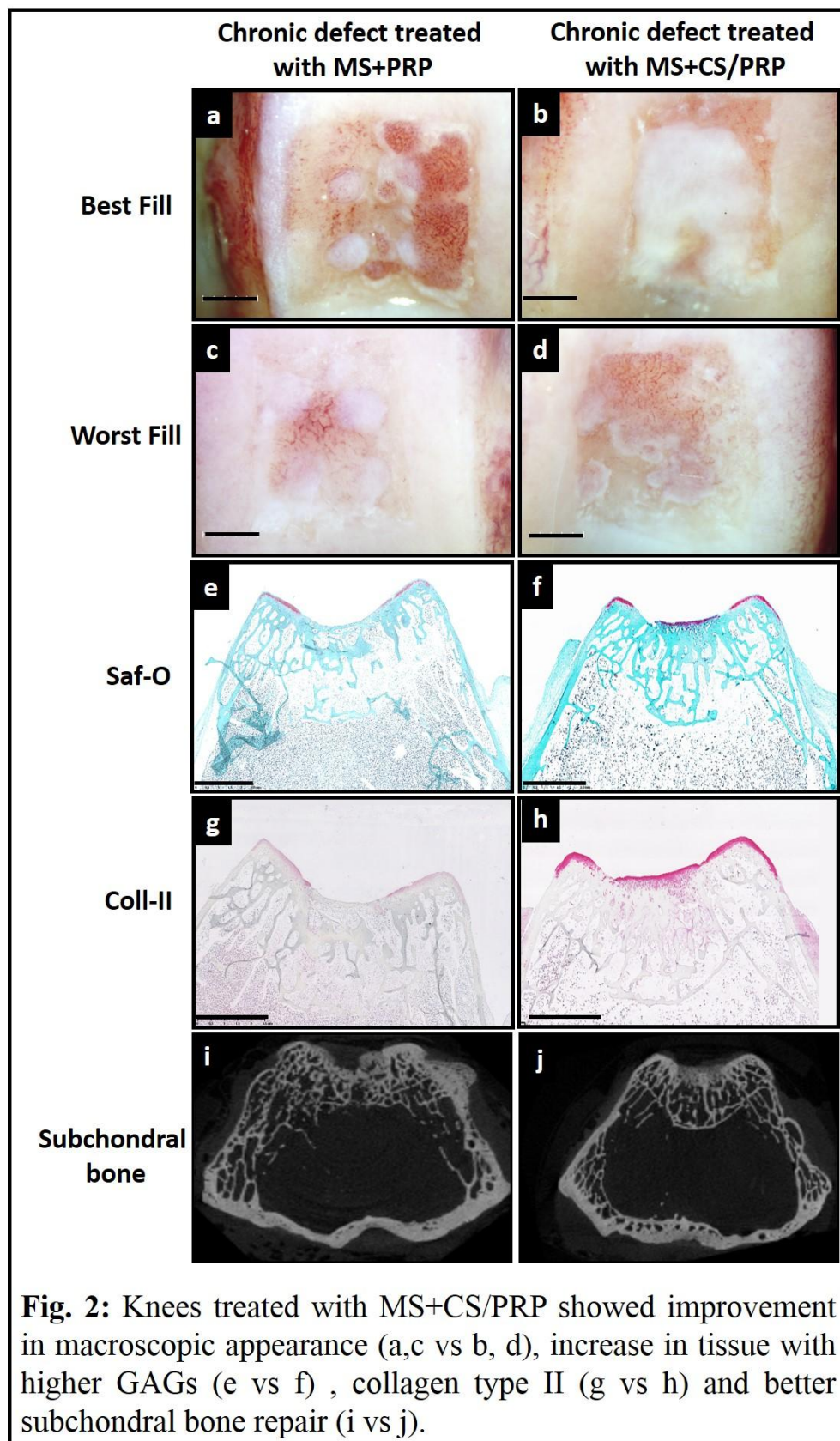
[1] Chevrier A et al 2007; OAC, 15, 3:316-27.

[2] Hoemann CD et al 2007; OAC, 15, 1: 78-89

IMAGES AND TABLES:



**Fig. 1:** a-An improvement in macroscopic appearance of repair was observed in knees treated with MS+CS/PRP as indicated by higher ICRS scores vs knees treated with MS+PRP alone, b-An overall improvement was indicated by higher O'Driscoll scores in knees treated with MS+CS/PRP vs MS+PRP alone.



**Fig. 2:** Knees treated with MS+CS/PRP showed improvement in macroscopic appearance (a,c vs b, d), increase in tissue with higher GAGs (e vs f) , collagen type II (g vs h) and better subchondral bone repair (i vs j).