

INTRA-ARTICULAR INJECTION OF PERIPHERAL BLOOD-DERIVED MESENCHYMAL STEM CELLS, PLATELET-RICH CONCENTRATE AND BONE MARROW CONCENTRATE FOR ARTICULAR CARTILAGE REPAIR AND REGENERATION

Liew TWS; Othman R; Nabillah AR; Chong PP; Kamarul T

National Orthopaedic Centre of Excellence for Research and Learning (NOCERAL), Department of Orthopaedic Surgery, Faculty of Medicine, Universiti Malaya, 50603 Kuala Lumpur, Malaysia.

INTRODUCTION:

The use of platelet-rich concentrate (PRC)¹, bone marrow concentrate (BMAC)¹ and mesenchymal stem cells (MSC)² have been widely used to treat cartilage injury via transplantation with good results. This study aims to isolate, quantify, and compare their efficacies given as intra-articular injections.

METHODS:

The experiment was conducted on New Zealand white rabbits. The cartilage defect was created surgically. A week later, treated with weekly intra-articular injection for three consecutive weeks. After six months, the results were then scored based on their gross morphology and histology using the International cartilage repair society score (ICRS) and the modified O’Driscoll score. The femurs were also analysed using the high resolution peripheral quantitative computed tomography (HR-pQCT).

RESULTS:

Statistical analysis using ANOVA showed statistically significant improvement in the BMAC+PRC group in both gross morphology and histology (Fig 1&2). HR-pQCT has showed significant difference among the groups

Figure 1: The distribution of mean and standard deviation of the ICRS scores.

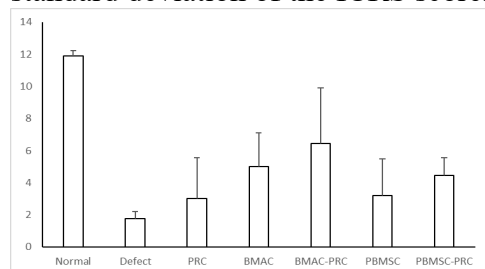


Figure 2 The distribution of the mean and standard deviation of the modified O’driscoll scores.

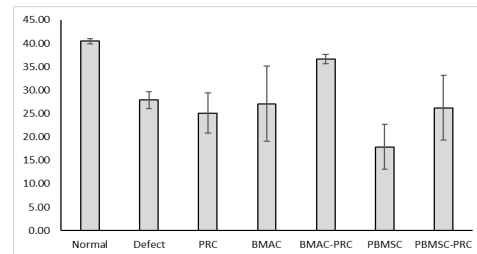
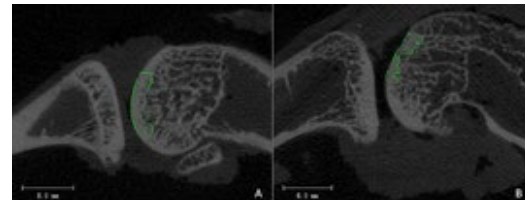


Figure 3: The HR-pQCT image showing A: normal knee and B: Defect knee.



DISCUSSIONS:

The results of BMAC+PRC showed the best outcome when compared to the defect group. Our study fixed and standardised the concentration and amount of each treatment. PBMSC, 1 million cells per injection in 300 ul of saline. PRC, at 300-500 percent of the basal concentration in blood, and BMAC, 15-20 million cells/ml.

CONCLUSION:

This study showed BMAC+PRC group has the best results. This is likely due to its high concentration of MSCs and growth factors.

REFERENCES:

- Centeno, C et. al. Biomed Res Int, 2014, 370621. doi:10.1155/2014/370621
- Dashtdar, H et. al. J Orthop Res, 2011, 29(9), 1336-1342. doi:10.1002/jor.21413