

# **Comparative in vivo study of injectable biomaterials combined with BMP for enhancing tendon graft osteointegration for anterior cruciate ligament reconstruction.**

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## **Abstract:**

This study was to compare effect of osteointegration of grafted tendon in bone tunnels between injected calcium phosphate cement (ICPC) and injected fibrin sealant (IFS) combined with bone morphogenetic protein (BMP) after anterior cruciate ligament (ACL) reconstruction. ACL reconstruction was performed bilaterally in 51 rabbits. ICPC-BMP composite was injected into one knee, with the contralateral knee IFS-BMP composite. The rabbits were killed at postoperative weeks 2, 6, and 12 for testing. Histological observations showed the ICPC composite gradually increased the new bone formation during the whole healing process, while the IFS composite had a burst effect on enhancing the healing of tendon-to-bone at 2 and 6 weeks. By 12 weeks, there was more new cartilage and new bone in the interface in the ICPC-bBMP group. Micro-CT showed that the values of BMD in the ICPC-bBMP group were lower than those in the IFS-bBMP group at 6 weeks, while the values in the ICPC-bBMP group were higher than those in the IFS-bBMP group at 12 weeks ( $p > 0.05$ ). Fluorescent labels showed that the rate of new bone formation of IFS-BMP composite was significantly higher than that of ICPC composite at 6 weeks ( $3.45 \pm 0.62$  mm/day vs.  $2.93 \pm 0.51$  mm/day), but the rate was decreased compared with ICPC composite at 12 weeks ( $2.58 \pm 0.72$  mm/day vs.  $3.05 \pm 0.68$  mm/day;  $p < 0.05$ ). Biomechanically, the ultimate failure load in the ICPC-BMP group was always higher than that in the IFS-BMP group. It is evident that the ICPC composite achieved a more prolonged osteogenic effect than that by IFS composite. © 2011 Orthopaedic Research Society Published by Wiley Periodicals.