Smith+Nephew

CONCELOC◊
Advanced Porous Titanium

Pre-clinical animal study

Osseointegration of the CONCELOC Advanced Porous Titanium was assessed in a previously validated, load-bearing ovine model.[1] This model was purposefully developed as a more challenging ingrowth model due to the higher stresses and micromotions observed in the sub-articular region compared to the more standard implantation sites in the femoral diaphysis or metaphysis, for example.

Semi-circular implants were fabricated with either the CONCELOC porous structure (Figure 1a) or CP-Ti beads (Figure 1b) on the top and bottom surfaces. Bilateral defects were created in the cancellous bone of the proximal tibias of adult sheep parallel to and approximately 3mm below the medial tibial plateaus (Figure 2a). One of each type of implant was randomly assigned to the left or right limb and press-fit into each bilateral defect (Figure 2b). After 12 weeks, tibiae were harvested and subjected to biomechanical testing (n=8 per porous structure) to assess the force required to push the implants out of the bone.

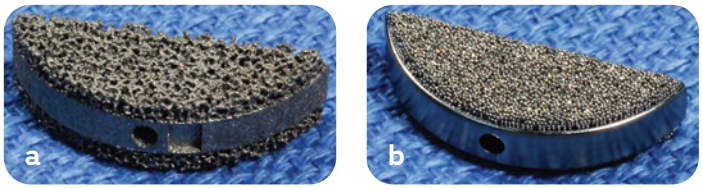

Figure 1. Images of the (a) additive-manufactured CONCELOC and (b) CP-Ti bead sub-articular implants.

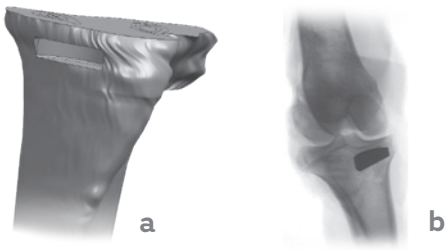

Figure 2. (a) A schematic illustration of the defect created in the proximal tibia below the tibial plateau and (b) an X-Ray of one of the CONCELOC implants in the tibia.

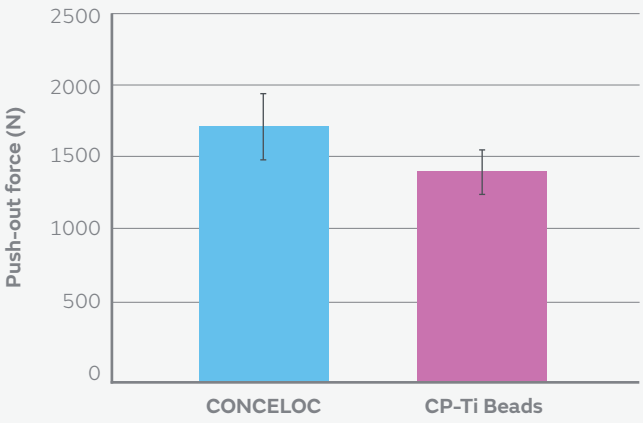

Figure 3: Mean push-out forces for the CP-Ti beads and CONCELOC Advanced Porous Titanium after 12 weeks *in vivo*.

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References

1. S. Fenwick, D. Wilson, M. Williams, J. Penmetsa, K. Ellis, M. Smith, J. Dodd, J. Pitcher and M. Scott, "A load bearing model to assess osseointegration of novel surfaces - A pilot study," World Biomater Cong, Amsterdam, NL, May 28-Jun 1, 2008, 233.