Results: rhBMP-2 was retained at surgical site up to 7 weeks after surgery (Fig. 1). There was no difference in the area under the curve between rhBMP-2 concentrations (1.5BMP = 18.1 ± 0.5 mm², 4.5BMP = 23.4 ± 5.2, Fraction Days). Radiographs demonstrated an increase in bone density both within and outside the core defects and a decrease in CPM with time in both BMP groups. Radiographic evaluation of the CPM and SXCT groups indicated walling of the core defects with a thin rim of bone. There was minimal increase in bone density outside the core defect and the majority of the initial CPM was apparent at 8 weeks. Histologic evaluation of the 1.5BMP distal radial core defects at 1 week revealed appositional new bone formation beginning on existing trabecular adjacent to the defect. The bone marrow was highly cellular with numerous spindle shaped cells and new blood vessels. TRAP positive osteoclasts were also observed resorbing the periphery of the CPM. There was considerable hemorrhage filling the distal radial core defects in the SXCT animals at 1 week. However there was no evidence of new bone formation at this time point. At two weeks, in addition to increased appositional new bone formation, increased vascularization and resorption of CPM, there was considerable de novo bone formation present in the trabecular spaces adjacent to the core defects in the 1.5BMP distal radius animals. Appositional new bone formation, increased marrow cellularity and vascularization were confined to the thin rim surrounding the core defects in the SXCT animals at 2 weeks.

Discussion: This study demonstrated rapid induction of de novo and appositional trabecular bone within and adjacent to core defects treated with rhBMP-2/CPM compared to CPM alone and SXCT in nonhuman primates. The higher BMP concentration was associated with a small amount of transient bone resorption at 4 weeks. The rate of CPM resorption was accelerated in the presence of BMP. The results of this study provide strong rationale for investigating the use of rhBMP-2/CPM to accelerate metaphyseal fracture repair in animals and people.