Δ BMP-2 is Superior to PDGF for Bone Defect Healing in a Small Animal Model

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Purpose: Various strategies have been reported for bone defect and nonunion management, including the application of growth factors. Bone morphogenetic protein-2 (BMP-2) and platelet-derived growth factor-BB (PDGF) are 2 of the more promising and commercially available growth factors for augmenting bone healing. While evidence exists for their individual effectiveness, their relative potency is unknown. We therefore sought to compare the relative efficacy of BMP-2 and PDGF for bone defect healing in a small animal model.

Methods: A 5-mm bone defect was created in the right femur of adult male rats. This was stabilized with a mini-plate and screws, with defect treatment as follows (n = 10 per group): (1) control group, no treatment; (2) β-TCP group, β-tricalcium phosphate carrier; (3) β-TCP + PDGF group, β-TCP carrier with PDGF-BB; (4) ACS group, absorbable collagen scaffold carrier; and (5) ACS+BMP-2 group, ACS carrier with BMP-2. Radiographs were performed bi-weekly for 10 weeks, after which the femora were harvested and subjected to biomechanical testing. Radiographic union, ultimate torque, yield point, and maximum stiffness were compared.

Results: Radiographs demonstrated significantly improved healing in the BMP-2 treatment group relative to all other groups (P<0.05), as reported previously. Notably, 100% of animals with BMP-2 treatment achieved full union, while only 20% of animals in the PDGF treatment group healed. Biomechanical analysis demonstrated significantly higher ultimate torque, yield point and maximum stiffness in the BMP-2 treatment group (P<0.05, see Figure 1).

Conclusion: BMP-2 treatment resulted in significantly improved healing and mechanical properties compared to PDGF in a small animal bone defect model. These results have implications for the use of these growth factors for the augmentation of fracture repair in bone defects and nonunions.

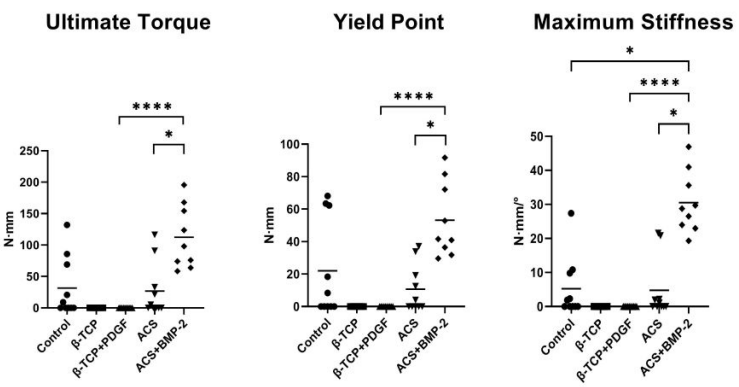

Figure 1: Graphs demonstrating mean and individual values of ultimate torque, yield point, and maximum stiffness. (*) denotes a statistically significant difference.

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See the meeting website for complete listing of authors' disclosure information. Schedule and presenters subject to change.