Effects of the combination of Bone Morphogenetic Protein (rh-BMP-2) and Platelet Derived Growth Factor (rh-PDGF-BB) on ectopic bone formation in rats

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The specific aim of this investigation is to evaluate the osteoinductive potential in the rat ectopic bone formation model after implantation of a combination of rh-BMP-2 and rh-PDGF-BB on ACS and TCP carriers at 2 and 4 weeks of healing. Eight male immunocompetent 5-month-old Sprague-Dawley rats were used. A combination of rh-BMP-2 and rh-PDGF-BB was randomly implanted subcutaneously in the back of the animals at 4 sites per rat using two different carriers (ACS and beta-TCP)' giving a total of 32 experimental sites. Rats were sacrificed at 2 and 4 weeks post operatively. Micro-CT imaging was performed and tissue and bone volume analysis was calculated. H&E staining was performed for histologic and histomorphometric analysis. One-way ANOVA and Unpaired T-test were used to determine statistical significance between the groups and a P<0.05 was considered as significant. All animals tolerated successfully the surgical procedure and samples were obtained after euthanasia. 2 experimental sites were reabsorbed in the ACS group at 4 weeks. Micro-CT analysis revealed no bone growth in 4 ACS samples: Two at 2 weeks and two at 4 weeks respectively. Bone volume over total sample tissue volume ratio was significantly lower in the ACS group at 2 weeks (P<0.05). No statistically significant differences were observed regarding bone volume formation at 4 weeks of healing in the experimental groups. Histologic sections revealed new bone formation with both carriers in all the remaining samples. Extra-cellular matrix mineralization, high vascularity and osteoblasts and osteocytes disposed in lacunae were observed in all the samples. This study shows that the combination of rh-BMP-2 and rh-PDGF-BB successfully induced bone formation in the ectopic bone formation in rats. Within the limitation of the study, statistical analysis didn't find significant differences regarding the carriers. Time period showed to be significant in terms of mineralization on the ACS group.