Osteoinduction by Combining BMP-2 with a Biodegradable Novel α-Tricalcium Phosphate/Poly(D,L-lactide-co-glycolide) Nanocomposite

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Introduction

The annual incidence of fractures in the UK is almost 4%.1 Bone grafting procedures and segmental bone transport have been employed for bone tissue regeneration. However, their limited availability, donor site morbidity and increased cost mean that there is still a large requirement for alternative methods and there is considerable research into regeneration using BMPs. The aims of this study are to synthesise and combine BMP-2 with a novel nanocomposite and study its release.

Materials and Methods

BMP-2 was synthesised using an E. coli expression system and purified. C2C12 cells were used to test its bioactivity using an ALP assay. The modified solution evaporation method2 was used to fabricate α-TCP/PLGA nanocomposite and it was characterized using SEM, TEM, TGA, XRD, EDX and particle size analysis. The release pattern of adsorbed BMP-2 was studied using an ELISA assay.

Results

SEM (Figs. 1&2) suggests that there was a homogeneous distribution of α-TCP nanoparticles within the PLGA matrix. The ALP activity reported in Fig. 3 suggests that the BMP-2 was bioactive and successfully adsorbed onto the surface of the α-TCP/PLGA nanocomposite. A burst release pattern of BMP-2 was observed (Fig. 4). Further research will optimise this release pattern and test mechanical strength.

Discussion and Conclusions

Bioactive BMP-2 was synthesised and combined with α-TCP/PLGA nanocomposite, producing a biodegradable and osteoinductive material which has potential for use in bone regeneration.

References


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Disclosures

The authors have no commercial conflict of interest to disclose.