

# Injectable Self-Hardened Synthetic Bone Cement (Osteopaste) As A Filler For Bone Defects: A Histological Result From Experimental Study In New Zealand White Rabbits' Tibia

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## INTRODUCTION:

Calcium phosphate cements have become a subject of interest in biomedical material researchers to promote healing of bone fracture or in reconstructed implantation of injectable Osteopaste was bone defects because of their excellent biocompatibility and bioactivity<sup>1</sup>. So far, there is no locally product of injectable calcium phosphate cement in Malaysia. Therefore, injectable Osteopaste has been designed to conduct pre-clinical evaluations (*in vivo*) on critical size bone defects (CSD) of New Zealand White rabbits. The compared with currently available commercialized bone graft namely Jectos (calcium phosphate) and MIIG® – X3 (calcium sulphate). This injectable Osteopaste is hoped to be used as an alternative bone graft substitute to promote new bone formation and bridge the critical size bone defects.

## MATERIALS & METHODS:

A CSD of approximately 4.5 mm (width) X 9.0 mm (length) were created at proximal tibial metaphysis of rabbit's right leg and then, implanted with either Osteopaste, Jectos or MIIG – X3. CSD without treatment served as negative control. The new bone formation was assessed by histological analysis at day 6, 12 and 24 weeks post-implantation.

## RESULTS:

The defect closure and the new bone area gradually increased with the healing time. The results demonstrated that new bones in Osteopaste groups bridged the defect at 12 weeks onwards. New bones in MIIG-X3 group bridged the defect at 24 weeks. Meanwhile, in Jectos group, there was no bridge to close CSD.

Repeated measurement ANOVA was done shows there was significant difference of length between two bridges between Osteopaste, Jectos and MIIG-X3 ( $p < 0.05$ ). However, new bone area and without new bone area were not significant difference between Osteopaste, Jectos and MIIG-X3 ( $p > 0.05$ ).

## DISCUSSIONS:

The Osteopaste had formed direct bonding with host bone without intervening of soft tissue after 6 weeks of implantation. The contact of bone to the Osteopaste is intimate and direct, exhibiting better osteoconduction, osteoinduction and osteointegration at the interface between material and bone.

Degradation process of Osteopaste was observed through 6 weeks implantation. As the implantation time prolonged, the area of Osteopaste continued reduce with the gradually increase of newly formed bone, indicating that a cell-mediated resorption of Osteopaste occurred.

## CONCLUSION:

Injectable Osteopaste is a bone graft substitute that is comparable as commercial bone graft in the market for the treatment of bone defects.

## REFERENCES:

1. Hu, G., Xiao, L., Fu, H., Bi, D., Ma, H., Tong, P. Study on injectable and degradable cement of calcium sulphate and calcium phosphate for bone repair. *Journal Material Medicine* 2010; 21: 627-634.