

Chaiyakorn Thitiyanapom 2013: Effects of Antibiotic Coated High Porous Calcium Sulfate Beads on Osteomyelitis Management: *in vitro* and *in vivo* Studies. Doctor of Philosophy (Agricultural Biotechnology), Major Field: Agricultural Biotechnology, Interdisciplinary Graduate Program. Thesis Advisor: Associate Professor Naris Thengchaisri, Ph.D. 94 pages.

The high porous calcium sulfate (HPCS) bead was created in this study by salt leaching technique. In the first study, variations of the ratio between calcium sulfate (CS) and sodium chloride salt made the different porosity levels of CS bead with determine the ceftazidime elution pattern from the CS beads. The maximum ratio of CS per sodium chloride was 1:1 w/w that could increase the total porosity level up to 50%. The highest porosity level of CS is the high porous calcium sulfate (HPCS) bead. The HPCS bead could provide total amount of the ceftazidime as same as the native calcium sulfate (NCS) bead with a shorter period than NCS bead. In the second study, the gentamicin impregnated polymethylmethacrylate (GI-PMMA) bead with gentamicin coated PMMA (G-PMMA) were compared with gentamicin coated NCS (G-NCS) and gentamicin coated HPCS (G-HPCS) beads on gentamicin releasing. G-NCS and G-HPCS beads could provide the gentamicin concentration higher than GI-PMMA and G-PMMA beads and also found that the coating technique could be used only in CS bead in this study. For the third study, the efficiency of GI-PMMA, G-NCS and G-HPCS beads were compared in the management of osteomyelitis in a rat model. The results showed that G-HPCS bead could be used for the osteomyelitis management as G-NCS bead whereas G-PMMA bead had to be removed from the bone and created a defect on the bone cortex.

The results of studies showed that the HPCS bead is a new type of CS bead that can be used as an antibiotic carrier for osteomyelitis management. In addition, the HPCS bead also has a positive effect for the new bone regeneration.

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