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# [O65] NOVEL CALCIUM PHOSPHATE ANTIBIOTIC CARRIER FOR BONE HEALING WITH SLOW RELEASE PROPERTIES

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**Aim:** Chronic osteomyelitis often requires surgical debridement and local antibiotic treatment. Disadvantages of PMMA carriers include low dose release and the requirement of surgical removal in the case of PMMA-beads[1] . Synthetic nanocrystalline calcium phosphate (nCP) materials, which mimic the chemical structure of the mineral composition of bone, have been well accepted as bone grafting materials due to their consistent osteoconductivity, ease of use, and mechanical properties[2] . Such a material which remodels into native bone is a much more attractive option. The aim of this study is to investigate the release of gentamicin from CaP in vitro and in vivo when implanted in a rabbit femoral condyle defect.

**Method:** Three formulations of nCP were evaluated in this study: putty, paste and porous. Four cylindrical dowels were made for each group with gentamicin sulphate at a concentration of 20mg/cc of paste. Material were eluted in PBS at 37C and pH 7.0 and elutions were tested every day up to 30 days. Eighteen New Zealand white rabbits will undergo surgeries. Briefly, a drill defect will be created in the metaphyseal bone of the lateral femoral condyle. The formulations will be implanted in the created defect at time of surgery and the wound will be closed. Blood will be collected regularly and analyzed for gentamicin titers. Animals will be sacrificed at 6wk, 12wk or 24wk. Explanted femurs will be fixed, sectioned and stained.

**Results:** At 7 days the in vitro elution, showed a continued release of gentamicin. A large amount of gentamicin is released within the first day followed by a slow controlled release. The nCP putty shows the slowest release, followed by the paste and porous formulations respectively. There is a significant increase in the elution with an increase in porosity of the material. We expect to observe a similar trend in the rabbit study with an improved healing. At 6wk we expect the implant material to be still present at the site of implantation, which would remodel by 12wk and 24wk to significant levels due to active ossification.

**Conclusions:** nCP materials, which undergo remodeling, can be used an effective carrier for gentamicin or other antibiotic agents. Because of its potentially prolonged release of high levels of antimicrobial agents, this system could maintain long-term antibacterial effectiveness locally.

**References:**

[1] Stallmann H et al, BMC Musculoskeletal Disorders 2006 (7) p18
[2] Faour O et al, Injury 2011 (42) pS87