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Abstract No.38370: In vivo safety and efficacy of antibacterial-loaded DAC hydrogel coating of orthopaedic implants

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Topic: Research - ii. Basic Science: Biomaterials and Implants

Introduction: Implant-related infection remains one of the first reasons for failure of implanted biomaterials in orthopaedics. In vitro studies have shown the ability of a fast resorbable hydrogel (DAC, Novagenit Srl, Mezzolombardo, Italy), loaded with different antibacterials, to prevent bacteria colonization and biofilm formation on various substrates. Aim of the present study was to evaluate the safety and efficacy of the coating in an animal model of highly contaminated implant. **Methods:** 18 New Zealand White Rabbits (Charles River, France), divided in three groups: no hydrogel (N = 6), hydrogel (N = 6), hydrogel + vancomycin 5% (n = 6), underwent tibial titanium intramedullary nail implant. At the time of implant all rabbits received a local inoculum of 10E5 CFU of Staph. aureus (Wood 46—ATCC 10832). No systemic antibiotic prophylaxis was administered in either group. Four weeks after implant, serological parameters, weight loss, CFUs and hystology were evaluated. Student's t test or Fisher exact test were used for statistical analysis. The study has been funded by the European Community (7th Framework Programme - Grant # 277988) and approved by local ethical committee. **Results:** Hydrogel + vancomycin group showed no serological changes, weight loss, positive CFU or histological changes, at variance with the other two groups ($p < 0.05$). **Discussion:** Vancomycin-loaded hydrogel DAC coating is able to prevent implant-related infection in an highly contaminated animal model and in the absence of systemic antibiotic prophylaxis, without detectable local or general side effects.