PP-125

Osseous integration of silver-coated orthopedic prostheses – An animal model

G. Gauschild, S. Hoell, **J. Hardes**, G. Gosheger, S. Stoeppeler, H. Ahrens, F. Blaske, C. Wehe, U. Karst, A. Streitbuerger
Münster University Hospital, Münster, Germany

Introduction: Periprosthetic infection of orthopedic (mega-) prostheses still is to be seen as a common and serious complication in orthopaedic oncology. The efficiency of silver-coated orthopaedic (mega-) prostheses in reducing these infections has been proven but is limited to surface areas exposed to soft-tissues at present. This is due to concerns regarding possible inhibition of osseous integration of cementless stems by silver ions. In this study osseous integration of silver-coated stems has been evaluated in a canine model.
Methods: Nine healthy female beagle dogs underwent unilateral total hip replacement using a custom made physical-vapor-deposition (PVD)- silver-coated titanium alloy stem in addition with a cemented polyurethane cup and a modular head each. Follow up was about 12 months including clinical assessment, blood count, blood chemistry, c-reactive protein, metal ions and x-rays. After sacrification biomechanical testing as well as histological examinations and laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS) of the prosthesis-bone-interface were carried out.
Results: Stable osseous integration had been achieved in four out of nine stems implanted. Silver trace elemental concentrations in serum did not exceed 1.82 parts per billion (ppb) and can be considered as non-toxic. Changes in liver and kidney functions associated to the silver-coating could be excluded by blood chemistry analysis. This was in accordance to very limited metal displacement from coated surfaces observed by laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) 12 months after implantation.
Conclusion: Our study reports about a PVD (physical-vapor-deposition)-silver-coated cementless stem in a canine model for the first time and proved osseous integration of a silver-coated titanium surface in-vivo in principle. The occurrence of reduced secondary stability or loosening is subject to further investigations. Our results represent a step towards complete bactericidal silver-coating of orthopaedic prostheses.