**Dokumenttyp:**
journal article

**Autor(en) des Beitrags:**
Gorzelanny, Christian; Kmeth, Ralf; Obermeier, Andreas; Bauer, Alexander T; Halter, Natalia; Kümpel, Katharina; Schneider, Matthias F; Wixforth, Achim; Gollwitzer, Hans; Burgkart, Rainer; Stritzker, Bernd; Schneider, Stefan W

**Titel des Beitrags:**
Silver nanoparticle-enriched diamond-like carbon implant modification as a mammalian cell compatible surface with antimicrobial properties.

**Abstract:**
The implant-bone interface is the scene of competition between microorganisms and distinct types of tissue cells. In the past, various strategies have been followed to support bony integration and to prevent bacterial implant-associated infections. In the present study we investigated the biological properties of diamond-like carbon (DLC) surfaces containing silver nanoparticles. DLC is a promising material for the modification of medical implants providing high mechanical and chemical stability and a high degree of biocompatibility. DLC surface modifications with varying silver concentrations were generated on medical-grade titanium discs, using plasma immersion ion implantation-induced densification of silver nanoparticle-containing polyvinylpyrrolidone polymer solutions. Immersion of implants in aqueous liquids resulted in a rapid silver release reducing the growth of surface-bound and planktonic Staphylococcus aureus and Staphylococcus epidermidis. Due to the fast and transient release of silver ions from the modified implants, the surfaces became biocompatible, ensuring growth of mammalian cells. Human endothelial cells retained their
cellular differentiation as indicated by the intracellular formation of Weibel-Palade bodies and a high responsiveness towards histamine. Our findings indicate that the integration of silver nanoparticles into DLC prevents bacterial colonization due to a fast initial release of silver ions, facilitating the growth of silver susceptible mammalian cells subsequently.