Liquorice nanotech component offers clue to cleaner medical implants

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A nanotech material containing an extract from liquorice can be used to sterilize and protect medical devices and implants which include biological components, and protects these functional bio-components during the sterilization process.

Publishing their findings in the latest issue of *Materials Today*, a team of researchers from Germany and Austria explain how conventional sterilization techniques based on a blast of radiation, or exposure to toxic gas can damage the functional biological components of the device. The coating, containing a component found in liquorice and developed by German biotech company LEUKOCARE AG, protects these sensitive components.

Joachim Koch of the Georg-Speyer Haus, Institute for Biomedical Research in Frankfurt am Main in Germany and colleagues explain how medical devices and implants are increasingly functionalized using pharmacologically active proteins, antibodies and other biomolecules. Harsh sterilization procedures, including beta and gamma irradiation or exposure to toxic ethylene oxide can damage these sensitive molecules and render the device useless. However, without sterilization the patient is at risk of infection when the device is used or implanted.

The team has now successfully evaluated the nano-coating; a technology which employs a composition of stabilizing nano-molecules. One important ingredient is a compound known as glycyrrhizic acid, a natural, sweet-tasting chemical found in liquorice. Unlike other

stabilizing approaches used in biopharmaceutical formulations, the nano-coating contains no sugars, sugar-alcohol compounds or proteins that might otherwise interfere with the biological activity of the device.

The team has tested the nano-coating by coupling and stabilizing an anti-inflammatory antibody to a porous polyurethane surface. This carrier acts as a surrogate for a medical device. Such a system might be used as a therapeutic implant to reduce inflammation caused by an overactive immune system in severely ill patients. The researchers found that even if the test device is blasted with radiation to sterilize it entirely, neither the nano-coating nor the proteins are damaged by the radiation and the activity of the device is maintained.

"This nano-coating formulation can now be applied for the production of improved biofunctionalized medical devices such as bone implants, vascular stents, and wound dressings and will ease the application of biomedical combination products," Koch explains.

More information: This article is "Nano-coating protects biofunctional materials" by Rupert Tscheliessnig, Martin Zornig, Eva M. Herzig, Katharina Luckerath, Jens Altrichter, Kristina Kemter, Adnana Paunel-Gorgulu, Tim Logters, Joachim Windolf, Silvia Pabisch, Jindrich Cinatl, Holger F. Rabenau, Alois Jungbauer, Peter Muller-Buschbaum, Martin Scholz, and Joachim Koch (DOI: 10.1016/S1369-7021(12)70166-9) .The article appears in *Materials Today*, Volume 15, Issue 9, Page 394 (2012)

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