High-tech wound dressing fights infection in mouse trial

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(Phys.org) -- An ultra-thin layer of polymer impregnated with a surgical anti-bacterial aided healing by preventing infection in a mouse study performed at the University of Wisconsin-Madison.

Using a technology developed in the lab of Nicholas Abbott, a professor of chemical engineering, Abbott, Ankit Agarwal and colleagues crafted a polymer nanofilm containing chlorhexidine, and then stamped it onto a biologic wound dressing that is already on the market.

The commercial dressing is sometimes called a skin substitute because it is embedded with biological compounds that promote healing, and so it is a prime treatment for burns and persistent wounds. But Agarwal, an honorary associate in the UW-Madison Department of Chemical Engineering, notes that infection can block healing in as many as 20 percent of patients.

To fight infection, doctors can place a gauze containing chlorhexidine on the biological dressing, but the high concentration of the anti-bacterial kills skin cells and retards healing, and the gauze must periodically be re-applied.

The nanotechnology approach releases a much smaller dose of chlorhexidine, and in the mouse study described today in the online edition of the journal *Biomaterials*, it also blocked infection while promoting healing.

"Our goal was to reduce the amount of antibacterial agent needed, so it's not toxic to the healing cells, just to bacteria, and to reduce the need to reapply the solution," says Agarwal. "By incorporating this nanofilm on the wound-contact surface of the skin substitute, we provide a sustainable and prolonged localized release of the antiseptic on the wound."

In the first study to test the use of specially treated nanofilms to speed healing in an animal model, the new material reduced the number of bacteria colonies by 99.9 percent after three days, Agarwal says. "In burns and chronic ulcers, if we can prevent infection for three days following the application of the skin substitute, there is a 90 percent chance the treatment will be successful."

The study was funded by the National Institutes of Health and an innovation and economic development research grant from the Graduate School at UW-Madison. Veterinary surgeon Jonathan McAnulty at UW-Madison directed the animal study, and burn surgeon Michael Schurr, at the University of Colorado, Denver, provided input on the human, clinical aspects.

Provided by University of Wisconsin-Madison