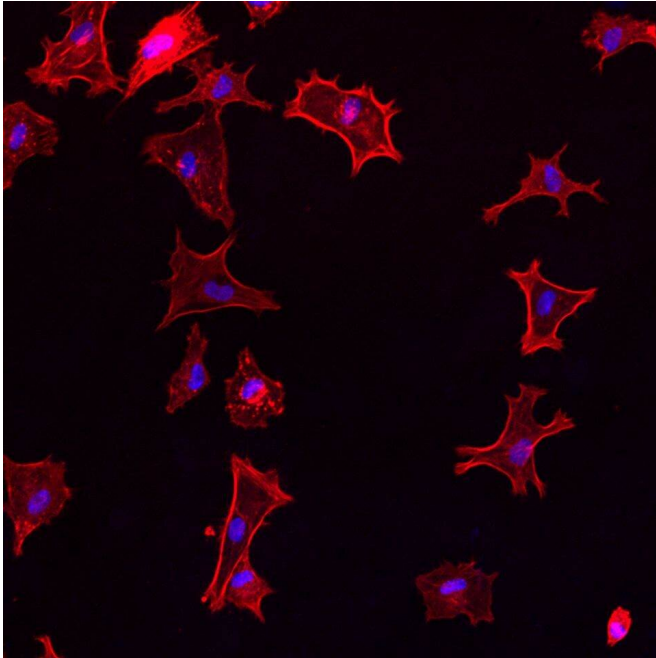


A wound dressing that kills bacteria

11 August 2020



Yoga for connective tissue cells: In the presence of functionalized cellulose, connective tissue cells, as hoped, attach themselves more effectively and spread on the surface. Credit: Empa

If germs invade a wound, they can trigger a long-lasting infection that may fail to heal or even spread throughout the body, leading to life-threatening blood poisoning (sepsis). The problem of antibiotic resistance is becoming more and more widespread, particularly in complex wounds, as bacteria such as staphylococci have become resistant to what was once the miracle weapon of medicine. Empa researchers have therefore developed cellulose membranes, with which these infections can be eliminated early on.

The team led by Empa researcher Katharina Maniura from the Biointerfaces lab in St. Gallen produced fine membranes from cellulose using electrospinning technology. The [cellulose fibers](#) with a diameter of less than one micrometer were spun into a delicate multi-layered, three-

dimensional fabric. The membranes became particularly flexible and at the same time stable after the researchers had added the polymer polyurethane to the spinning process.

In order to achieve an antibacterial effect, the researchers designed multifunctional peptides—which can bind to cellulose fibers and exhibit [antimicrobial activity](#). Peptides have several advantage compared to larger proteins: They are easier to produce and more stable than proteins, which react more sensitively to the chemical conditions in a wound.

Skin-friendly membranes

If the cellulose membranes are treated with such a peptide solution, the fiber scaffold will become saturated with peptides. In cell culture experiments, the researchers then showed that the peptide-containing membranes are well tolerated by human skin cells. However, the cellulose membranes were a [death sentence](#) for bacteria such as staphylococci, which are often found in poorly healing wounds. "In [bacterial cultures](#), over 99.99 percent of the germs were killed by the peptide-containing membranes," says Maniura.

In future, the antimicrobial membranes will be equipped with additional functions. "The peptides might, for instance, be functionalized with binding sites that enable the controlled release of further therapeutic substances," says Maniura.

More information: Ramon Weishaupt et al. Antibacterial, Cytocompatible, Sustainably Sourced: Cellulose Membranes with Bifunctional Peptides for Advanced Wound Dressings, *Advanced Healthcare Materials* (2020). [DOI: 10.1002/adhm.201901850](#)

Provided by Swiss Federal Laboratories for Materials Science and Technology

APA citation: A wound dressing that kills bacteria (2020, August 11) retrieved 3 September 2022 from <https://medicalxpress.com/news/2020-08-wound-bacteria.html>

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