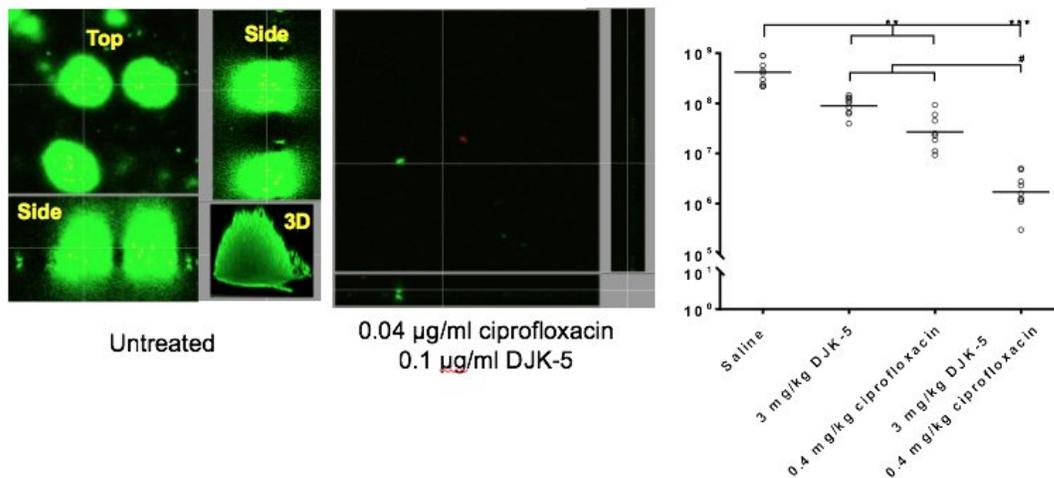


Researchers create matchmaking service for peptides and antibiotics

June 21 2018



DJK-5 in combination with ciprofloxacin prevents biofilm development in the laboratory and shows enhanced removal of bacteria in skin abscesses. The image to the left shows a confocal scanning microscope image of a biofilm, with the 3D reconstruction in the lower right hand corner. Treatment with a combination of peptide and antibiotic completely destroyed the biofilm (middle picture) and killed resistant bacteria in abscess infections in a mouse model (right panel). Biofilm reference: ncbi.nlm.nih.gov/pmc/articles/PMC4362967/ Credit: Hancock lab

UBC researchers have matched small proteins, called peptides, with antibiotics so they can work together to combat hard-to-treat infections that don't respond well to drugs on their own.

The study builds on previous research that showed that the [peptides](#) are key to making harmful [bacteria](#) more responsive to drugs.

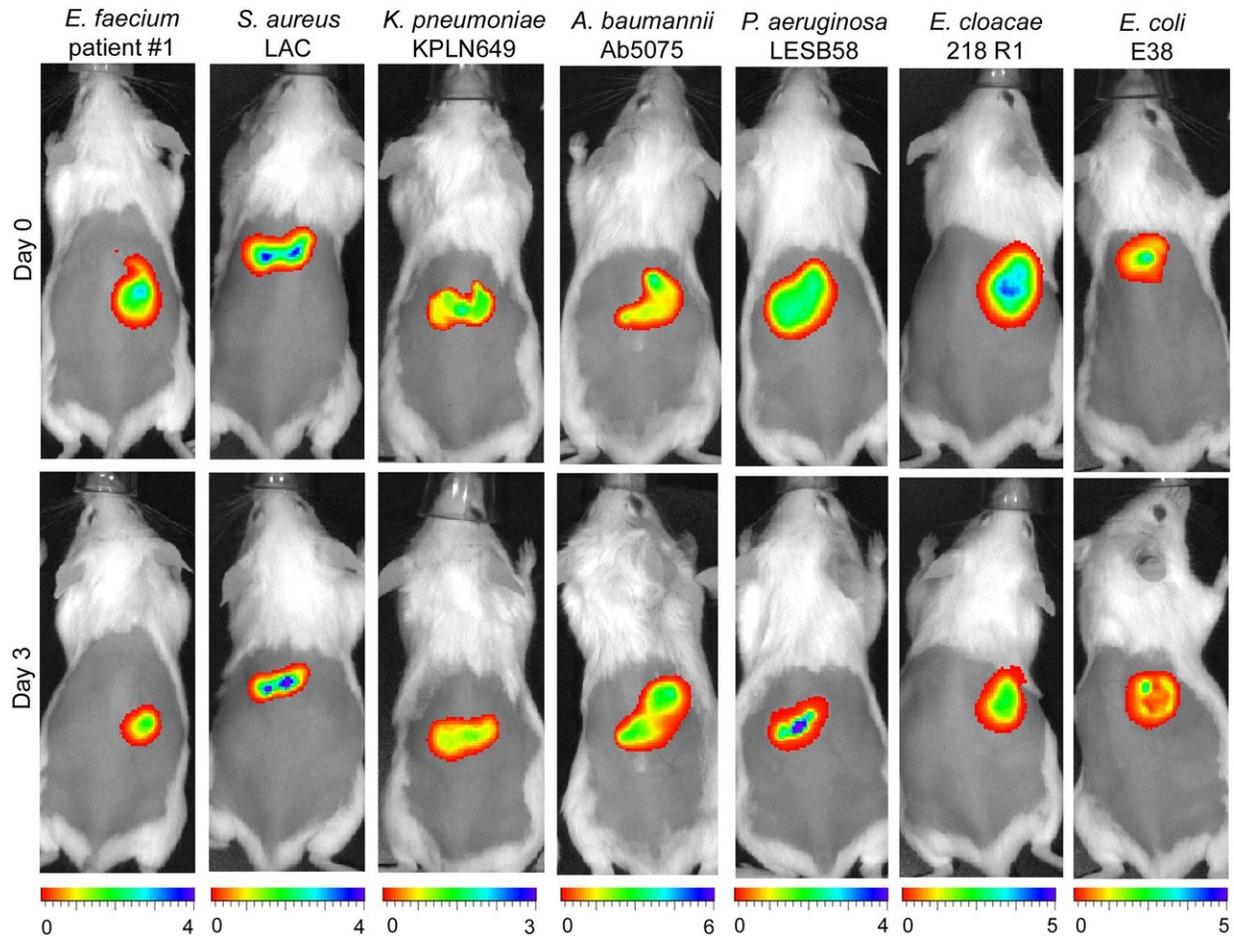
"We had developed information from earlier experiments that showed there was some good synergy between peptides and [conventional antibiotics](#)," said Bob Hancock, the senior author of the paper and a professor of microbiology and immunology at UBC. "It was our idea that maybe we could breathe some life back into antibiotics by adding peptides and thus make antibiotics work in infections where they weren't working well before."

The study aimed to find new treatments for infections caused by antimicrobial resistant bacteria including *Escherichia coli* and the so-called ESKAPE pathogens, a group named from the first-letter of six [bacteria species](#): *Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumonia*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa* and *Enterobacter*. These infections collectively account for more than 60 per cent of all hospital infections, manifesting as abscesses in the skin or infections in internal tissues like the lungs or urinary tract.

Most antibiotics are designed to work on bacteria that are swimming freely in the body. However, in the majority of infections, bacteria grow together on body surfaces in massive communities known as biofilms, shielded by a protective structure. Together, [biofilm bacteria](#) adapt to stress by learning to resist the immune system and chemicals, making them extremely resistant to antibiotics and difficult to treat.

The peptides help several antibiotics to work by removing the bacteria's ability to respond to stress and form these resistant communities. To find the best combination of peptide and drug, the researchers tested different options in a laboratory setting. Once they identified possible mixtures, they tested them in mice with abscesses on their skin. In total, they found seven combinations that worked better than [antibiotics](#) on

their own.



In vivo tracking of bioluminescently labeled (live) bacterial infections. Credit: Pletzer et al (2018)

"Not every combination will work and it required lots of testing to find the right combinations of peptides and antibiotic to treat the dense infections in skin abscesses," said Daniel Pletzer, lead author of the study and postdoctoral fellow in the department of microbiology and immunology.

When the peptides worked in combination with the drugs, the researchers observed a reduction in the size of the abscess in mice and the number of bacteria in the [infection](#) area. The combinations offered up to 100-fold improvement.

The results are particularly important for patients with cystic fibrosis who often deal with dense, chronic infections in the lungs. The disease causes mucus to build up around tissues, creating an ideal environment for bacteria to form biofilms and thrive.

More information: Pletzer D, Mansour SC, Hancock REW (2018) Synergy between conventional antibiotics and anti-biofilm peptides in a murine, sub-cutaneous abscess model caused by recalcitrant ESKAPE pathogens. *PLoS Pathog* 14(6): e1007084. [DOI: 10.1371/journal.ppat.1007084](#)

Provided by University of British Columbia

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