



Old masters rediscovered

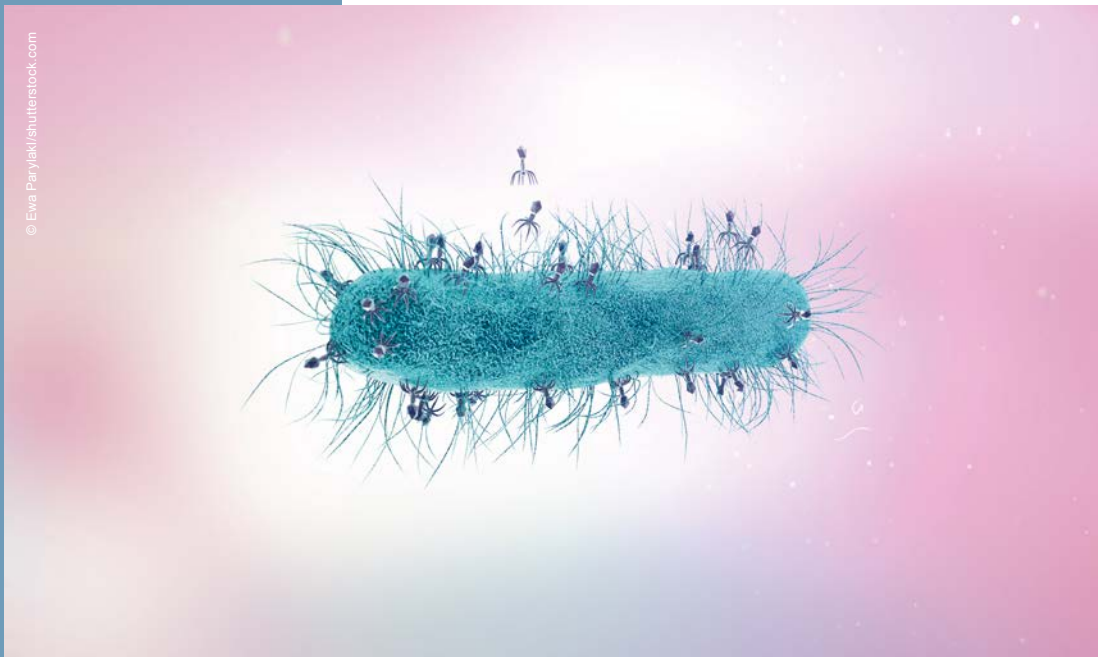
A natural remedy can put pathogenic bacteria such as listeria or salmonella in their place – even those for which antibiotics are no longer effective: bacteriophages.

A test tube with yellowy-cloudy contents sits on the laboratory bench. It contains a solution with bacteria. Dr. Stefan Hertwig, a microbiologist at the BfR, adds a shot of another liquid. The liquid will become clear and transparent within a few hours. This is the visual indication that the bacteria are dead.

They have been defeated by bacteriophages. These are viruses that can infect and kill bacteria. The little bacteria-eaters use what nature has given them: with the help of the genetic material in their heads, they enter certain types of bacteria and multiply millionfold.

This leads to a burst of the infected bacteria, therefore immobilising them. All of this takes place invisible to the human eye: the bacteria that have been attacked are 50 times smaller than the diameter of a thin human hair. Bacteriophages, like other viruses, measure in at just one tenth to one hundredth the size of bacteria.

Bacteriophages can be found in large numbers wherever bacteria are found themselves: in the ground, in water or in food. They are harmless to humans. Bacteriophages contribute to maintaining a healthy balance in our intestine, where millions of useful bacteria live.



Bacteriophages stick to the surface of bacteria with their spikes and insert their genetic material into the bacteria for virus replication.

The benefits of bacteriophages were already recognised at the beginning of the 20th century – for treating bacterial infections. After the discovery of antibiotic substances and their wide use as medicines, bacteriophages were forgotten in most countries. However, they are once again coming to the fore due to the spread of antimicrobial resistance. A clinic in Georgia is a pioneer in this field with the largest phage collection in the world. For patients with persistent wound infections, including those from Western Europe and the USA, appropriate therapies are developed on site within a few days – and with great success. But phages also have potential in the fight against bacteria in food.

Researchers like Stefan Hertwig, who work with bacteriophages, have been completely won over by the bacteria-eating viruses: “They are very efficient. Very few phages can destroy a large number of bacteria,” says Hertwig. Phages would only destroy the unwanted bacteria in a targeted way. All other ‘good’ bacteria, such as those that are important for human digestion, remain intact and continue to function. Furthermore, no genetic engineering is involved because phages occur naturally in vast numbers. “We collect them from nature and select the most effective ones in the laboratory.” And finally, they can be easily produced in large quantities.

Bacteriophage compounds can already be used in the Netherlands and Austria against listeria, for example, but this is not yet allowed in Germany. Listeria are involved in disease outbreaks caused by food time and again. Since they can survive almost anywhere and, therefore, cannot be completely destroyed, a phage compound might make food safer. The only challenge: since phages are inanimate, they would have to be sprayed on their targets in large quantities, preferably as a liquid film, on production lines in factories or on food. Types of phage must also be thoroughly researched as “disinfectants”, says bacteriophage researcher Hertwig. “And they must not insert their genetic material into the attacked bacterial cell.”

The use of phages in the European Union is still in its infancy – both in food production and medicine, but studies and successful applications open up prospects for their wider application in the future. ■

More information:

www.bfr.bund.de/en > FAQ: Bacteriophages
www.bfr-akademie.de > Archiv: Vorträge des
 20. BfR-Verbraucherschutzforums “Bakteriophagen”
 (lectures in German)