

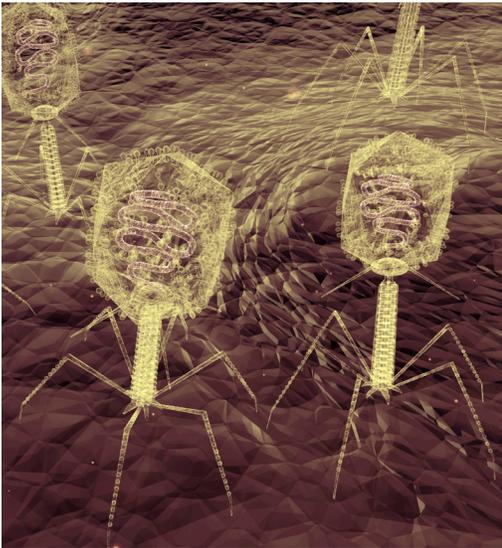
# BACTERIOPHAGE HOST-RANGE EXPANSION

Patent Pending

Technology Readiness Level:4

*Basic technological components are integrated to establish that the pieces will work together*

## TECHNOLOGY DESCRIPTION



Decades of widespread antibiotic use has created antibiotic-resistant strains of bacteria that are becoming increasingly difficult to treat. In 2006, the Federal Drug Administration (FDA) approved the use of bacteriophages (phages) for food industry applications to eliminate the presence of bacteria, such as *Listeria*, *E.coli*, and *Salmonella*. Phages have also been approved for agricultural use as an alternative to chemical pesticides, and phage treatment is popular in other countries to treat bacterial infections in humans.

As phages are host-specific, searching for, isolating, and propagating phages to target specific “problem” bacterial strains can be challenging and time-consuming. To deal with this issue, manufacturers of phage treatments have created phage “cocktails”, each containing dozens of phage strains to combat a single, specific bacterial strain. In order to receive FDA approval, each phage variant in these cocktails must be individually tested, which can take an extended amount of time.

Rather than searching the environment for bacteriophage specific to a particular bacterial strain, Sandia researchers developed a method to propagate known phage strains and mutate them in a way that expands their host-range. This method allows known phage strains to be modified to infect specific strains of bacteria. Mutant phage can become more effective against their natural hosts as well as against a wider range of hosts. By combining strains of mutant phages, problematic bacteria will be infected in multiple modes, overwhelming them and killing the entire bacterial population. Given the nature of mutant phages with broader host-ranges, the number of phage strains required for a cocktail would decrease, which in turn would speed up the FDA approval process while possibly increasing the cocktail’s efficacy. By broadening the use of currently known phage strains to fight more diverse bacterial variants, phages can be used as an alternative to, or in conjunction with, antibiotics in human health, agriculture, food processing, and veterinary industries.

## TECHNOLOGICAL BENEFITS

- Creates bacteriophage strains with increased host-range
- Reduces the number of phage strains needed in bacteriophage cocktails
- Creates ability to mutate known phage strains for specific bacteria of interest

## POTENTIAL APPLICATIONS

- Healthcare
- Agriculture
- Food safety & processing
- Hospital sterilization
- Veterinary



## CONTACT US

For more information,  
please contact:**Sandia National Laboratories**

ip@sandia.gov

Refer to SD#13347

Or to learn more,  
please visit our website at:**<https://ip.sandia.gov>**