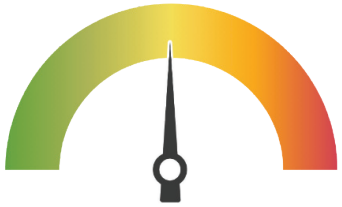
WHAT ARE THE RISKS?



Bacteria can develop resistance to phages.
But because phages have been living with bacteria for a very long time, it is unlikely that bacteria will become completely immune to them. In fact, when bacteria do become resistant to phages, they often become weaker and easier to fight off with antibiotics. Scientists are studying how to use this natural process to help us fight infections better.

Phages can potentially cause harmful immune responses.
Phages can sometimes be recognised by our immune system, which can make the treatment less effective and potentially harmful to the patient. But so far, scientists have not observed a strong immune response against phages, even when they were given directly into the bloodstream where immune reactions are stronger.

WHY IS PHAGE THERAPY NOT YET ROUTINELY USED?

Additional research required
Phages are a diverse and complex group of viruses and there is still a lot we don't know about how to use them to treat illnesses. Some important questions that scientists are trying to answer include:
* How can we stop bacteria from becoming immune to phages, or even use the process to our advantage?
* Is the immune response to phages a problem when using them as therapy?
* And what happens to phages in the body, from when they are given to when they are removed?

Regulatory issues
Current regulations for medicinal products do not really work for treatments like phage therapy, which need to be customized for each patient. People who want to use phage therapy are talking to the people who make the rules to try and find better ways to make it happen.

Lack of interest from big pharma
It is hard for companies to own the rights to phages. Plus, testing lots of different phages in clinical trials is really expensive, and the rules for using them as medicine are not totally clear yet. All of this makes it hard for big drug companies to make money from phage therapy, so they are not really interested in investing in it.

THE PHAGE COLLECTION PROJECT

University of Southampton

ALL YOU NEED TO KNOW ABOUT BACTERIOPHAGE THERAPY

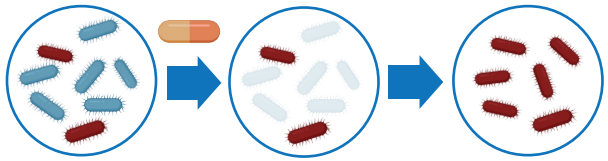
WHAT IS PHAGE THERAPY?

Bacteriophages, or phages, are viruses that only infect bacteria.
Unlike other viruses that can make us sick, such as the flu or HIV, phages don't harm people, animals, or plants. They are found anywhere that bacteria live, including soil, sewage, and water.

Phage therapy is the use of phages to treat bacterial infections.
When phages were first discovered in 1917, people quickly started using them to treat bacterial infections like typhoid, dysentery, and cholera. However, there was some debate about what phages were and how they worked. Then, in 1928, antibiotics were discovered and quickly became more popular than phage therapy in the Western world. But in Eastern Europe, limited resources and a lack of access to Western antibiotics meant that phage therapy remained popular. There are even reports of soldiers in World War II being treated with phages. Today, many people around the world turn to phage therapy when other treatments don't work to cure their bacterial infections.

WHY DO WE NEED IT?

Antibiotics are losing efficacy to treat infections with bacteria.
When we get sick from bacteria, antibiotics are often used to treat the infection.. However, using antibiotics too often or in the wrong way can cause bacteria to become resistant to them, meaning the antibiotics will not work anymore. This is becoming a huge problem all around the world. Eventually, we may run out of antibiotics that can help us fight these serious infections, which could be dangerous.



Among bacteria, only a few are resistant to antibiotics.

Antibiotics kill bacteria but the few resistant ones survive.

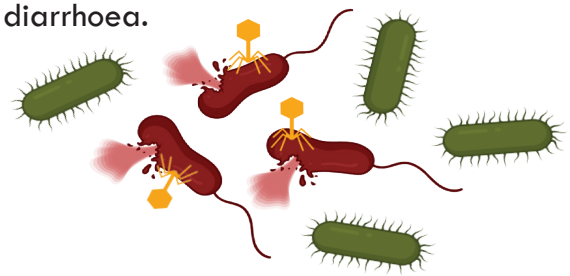
Resistant bacteria grow and take over, causing untreatable infections.

Resistance to antibiotics can change medicine as we know it.
If bacteria become resistant to antibiotics, we may face a situation similar to the time before antibiotics were discovered - we may not be able to fight off infections, and people may not live as long or be as healthy. Serious medical treatments like organ transplants, chemotherapy, and surgeries may become much more dangerous if we can't use antibiotics to prevent and treat infections that could arise from these procedures.

WHAT ARE THE BENEFITS?

Phages can kill bacteria resistant to antibiotics.
Phages and antibiotics work differently to kill bacteria. This means that if bacteria become resistant to antibiotics, they may not necessarily be resistant to phages. Therefore, phages can potentially help fight infections caused by antibiotic-resistant bacteria.

Phages are very specific.
Unlike antibiotics, phages do not kill the good bacteria in our gut and therefore do not cause side effects such as nausea, vomiting or diarrhoea.



Phages multiply at the site of infection.
Phages destroy bacterial cells by reproducing inside them. This means that when phages are used to treat an infection, they multiply at the site of infection, which makes the treatment stronger where it is needed the most.

Phage therapy can be used together with other treatments.
Phages can work well with other treatments, such as antibiotics, and combining them can improve the effectiveness of treatment.