



WPI

SUPERBUGS: THE SILENT KILLER

NEW METHODS TO FIGHT ANTIBIOTIC RESISTANT BACTERIA

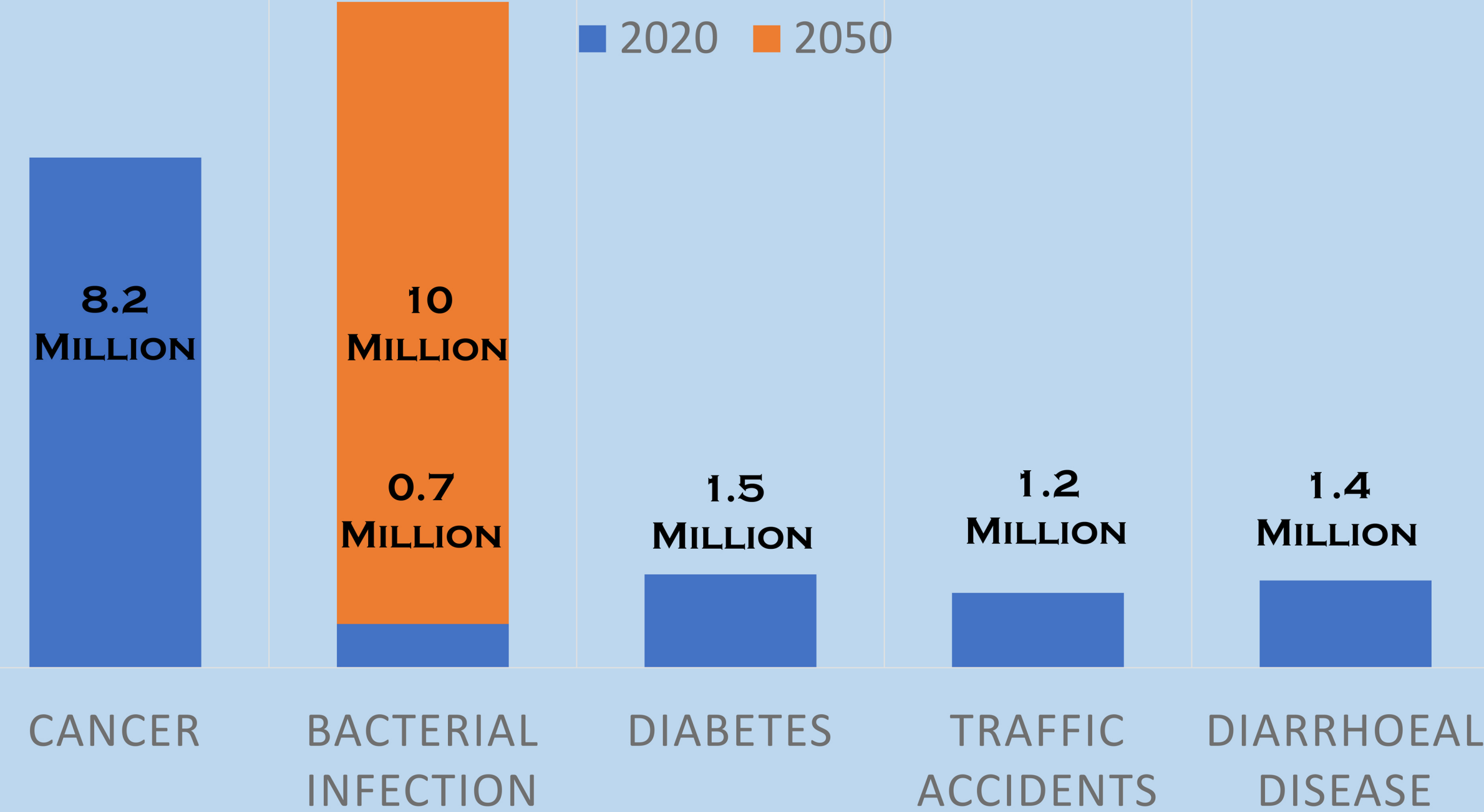
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PROBLEM

BY 2050 IS PREDICTED THAT ANTIBIOTIC RESISTANCE WILL KILL MORE PEOPLE THAN CANCER

WORLDWIDE CAUSES OF DEATH



In the U.S. **87%** of deaths due to bacterial infections are caused by **MRSA** superbugs

HOW MRSA BECOMES ANTIBIOTIC RESISTANT

1. Antibiotics are prescribed to a patient with a bacterial infection.
2. Bacteria become resistant due to adaptation and misuse of drugs. Resistant bacteria survive and become MRSA superbugs.
3. The MRSA have more room to grow and spread.
4. Bacteria can spread antibiotic resistance to other strains.

Immunocompromised patients are at an increased **risk** for developing an antibiotic resistant **infection**.

42.86% of *S. aureus* strains in diabetic foot infections account for presence of MRSA

18% of deaths with functioning transplantation grafts in the U.S. are due to infections and resistance.

REFERENCES

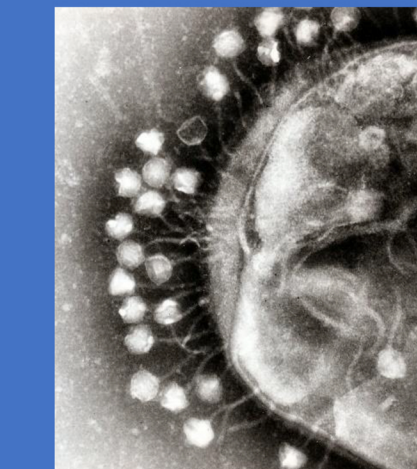
Franci, G., Falanga, A., Galdiero, S., Palomba, L., Rai, M., Morelli, G., & Galdiero, M. (2015). Silver nanoparticles as potential antibacterial agents. *Molecules*, 20(5), 8856-8874.
Julian Davies, & Dorothy Davies. (2010). Origins and evolution of antibiotic resistance. *Microbiology and Molecular Biology Reviews*, 74(3), 417-433. doi:10.1128/MMBR.00016-10
Loc-Carrillo, C., & Abedon, S. T. (2011). Pros and cons of phage therapy. *Bacteriophage*, 1(2), 111-114. doi:10.4161/bact.1.2.14590
The biggest antibiotic-resistant threats in the U.S. (2019).

Phage Therapy

What is it?

Use of Phages to kill bacteria

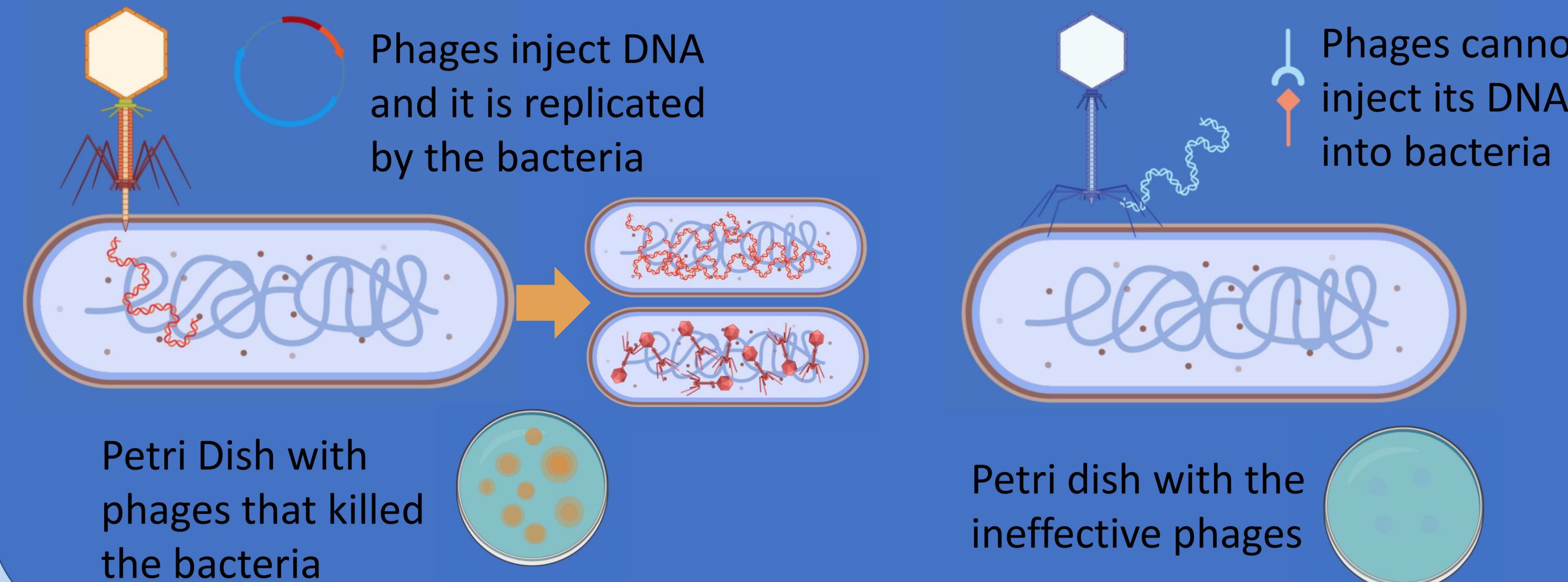
Phages are viruses that target specific strains of bacteria



Bacteriophages targeting bacteria

HOW DO THEY WORK?

Virus phage is compatible with bacterial strain | Virus phage is not compatible with bacterial strain



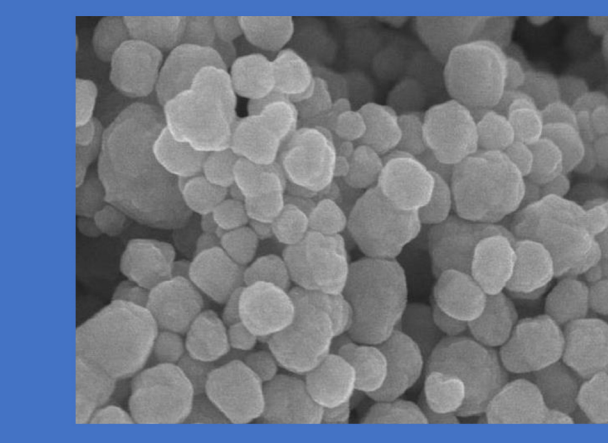
SOLUTIONS

Silver Nanoparticles

What is it?

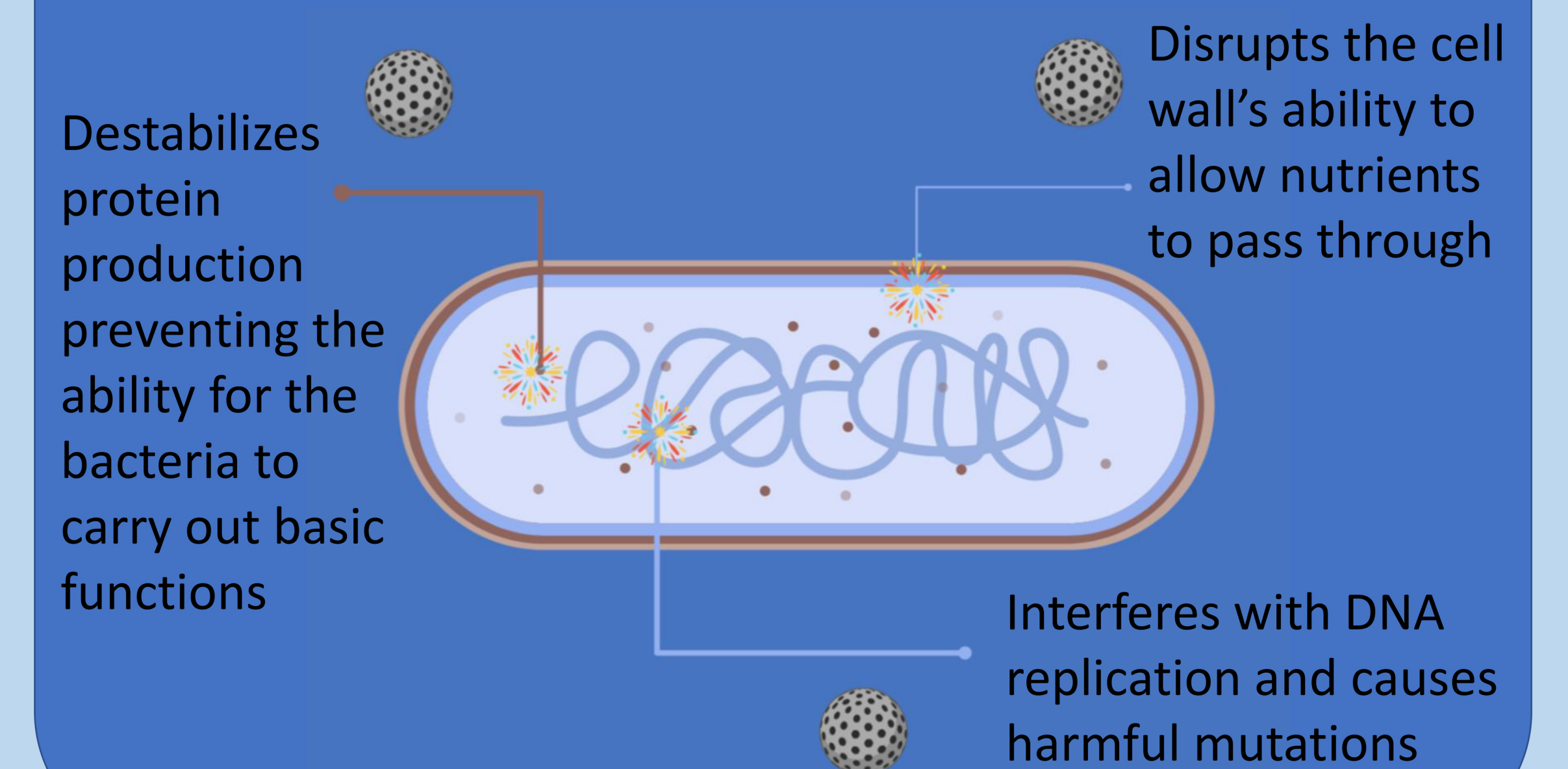
Silver Nanoparticles to kill bacteria

Silver Nanoparticles are small pieces of silver that interfere with bacterial processes

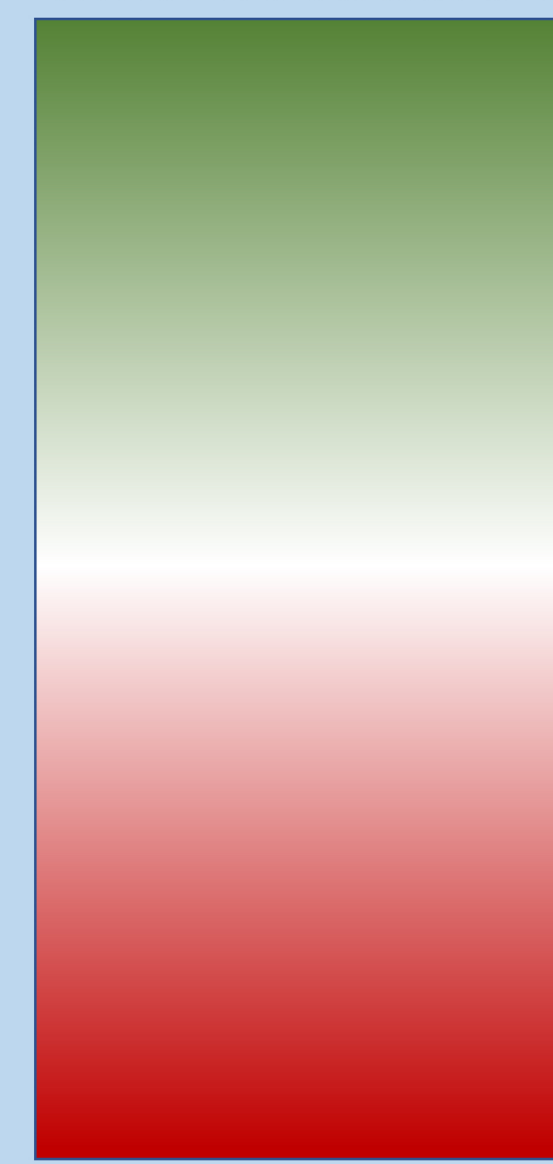


Silver Nanoparticles at 30 mm zoom

HOW DO THEY WORK?



MOST SUCCESSFUL



LEAST SUCCESSFUL

Factor	Phage Therapy	Antibiotics	Silver Nanoparticles
COST	Green	Red	Green
EFFECTIVENESS	Green	Green	Green
TOXICITY	Green	Green	Red
APPROVED TREATMENT	Red	Green	Red
SPECIFIC TARGET	Green	Red	Red

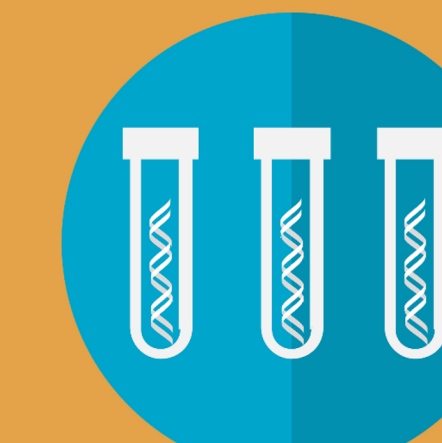
IMPLEMENTATION



Partner with an infectious disease clinic and suggest opening a center for phage therapy.



Collect and keep a database of phages

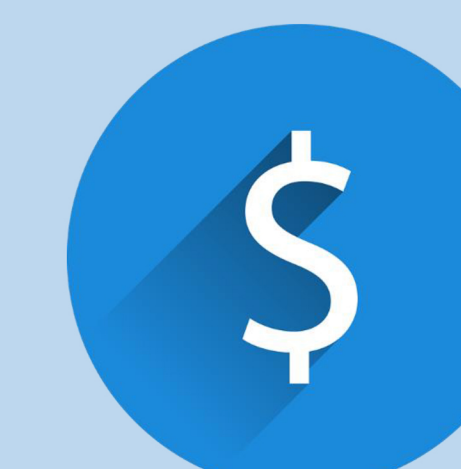


Test the effectiveness of phages in the patient's bacterial strain



Contact the FDA and get approval for compassionate use

LIMITATION



Who pays for the compassionate use?

POTENTIAL SOLUTION

