Bacteriophage is the generic name given to microorganisms that can destroy bacteria. The name (which comes from the Latin bacteria and the Greek φάγειν phagein - "to eat", "to devour") was introduced by the Canadian bacteriologist Félix d'Herelle in 1917, the year he discovered a virus possessing such characteristics. Also called bacteria-eating viruses, bacteriophages represent a group of viruses with a destructive effect on bacteria (lytic effect), being widespread in nature, in all living

UNIVERSITY OF LIFE SCIENCES
"KING MIHAI I" FROM Timisoara
Multidisciplinary Conference on Sustainable Development
30-31 May 2024

2024 MULTIDISCIPLINARY CONFERENCE ON SUSTAINABLE DEVELOPMENT

BACTERIOPHAGES, A SOLUTION TO THE DISTRUCTION OF ANTIBIOTIC-RESISTANT BACTERIA

Daniela Moţ[1], Emil Tîrziu[2]

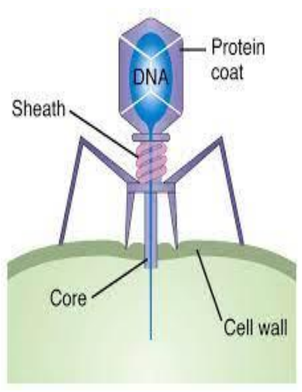
[1]*University of Life Sciences" King Michael I", Faculty of Animal Sciences and Biotechnologies, 300645 Timişoara, 119 Aradului Way, Romania*

[2]*University of Life Sciences "King Michael I", Faculty of Veterinary Medicine, 300645 Timişoara, 119 Aradului Way, Romania*

Bacteriophage is the generic name given to microorganisms that can destroy bacteria. The name (which comes from the Latin bacteria and the Greek φάγειν phagein - "to eat", "to devour") was introduced by the Canadian bacteriologist Félix d'Herelle in 1917, the year he discovered a virus possessing such characteristics. Also called bacteria-eating viruses, bacteriophages represent a group of viruses with a destructive effect on bacteria (lytic effect), being widespread in nature, in all living environments (water, soil, air). Through their mechanism of action, bacteriophages can become a kind of additional immune system for organisms, and phage therapy, a therapy to be studied and perspective for maintaining human and animal health.

Introduction

Many countries preferred the use of antibiotics in favour of phage therapy, despite its proven efficacy, because they were easier to understand, to produce in large quantities, and these antibiotics represented a universally valid solution to a wide spectrum of infections .A form of therapy using bacteriophages - phageotherapy - was developed. Bacteriophages are far more numerous than pathogenic human viruses or those infecting any other mammal on earth. The reason is related to the fact that there are more hosts for phages than for viruses that infect our own cells. Bacteriophages are made up of nucleic acid (DNA or RNA), protein shell (capsid), and three main morphological forms of phages are known: icosahedral, cylindrical and complex (icosahedral head and helical tail). Although bacteriophages are everywhere (land, oceansice, air), scientists first discovered them inside the human body.



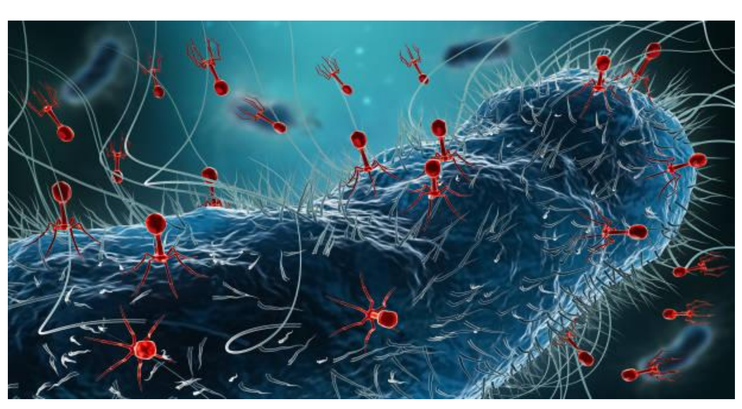


Table 1: Classification of Bacteriophages

Family	Morphology	Nucleic acid	Characteristic
Myoviridae		Linear dsDNA	contractile tail,Non-enveloped
Siphoviridae		Linear dsDNA	Long non-contractile tail,Non-enveloped
Podoviridae		Linear dsDNA	Short non-contractile,Non-enveloped tail
Tectiviridae		Linear dsDNA	Isometric , Non-enveloped
Corticoviridae		Circular dsDNA	Isometric,Non-enveloped,
Lipothrixviridae		Linear dsDNA	rod-shaped,Enveloped
Plasmaviridae		Circular dsDNA	Pleomorphic, Enveloped
Rudiviridae		Linear dsDNA	Rod-shaped , Enveloped
Fuselloviridae		Circular dsDNA	lemon shaped , Non-enveloped
Inoviridae		Circular ssDNA	Filamentous,Non-enveloped
Microviridae		Circular ssDNA	Isometric,Non-enveloped
Leviviridae		Linear ssDNA	Isometric, Non-enveloped
Cystoviridae		Segmented dsDNA	Spherical , Enveloped,

By 2050, 10 million people a year are expected to die from superbacteria infections, meaning one person will die every three seconds from these antibiotic-resistant bacteria. Superbacteria are so resistant to antibiotics that regular treatments are no longer effective against them . These multidrug-resistant superbacteria can cause chronic infections for months to years and sometimes even decades. It's ridiculous how virulent some of these bacteria become over time. Bacteriophages can be collected from water or soil, and in laboratories they are processed and multiplied to be used in treatments. The practical applications of bacteriophages can be in the therapeutic field, by treating and preventing infectious diseases, infections with different locations, caused by bacteria that already acquire resistance to antibiotics. Another important application of bacteriophages is the field of diagnostics. In this case, phage-identification reactions are important when unknown bacterial strains can be identified using homologous phages.

Conclusions

Bacteriophages which are considered natural "antibiotics" may at some point be a good alternative treatment. It may be useful for other purposes, but more research is needed before its use is approved for humans.

Bacteriophages can destroy bacteria capable of resisting the most modern drugs ever produced. In the future, it is important that bacteriophages treatment could become the main factors in the battle against the superbacteria crisis. These microorganisms have saved the lives of many patients who were about to die from superbacteria infections. Through their mechanism of action, bacteriophages can become a kind of additional immune system for organisms, and phage therapy, a therapy to study and perspective for maintaining human and animal health. If bacteriophages appear to be well tolerated without adverse effects, higher doses and longer treatment periods may be possible and even recommended. Treatment with bacteriophages is usually short-lived (two to three weeks) and significantly less expensive than antibiotics.. Bacteriophages do not produce adverse effects because they only attack the target bacteria, while antibiotics attack both pathogenic and sanogenic bacteria.

There are authors who believe that many other researches are still needed to concretely establish the effectiveness of bacteriophages in therapies, the clear synergistic associations with antibiotics, according to their concentrations, time and mode of administration.

Good clinical results have been achieved by administering specific phages together with antibiotics to which the bacteria causing the infection have been shown to be sensitive, but clinical trials are still needed to demonstrate the effectiveness of these combinations. Future studies will need to specify which antibiotic and phages can act synergistically, at what concentrations, and at what optimal time when they should be inoculated into affected subjects.