THE REVIEW ARTICLE OF BACTERIOPHAGE THERAPY AND ANTIBIOTIC RESISTANCE

Joseph Mozibuko[1], Bharti Sharma[2], Bhawna[3]

1. Student At Swami Vivakanand Group Of Institutions Rajpura punjab India
2. Assistant professor at Swami Vivakanand Group Of Institutions Rajpura punjab India
3. Assistant professor Swami Vivakanand Group Of Institutions Rajpura punjab India

Abstract

Antibiotic resistance is now one of the biggest challenges which has arised in the medical world. Scientist are working day and night non stop to deal with this challenge. Antibiotic resistance is when the bacteria develop characteristics and modify in its features that it is no longer affected bythe antibiotic which once worked and were effective on them. Resistance occur due to mutation of the bacteria were the bacteria modifies the antibiotic target site that when exposed to antibiotics it can no longer get affected, also by reduced permeability, the bacterial wall becomes hard and impermeable to antibiotic agents. The antibiotic resistance has read to over production and development of different antibiotics which becomes useless in a shortperiod of time , so energy resources and financial resource are lost in the way but without giving permanent solution. To deal with the problem of antibiotic resistance alternative methods for treatment of bacterial infection are developed, the development read to the rediscovery of bacteriophage therapy, which treat those bacterial infections which are antibiotic resistance .Bacteriophage therapy is the use of bacterial viruses to kill the bacteria. Phagesare the viruses that attacks specific target bacteria and burst it or kill it. The bacteriophage attack and attaches to the bacterium, then draw its DNA into the cell and destroy the bacterium to function or replicate. The bacteriophage can be used to treat different deadly bacterial infections , research are still going on to improve the effectiveness of the bacteriophage so that it can be the permanent solution to antibiotic resistance and the treatment to deadly bacterial infections.

greek word which means ‘to eat’ ,then bacteriophage means to eat bacteria , bacteriophage are bacterial viruses which attacks the bacterial cells and kills or breakthe bacterium. Bacteriophages are very highly specific, theyonly affect the bacteria of a specific strain.

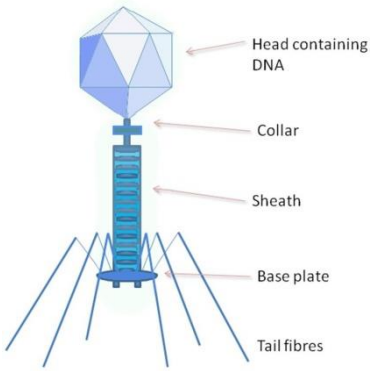
This specificity and killing capability makesthem enermies of bacteria.

History

It is suggested that the phages were first discovered in the 1896, by Dr.Ernest Hankin a British bacteriologist who reported on the presence antibacterial activity against vibrio cholerae. Which he observed in the waters of ganges and jumna rivers in india and his

suggestion he said unidentified substance was responsible for the phenomenon and for limiting the spread of cholera but this principle was not scientifically approved as some scientist suggest that it was the action of other environmental factors such as temperature responsible for the killing the bacterias. About two years later the Russian bacteriologist Gamaleya observed a similar phenomenon while working with Bacillus subtilis, However no one of these investigation further explored their findings.20 years later sir.Frederick Twort, a medical bacteriologist from England reintroduced the subject and discovered the bacterial viruses called bacteriophages in 1915. In

1917 Dr.felix d'Hellelle discovered some



Introduction .

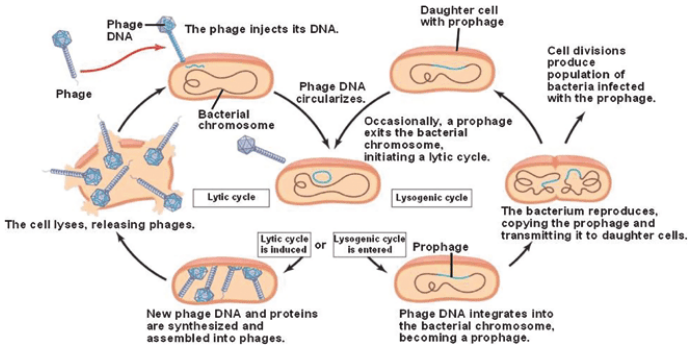
Bacteriophage – It is composed of two words 'Bacteria' =bacteria 'phagein' is a other bacteriophages. Historically in 1920 isolated bacteriophages as antibacterial agents, in 1930's phage therapy was licensed for use.The use of phages was later dropped by many countries especially in the western countries because of a number of reasons ,like improper storage and purification for example early commercial preparation included preservatives such as phenol which denatured and inactivate phages .Another reason why phages were abandoned by many countries is that scientist at that time didn't understand that phages are highly specific to the bacteria of target and the main reason why phages were abandoned was the discovery of antibiotics, after the discovery of antibiotics bacteriophage therapy come to an end in

most countries since that time antibiotics were more preferred . But the increase development of

antibacterial resistance required the need for new antibiotics every now and then and alternative strategies .

Since antibiotic resistance is a major global challenge this read to the rediscovery of bacteriophage therapy as an alternative against antibiotic resistance.

The life cycle of phages are twothe lytic and lysogenic cycle.



They are main categorized into two groupsbased on their mode of action; Lytic bacteriophages and temperate bacteriophages. Lytic phages infect their host cell and cause it to burst, thus killing the bacterium. They get attached or adsorbed to the bacterial cell wall, a bacteriophage enzyme ‘drills’ a hole in the

Bacterial wall and the bacteriophage injects

Its genome into the bacterial cytoplasm. Temperate or lysogenic phages don’t kill the bacteria, they integrate their genome which may harbor (bear) AMR or toxin genes into host cell, it incorporates its DNA into the bacterium DNA and become a non- infectious prophage whereby the bacteriophage DNA replicates as a part of

the bacterium’s DNA so that every daughterbacterium now contains the prophage. Where are phages found. Bacteriophages are viruses that affect bacteria , these viruses can be found everywhere bacteria exist including , in thesoil, deep within the earth’s crust , inside

Plants and animals and even in lakes and

Ocean, They are isolated from the nature are commercially prepared and preserved for use. Administration of phages include; Orally through colon infusion, as aerosols, as injections , intradermal, intravascular, intramuscular, intraduodenal, intraperitoneal ,and even into lungs, carotidartery and pericardium.

The advantage of phages over antibiotics

It effectively fight and destroy multi-drug resistant bacteria, Phages are highly specific to the target bacteria cell, Phages doesn't affect the normal gut micro floral, Not only that bacteriophages are used as alternative for people allergic to antibiotics, the

advantage of phage therapy is that often only one dose is sufficient, and phages aresafe, efficient, simple and inexpensive.The problems associated withphage therapy.

Although phage therapy looks to be the answer to the global challenge of antibiotic resistance, there're some challenges which is making this alternative method not to be accepted by many scientist and countries, The challenges include that the phages are difficult to prepare for clinical use, it is hard to identify , isolate, and preserve the phages, Also because there is a need to make a specific diagnosis before prescribing a phage treatment, Not only that but also our immune response decreases the activities of phages for example, Gastric acidity should be neutralized prior to oralphage administration because it can inactivate the phage.

Conclusion.

Yes bacteriophage therapy is the answer to the challenge of antibiotic resistance ,whichis has result in arise of deadly infections.The phage therapy its specificity ,efficiency

, simplicity and inexpensive despite all this development to make it reliable for human use . After improvement and further research phage therapy will be the answerto the antibiotic resistance.

Refrences

1. Clinical Aspects and Advances.
2. *By Rabecca Chesterton*
3. Biology and Applications
4. *Edited By Eliza kutter,Alexander Sulakvelidze*
5. Other sources//
6. www.microrao.com/micronotes/bacteriophage.pdf

7. www.saudijournals.com/media/articles/SB_73_27-37.pdf
8. www.ncbi.nlm.gov/pmc/article/PMC10295561/
9. www.journals.asm.org/doi/full/10.1128/aac.45.3.649-659.2001
10. www.ncbi.nlm.gov/pmc/articles/PMC3278648/
11. www.sciencedirect.com
12. www.khanacademy.org
13. www.academic.oup.com
14. www.frontiersin.org
15. www.healthline.com
16. www.britannica.com
17. www.nature.com
18. www.researchgate.net
19. www.cambridge.org
20. www.iomcworld.org