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Mycobacterial Diseases

ISSN: 2161-1068

Perspective

An Overview on Structure and Applications of Mycobacteriophage

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DESCRIPTION

Mycobacteriophages, or simply phages, are viruses that infect mycobacteria, which are a type of bacteria that can cause Tuberculosis (TB) and leprosy in humans. These phages have become increasingly popular as research tools in the field of microbiology, especially in the study of mycobacterial genetics and evolution. One such phage that has gained attention is the mycobacteriophage. The mycobacteriophage, also known as the mycobacteriophage BPs, is a temperate phage that was isolated from soil samples in 2004. It is a siphovirus, which means it has a long, flexible tail that it uses to infect its host cells. The mycobacteriophage has a genome size of approximately 69 kilobases, and it is estimated to contain about 99 protein-coding genes. Like other phages, the mycobacteriophage has two life cycle options: The lytic cycle and the lysogenic cycle. During the lytic cycle, the phage infects a mycobacterial cell, replicates its DNA, and eventually causes the cell to lyse, or burst open, releasing new phages into the environment. In the lysogenic cycle, the phage integrates its DNA into the host cell's genome and replicates along with the host DNA during cell division. The lysogenic cycle can remain dormant for many generations until the phage is triggered to enter the lytic cycle.

The mycobacteriophage's genome contains several genes that are involved in the lysogenic cycle, including the integrase gene, which is responsible for integrating the phage DNA into the host genome, and the repressor gene, which controls the switch between the lysogenic and lytic cycles. The mycobacteriophage's genome also contains genes that are involved in DNA replication, transcription, and translation, as well as structural genes that are responsible for assembling the phage particles. One of the most significant applications of the mycobacteriophage is in the study of mycobacterial genetics. Because mycobacteria are difficult to manipulate genetically, phages like the mycobacteriophage have become essential tools for introducing foreign DNA into mycobacterial cells. The mycobacteriophage's genome can be modified to carry foreign DNA sequences, which can then be integrated into the mycobacterial genome through the lysogenic cycle. This process, known as phage-mediated transduction, has been used to introduce mutations into mycobacterial genes and to study the function of specific genes. In addition to its utility as a genetic tool, the mycobacteriophage also has the potential to be used in the treatment of mycobacterial infections. Phage therapy, which involves using phages to treat bacterial infections, has been used for over a century in some parts of the world, but it has not been widely adopted in western medicine.

CONCLUSION

Mycobacteriophages have become valuable tools in the field of microbiology due to their ability to infect and manipulate mycobacterial cells. The mycobacteriophage, in particular, has been extensively studied and has provided insights into mycobacterial genetics and evolution. Its genome can be modified to carry foreign DNA sequences, allowing researchers to study the function of specific genes in mycobacteria. Additionally, the mycobacteriophage has the potential to be used in phage therapy, which could be an alternative treatment for mycobacterial infections. Overall, the study of mycobacteriophages has contributed to our understanding of mycobacteria and has opened up new avenues for research in the field of microbiology.

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Received: 03-Apr-2023, Manuscript No. MDTL-23-23969; **Editor assigned:** 05-Apr-2023, Pre QC No. MDTL-23-23969 (PQ); **Reviewed:** 19-Apr-2023, QC No. MDTL-23-23969; **Revised:** 26-Apr-2023, Manuscript No. MDTL-23-23969 (R); **Published:** 03-May-2023, DOI: 10.35248/2161-1068.23.13.339.

Citation: Tami A (2023) An Overview on Structure and Applications of Mycobacteriophage. Mycobact Dis. 13:339.