The Torch
Vol. 2 (4)

Phage therapy against multi-drug resistant Pseudomonas aeruginosa

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P. aeruginosa, an opportunistic pathogen, which is known to be one of the major causes of nosocomial (hospital-acquired) infections is considered to be a major threat to human society because of its ability to form biofilms (thin layers that attach to a surface and are basically a community of bacteria) on the surfaces of various biological membranes or medical devices. These biofilms provide extra protection to the organisms and help them in being resistant to multiple antibiotics and therapeutic drugs. However, a new approach that has been developed as a treatment against P. aeruginosa is phage therapy. Bacteriophages are basically the viruses that attack bacteria; these viruses infect the bacteria, multiply within them, and cause lysis of the bacteria, thereby leading to their death. For therapeutic purposes, lytic phages are commonly used. In the case of P. aeruginosa, if a specific strain is infected with a phage, it develops resistance against that particular phage. In order to overcome this limitation, the host range expansion method (HRE) has been developed as a potential solution. In this method, different phages that are specific to certain P. aeruginosa strains are combined and made to form a mixture called the phage mixture. This mixture can also be referred to as phage cocktail; an example of phage mixture is a cocktail of 4 P.aeruginosa-specifc phage (Ã•â€¢KMV, Ã•â€¢PA2, Ã•â€¢Paer4, Ã•â€¢E2005). This phage mixture effectively acts against the biofilms formed by different P. aeruginosa strains. Also, phage mixtures are proved to be helpful to patients with weakened immune systems wherein they would kill and decrease the number of bacteria. In spite of its remarkable advantages, there are some limitations of phage therapy, which could be addressed with intensive research by understanding the phage-host interaction and can be used in the future in combination with antibiotics for improved performance.

Keywords: Pseudomonas aeruginosa, Biofilms, Phages, Antibiotic Resistance, Host Range Expansion Method (HRE)

Citation:
Nitya Shailesh Palekar. Phage therapy against multi-drug resistant Pseudomonas aeruginosa. The Torch. 2021. 2(4). Available from: https://www.styvalley.com/pub/magazines/torch/read/phage-therapy-against-multi-drug-resistant-pseudomonas-aeruginosa.