Phage and Peptide Solutions for Biofilm Growth in Space

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Biofilms are dangerously formed by bacteria in threatening environments and are challenging to treat when a person is infected. Biofilms form due to stressors on the bacteria, and on the International Space Station (ISS), there are a multitude of unique stressors. Hence, the danger of biofilm infection is heightened in space, and there is no easy access to advanced medical treatment. This project aimed to discover a new method of attacking biofilms that form in space-like conditions to diversify the ISS's current biofilm safety measures, which consist of chemical-coated surfaces and HEPA air filters, for current exploration and future missions. To explore a new method, mixtures of bacteriophages T4r(+) and T2 were combined with the antimicrobial peptide nisin to efficiently combat biofilms from E. coli B12. Plaque analysis was utilized to determine the effectiveness of each group. The experiment's findings resulted in no statistically significant difference between the efficiency of each group. Still, the T2 mixture showed a slightly higher observable trend in plaque formation, meaning future trials could discover an underlying statistical relationship. This study can serve as groundwork for future studies conducted on the ISS or with different space-like conditions introduced to the bacteria. With microgravity challenging to simulate without skilled machinery, limiting nutrients has been proven more accessible to perform without this equipment. This project can also be imitated by changing oxidative stress or introducing radiation in the future to yield new results and a new perspective on the applications of bacteriophages in space.

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