Lifestyle Determination qPCR Assays for S. aureus Bacteriophage

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The aim of this project was to create qPCR assays for lifestyle determination of Staphylococcus aureus bacteriophage. Bacteriophage are viruses that infect bacteria and therefore have antibacterial potential. These phage therapies are especially important for treating bacterial infections that are resistant to antibiotics, such as methicillin resistant S. aureus (MRSA). However, temperate phage can be problematic for these therapies, while obligately lytic phage are essential for them. To aid in the identification process, four groups of qPCR assays were developed based on the integrase genes of temperate S. aureus phage and two were developed based on Myoviridae and Podoviridae family proteins to detect obligately lytic phage. They were all tested with one positive and two negative controls. One of the original groups failed the positive control test, so it was divided into two subgroups which both passed the positive control test. A different assay group had late amplification on a negative control, indicating weak off-target binding. However, this is more likely indicative of a contamination or an issue with the preparation of the assay than of a design flaw. The results are very promising and indicate that the assays could be used soon, with some minor modifications, to quickly identify raw samples containing obligately lytic phage and temperate phage that have been isolated. They also indicate the validity of the methodology, meaning that similar assays could potentially be made the same way for phage infecting different bacteria. This would expediate research into phage and phage therapies that treat bacterial disease.

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