Creating Novel Bacteriophage Solutions as a Preventative Measure for Escherichia coli Biofilm Formation on Elastomer Biomaterials in Medically Relevant Settings in vitro

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According to the Centers for Disease Control, 1 in every 25 hospitalized patients in America has a Healthcare Associated Infection (HAI), affecting around 650,000 patients annually (Magill et al., 2014). Around 41 million or 43% of gastrointestinal endoscopy patients face HAIs annually. Meaning if a drug-resistant strain of E. coli infects endoscopes, then antibiotics given to infected patients become ineffective, making pre-procedure sanitation one of the only means to prevent serious harm to patients. If a peracetic acid and T4+ bacteriophage solutions are used against Escherichia coli biofilm that is found on elastomer biomaterials, then there should be lower amounts of E. coli remaining after treatment, in comparison to treatments using only bacteriophage or current peracetic-acid treatments. The independent variables are 0.2% peracetic acid, T4 bacteriophage, and a combination of both treatments. The control is E. coli growth in each plate, mimicking an unclean environment. A phage titration determined the phage were healthy and living based on plaque formation. A crystal violet assay was performed on each of the variables, consisting of incubating E. coli onto microtiter wells, adding independent variables or control, placing CV dye, and quantifying with plate reader. For control trials, results showed that there was adequate growth in the wells and that E. coli can grow on elastomer biomaterials in medical settings. For phage trials, bacterial growth was consistent with control trials. Both the peracetic acid trials and hybrid treatment trials experienced significantly more biofilm decay, while the hybrid trial had the same efficiency as the peracetic acid trial.