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Investigating the impact of different lethality inducing conditions on cells of *Bacillus subtilis* via flow cytometry

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Background: Decontamination of surfaces is a vitally important process in industrial settings. *Bacillus subtilis* spores are a good safe alternative to model pathogenic organisms such as *B. cereus* and *Clostridium* difficile. In this communication a range of novel and commonly used antimicrobials are applied to cells and spores of *B. subtilis*. By looking for alternative antimicrobial agents, this could have far reaching implications for use against antibiotic resistant strains of bacteria. Furthermore, employing natural antimicrobials will have a less detrimental effect on the environment.Common methods of cell killing are heating 85˚C for 35 minutes is our standard method and 50% Ethanol (water) treatment is used to kill off vegetative cells (leaving spores unharmed). Common antimicrobials: Peracetic acid (PAA) is a strong oxidizing agent thought to be capable of killing spores as well as cells and chlorine- oxidizing agent commonly used in bleach. Natural Antimicrobial: Green tea extract believed to exert an antimicrobial effect due to tea polyphenols.

Aim: To assess the efficacy of both common and novel antimicrobials as bactericidal and sporicidal agents and to test these antimicrobials on cells of *Bacillus subtilis* comparing the results of the FCM analysis with serial dilution plating.

Results: Antimicrobials PAA and Chlorine both have high bactericidal effects with PAA being the most effective antimicrobial causing 100% cell death. Previous research indicates this has the potential to kill spores as well as cells. Green tea extract also has an impact on viability with around a 1 log reduction in cell number. Green tea caused more cells to become damaged or membrane permeabilised as opposed to completely killed. It is demonstrated by a strong double staining with PI and Syto 16.

Conclusions: Findings such as these highlight the significance of FCM as a descriptive tool as plating or fluorescent microscopy would not give us information as to the numbers of damaged cells. It is also highly significant when one considers the lack of FCM enumeration data available. FCM is a good method to enumerate sub-populations based on a strong correlation with plate counts.

Biography

Catherine Bowe graduated from Northumbria University in 2010 in Applied Biology. In 2011 she began her PhD under the supervision of Dr. Nikos Mavroudis studying probiotic viability, which she completed in July 2015. Now she is working as a research associate on an NIHR project exploring the potential of progressive cuisine for quality of life improvement for head and neck cancer survivors. Her research interests include bacterial Flow cytometry, Food microbiology and probiotics.

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