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Symposium

Resistance mechanisms to antiseptics

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The effective use of biocides is crucial to prevention of infection, particularly in light of the emergence and spread of highly antibiotic resistant pathogens. Biocides are increasingly used in a number of applications and concern has been raised that biocide exposure might act as a selective force for development to biocide resistance and that such mutants may be cross resistant to antibiotics. Our laboratory has studied the consequences of exposure of bacteria to various biocides in terms of survival and development of antibiotic resistance. We have assessed exposure to in use concentrations of biocides and sub-optimal exposures and determined the ability of strains to survive and characterised surviving mutants using a combination of flow cytometry, phenotypic characterisation, transcriptomic and genomic analysis and virulence assays. We have found bacteria can survive high level biocide exposure and that surviving mutants demonstrate a low-level multiple antibiotic resistance phenotype and that this is mediated by de-repression of multidrug efflux. Similarly biocide exposure results in selection of multidrug efflux mutants. However the propensity to select for antibiotic resistant mutants varies between different biocides we have evaluated and true biocide resistance is rare and hard to achieve. Biocides must be used appropriately and in line with recommended dilutions to ensure success, the potential for development of antibiotic resistance should be considered when developing novel biocide formulations.