Photoxidative Effects on Bacterial Persistence Phenotype

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Natural or synthetic substances that have the ability to kill or inhibit the growth of pathogenic microorganisms are called antimicrobials or antibiotics. Antibiotics have helped medicine save millions of lives, which is why the emergence and spread of antimicrobial resistance is a global health problem. The inappropriate use of antibiotics, which favors selective pressure, leads to the emergence and spread of antibiotic-resistant pathogens, which is a major concern in healthcare. However, resistance is not the only phenotype that can be expressed by a bacterial population, within which it is possible to observe heterogeneity, where phenotypes such as tolerance, heteroresistance, persistence and others are expressed. Persistence has been suggested as one of the potential drivers for the development of genetic resistance, as they provide a viable cellular reservoir from which resistant mutants can arise through horizontal transfer or by new genetic mutations. Persistent bacterial cells are responsible for the difficulty in treatment and the nature of chronic infections.

In this work we sought to work with bacteria with the persistence phenotype in Escherichia coli, because Photodynamic Inactivation (PDI) combined with antibiotic therapy has shown promise in persistent Staphylococcus aureus bacterial strains. Using a parameter called MDK - Minimum Duration of Killing, the aim of the study is to reduce the time it takes to kill persistent bacteria by combining IFD with antibiotic therapy. To find the persistent bacteria in a population, we determined the value of the minimum inhibitory concentration of the antibiotics: amoxicillin and ciprofloxacin in E. coli, with these determined values we multiplied by 10x and made killing curves at predetermined times to observe the behavior of these persistent bacteria. With these results, we started combining photodynamic inactivation with antibiotic therapy in persistent.