Challenging Resistance: Photodynamic Strategies Against Multi-Resistant Bacteria

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Treatments for bacterial infections are essential for quality of life, which is why antibiotics have been revolutionary for medicine. However, treatment failures due to resistant, persistent, and tolerant bacterial strains are major global concerns [1]. The discovery of new antibiotics is not expected in the short term, thus techniques to prolong the effectiveness of existing antimicrobials are necessary[2]. In this context, antimicrobial photodynamic therapy (aPDT), which relies on the combination of light, a photosensitizer, and oxygen to induce bacterial cell death or damage through oxidative stress, offers a promising solution. By weakening bacterial cells, aPDT can enhance the efficacy of antibiotics [3].

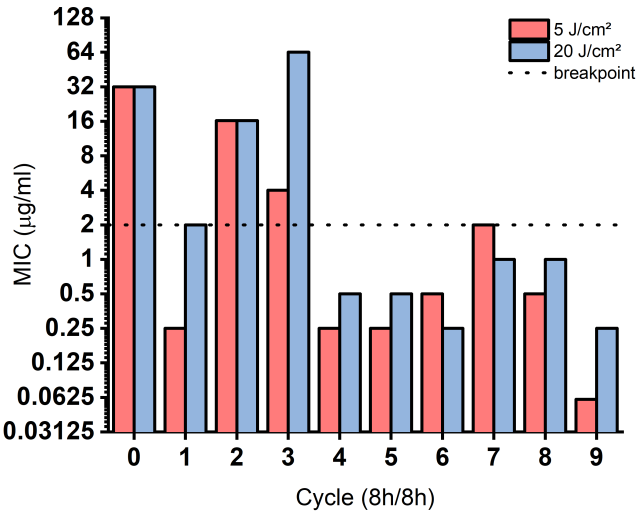

Figure 1: Effects of antimicrobial photodynamic therapy (aPDT) cycle every 8 hours on the antibiotic azithromycin's minimum inhibitory concentration (MIC), using 10 µM curcumin

In this work, we delve deeper into photodynamic action as a strategy to restore antibiotic effectiveness against resistant cells. Specifically, we apply curcumin (10 μM) and light (450 nm, 5 and 20 J/cm^2) to methicillin-resistant *Staphylococcus aureus* (MRSA), resulting in reduced minimum inhibitory concentrations (MIC) for antibiotics through repeated aPDT cycles, as Figure 1. We also evaluate how population heterogeneity is affected by photodynamic action. In summary, photodynamic action has shown promise as an adjuvant strategy to antibiotic therapy.

References

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