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The mechanisms of bacterial inactivation via MB-APDT avoid drug resistance (Conference Presentation)

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Abstract

Antimicrobial photodynamic therapy (APDT) is trending as a powerful therapeutic platform to minimize the negative impacts of microbial drug resistance. The mechanisms of action of APDT are imposed as a generalized oxidation of all cellular structures. Therefore, is assumed that the development of resistance to APDT is very unlikely to occur due to its multitarget oxidative effects. Even though the instant effects of APDT may be interesting to several situations, the few microbial cells left alive after irradiation procedure may be enough to allow tissue recolonization. Therefore, to ensure higher effectiveness of APDT protocols should also rely on therapeutic combinations with longer lasting effects. In this study, we report the statistical correlation of bacterial inactivation rate with the degradation rate of lipids, proteins and DNA. We observed that APDT mediated by methylene blue (MB) and red light can induce degradation of enzymes associated with drug resistance. Thus, cells exposed to sublethal doses of MB-APDT may recover sensitivity to antibiotics they were previously resistant. This fact may lead to a time interval where highly resistant pathogens become sensitive to most standard drugs, such as penicillin. Additionally, we observed that drug-resistance genes present in bacterial DNA are severely damaged. Hence, drug resistance gene expression and/or dissemination to other cells should also be impaired. In summary, we can conclude that APDT also challenges drug resistance by degradation of related enzymes and DNA.

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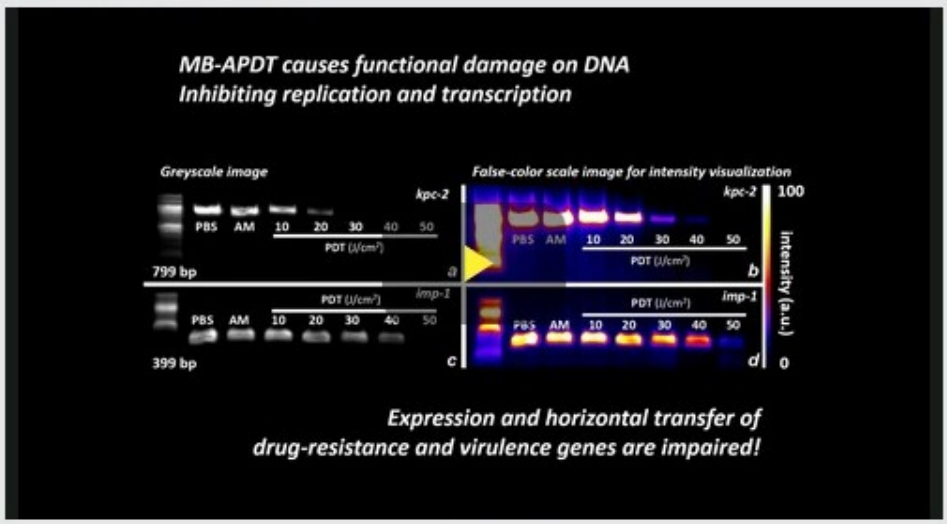
Conference Presentation



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KEYWORDS

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