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INACTIVATION OF ANTIBIOTIC-RESISTANT OPPORTUNISTIC PATHOGEN STENOTROPHOMONAS MALTOPHILIA BY CHLOROPHYLLIN-BASED ANTIMICROBIAL PHOTODYNAMIC THERAPY

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Antimicrobial resistance is one of the most important current threats to global health [1]. *Stenotrophomonas maltophilia* is an emerging opportunistic pathogen responsible for highly lethal nosocomial infections among immunocompromised patients. Its ability to form biofilms as well as high-level intrinsic resistance to a wide range of antibiotics makes treatment of *S. maltophilia* infections very complicated, requiring alternative antimicrobial strategies [2]. One perspective method is antimicrobial photodynamic therapy (aPDT), which involves a photosensitizer, molecular oxygen and light to produce reactive oxygen species, causing oxidative stress, and killing bacterial cells.

The aim of this study was to analyse the efficacy of chlorophyllin-based aPDT (Chl-aPDT) inactivation against *S. maltophilia* when exposed to 402 nm light at different irradiances. Chl is a water-soluble chlorophyll derivative also known as a food colorant. Two multidrug-resistant biofilms forming clinical *S. maltophilia* isolates (SM3 and SM21) were used for Chl-aPDT. Bacterial cultures were suspended with 0.015 mM Chl in the dark. For inactivation, samples were exposed to 250 and 350 W/m² irradiance at different periods. The irradiation dose (J/m²) was calculated as irradiance (W/m²) multiplied by irradiation time (s). Bacterial viability was evaluated by colony-forming unit count (CFU/mL).



Fig. 1. The illumination system used in aPDT experiments.

The results showed that sensitivity to ChI-aPDT varies among both *S. maltophilia* isolates. SM3 was inactivated in a similar manner when exposed to the same irradiation dose at different irradiance. In contrast, the viability of SM21 after ChI-aPDT was more than 7-fold lower after irradiation at a dose of 31.5 J/cm² with 250 W/m² compared to 350 W/m², but almost 4-fold higher at a dose of 63 J/cm².

^[1] Murray, Christopher J. L., et al. Global Burden of Bacterial Antimicrobial Resistance in 2019: A Systematic Analysis. The Lancet, vol. 399, no. 10325,

<sup>Feb. 2022, pp. 629-55.
[2] Flores-Treviño, Samantha et al. Stenotrophomonas maltophilia biofilm: its role in infectious diseases. Expert review of anti-infective therapy vol. 17,11 (2019): 877-893.</sup>