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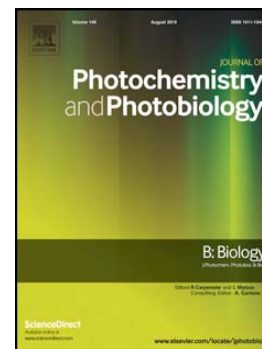
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Photodynamic inactivation of planktonic and biofilm growing bacteria mediated by a meso-substituted porphyrin bearing four basic amino groups

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Abbreviations

CFU: colony forming units; CSLM: confocal scanning laser microscopy; DMF: dimethylformamide; PDI: Photodynamic Inactivation, PS: photosensitizer; SEM: scanning electronic microscopy; TAPP: 5,10,15,20-tetrakis[4-(3-*N,N*-dimethylammoniumpropoxy)phenyl]porphyrin; TAPP-PDI: TAPP mediated photodynamic inactivation; Tetra-Py⁺-Me: 5,10,15,20-tetrakis(1-methylpyridinium-4-yl)porphyrin tetraiodide; TMAP⁴⁺: 5,10,15,20-tetrakis(4-*N,N,N*-trimethylammoniumphenyl) porphyrin; TB: Toluidine blue; TMPyP: 5,10,15,20-tetrakis(1-methyl-4-pyridinium)porphyrin tetra-(*p*-toluenesulfonate); TSA: Trypticase Soy agar; TSB: Trypticase Soy Broth.

Keywords

Photodynamic inactivation, porphyrin, bacteria, *Staphylococcus aureus*, biofilm, planktonic.

ABSTRACT

Biofilm-associated diseases account for 80% of all infections in humans. Due to the emergence of antibiotic resistances, alternative therapies such as Photodynamic Inactivation (PDI) of microorganisms have emerged. Porphyrins with intrinsic positive charges have been proposed as successful photosensitizers (PSs) against microorganisms. We have recently designed the new synthetic porphyrin 5,10,15,20-tetrakis[4-(3-*N,N*-dimethylammoniumpropoxy)phenyl]porphyrin (TAPP) containing four basic amine groups in the periphery of the tetrapyrrolic macrocycle, which can acquire positive charges at physiological pH, thus favouring the interaction with biomembranes.

Illumination of planktonic cultures of *Staphylococcus aureus* at 180 J/cm² in the presence of 2.5 μM TAPP induced complete bacteria eradication.

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