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Abstract

Porphyrin-IgG Photoimmunoconjugates for Photodynamic Inactivation against *Staphylococus aureus* †

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Abstract: Photodynamic inactivation (PDI) is a therapeutic approach based on combined use of light, oxygen, and a photosensitizing agent (PS). These three components interact to generate reactive oxygen species, which are cytotoxic and irreversibly damage vital components of microbial cells, leading to death. However, this methodology has not managed to be completely specific in its mode of action since the photosensitizer can bind to both pathogenic and commensal microorganisms and even to host cells. Since subsequent irradiation of such cells could lead to their destruction, it is desirable to direct the photodynamic activity to the target cell. Therefore, the objective of this work was to direct the destruction of pathogenic microorganisms without affecting the normal flora. This could be achieved by binding the photosensitizing molecule to an antibody against the surface of the target organism. Therefore, a TCPP-IgG conjugate was synthesized using 4,4′,4″,4‴-(porphine-5,10,15,20-tetrayl)tetrakis(benzoic acid) (TCPP) and the antibody anti-protein A of *Staphylococcus aureus*. The UV-visible spectra of TCPP-IgG showed the typical Soret and Q bands characteristic of porphyrin derivatives and, additionally, a new band was observed, corresponding to the absorbance of the protein. However, the results indicated that the conjugation reaction affects the photochemical properties of fluorescent emission and the production of reactive oxygen species compared to TCPP free base. As a consequence, a lower cytotoxicity was observed in planktonic cells of S. aureus. PDI can become a promising therapeutic alternative, having as a strategy the specific control of bacterial death for an efficient eradication.

Keywords: antibody; bacteria; photoconjugate; photoinactivation; porphyrin

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