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Antimicrobial Photodynamic Therapy with Single Application of Phthalocyanines in *Staphylococcus aureus* and *Escherichia coli* Wounds Infections

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ABSTRACT

Phthalocyanines are considerable interest due to their general chemical and thermal stabilities. They are photochemical materials used in photodynamic therapy (PDT) and also as dyes due to their intense colors. In this study, we evaluated some phthalocyanines for their wound healing properties in mice models. Four groups of mice were tested for healing of wounds infected with *Staphylococcus aureus* and *Escherichia coli*. Animals were induced with a skin injury and infected 30 minutes later by applying *Staphylococcus aureus* into each right dorsal wound and *Escherichia coli* into each left dorsal wound. Three groups treated with phthalocyanine-containing ointments and the fourth group was used as control that was treated with ointment base only. The source of red light was applied for 5 minutes on these mice and observed them for one week. In treatment groups, the wounds had shown healing within the treated mice compared with the control group. The compound 1(PcZn) was more affective on *E coli* than *S. aureus*, compound 2($(4\text{-}NH_2)_4$PcZn.$2H_2O$) more potency on *S. aureus* than *E coli* and the compound 3($(4\text{-}NO_2)_4$PcZn) has similar potency on both, *S. aureus* and *E coli*. In conclusion, these results show that the three phthalocyanine compounds were active as bactericidal on both *S. aureus* and *E. coli in vivo*, and helpful for rapid wound healing. These compounds might be suggested for treatment of infected burns.

KEYWORDS: Photodynamic therapy; photosensitizer; PcZn; $(4\text{-}NH_2)_4$PcZn.$2H_2O$; $(4\text{-}NO_2)_4$PcZn; photo-antimicrobial; antimicrobial, wounds infections.