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Temperature-modulated photodynamic therapy for the treatment of actinic keratosis on the extremities: a pilot study

Andrea Willey¹, R Rox Anderson, Fernanda H Sakamoto

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PMID: 25207759 DOI: 10.1097/01.DSS.0000452662.69539.57

Abstract

Background: The efficacy of photodynamic therapy (PDT) using topical 5-aminolevulinic acid (ALA) for the treatment of actinic keratosis (AKs) is lower on the distal extremities compared with the head and neck areas. The strong temperature dependence of porphyrin synthesis in biologic tissue suggests that heating skin during incubation may improve the efficacy of PDT, particularly in areas where biologic temperatures are naturally lower. The aim of this study was to evaluate the efficacy and tolerability of temperature-modulated PDT for the treatment of AKs on the extremities.

Methods: In this IRB-approved, single-center study, the upper or lower extremities of 20 subjects were treated with 20% ALA under occlusion, followed by 10 J/cm, 417-nm blue light. One of the 2 extremities treated was heated during the 1-hour incubation. Outcome measures included lesion counts, tolerability, and global improvement at baseline, 1 week, and 2 and 6 months after treatment.

Results: The median temperatures of the heated and control sides were 38.8°C and 29.4°C, respectively. The median clearance for the heated side was significantly greater than the control side at 2 and 6 months ($p < .0001$). Typical PDT side effects were greater on the heated side compared with the control yet were well tolerated by all subjects.

Conclusion: Warming the skin during incubation of ALA seems to improve the efficacy of PDT in the treatment of AKs on the extremities and is well tolerated when heat application is controlled within the limits of safety.

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