Evaluating the safety and efficacy of aminolevulinic acid 20% topical solution activated by blue light in the treatment of facial cutaneous squamous cell carcinoma in situ

Aysham Chaudry, DO[1]; Angelica Marrero-Perez, MD[1]; Robert J. Vanaria, BS[1,2]; Vishnu Bhupalam, BS[1,3]; Mark S. Nestor MD, PhD[1,4-5]

[1]Center for Clinical and Cosmetic Research, Aventura, FL; [2]Hackensack Meridian School of Medicine, Nutley, NJ; [3]University of Central Florida College of Medicine, Orlando, FL; [4]Department of Dermatology and Cutaneous Surgery, University of Miami Miller School of Medicine Miami, Miami, FL; [5]Department of Surgery, Division of Plastic Surgery, University of Miami Miller School of Medicine Miami, Miami, FL

Background

Cutaneous squamous cell carcinoma in situ (isSCC) is a common skin cancer occurring from sun exposure and often appears on the face. Treatment is primarily surgical but less invasive treatments are desirable. Currently, aminolaevulinic acid for photodynamic therapy (ALA-PDT) is approved in the US and Canada for the treatment of single and multiple non-hyperkeratotic actinic keratoses (AK) of the face and scalp. This study evaluated the safety, tolerability, and efficacy of ALA-PDT for treatment of facial isSCC.

Methods

Thirty-two patients with biopsy-confirmed isSCC on the face were recruited. Lesions 0.4–1.3 cm in diameter were included. Per the actinic keratosis treatment protocol, the lesion was debrided with a 4 x 4 gauze and ALA 20% topical solution was applied to the lesion and adjacent skin and incubated for 18–24 hours, followed by blue light therapy 16 minutes 40 seconds at 10 J/cm2. Patients underwent two treatments with ALA-PDT spaced 28 +/- 3 days apart. The area of the original lesion was excised eight weeks following the second treatment for histopathological assessment. The primary efficacy endpoint was the complete absence histologically of the isSCC at end of treatment. The secondary efficacy endpoint was the achievement of clinical clearance of the skin lesion. Safety assessment was done through adverse events (AEs) and local skin reactions (LSRs; erythema, flaking/scaling, crusting, swelling, vesiculation/pustulation, and erosion/ulceration) and site pain within 15 minutes of each treatment session.

Results

Thirty-two patients with a mean age of 75 (age range: 54-95) and Fitzpatrick skin type I, II, or III were enrolled. Two patients dropped out of the study, one due to death that was unrelated to the study and one after seeking treatment outside of the study. The mean diameter of the lesion was 0.73 cm (range: 0.4–1.2 cm, standard deviation [SD]: 0.20 cm). The mean width was 0.59 cm (range: 0.4–1.1 cm, standard deviation [SD]: 0.19 cm).

Results (cont.)

Overall, all 30 patients (100%) achieved complete absence of the isSCC histologically at surgical excision/End of Treatment (EOT). Clinical clearance was observed in 100% of patients prior to excision. Figure 1 demonstrates the successful clearance of isSCC.

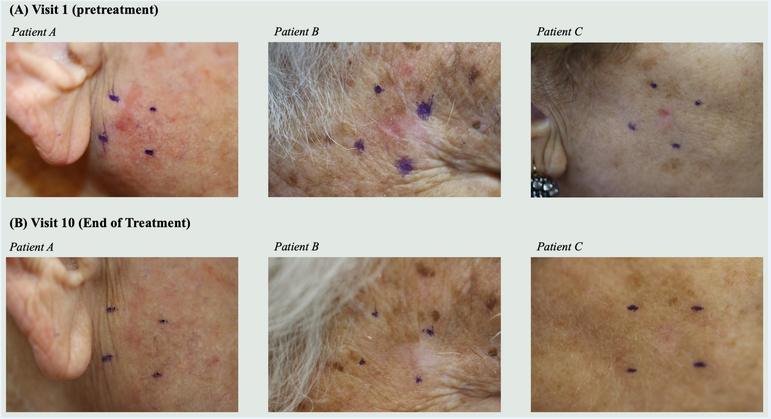

Figure 1. Squamous cell carcinoma in-situ before and after treatment with aminolevulinic acid and photodynamic therapy (ALA-PDT).

Mean erythema and erosion/ulceration peaked on the day of each blue light treatment, one day after ALA application (Visit 3 and 6, Table 1). Mean flaking/scaling peaked within 2 weeks after each blue light treatment and were primarily mild and rapidly decreased thereafter. Erythema and flaking/scaling were the most common LSRs.

The mean pain score recorded within 15 minutes of each ALA application and each blue light treatment using the VAS was 2.71 (range, 0-9; SD, 2.27).The majority of patients (n=28, 93%) did not experience any AEs. The reported AEs were newly diagnosed hypertension in one subject and worsening hypertension in another subject. The investigators did not consider this AE to be related to the treatment. Majority of the patients (29/30; 96.7%) did not have any changes in lesion pigmentation. Only one patient experienced mild hyperpigmentation which was observed 14 days after the first blue light treatment and resolved by the following visit 14 days later.

Discussion

ALA-PDT has emerged as a promising non-invasive treatment for superficial skin cancer. It has demonstrated efficacy as an alternative to current treatment modalities such as excisional surgery, curettage and electrodessication (ED&C), and cryotherapy for treating isSCC. Previous studies show that ALA-PDT has clearance rates of 90-100% following 1-3 treatments in patients with Bowen's disease.

ALA-PDT treatment using standard AK protocol has demonstrated 100% histologic and clinical efficacy and superior cosmetic outcomes compared to surgery. Our data suggests that both clinical clearance and complete absence of isSCC histologically can be achieved using non-surgical methods without scarring. This is particularly favorable with lesions located on the face, as in our study.

Since ALA-PDT is FDA approved for the treatment for AK treatment of isSCC with this ALA-PDT protocol can especially be helpful because it can both treat the isSCC and surrounding AK to prevent occurrence of additional AKs in areas of actinic damage and the subsequent development of isSCC and SCC.

In conclusion, the ALA-PDT protocol outlined in this study appears to be an extremely effective, cosmetically appealing, safe and well-tolerated treatment option for isSCC on the face and potentially in the treatment of surrounding precancerous lesions.

References & Disclosures

1. Sharma A, Birnie AJ, Bordea C, et al. British Association of Dermatologists guidelines for the management of people with cutaneous squamous cell carcinoma in situ (Bowen disease) 2022. Br J Dermatol. 2023;188(2):186-194. doi:10.1093/bjd/ljac042
2. Nestor MS, Han H, Ceci FM, Lawson A, Gade A. Evaluating the safety and efficacy of aminolevulinic acid 20% topical solution activated by pulsed dye laser and blue light in the treatment of facial cutaneous squamous cell carcinoma in situ. J Cosmet Dermatol. 2023;22(9):2471-2475. doi:10.1111/jocd.15886
3.Nestor MS, Berman B, Patel J, Lawson A. Safety and Efficacy of Aminolevulinic Acid 10% Topical Gel versus Aminolevulinic Acid 20% Topical Solution Followed by Blue-light Photodynamic Therapy for the Treatment of Actinic Keratosis on the Face and Scalp: A Randomized, Double-blind Study. J Clin Aesthet Dermatol. 2019;12(3):32-38.

The study was funded as an investigator-initiated trial by Sun Pharma. Submission support was funded by Sun Pharma. **MSN** reports research grants from Sun Pharma. **AC**, **AMP**, **RJV**, and **VB** report no disclosures.