

# EFFECTIVENESS AND SAFETY OF ALA-IPL IN TREATING ACTINIC KERATOSES AND PHOTODAMAGE

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## Abstract

**Background:** Photorejuvenation involves the use of a light source or laser in reversing the signs of aging. The Intense Pulsed Light (IPL) has demonstrated effectiveness in treating signs of photodamage. Photodynamic therapy is a relatively new and promising treatment for actinic keratoses.

**Objective:** To determine the effectiveness of ALA-IPL in treating actinic keratoses as well as reversing the signs of aging.

**Methods:** A retrospective trial of 17 patients treated with ALA-IPL. Patients were evaluated for improvement of telangiectasias, blotchy pigment, fine wrinkles, coarseness of skin and number of actinic keratoses. All side effects were recorded.

**Results:** 68% of actinic keratoses resolved after one treatment. There was a 55% improvement in telangiectasias, a 48% improvement in pigmentary irregularities and a 25% improvement in coarseness of skin texture. There was minimal change in fine wrinkle appearance. Side effects were minimal including mild erythema and edema for 3-5 days on average. No infections were noted.

**Conclusions:** ALA-IPL treatment is effective in treating both actinic keratoses and signs of photodamage. In this study, we achieved significant improvement after just one treatment. ALA-IPL is a safe, effective way to treat both actinic keratoses and photodamage with little down time.

**KEYWORDS:**  
**PHOTODYNAMIC THERAPY**  
**INTENSE PULSED LIGHT**  
**ACTINIC KERATOSES**  
**PHOTODAMAGE**

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## Background

Photorejuvenation involves the use of a light source or laser to reverse the signs of aging. The Intense Pulsed Light (IPL) is effective in treating several components of photoaging including dyschromia, skin texture and vascular lesions<sup>1,2</sup>. Photodynamic therapy is a relatively new method to treat extensive actinic keratoses, Bowen's disease, and basal cell carcinomas<sup>3,4,5,6</sup>. Photodynamic therapy (PDT) consists of light irradiation after topical application of aminolevalinic acid (ALA),



Figure 1. Pre-op.



Figure 2. One day post-op.



Figure 3. Four days post-op.

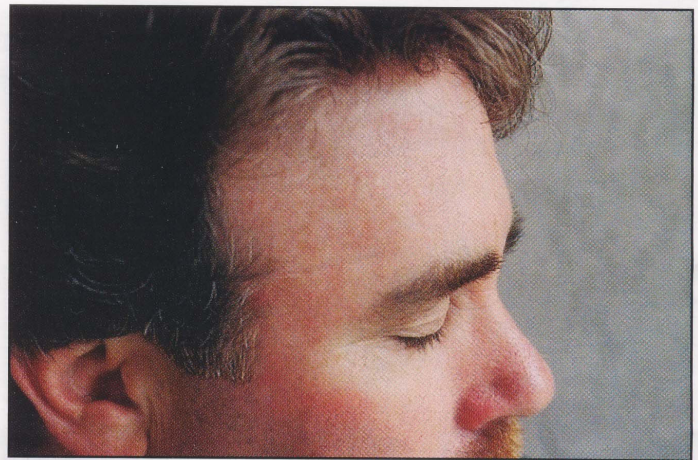


Figure 4. One week post-op.

a porphyrin precursor. The objective of this study is to determine the effectiveness of topical ALA application followed by IPL irradiation (ALA-IPL) in treating actinic keratoses as well as signs of photoaging.

### Subjects and Methods

A retrospective trial of 17 patients treated with ALA-IPL over four months (October-February 2003) at one center was performed. Patients with greater than three actinic keratoses on the face as well as signs of photoaging that included fine wrinkles, coarseness of the skin, pigmentary irregularities and telangiectasias were enrolled and treated. The average age of patients treated was 52 with a range from 38 to 78. Twelve patients

were women and five were men. Patients had no previous history of photodynamic therapy. All patients were Fitzpatrick skin types I-III.

ALA (Levulan Kerastick, Dusa Pharmaceuticals Inc., Wilmington, MA) was applied to the entire face for one hour. The IPL was then used with a 560nm filter Vasculite Elite (Lumensis Corporation, Santa Clara, CA) at 28-32 J/cm<sup>2</sup> with a double pulse of 3.0 and 6.0 millisecond with a 10msec delay. Post procedure wound care consisted of sun protection and moisturizer. Standard digital photographs were taken prior to the treatment and at follow ups that occurred at 1 week, 1 month and 3 months post procedure. Patients were not treated with any topical anesthetic or



Figure 5. Pre ALA-IPL.

Figure 6. One week post ALA-IPL.



Figure 7. Pre ALA-IPL.

Figure 8. One week post ALA-IPL.

regional nerve block. At initial visit and with each follow up the number of actinic keratoses on the face was recorded for each patient.

On each follow up, patients were evaluated for improvement of pigmentary irregularities, skin texture, fine wrinkles and vascular lesions on a quartile scale from 0%; 1-25%; 26-50%; 51-75%; and 76-100%. The level of improvement of all these parameters was evaluated by a non treating physician by comparing digital images at the end of the trial. All side effects were recorded at each visit. Patients were asked the degree of discomfort during procedures from none, mild, moderate and severe.

## Results

68% of actinic keratoses resolved after one treatment. There was a 55% improvement in telangiectasias, a 48% improvement in pigmentary irregularities, a 25% improvement in coarseness of skin texture and no change in fine wrinkle appearance after only one treatment. Side effects were minimal including mild erythema, edema and flaking for 3-5 days. Treatment was mildly discomforting in 78% of patients and moderately discomforting in 22%. No infections were noted. One patient had a BCC at initial visit that did not respond to one treatment. A total of three treatments were performed on this biopsy proven nodular BCC and it did not clear after these treatments. The nodular BCC was subsequently excised.

## Discussion

The results of this study demonstrate the efficacy, safety and cosmetic benefit of a single treatment with ALA-IPL. This study confirms the findings of Ruiz-Rodriguez et al. that ALA-IPL is effective in treating AK's<sup>7</sup>. In their study, 33 out of 38 AK's were cleared after two treatments. In this study, 68 percent of AK's were cleared with just one treatment. We did not breakdown the morphology of each actinic keratoses treated but the more hypertrophic lesions were clearly more resistant. Options for treating actinic keratoses including cryosurgery, curettage and topical 5-FU. All of these options have shortcomings such as pain, pigmentary changes, scarring and limited areas to treat at once. 5-FU can treat large areas but patients have to be willing to apply the medication for weeks and then tolerate side effects such as prolonged erythema, edema, flaking and potential infection. Side effects from the ALA-IPL treatment were quite tolerable. Patients typically had mild to moderate erythema and edema for 3-5 days. Flaking was minimal. No prolonged side effects were noted and there were no cases of infection.

Aminolevulinic Acid (ALA) is a precursor in the heme biosynthesis pathway of the endogenous photosynthesizer protoporphyrin (PpIX). ALA penetrates the altered epidermis of actinic keratoses and then is

enzymatically converted to PpIX. Irradiating PpIX with light at appropriate wavelengths releases cytotoxic radicals. ALA has been used with various light sources to treat actinic keratoses. These have included lasers, xenon arc/discharge lamps, incandescent filament lamps and solid-state light emitting diodes. Most of these sources seek to utilize the peak absorption of PpIX in the red spectrum at 630nm wavelength<sup>8</sup>. IPL with a 560 filter targets this peak absorption and also allows for the beneficial cosmetic effects that we found in this study.

Besides the efficacy in treating actinic keratoses, ALA-IPL clearly improved signs of photodamage. There was a 55% improvement in telangiectasias, a 48% improvement in pigmentary irregularities, a 25% improvement in coarseness of skin texture and no change in fine wrinkle appearance after only one treatment. This is the first study to clearly demonstrate the effectiveness of ALA-IPL in treating both actinic keratoses and signs of photodamage.

## Conclusion

ALA-IPL treatment is effective in treating both actinic keratoses and signs of photodamage. There was a 68 percent clearance of actinic keratoses after just one treatment. Cosmetic results included improvement in telangiectasias, pigmentary irregularities and skin texture were found as well. Side effects were mild including 3-5 days of erythema, edema and flaking.

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