

# Fingernail Photo-onycholysis After Aminolevulinic Acid–Photodynamic Therapy Under Blue Light for Treatment of Actinic Keratoses on the Face

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### PRACTICE POINTS

- Photodynamic therapy with aminolevulinic acid (ALA) is an effective treatment of actinic keratoses but can produce unexpected side effects in locations distant from initial therapy sites.
- It is important to counsel patients prior to initiating photodynamic therapy with ALA about isolating the ALA treatment zone from nontreated areas on the body during incubation.

To the Editor:

Topical photodynamic therapy (PDT) is one of several effective treatments of actinic keratoses (AKs). Photodynamic therapy involves selection of a lesion field, application of a photosensitizer drug, incubation for an explicit period of time, and illumination of the area from a light source corresponding to the absorption spectrum of the chosen drug.<sup>1</sup> A photosensitizer drug used in PDT to target AK is aminolevulinic acid (ALA). Aminolevulinic acid converts disease tissue to photoactivatable porphyrins, especially protoporphyrin IX, which has its largest absorption peak (410 nm) in the blue spectrum, with smaller absorption peaks at 505, 540, 580, and 630 nm. Photodynamic therapy treatments historically have been carried out under red light

(peak emissions, 630 nm) to improve tissue penetration, which is superior in efficacy when treating Bowen disease and basal cell carcinoma.<sup>1,2</sup> Broadband blue light (peak emission, 417 nm) now is routinely used and has been proven effective in combination with ALA for the treatment of AK.<sup>3</sup> It was approved by the US Food and Drug Administration for AKs in 1999.<sup>4</sup>

Photo-onycholysis is a photosensitivity reaction defined as separation of the nail plate from the nail bed. There are 4 different types of photo-onycholysis characterized by appearance and by the number of digits affected: Type I is denoted by the involvement of several fingers, with half-moon-shaped separations of the nail plate. Type II affects a single finger and corresponds to a brown, defined, circular notch opening distally. Type III, which involves several fingers, is defined as round yellow stains in the central portion of the nail that turn red after 5 to 10 days. Type IV has been associated with bullae under the nails.<sup>5</sup> There have been cases of photo-onycholysis arising after exposure to UV light following ingestion of certain prescription drugs or spontaneously,<sup>6</sup> and a single case following PDT to the hands with red light.<sup>5</sup> We report a

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case of fingernail photo-onycholysis resulting from ALA-PDT for the treatment of perioral AK.

A 65-year-old woman was treated for AKs on the perioral region of the face with PDT. Aminolevulinic acid hydrochloride 20% was applied to the lips and allowed to incubate for 60 minutes. Her face was illuminated with 10 J/cm<sup>2</sup> of blue light (417 nm) for 16 minutes and 40 seconds. Sunscreen (sun protection factor 40) was applied to the area immediately after treatment, and the patient was thoroughly counseled to avoid sunlight for the next 48 hours and to use sun protection. Within 72 hours following treatment, the patient reported all 10 fingernails noticeably separated from the nail bed with minimal pain, corresponding to type I photo-onycholysis (Figure). The patient's only medications were vitamin D (1000 mg once daily) and calcium supplements (1500 mg twice daily). Although the patient exercised strict UV light avoidance for the face, her hands were not protected when she went gardening directly after the treatment. At 5 weeks, the patient returned for her second ALA-PDT treatment of perioral AK and a fungal culture was taken of the left third fingernail, which returned negative results. Poly-urethane nail lacquer 16% was prescribed and was used once daily to protect and strengthen the fingernails. The patient returned for follow-up in clinic after 13 weeks and photo-onycholysis was resolving.

Photo-onycholysis is categorized as a phototoxic reaction often associated with drug intake, more specifically with the use of tetracyclines, psoralens, and fluoroquinolones; less commonly with oral contraceptives; or spontaneously.<sup>6</sup> It usually is recognized as a crescent-shaped distal separation of the nail surrounded by pigment. The action spectrum is believed to include UVA and UVB, though the exact mechanisms have not been confirmed.<sup>5</sup>

Our case provides evidence for risks involving the development of photo-onycholysis following PDT. We have no reason to believe there was systemic absorption of ALA, as there were no visible vesicles on the arms or hands after the treatment. Negative fungal culture results excluded onychomycosis. It is our hypothesis that the patient touched her face with her fingernails during the 60-minute incubation time prior to ALA-PDT treatment under blue light, inadvertently collecting ALA under the fingernails. Once she exposed her hands to sunlight while gardening after treatment, the nails likely reacted with the ALA in response to the UV radiation, thus triggering photo-onycholysis.



Photo-onycholysis of the fingernails induced by aminolevulinic acid-photodynamic therapy 72 hours following treatment.

This case represents a report of fingernail photo-onycholysis from ALA-PDT under blue light as well as a report following treatment of AK not located on the hands with PDT. Although the photo-onycholysis did resolve within a few months of treatment, our case demonstrates the importance of counseling patients more specifically about isolating the ALA treatment zone from nontreated areas on the body during incubation. Improper UV light protection following ALA-PDT is known to produce phototoxic reactions and our case supports this outcome.

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