

Treatment of Nodular Basal Cell Carcinoma With 5-Aminolevulinic Acid Activated With a 595-nm Long-Pulsed Dye Laser: A Case Report

Mitchel P. Goldman, MD; Rolf-Markus Szeimies, MD, PhD

A 50-year-old man with a nodular basal cell carcinoma present for 4 months was treated with 5-aminolevulinic acid (5-ALA) activated with a 595-nm long-pulsed dye laser. 5-Aminolevulinic acid was applied for 60 minutes after debulking the lesion with a sharp curette. The 595-nm long-pulsed dye laser with a spot size diameter of 7 mm, a pulse duration of 20 ms at 11.3 J/cm², and continuous cold air cooling with a Zimmer unit was used to activate the 5-ALA-treated lesion, with 50 pulses to the entire 2-cm diameter lesion. The treated area completely healed within 3 weeks leaving a minor hypertrophic scar. No evidence of recurrence was noted 3 years after treatment and excellent postoperative healing was observed.

A 50-year-old man with 2 earlier incidences of basal cell carcinoma (BCC) on the chest that appeared at 10 years and 7 years prior to presentation had developed an ulcerated growth on the left chest of 4 months duration. Biopsy demonstrated a nodular BCC (nBCC). The patient was an avid golfer with extensive unprotected sun exposure as well as many episodes of sunburn as a

teenager living in San Diego, California. There was evidence of extensive photodamage on the face and trunk with numerous actinic keratoses and solar lentigines.

The patient refused surgical excision because of the possibility of hampering his golf game. After completing informed consent with the knowledge that there was a 20% chance of recurrence that would require surgical excision, he elected to undergo photodynamic therapy (PDT).

After infiltration with 2 mL of lidocaine 1% with epinephrine, the lesion, which measured 2 cm in diameter, was debulked with a sharp curette until nonfriable tissue was felt and bleeding stopped with pressure only (Figure 1). 5-Aminolevulinic acid (5-ALA) was applied for 60 minutes. A 595-nm long-pulsed dye laser (LPDL) with a spot size diameter of 7 mm, a pulse duration of 20 ms at 11.3 J/cm², and continuous cold air cooling with a Zimmer unit was used to activate the 5-ALA-treated lesion, with 50 pulses to the entire 2-cm diameter lesion. This resulted

Dr. Goldman is Clinical Professor of Dermatology/Medicine, University of California, San Diego, and Medical Director, La Jolla Spa MD, California. Dr. Szeimies is Associate Professor, Department of Dermatology, Regensburg University, Germany.

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Figure 1. A nodular basal cell carcinoma measuring 2 cm in diameter on the left anterior chest after infiltration with 2 mL of lidocaine 1% with epinephrine.

in 3 passes with almost zero overlap to the entire lesion. The patient reported no pain with treatment. A simple dressing with antibacterial ointment was applied and changed daily until healing occurred.

The treated area completely healed within 3 weeks, leaving a minor hypertrophic scar (Figure 2). No evidence of recurrence was noted 3 years after treatment and



Figure 2. A nodular basal cell carcinoma 3 weeks posttreatment with 5-aminolevulinic acid and a 595-nm long-pulsed dye laser, with complete healing and a slight hypertrophic scar.

excellent postoperative healing was observed (Figure 3).

DISCUSSION

Aminolevulinic acid–photodynamic therapy for BCC has been previously reported (Tables 1 and 2).¹⁻¹⁵ The weighted average of complete clearance rates, after follow-up periods varying between 3 and 36 months, was 87% in 12 studies treating 826 superficial BCCs (sBCCs) and 53% in 208 nBCCs, as reviewed by Peng et al.¹⁶ Available data compiled from other trials by Zeitouni et al¹⁷ have shown an average of 87% for sBCCs and 48% for nBCCs.

Methylaminolevulinate PDT for BCC achieves clearance rates of around 80% for nBCC (debulking prior to PDT) and sBCC after 2 PDT sessions adminis-

tered 7 days apart. Methylaminolevulinate PDT is allowed to incubate for 4 hours in all of these published studies.

In a prospective phase 3 trial comparing ALA-PDT with cryosurgery, Wang et al⁶ included 88 sBCCs and nBCCs. A water-in-oil cream with ALA 20% was applied and left on for 6 hours under an occlusive dressing, followed by irradiation with a laser at 635 nm (80 mW/cm², 60 J/cm²).

In the arm receiving cryosurgery, lesions were treated with liquid nitrogen by employing the open spray technique using 2 freeze-thaw cycles for 25 to 30 seconds each time. After 3 months, punch biopsies were performed, which revealed a recurrence rate of 25% in the PDT group and 15% in the cryosurgery group. However, the clinical recurrence rates were only 5% for ALA-PDT and 13% for cryosurgery. Besides a better cosmetic outcome, the healing time was also shorter in the PDT-treated group.

Tumor thickness is a determinant of the response of BCC to ALA-PDT. A clearance rate of 100% was achieved by Morton et al³ with an ALA application time of 6 hours for BCCs greater than 2 mm in thickness.



Figure 3. A nodular basal cell carcinoma 2 years posttreatment with 5-aminolevulinic acid and a 595-nm long-pulsed dye laser, with no evidence of recurrence and an acceptable linear scar.

were noted with the laser parameters. Alexiades-Armenakas and Geronemus¹⁸ compared a LPDL at nonpurpuric 595 nm with the Levulan Kerastick. No differences were noted with incubation times of 3 hours and 14 to 18 hours, and the remission rates after follow-up of 8 months were 90% for head lesions. Both authors state that using the laser is safe and effective, provides an excellent cosmesis, has only a low level of pain, and is easy and quick. However, exact alignment or even overlap of the laser spots is mandatory to avoid underdosage of light.

No studies to our knowledge have used a LPDL alone to activate 5-ALA for BCC. It is evident that this procedure is not first-line therapy, but can be used in selected cases where alternatives do not exist. ALA-PDT with

For actinic keratoses, Karrer et al¹⁸ have used a LPDL at 585 nm (preincubation with ALA 20% extratemporeaneous preparation for 6 hours) and reached comparable results as compared with results achieved using a conventional lamp. However, purpuric side effects

a LPDL provides an easy-to-use and efficient treatment option, as demonstrated with this case report. It is rapid, and patients experience virtually no pain. It is hoped that a multicentered study using a LPDL can be performed for ALA-PDT.

TABLE 1

Localization of Basal Cell Carcinoma: Summary of Results of Clinical Studies Using Topical Aminolevulinic Acid Photodynamic Therapy for the Treatment of Basal Cell Carcinoma

Study	Indication/Procedure	Lesions, n	Complete Remission, %	Follow-up, mo
Fink-Puches et al ²	sBCC	95	50	36
Morton et al ³	sBCC, <2-mm thickness, 6 h incubation	26	100	6–16
Thissen et al ⁴	nBCC (debulking 3 wk prior to PDT)	24	92	3 (histological control)
Haller et al ⁵	sBCC (double treatment within 7 d)	26	96	15–45
Wang et al ⁶	sBCCs and nBCCs	44	75 (histologically) 95 (clinically)	3 (histological control)
Varma et al ⁷	sBCC	61	82	12
Clark et al ⁸	sBCC	87	97	12

Abbreviations: sBCC, superficial basal cell carcinoma; nBCC, nodular basal cell carcinoma; PDT, photodynamic therapy.

TABLE 2

Localization of Basal Cell Carcinoma: Summary of Results of Clinical Studies Using Topical Methyl Aminolevulinate Photodynamic Therapy for the Treatment of Basal Cell Carcinoma

Study	Indication/Procedure	Lesions, n	Complete Remission, %	Follow-up, mo
Soler et al ⁹	nBCCs and sBCCs (debulking of nBCC, double treatment within 7 d)	350	79	35
Horn et al ¹⁰	nBCCs and sBCCs (double treatment within 7 d, nonresponders re-treated after 3 mo)	123	82	24
Tope et al ¹¹	nBCC (double treatment within 7 d, nonresponders re-treated after 3 mo, histological control)	56	79	6
Basset-Seguín et al ¹²	sBCC (single treatment, nonresponders re-treated after 3 mo)	60	78	60
Eibenschutz et al ¹³	Large sBCCs and nBCCs (diameter ≤10 cm, re-treatment on recurrence in 7 cases)	37	81	12
Rhodes et al ¹⁴	nBCC (double treatment within 7 d, nonresponders re-treated after 3 mo)	52	86	60
Viniciullo et al ¹⁵	High-risk BCC (double treatment within 7 d, nonresponders re-treated after 3 mo)	148	80	48

Abbreviations: nBCC, nodular basal cell carcinoma; sBCC, superficial basal cell carcinoma; BCC, basal cell carcinoma.

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TREATMENT OF NBCC

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