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A comparison of the efficacy of ablative fractional laser–assisted photodynamic therapy according to ablative depth for actinic keratosis: A single-blinded, randomized, comparative, prospective study

To the Editor: Ablative fractional laser (AFL) pretreatment is better than curettage, microdermabrasion, microneedling, and nonablative fractional laser treatment for enhancing response to photodynamic therapy (PDT) in normal-appearing skin.[1] An erbium:yttrium-aluminum-garnet AFL at 2940 nm ablates the epidermis and dermis without thermal injury, creating microscopic ablation zones (MAZs) in the skin.[2] MAZs facilitate the delivery and uptake of topical methyl aminolevulinate deep into the skin, enhancing porphyrin synthesis and photodynamic activation.[3] MAZs depend on parameters such as laser depth, laser density, and laser passes. Increasing ablative laser density and the number of pretreatment passes did not further enhance fluorescence of protoporphyrin IX (PPIX).[1] The effect of ablative laser depth in AFL-PDT on actinic keratosis (AK) lesions is unknown. We investigated whether increased laser ablative depth affects the efficacy, side effects, cosmetic outcomes, and PPIX accumulation of AFL-PDT for facial AK.

Overall lesion thickness was classified as grades I to III according to the classification system reported by Olsen et al.[4] Patients indicated for PDT were randomly assigned to undergo AFL-PDT with 150 μm, 350 μm, or 500 μm of ablative depth therapy with the same treatment density and coagulation level (coagulation, level 1; treatment density, 22%; single pulse). Irradiation (dose, 37 J/cm^2) with a red light-emitting diode lamp followed application of methyl aminolevulinate. The primary outcomes included complete response (CR) rate at 3 and 12 months after treatment. Fluorescence intensity measurements were assessed by using levels of accumulated PPIX.

A total of 60 patients with 366 AK lesions in all completed the study and were analyzed: the group treated with 150-μm AFL-PDT included 20 patients with a total of 121 lesions, the group treated with 350-μm AFL-PDT included 19 patients with a total of 116 lesions, and the group treated with 500-μm AFL-PDT included 21 patients with a total of 129 lesions (Fig 1). There were no differences between the 3 groups in terms of sex, age, Fitzpatrick score, or Olsen grade. For Olsen grade I or II lesions, there was no difference between the 3 groups in terms of CR rates (Fig 2). However, for Olsen grade III lesions, CR rates were better in the group treated with 500-μm AFL-PDT (rate at 3 months, 87.2%; rate at 12 months, 79.5%) than in the group treated with 150-μm AFL-PDT (rate at 3 months, 68.4%; rate at 12 months, 57.9%). We found no significant difference between the groups in terms of PPIX accumulation, cosmetic outcomes, or treatment safety.

Treatment results for PDT differ according to thickness of the atypical cell layer.[5] AFL has been used to enhance the penetration of photosensitizers to deep layers of the lesion and augment the efficacy of PDT, and laser parameters are important factors that can affect treatment efficacy. In this study, higher ablative depth did not influence PPIX accumulation, but it did improve AFL-PDT treatment efficacy. Once the stratum corneum is disrupted by AFL, there is no further benefit from drilling deeper laser channels for PPIX accumulation. This study showed that varying the penetration depth of laser channels does not affect PPIX accumulation.

Our results are limited by the small sample size. In addition, we used noninvasive surface fluorescence photography to measure PPIX accumulation at the skin surface, which did not allow quantification of PPIX accumulation in deeper skin layers.

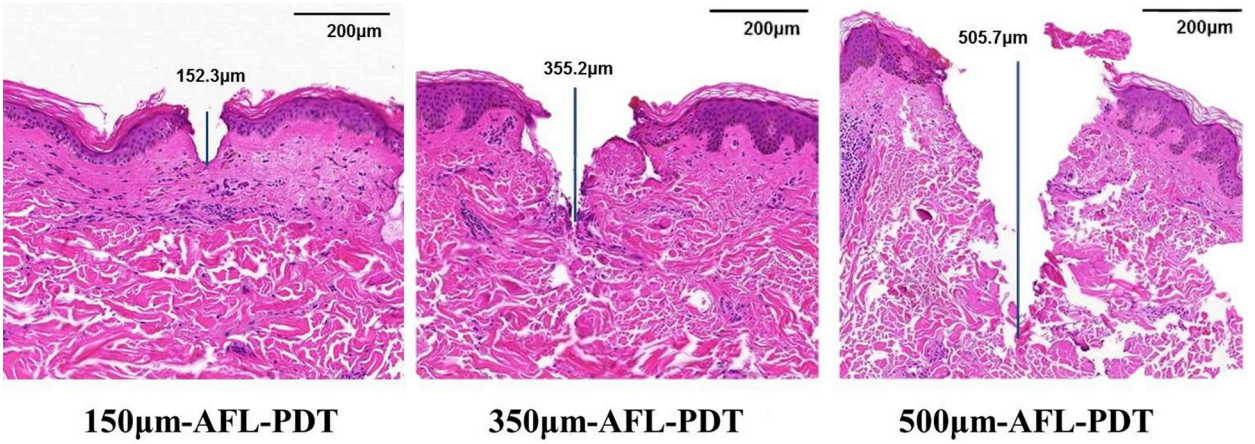

Fig 1. Histologic evaluation of ablative fractional laser (AFL) pretreatments. AFL-assisted photodynamic therapy (PDT) using erbium:yttrium-aluminum-garnet AFL-PDT: 150-μm AFL-PDT, 350-μm AFL-PDT, and 500-μm AFL-PDT.

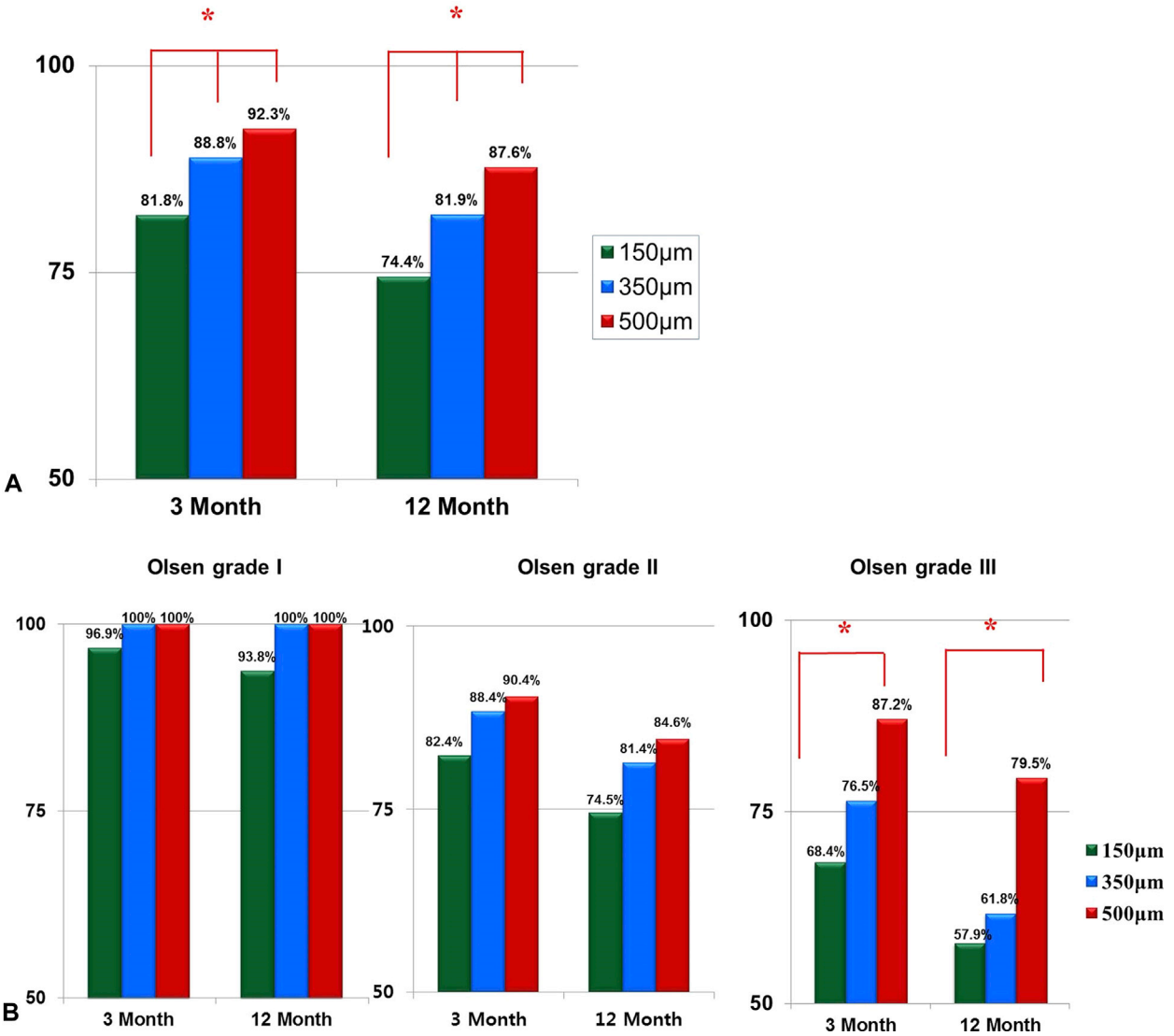

Fig 2. **A**, Complete response rates of all lesions at 3 and 12 months. **B**, Complete response rate of all lesions according to Olsen grade. *$P < .05$; ablative fractional laser (AFL)-assisted photodynamic therapy (PDT) using an erbium:yttrium-aluminum-garnet AFL: 150-μm AFL-PDT, 350-μm AFL-PDT, and 500-μm AFL-PDT.

We recommend AFL-assisted PDT using higher laser depth parameters in cases of high-grade AK lesions.

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Pityriasis rubra pilaris: A study evaluating patient quality of life in 2 populations

To the Editor: Pityriasis rubra pilaris (PRP) is an inflammatory, papulosquamous condition associated with a variety of debilitating sequelae that is frequently refractory to therapy.[1] Although many cutaneous diseases are known to negatively affect quality of life (QoL),[2-5] the degree to which PRP affects QoL has not been studied. We investigated the impact of PRP on QoL in 2 populations, the international online PRP support group and PRP patients seen within Partners Healthcare System (PHS), using the validated Skindex-29, Dermatology Life Quality Index (DLQI), and Short Form-36 (SF-36). In addition, we collected information on demographics and disease sequelae to elucidate which independent variables are associated with poor QoL.

This study was approved by the Institutional Review Board of Partners Healthcare. In total, 121 dermatologist-diagnosed support group members and 14 PHS patients completed all surveys. Surveys were administered online by using REDCap, a secure web-based software, to adult members of the PRP support group and PHS patients. QoL scores from patients with PRP were compared to existing data for other dermatologic conditions[3] utilizing 2-sample *t* tests. The relationship between mean Skindex-29 scores and independent variables was examined using 2-sample *t* tests and analysis of variance. Correlation between Skindex-29 and DLQI was computed by using Pearson correlation coefficient.

Skindex-29 Functioning scores revealed support group members had worse QoL than patients with all other dermatologic conditions ($P < .01$) included in the analysis (Table I). Skindex-29 Symptoms scores also showed that these PRP patients demonstrated worse QoL than patients with all other dermatologic conditions ($P < .01$) except epidermolysis bullosa ($P = .025$), and Emotions scores demonstrated they had worse QoL than patients with all other diseases ($P < .01$) except vulvodynia ($P = .011$), dermatomyositis ($P = .193$), and cutaneous lupus erythematosus ($P = .033$). DLQI and Skindex-29 scores were significantly correlated ($P < .001$). According to Skindex-29 and SF-36 scores, there was no significant difference in QoL between the 2 populations ($P < .01$).

According to SF-36, those with PRP had worse QoL in role physical, bodily pain, vitality, social functioning, and role emotional subscales than patients with recent myocardial infarction, hypertension, and type 2 diabetes mellitus ($P < .01$).

Factors related to poor QoL included alopecia and joint pain (Table II); 44% of support group members and 37.5% of PHS patients noted that PRP-related hair loss affected their daily social interactions. In addition, 31% of support group members and 18.75% of PHS patients noted joint pain that occurred within 1 month of PRP onset. On the basis of Functioning scores, those >65 years of age at diagnosis, duration of disease <1 year, and palmoplantar keratoderma also had worse QoL (Table II). Palmoplantar keratoderma,