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688 Use of low-level light therapy in management of central centrifugal cicatricial alopecia

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Background: Central Centrifugal Cicatricial Alopecia (CCCA) is a scarring hair loss that predominately affects women of African descent. The etiology is unknown, however is proposed to involve genetic, inflammatory, and environmental factors. Treatment includes anti-inflammatory therapies, such as intralesional steroids, topical steroids, and oral antibiotics. However, effective, safe medical therapy is often a challenge for many patients. Low-level red-light therapy has effectively improved androgenetic hair loss by promoting anti-inflammatory factors, however, its use in CCCA management is not well understood. Objective: To investigate the potential use of low-level light therapy for the management of CCCA. Methods: Five African American women with a biopsy-proven diagnosis of stage II-IV CCCA were enrolled in this prospective clinical trial. All patients were required to be on a stable treatment regimen for at least three months prior to enrollment, and regimens were kept constant throughout the study period. Each patient was instructed to use the REVIAN RED all-LED Light Cap for 10 minutes per day. Patients' hair loss was assessed with follow-up visits at 2,4 and 6-months using digital photography, patient self-assessments of symptoms, and clinician evaluations of severity. Results: The mean age of patients was 53.4 years old, the average duration

of disease was 12 years, and baseline stages of disease severity ranged from IIB-IVA. Of the three patients that have completed 4 months of treatment thus far, there was a subtle improvement in hair loss in patients 2 and 3, and no increased hair loss in patient 1. Conclusion: Low-level light therapy could serve as a safe and effective treatment option for patients with CCCA. Overall, patient satisfaction with treatment was high, with patients referring to the cap as a convenient and effective option for their hair loss. To our knowledge, this is the first study on the use of low-level light therapy for CCCA management.

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Title: Use of Low-Level Light Therapy in Management of Central Centrifugal Cicatricial Alopecia: *a clinical study*

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Background:
Central centrifugal cicatricial alopecia (CCCA) is a type of scarring alopecia that predominately affects women of African descent.[1] CCCA presents with hair thinning and breakage at the vertex of the scalp that spreads peripherally and progresses to irreversible scarring with follicular drop-out.[1] The etiology is unknown but is thought to have environmental, genetic, and inflammatory components.[1] Anti-inflammatory treatment often includes topical or intralesional corticosteroids and oral tetracyclines. Low-level light therapy (LLLT) has been utilized for wound healing, musculoskeletal conditions, and more recently hair-loss.[2] While LLLT is FDA approved as a device in the treatment of androgenetic alopecia, its use in the management of primary cicatricial alopecias is less known. We assessed the potential use of low-level light therapy as an adjunctive treatment for the management of CCCA.

Methods:
Five African American women with a biopsy-proven diagnosis of stage II-IV CCCA were enrolled in this prospective clinical trial. All patients were required to be on a stable treatment regimen for at least three months prior to enrollment, and regimens were kept constant throughout the study period. Each patient was instructed to use the REVIAN RED all- LED Light Cap for 10 minutes per day. Each cap emits 620nm and 660nm of light from 119 LED panels. Patients' hair loss was assessed with follow-up visits at 2,4 and 6-months using digital photography, patient self-assessments of symptoms, dermoscopic assessment, and clinician evaluations of severity. Baseline disease severity was assessed using a validated 6-point photographic scale.[3] Adherence was measured using an online application that monitored every time patients used their cap.

Results:
Four patients completed the study; one was lost to follow-up. The mean age of patients was 57.2 years old (49-69), the average duration of disease was 16.5 years, and baseline stages of disease severity ranged from 2B to 4A (Table 1). Physician assessment of loss of follicular openings improved from baseline to follow-up in 3 of 4(75%) patients. The amount of breakage improved in one patient. A mild increase in hair density was observed via digital photography in 3 of 4(75%) patients (Figure 1). The patient with the most severe disease stage at baseline had no increased hair loss noted via digital photography following 6-months of treatment. Trichoscopy revealed mild erythema, some circle hairs, and upright regrowing hairs in the vertex of the scalp at 4 and 6-month follow-up in the three patients with increased hair density. (Figure 1). All patients felt that they had hair regrowth with the treatment and two patients noted improvement in scalp itch. Three out of 4 patients (75%) had improved DLQI from baseline (mean=2) compared to follow-up (mean=1.25) The average adherence rate was 93.8% (79.1-99.4%). No side effects from treatment were reported.

Discussion:
To our knowledge, this is the first study on the use of LLLT for CCCA management. Previous studies reported increased hair density and thickness in patients with lichen planopilaris (LPP) following 6-months of treatment with LLLT.[4,5] Results from our study support these previous findings and indicate that LLLT may serve as an effective and well-tolerated adjuvant treatment option for patients with CCCA. Patient satisfaction and adherence to medications is usually poor in patients with alopecia, however in our study, patient satisfaction was high and adherence to

treatment was much greater than reported for topical therapies such as minoxidil.[6] Our study is limited by a small sample size from a single academic center and a lack of a control group. Future placebo-controlled studies are needed to further assess the efficacy of LLLT for patients with CCCA.

References

1. Aguh C, McMichael A. Central Centrifugal Cicatricial Alopecia. *JAMA Dermatology*. 2020;156(9):1036-1036. doi:10.1001/JAMADERMATOL.2020.1859
2. Avci P, Gupta A, Sadasivam M, et al. Low-level laser (light) therapy (LLLT) in skin: stimulating, healing, restoring. *Semin Cutan Med Surg*. 2013;32(1):41. Accessed May 24, 2022. /pmc/articles/PMC4126803/
3. Olsen EA, Callender V, Sperling L, et al. Central scalp alopecia photographic scale in African American women. *Dermatol Ther*. 2008;21(4):264-267. doi:10.1111/J.1529-8019.2008.00208.X
4. Fonda-Pascual P, Moreno-Arrones OM, Saceda-Corralo D, et al. Effectiveness of low-level laser therapy in lichen planopilaris. *J Am Acad Dermatol*. 2018;78(5):1020-1023. doi:10.1016/J.JAAD.2017.11.040
5. Gerkowicz A, Bartosińska J, Wolska-Gawron K, Michalska-Jakubus M, Kwaśny M, Krasowska D. Application of superluminescent diodes (sLED) in the treatment of scarring alopecia - A pilot study. *Photodiagnosis Photodyn Ther*. 2019;28:195-200. doi:10.1016/J.PDPDT.2019.09.006
6. Zschocke I, Mrowietz U, Lotzin A, Karakasili E, Reich K. Assessing adherence factors in patients under topical treatment: development of the Topical Therapy Adherence Questionnaire (TTAQ). *Archives of Dermatological Research*. 2014;306(3):287. doi:10.1007/S00403-014-1446-X

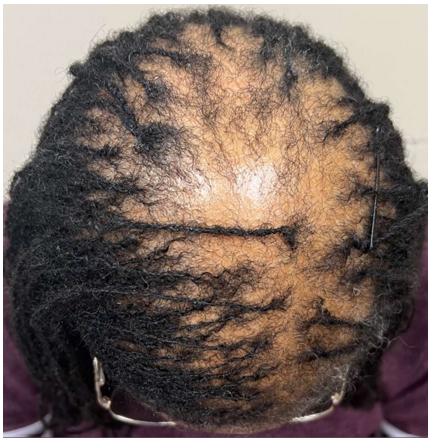
Patient #	Age (years)	Sex	Race	Disease Severity	Duration of Disease (years)	Current Treatment Regimen
1	69	Female	Black or African American	4A	15	-Intralesional steroids -Topical steroids -Topical minoxidil
2	50	Female	Black or African American	2B	22	-Topical steroids -Topical minoxidil
3	61	Female	Black or African American	3B	19	-Intralesional steroids -Topical steroids -Finasteride -Topical minoxidil
4	49	Female	Black or African American	2B	10	-Topical steroids -Doxycycline -Topical minoxidil

Table 1: Demographics and Baseline Disease Characteristics

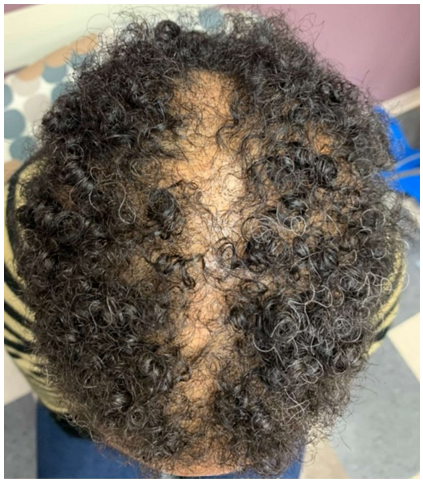
Figure 1: Effect of low-level light therapy on hair-loss and regrowth. A) central scalp of patient with B) increased density of hairs after 4 total months of light therapy. C) diffuse thinning present centrally and expanding peripherally on the scalp of patient 5 with D) increased density and E) signs of hair regrowth noted after 6 months of treatment with light therapy

A) Patient 4: 2-month f/u

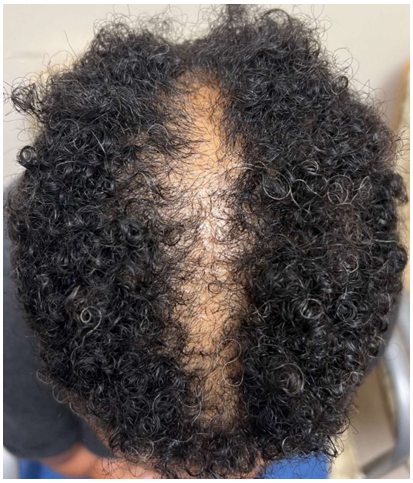
B) Patient 4: 4-month f/u



C. Patient 5: initial visit



D. Patient 5: 6-month f/u



E. Dermatoscopic image of scalp of patient 5 at 6-month f/u