

- common viral warts at intervals of 1, 2 and 3 weeks. *Br J Dermatol* 1995;132:433-436.
7. Kienzler JL, Lemoine MT, Orth G, Jibard N, Blanc D, Laurent R, et al. Humoral and cell-mediated immunity to human papillomavirus type 1 (HPV-1) in human warts. *Br J Dermatol* 1983;108:665-672.
 8. Sri JC, Dubina MI, Kao GF, Rady PL, Tyring SK, Gaspari AA. Generalized verrucosis: a review of the associated diseases, evaluation, and treatments. *J Am Acad Dermatol* 2012;66:292-311.
 9. Bruggink SC, Gussekloo J, Berger MY, Zaaier K, Assendelft WJ, de Waal MW, et al. Cryotherapy with liquid nitrogen versus topical salicylic acid application for cutaneous warts in primary care: randomized controlled trial. *CMAJ* 2010;182:1624-1630.
 10. Cockayne S, Hewitt C, Hicks K, Jayakody S, Kang'ombe AR, Stamuli E, et al. Cryotherapy versus salicylic acid for the treatment of plantar warts (verrucae): a randomised controlled trial. *BMJ* 2011;342:d3271.

<https://doi.org/10.5021/ad.2019.31.4.460>



Differences among Dermoscopic Findings in Riehl's Melanosis of the Cheek and Neck

June Hyuck Yim, In-Hye Kang, Min Kyung Shin, Mu-Hyoung Lee

Department of Dermatology, School of Medicine, Kyung Hee University, Seoul, Korea

Dear Editor:

Riehl's melanosis is a pigmented dermatosis that presents as bilateral, symmetrical, grayish-purplish-brown reticulated hyperpigmentation on the face and neck¹. The etiology of Riehl's melanosis remains largely unknown, but it is believed to be associated with contact dermatitis or photo-contact dermatitis caused by ingredients from certain cosmetics². The diagnosis of Riehl's melanosis may be difficult because the diagnostic criteria have not been clearly established. Recently, dermoscopy has been widely used for the accurate diagnosis of pigmented skin lesions. Wang and Xu³ explained that pseudonetwork and grey dots/granules were the most suggestive dermoscopic features of Riehl's melanosis on the face. However, the face and neck have different skin characteristics, and skin lesions of Riehl's melanosis can also be found on the later-

al side of the neck in some patients.

In this retrospective study, we compared dermoscopic findings of the face and neck in patients with Riehl's melanosis seen at the Department of Dermatology of Kyung Hee Medical Center (Seoul, Korea) from June 2014 to April 2017. The Ethics Committee of Kyung Hee Medical Center approved the study (approval number: KHMC IRB 2019-06-021). All patients were previously diagnosed with Riehl's melanosis and we reviewed clinical charts and obtained baseline clinical images and dermoscopic images. We have included only those patients who had dermoscopic images of both the face and neck. Digital dermoscopic images of the lesions were obtained using a Dermlite DL3 with polarized light (3Gen Inc., San Juan Capistrano, CA, USA) (10-fold magnification) mounted on a Canon EOS 350D camera (Canon Corp., Tokyo, Japan).

Received April 16, 2018, Revised July 24, 2018, Accepted for publication July 29, 2018

Corresponding author: Min Kyung Shin, Department of Dermatology, School of Medicine, Kyung Hee University, 23 Kyunghedae-ro, Dongdaemun-gu, Seoul 02447, Korea. Tel: 82-2-958-8300, Fax: 82-2-969-6538, E-mail: haddal@hanmail.net
ORCID: <https://orcid.org/0000-0001-9834-7931>

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We received the patient's consent form about publishing all photographic materials. Seven main dermoscopic features were evaluated, namely, slight scales, pseudonetwork, grey dots/granules, follicular keratotic plugs, perifollicular whitish halo, telangiectatic vessels and hypopigmented network patterns.

A total of 9 patients with Riehl's melanosis were identified and included in this study. Among the patients, eight were female and one was male, and the mean age at the time of inclusion was 62.9 years. The pigmentation presented on the entire face, but it was more pronounced on the lateral face and extended to the lateral side of the neck (Fig. 1). None of the patients were treated prior to the baseline visit and most patients had no history of preceding pigmentary dermatosis, inflammatory dermatosis or atopic dermatitis. The demographic data and dermoscopic features of our study patients are summarized in Table 1 and illustrated in Fig. 1. In the dermoscopic images of the face, pseudonetwork, grey dots/granules and telangiectatic vessels were observed in all the patients (9/9, 100.0%), while slight scales, follicular keratotic plugs and perifollicular whitish halo were observed in 6 of 9 patients (6/9, 66.7%). And erythematous background was observed in 5 of 9 patients (5/9, 55.6%). In the cheek, a hypopigmented network pattern was not observed in any patient. In the dermoscopic images of the neck, pseudonetwork, grey dots/granules and telangiectatic vessels as well as slight scales and hypopigmented network pattern were observed in all

the patients (9/9, 100.0%). On the other hand, follicular keratotic plugs and perifollicular halo were observed only in one and 3 of 9 patients, respectively, at a lower rate than in the face.

The major histopathologic features of Riehl's melanosis are vacuolar degeneration of the basal layer and pigment incontinence of the dermis⁴. These pathological features correspond with grey dots/granules on the dermoscopic images that represent melanophages in the dermis⁵. The pseudonetwork is due to homogeneous pigmentation that is interrupted by the non-pigmented follicular openings⁵. In this study, we also confirmed grey dots/granules and pseudonetwork in all cases the same as in the previous study³. However, the dermoscopic features of Riehl's melanosis in the neck showed different patterns compared with the face. In the neck, slight scales and a hypopigmented network pattern were observed additionally in all patients while follicular keratotic plugs and perifollicular halo were not observed significantly compared to the face. The flour-like slight scales were a specific finding to Riehl's melanosis because this pattern was not observed with other hyperpigmented disorders and this dermoscopic feature was more prominently observed in the neck³. The majority of Riehl's melanosis occurs in middle-aged women. In the neck, the number and depth of wrinkles increased with age because of intrinsic and extrinsic aging processes⁶. Furthermore, we repeatedly raise, lower, and turn our head in everyday life. Therefore, the skin of the neck

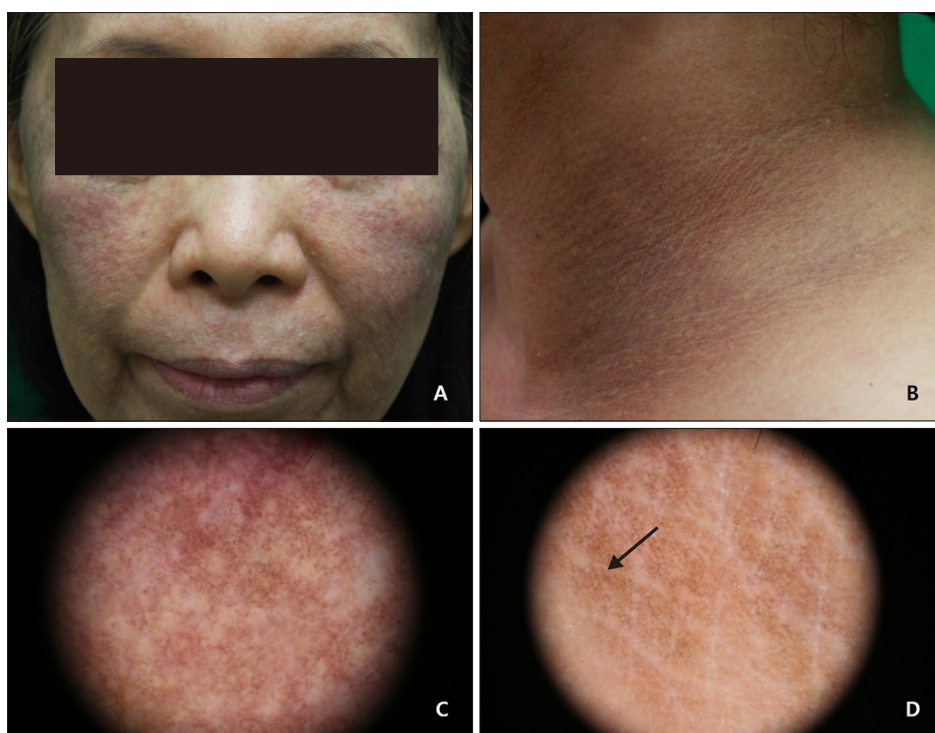


Fig. 1. Baseline clinical images of a 58-year-old female (A, B) and representative dermoscopic images of the face (C) and neck (D). The pigmentation presented on the entire face, but it was more pronounced on the lateral face and extended to the lateral side of the neck. In the face, pseudonetwork, grey dots/granules and telangiectatic vessels were prominently observed. In the neck, a characteristic hypopigmented network pattern (black arrow) with slight scales was observed.

Table 1. Demographic data and dermoscopic features of the study patients

Sex	Age (yr)	Slight scales		Pseudo network		Grey dots/ granules		Follicular keratotic plugs		Perifollicular whitish halo		Telangiectatic vessels		Hypopigmented network pattern		Erythematous background	
		Face	Neck	Face	Neck	Face	Neck	Face	Neck	Face	Neck	Face	Neck	Face	Neck	Face	Neck
1	Male	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
2	Female	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
3	Female	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
4	Female	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
5	Female	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
6	Female	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
7	Female	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
8	Female	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
9	Female	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Frequency (%)		66.7	100.0	100.0	100.0	100.0	100.0	66.7	11.1	66.7	33.3	100.0	100.0	0.0	100.0	44.4	33.3

+ and - represent present and absent features, respectively.

needed a lot of flexibility. Skin grooves are deeper and anisotropy of skin furrows are more complex in the neck compared to the face. A recent study by Kim et al.⁷ reported that neck wrinkles increased with age and were five-fold deeper than those of the cheek. Therefore, these furrows are relatively spared from contact allergens and sun exposure. We suppose that this could be the cause of the hypopigmented network pattern on the dermoscope. These results suggest that the pathogenesis of Riehl's melanosis is contact dermatitis or photo-contact dermatitis. A perifollicular whitish halo corresponds with perifollicular fibrosis in histopathology⁸. In the neck, a perifollicular whitish halo and follicular keratotic plug were observed in fewer cases compared to the face. We hypothesize that this is caused by the higher hair follicle density of the face compared to the neck. These dermoscopic findings can help to differentiate Riehl's melanosis from other diseases that may cause hyperpigmentation in the neck. In Terra Firma-Forme dermatosis, hyperpigmentation of stone pavement pattern can be seen with patchy distribution rather than diffuse distribution. And dirty neck in atopic dermatitis shows hyperpigmentation of deeper rippled pattern with prominent scales.

In this study, we were able to determine that pseudonetwork and grey dots/granules were the most suggestive dermoscopic features of Riehl's melanosis. In the neck, we observed a hypopigmented network pattern with slight scales and these findings are thought to be helpful in diagnosis of Riehl's melanosis. However, our study had some limitations because of the relatively small number of patients and the retrospective study design. Therefore, further studies are needed to improve the dermoscopic diagnosis of Riehl's melanosis.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

ORCID

June Hyuck Yim, <https://orcid.org/0000-0002-5043-155X>
 In-Hye Kang, <https://orcid.org/0000-0003-0659-122X>
 Min Kyung Shin, <https://orcid.org/0000-0001-9834-7931>
 Mu-Hyoung Lee, <https://orcid.org/0000-0002-0902-6843>

REFERENCES

1. Li YH, Liu J, Chen JZ, Wu Y, Xu TH, Zhu X, et al. A pilot study of intense pulsed light in the treatment of Riehl's melanosis. *Dermatol Surg* 2011;37:119-122.
2. On HR, Hong WJ, Roh MR. Low-pulse energy Q-switched

- Nd:YAG laser treatment for hair-dye-induced Riehl's melanosis. *J Cosmet Laser Ther* 2015;17:135-138.
3. Wang L, Xu AE. Four views of Riehl's melanosis: clinical appearance, dermoscopy, confocal microscopy and histopathology. *J Eur Acad Dermatol Venereol* 2014;28:1199-1206.
 4. Park JY, Kim YC, Lee ES, Park KC, Kang HY. Acquired bilateral melanosis of the neck in perimenopausal women. *Br J Dermatol* 2012;166:662-665.
 5. Braun RP, Rabinovitz HS, Oliviero M, Kopf AW, Saurat JH. Dermoscopy of pigmented skin lesions. *J Am Acad Dermatol* 2005;52:109-121.
 6. Choi YH, Kim D, Hwang E, Kim BJ. Skin texture aging trend analysis using dermoscopy images. *Skin Res Technol* 2014;20:486-497.
 7. Kim E, Cho G, Won NG, Cho J. Age-related changes in skin bio-mechanical properties: the neck skin compared with the cheek and forearm skin in Korean females. *Skin Res Technol* 2013;19:236-241.
 8. Lallas A, Apalla Z, Lefaki I, Sotiriou E, Lazaridou E, Ioannides D, et al. Dermoscopy of discoid lupus erythematosus. *Br J Dermatol* 2013;168:284-288.

<https://doi.org/10.5021/ad.2019.31.4.463>



Therapeutic Effect of 308-nm Excimer Laser on Alopecia Areata in an Animal Model

Jong Hyuk Moon, Chan YI Bang, Min Ji Kang, Seung Dohn Yeom, Hee Seong Yoon, Hyo Jin Kim, Ji Won Byun, Jeonghyun Shin, Gwang Seong Choi

Department of Dermatology, Inha University Hospital, Inha University School of Medicine, Incheon, Korea

Dear Editor:

Alopecia areata (AA) is an autoimmune disease characterized by round patches of alopecia with distinct margins¹. Genetic, autoimmune, and epigenetic factors are known to contribute to the development of AA¹. Among these factors, a follicle-specific T-cell-mediated autoimmune reaction is considered most important¹. Specifically, CD4⁺ and CD8⁺ T-lymphocytes are involved in the primary pathogenesis of AA^{1,2}. Natural killer group 2D positive (NKG2D⁺) cells such as NK, NKT, and CD8⁺ T cells and NKG2D activating ligands from the MHC I-related chain A family also have a key role in pathogenesis². CD4⁺/CD25⁺ T-cells are also involved^{3,4}. Most therapies of AA target the autoimmune reaction, but a new

therapy modality is being needed because of limitations and complications of previous therapies⁵. There are many reports on use of 308-nm excimer laser therapy for AA⁶⁻¹⁰, but the exact mechanism of effect is unknown. Thus, we performed histopathologic evaluation after 308-nm excimer laser therapy in an animal AA model to investigate therapeutic mechanism of excimer laser therapy on AA.

This study was conducted using C3H/HeJ mice with AA patches. AA patches of C3H/HeJ mice were grafted via full-thickness skin graft (FTSG) from 46-week-old C3H/HeJ mice that naturally developed AA patches as aging process. After 50 days from the date of FTSG, all of five mice had AA patches on the back. AA patches induced on the back skin of five C3H/HeJ mice were treated with 308-nm

Received December 19, 2017, Revised July 19, 2018, Accepted for publication August 13, 2018

Corresponding author: Gwang Seong Choi, Department of Dermatology, Inha University Hospital, Inha University School of Medicine, 27 Inhang-ro, Jung-gu, Incheon 22332, Korea. Tel: 82-32-890-2238, Fax: 82-32-890-2236, E-mail: garden@inha.ac.kr
ORCID: <https://orcid.org/0000-0002-5766-0179>

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