



Some Becker's Nevus Melanocytes Remain Alive after Treatment with Q-Switched Alexandrite Laser

Han Jin Jung, Sun Young Moon, Mi Yeung Sohn, Yong Hyun Jang, Seok-Jong Lee, Do Won Kim, Weon Ju Lee

Department of Dermatology, Kyungpook National University School of Medicine, Daegu, Korea

Dear Editor:

Becker's nevus (BN) is an uncommon cutaneous hyperpigmentation with hypertrichosis that develops during adolescence and occurs primarily in young men¹. BN appearing on exposed areas of the body may represent a distressing cosmetic handicap. However, treatment of BN is suboptimal and unfavorable. BN is known to be resistant to treatment with intense pulsed light or Q-switched laser². Permanent hypopigmentation or complete repigmentation can be observed after treatment of BN with laser devices³⁻⁵. This study was conducted to investigate the in vitro and in vivo effects of Q-switched alexandrite laser irradiation on BN melanocytes.

Melanocytes were cultured from BN epidermis in a melanocyte growth medium according to a known method⁶. The cultured BN melanocytes were divided into three groups: untreated group, Q-switched alexandrite laser (Alex[®]; Syneron Candela, Irvine, CA, USA)-treated group, and 0.7 J/cm² narrow-band ultraviolet B (UVB, Waldmann UV 801 BL[®]; Waldmann, Villingen-Schwenningen, Germany)-treated group. The protocol for treatment with Q-switched alexandrite laser was as follows: wavelength, 755 nm; spot size, 3 mm; fluence, 7 J/cm²; repetition rate, 2 Hz; overlapping, 10%. Immunocytofluorescence analysis was performed twice in the three groups, with antibodies against c-kit (1:50; Dako, Frederiksberg, Denmark), human melanoma black 45 (HMB-45, 1:50; Dako), melanocortin 1 receptor (MC1R, 1:100; Chemicon, Billerica, MA, USA), mel-5 (Signet, Dedham, MA, USA), microphthalmia-associated transcription factor (MITF, 1:50; No-

vocastra, Newcastle upon Tyne, UK), and NKI/beteb (Monosan, 1:50; Sanbio, Uden, The Netherlands). Skin biopsies were obtained from five patients with BN. In addition, skin biopsies were obtained from hypopigmented macules and repigmented macules of patients with BN after treatment with Q-switched alexandrite laser. The protocol for treatment with Q-switched alexandrite laser was as follows: wavelength, 755 nm; spot size, 3 mm; fluence, 7 J/cm²; repetition rate, 2 Hz; overlapping, 10%. Histological studies with hematoxylin-eosin stain and Masson-Fontana (M-F) stain and immunohistochemistry with antibodies against S-100 and c-kit were performed on the biopsy specimens.

The cultured BN melanocytes had slender cytoplasm with bipolar or tripolar dendritic processes (Fig. 1). After irradiation with Q-switched alexandrite laser, the cultured BN melanocytes were almost destroyed, but a few morphologically intact cells were seen (Fig. 1); meanwhile, after UVB irradiation, the cultured BN melanocytes had decreased density compared with untreated cells (Fig. 1). Like in epidermal melanocytes, c-kit, HMB-45, MC1R, mel-5, MITF, and NKI/beteb were well expressed in cultured BN melanocytes by immunocytofluorescence (Fig. 1). The expression of c-kit, HMB-45, MITF, and NKI/beteb in intact BN melanocytes after irradiation with UVB or Q-switched alexandrite laser was similar to that in untreated cells (Fig. 1). However, the expression of MC1R and mel-5 in the intact BN melanocytes was lower than that in untreated cells (Fig. 1). Like for other pigmented skin lesions, histological examination with M-F stain revealed an increase in

Received March 2, 2016, Revised May 30, 2016, Accepted for publication June 2, 2016

Corresponding author: Weon Ju Lee, Department of Dermatology, Kyungpook National University Hospital, 130 Dongdeok-ro, Jung-gu, Daegu 41944, Korea. Tel: 82-53-420-5838, Fax: 82-53-426-0770, E-mail: weonju@knu.ac.kr

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Copyright © The Korean Dermatological Association and The Korean Society for Investigative Dermatology

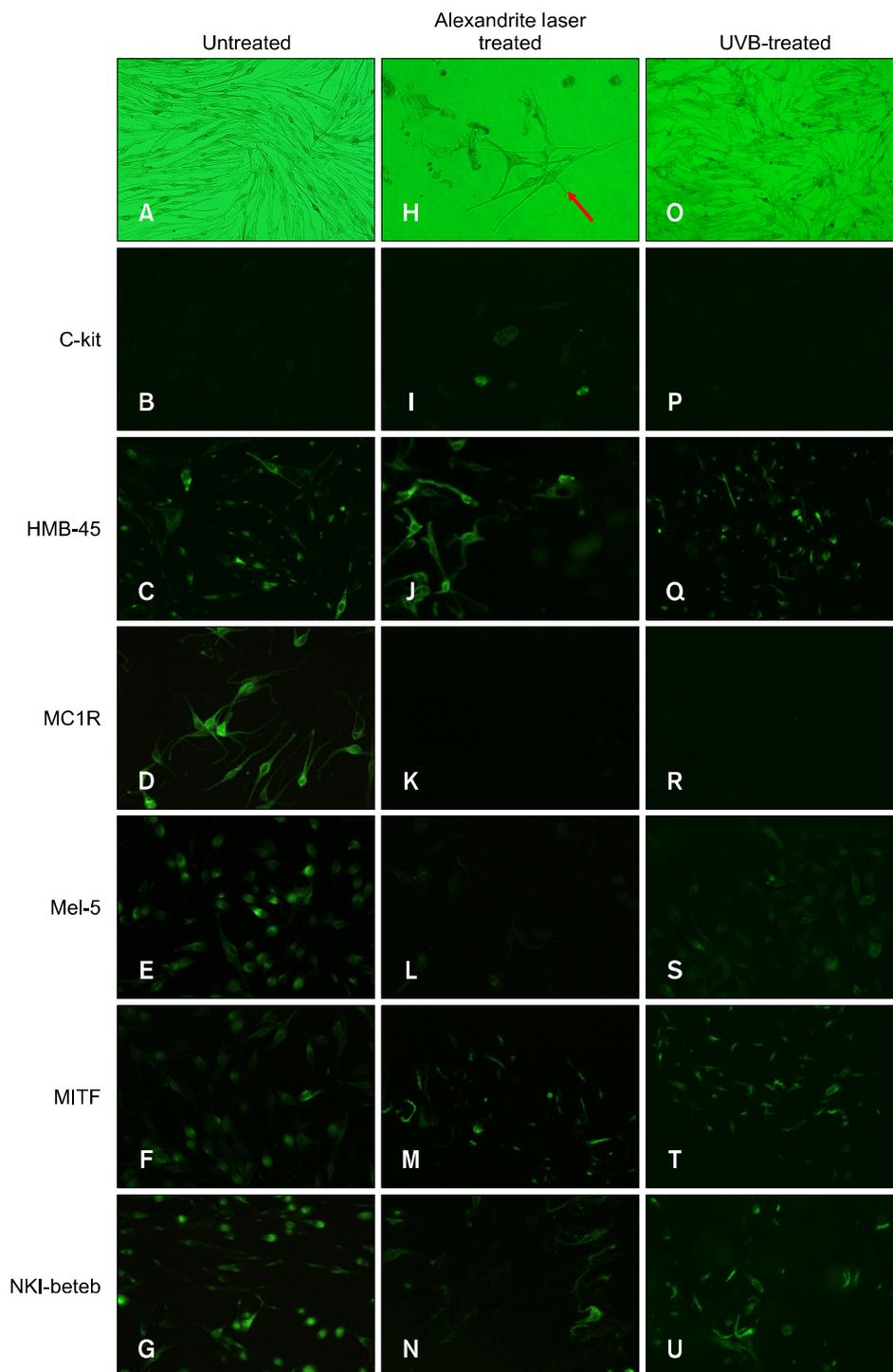


Fig. 1. Characteristics of cultured Becker's nevus (BN) melanocytes. (A) Cultured BN melanocytes ($\times 200$), (O) 0.7 J/cm^2 ultraviolet B (UVB)-treated BN melanocytes ($\times 200$), and (H) Q-switched alexandrite laser-treated BN melanocytes (arrow) ($\times 400$). (B~G, I~N, P~U) Immunocytofluorescent examinations for biomarkers of the cultured BN melanocytes in each condition ($\times 200$). HMB-45: human melanoma black 45, MC1R: melanocortin 1 receptor, MITF: microphthalmia-associated transcription factor.

pigmentation of the BN epidermis (Fig. 2). In addition, an immunohistochemical study showed the expression of S-100 and c-kit along the dermoepidermal junction of the BN skin (Fig. 2). However, the hypopigmented macules of BN produced by Q-switched alexandrite laser showed a negative reaction to M-F stain and antibodies against S-100 and c-kit (Fig. 2). The repigmented macules of BN,

after treatment with Q-switched alexandrite laser, showed a linear positive reaction to M-F stain and a focal positive reaction to antibodies against S-100 and c-kit (Fig. 2). Q-switched alexandrite laser irradiation targets dermal and epidermal chromophore for the treatment of pigmentary skin lesion including BN⁷. However, it is not easy to manage BN with Q-switched alexandrite laser. Permanent hy-

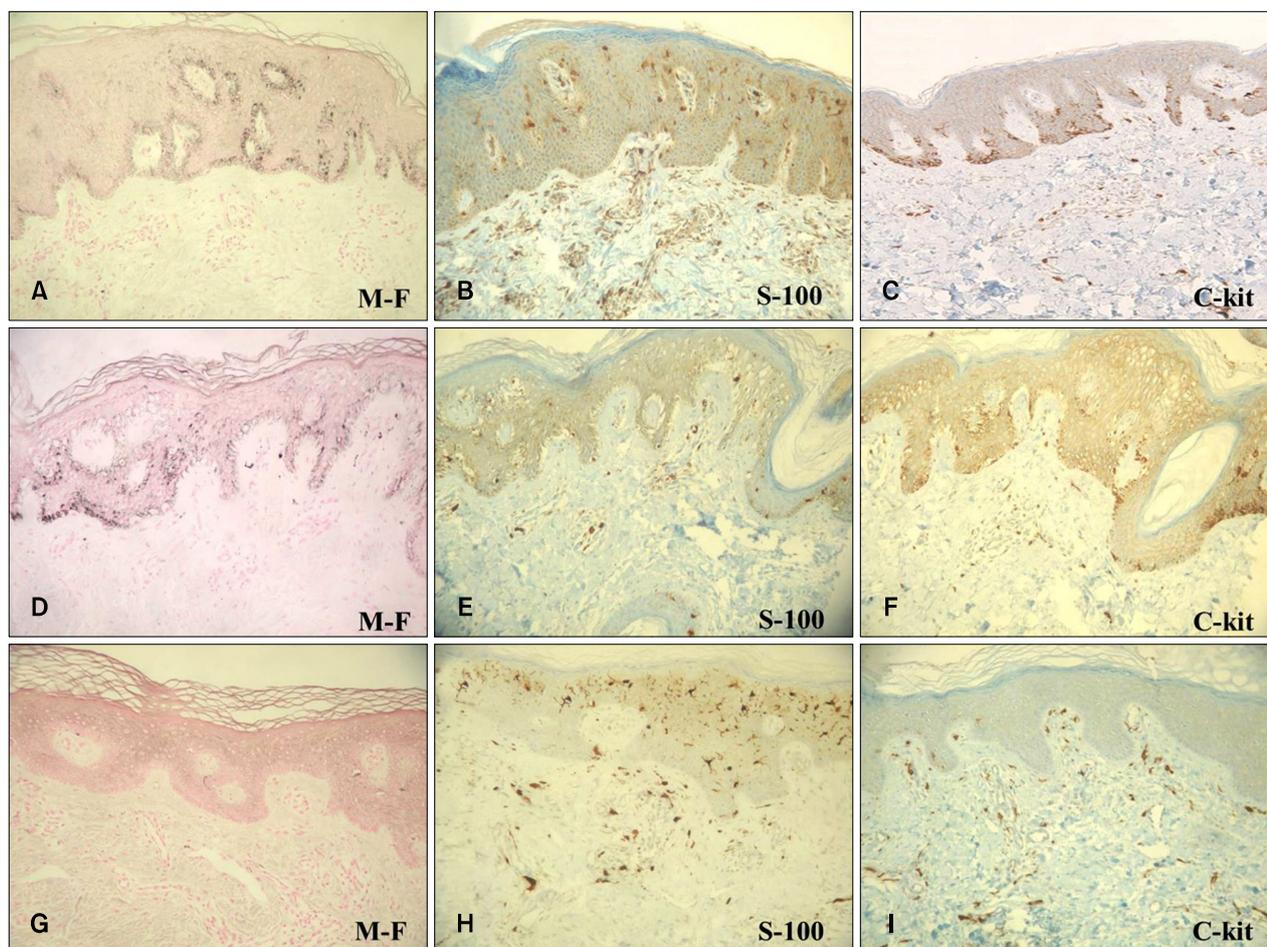


Fig. 2. Characteristics of Becker's nevus (BN). (A) Masson-Fontana (M-F) stain for BN, (D) repigmented, and (G) hypopigmented macules of BN; (B) S-100 for BN, (E) repigmented and (H) hypopigmented macules of BN; and (C) c-kit for BN, (F) repigmented and (I) hypopigmented macules of BN. A~I: $\times 200$.

popigmentation or complete repigmentation can develop after laser treatment of BN. An *in vitro* study was performed using cultured BN melanocytes. The cultured BN melanocytes had the same characteristics as epidermal melanocytes, showing slender cytoplasm, with bipolar or tripolar dendritic processes, and expressing c-kit, HMB-45, MC1R, mel-5, MITF, and NKI/beteb. The cultured BN melanocytes, after treatment with Q-switched alexandrite laser, were almost destroyed, but some BN melanocytes with intact cytoplasm and dendritic processes were observed. Intact cells expressed c-kit, HMB-45, MITF, and NKI/beteb, but did not express MC1R and mel-5. Cytotoxicity, which causes change in the expression of cellular biomarkers, can be induced at 0.4 J/cm^2 of narrow-band UVB⁸. In this study, cultured BN melanocytes were irradiated with 0.7 J/cm^2 UVB. The expression of biomarkers in the UVB-irradiated BN melanocytes was similar to that in the cells after irradiation with Q-switched alexandrite

laser. Usually, repigmentation of BN after laser treatment is thought to be caused by hormonal factors and higher hormonal receptor expression⁹. In addition, Q-switched laser-resistant BN melanocytes can be one of the causative factors of postlaser repigmentation of BN. Fewer BN melanocytes and similar pigmentation in repigmented skin were noted on histology and immunohistochemistry after treatment with Q-switched alexandrite laser. These S-100- and c-kit-positive cells may be Q-switched alexandrite laser-resistant BN melanocytes, with complete repigmentation. In conclusion, this study suggests that some BN melanocytes remain alive after treatment with Q-switched alexandrite laser, showing changes in expression of several biomarkers and playing an important role in cutaneous repigmentation.

CONFLICTS OF INTEREST

The authors have nothing to disclose.

REFERENCES

1. Lee DJ, Kang HY. Eczema confined to Becker's nevus on the face: the behavior of melanocytes during inflammation. *Ann Dermatol* 2012;24:99-100.
2. Danarti R, König A, Salhi A, Bittar M, Happle R. Becker's nevus syndrome revisited. *J Am Acad Dermatol* 2004;51:965-969.
3. Apfelberg DB, Maser MR, Lash H. Extended clinical use of the argon laser for cutaneous lesions. *Arch Dermatol* 1979;115:719-721.
4. Landthaler M, Haina D, Waidelich W, Braun-Falco O. Argon laser therapy of verrucous nevi. *Plast Reconstr Surg* 1984;74:108-113.
5. Kopera D, Hohenleutner U, Landthaler M. Quality-switched ruby laser treatment of solar lentigines and Becker's nevus: a histopathological and immunohistochemical study. *Dermatology* 1997;194:338-343.
6. Na GY, Paek SH, Park BC, Kim DW, Lee WJ, Lee SJ, et al. Isolation and characterization of outer root sheath melanocytes of human hair follicles. *Br J Dermatol* 2006;155:902-909.
7. Tse Y, Levine VJ, McClain SA, Ashinoff R. The removal of cutaneous pigmented lesions with the Q-switched ruby laser and the Q-switched neodymium: yttrium-aluminum-garnet laser. A comparative study. *J Dermatol Surg Oncol* 1994;20:795-800.
8. Cho TH, Lee JW, Lee MH. Evaluating the cytotoxic doses of narrowband and broadband UVB in human keratinocytes, melanocytes, and fibroblasts. *Photodermatol Photoimmunol Photomed* 2008;24:110-114.
9. Kim YJ, Han JH, Kang HY, Lee ES, Kim YC. Androgen receptor overexpression in Becker nevus: histopathologic and immunohistochemical analysis. *J Cutan Pathol* 2008;35:1121-1126.

<https://doi.org/10.5021/ad.2017.29.3.355>



Onychocytic Matricoma: Report of an Asian Case

Haiyan Song^{1,4}, Fei Qu², Ningning Dang¹, Xuwu Sun³

Departments of ¹Dermatology, ²Pathology, and ³Plastic Surgery, Jinan Central Hospital affiliated to Shandong University, ⁴Shandong Provincial Institute of Dermatology and Venereology, Jinan, China

Dear Editor:

Onychocytic matricoma (OCM) is very rare benign sub-ungual tumor of nail matrix origin¹. Here, we report the first Asian case with OCM.

A 41-year-old Chinese male came to the dermatology clinic with a dark line on the second finger of his right hand, which had been present for approximately ten years. He

denied pain or bleeding associated with this lesion. Physical examination of the right second digit demonstrated a 2-mm-wide black longitudinal streak extending to the distal lunula (Fig. 1A). A circular sinus was visible beneath the area of melanonychia (Fig. 1B), and a probe was inserted, resulting in no exudation but a peculiar smell. After the central area of the nail plate was avulsed, we

Received December 14, 2015, Revised May 3, 2016, Accepted for publication June 3, 2016

Corresponding author: Ningning Dang, Department of Dermatology, Jinan Central Hospital affiliated to Shandong University, 105 Jiefang Road, Shandong Province, Jinan 250013, China. Tel: 86-153-1881-6250, Fax: 86-0531-86951300, E-mail: 15318816250@163.com

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Copyright © The Korean Dermatological Association and The Korean Society for Investigative Dermatology