

# Repigmentation of vitiliginous facial area after Q-switched Nd-YAG laser therapy for depigmentation: Is it a case of true reverse Koebner phenomenon in vitiligo?

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The patients with universal vitiligo and residual pigmented patches usually do not benefit from available repigmenting methods and are better scheduled for depigmentation by medical, laser, and or freezing procedures. A 37-year-old lady with universal vitiligo and remaining pigmentation in the left anterior chest wall, both ventral forearms, and diffuse mottled depigmentation of the face was scheduled for facial depigmentation by 532 nm Q-switched Nd-YAG laser. All residual pigmented facial areas were treated uniformly. Two months after laser therapy, we paradoxically observed considerable repigmentation of the treated areas with only some remaining scattered and round depigmented patches. Through an unknown mechanism, a true reverse Koebner phenomenon with its resultant repigmentation rather than depigmentation was observed in our patient.

**Keywords:** depigmentation, Q-switched Nd-YAG laser, repigmentation, reverse koebner phenomenon, vitiligo

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## INTRODUCTION

The Koebner phenomenon is a well-known finding in vitiligo and other dermatological diseases such as psoriasis, and lichen planus<sup>1,2</sup>. The Koebner phenomenon is defined as the extension of preexisting lesions and emergence of new lesions in apparently normal skin following a trauma. Different traumas such as abrasion, erosion, burn, laceration, scratching and even surgical incision can initiate and spread the lesions<sup>1,2</sup>. In vitiligo, the Koebner phenomenon is usually seen at the site of trauma as patchy depigmented lesions which may gradually spread thereafter and beyond the extent of early traumatic lesions. The reverse Koebner phenomenon is defined as the clearance of the lesion following a trauma. The reverse Koebner phenomenon is a known entity in psoriasis<sup>1-3</sup> but it is not commonly seen in vitiligo patients and is reported only in limited case reports<sup>4,5</sup>. Herein, we report paradoxical repigmentation in a patient

with universal vitiligo after treatment with 532 nm Q-switched Nd-YAG laser for depigmentation. This phenomenon can be regarded as the reverse Koebner phenomenon in vitiligo.

## CASE REPORT

A 37-year-old lady with Fitzpatrick skin type 4 and universal vitiligo was scheduled for laser depigmentation of residual facial pigmented areas. The whole body of the patient was depigmented excluding some limited areas on the forearms, upper left anterior chest wall, and face. The facial pigmentation was diffusely mottled (Figure 1). The patient had received topical monobenzyl ether of hydroquinone (Monobenzone 20%) for 8 months with unsatisfactory results. She stopped the topical use of Monobenzone 4 months before laser therapy. The laser selected for this purpose was frequency-doubled, 532nm Q-switched Nd-YAG laser. The laser system was Q-switched, Nd-YAG,

Quanta lasers, DNA laser technology, Olona (VA) Italy. We previously depigmented several vitiligo patients by this laser using these parameters. Mild traction was done in order to minimize local blood circulation and lessen capillary damage. The parameters chosen were as following: spot size=3-5mm, frequency =10 Hertz, pulse duration =6 ns, and fluence =5J/cm<sup>2</sup>. The whole facial pigmented areas were treated with one pass of laser therapy.

Immediately after laser therapy, the skin became mildly edematous with diffuse purpuric lesions. The patient was asked to avoid sun exposure and to use sunscreen. The patient was visited one week later and the treated areas were found to be more pigmented than before treatment as a result of post-inflammatory hyperpigmentation. This is usually a common finding seen after laser therapy



**Figure 1.** Facial appearance in a patient with universal vitiligo, before laser therapy



**Figure 2.** Considerable repigmentation, 4 months after laser therapy for depigmentation

for depigmentation. The patient was also asked to return two months later to treat the remaining non responding areas. Two months later, we surprisingly observed considerable repigmentation of the treated areas with only some small, scattered, and oval depigmented macules. We observed the patient for 2 more months and found no more spontaneous depigmentation (Figure 2).

## DISCUSSION

The reverse Koebner phenomenon is usually not seen in daily clinical practice among the vitiligo patients. There are only few case reports in the literature regarding the reverse Koebner phenomenon as follicular repigmentation of vitiligo patches distant from the autologous skin graft, and or as satellite repigmentation after suction blister autografting<sup>4,5</sup>. Whether or not repigmentation in a distant area can be considered as a reverse Koebner phenomenon is not yet clear. To our knowledge, our patient was the first case of vitiligo that showed paradoxical repigmentation rather than depigmentation after laser therapy, which can be regarded as a true reverse Koebner's phenomenon in vitiligo. It is postulated that the melanocyte cells in vitiligo patients have an intrinsic defect. This intrinsic defect makes them vulnerable to trauma and this vulnerability may be an explanation for the Koebner phenomenon. The mechanism of the Koebner phenomenon is based on melanocyte destruction and extension of the vitiliginous lesions as a result. In this case report, we observed repigmentation rather than depigmentation as seen in our previous experiences and in the other reported studies<sup>6</sup>. Repigmentation is based on melanogenesis and melanocytes replication. Melanogenesis occurs when there is some immunomodulatory effect as a result of light and tissue interaction. Different phototherapy devices such as NB-UVB, excimer laser, and excimer lamp are used to treat vitiligo. The known mechanisms of the phototherapy are the synthesis of the immunosuppressive cytokines, and the reduction of the Langerhans cells, T lymphocytes and mast cells<sup>7</sup>. The pathogenesis of the reverse Koebner phenomenon can be explained in the context of phototherapeutic mechanism by inducing immunosuppression and melanogenesis. Like phototherapy, the paradoxical repigmentation

may occur as a result of cytokine changes<sup>2,4,5</sup>. Changing the inflammatory cells involved in the pathogenesis of vitiligo like Langerhans and T cells, and or damaging the antigenic structure of the melanocytes may be other possible mechanisms. Further studies in the future may be required to determine the true mechanism of laser light paradoxical effect.

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