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Phototherapy in Vitiligo: Evaluating Narrowband UVB versus Excimer Laser

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Introduction

Vitiligo is a chronic, acquired disorder characterized by depigmented macules and patches resulting from the destruction or dysfunction of melanocytes. It affects approximately 0.5% to 2% of the global population, with no predilection for race or gender. The exact etiology remains multifactorial, involving autoimmune, genetic, oxidative stress and neurogenic factors. Treatment of vitiligo remains a significant challenge, especially in extensive or recalcitrant cases. Among various therapeutic approaches, phototherapy has emerged as one of the most effective options for inducing repigmentation. In particular, Narrowband Ultraviolet B (NB-UVB) and the 308 nm excimer laser have been widely studied and utilized. Both therapies operate on the principle of UVB-induced immunosuppression and melanocyte stimulation, yet they differ significantly in delivery, efficacy, safety and suitability for different types and locations of lesions [1]. NB-UVB phototherapy has become the mainstay of vitiligo treatment over the past two decades. It involves the delivery of UVB radiation in the narrow wavelength range of 311–313 nm, which is considered optimal for stimulating melanocyte proliferation and migration while minimizing harmful effects such as erythema or carcinogenesis. NB-UVB is typically administered two to three times weekly in a full-body chamber or localized device, depending on the extent of involvement. Numerous studies have shown NB-UVB to be effective in inducing repigmentation, particularly in areas such as the face, neck and trunk. The mechanism involves stimulation of residual follicular melanocytes, modulation of cytokine profiles and suppression of autoreactive T cells that contribute to melanocyte destruction. Long-term treatment, often spanning several months, is required to achieve significant clinical improvement. The gradual and diffuse nature of repigmentation is generally well tolerated, with minimal side effects aside from occasional mild erythema or xerosis.

Description

In contrast, the 308 nm excimer laser is a form of targeted phototherapy that emits a monochromatic beam of UVB light directly onto lesional skin. This high-intensity, localized treatment allows for precise application to affected areas without exposing uninvolved skin, thus reducing the cumulative UV dose and associated risks. The excimer laser is particularly advantageous for treating localized vitiligo, especially on cosmetically sensitive areas such as the face, neck, hands and genitalia. Sessions are typically conducted once or twice a week and clinical improvement may be observed as early as four to six weeks after initiation. The laser induces repigmentation through mechanisms similar to NB-UVB, including stimulation of melanocyte activity and immunomodulation, but the higher fluence delivered in each session contributes to a more rapid response in many patients [2]. Comparative analyses of NB-UVB and excimer laser therapies reveal nuanced differences in efficacy, depending on disease extent, lesion location and patient characteristics. Several clinical trials have reported that excimer laser achieves faster repigmentation in focal vitiligo and in areas such as the face and neck. In one study, more than 75% of patients treated with the excimer laser for facial lesions achieved at least 50% repigmentation within eight weeks, a rate significantly higher than those treated with NB-UVB. However, the excimer laser is less practical for widespread vitiligo due to the time and cost associated with treating large surface areas. On the other hand, NB-UVB phototherapy is well suited for generalized vitiligo and has demonstrated sustained efficacy and long-term safety when administered under medical supervision. Another consideration is the duration of remission and risk of relapse. While both therapies can induce durable repigmentation, the long-term stability of pigment varies. NB-UVB has been associated with longer-lasting results in patients who complete full treatment courses and maintain periodic maintenance sessions. Conversely, repigmentation achieved with excimer laser may regress more rapidly if treatment is discontinued early or if the underlying autoimmune activity remains unchecked. Thus, combination therapies involving topical corticosteroids, calcineurin inhibitors, or systemic immunosuppressants are often used adjunctively with phototherapy to enhance outcomes and maintain pigment retention [2].

Conclusion

Phototherapy remains a cornerstone in the management of vitiligo, with NB-UVB and excimer laser representing two powerful and complementary tools. NB-UVB is the treatment of choice for widespread disease due to its safety, efficacy and accessibility, while excimer laser offers rapid, targeted treatment for localized vitiligo and cosmetically sensitive areas. Optimal outcomes depend on appropriate patient selection, individualized treatment planning and often a combination of therapies to address both immune dysregulation and melanocyte regeneration. As research advances, continued refinement in phototherapy protocols and combination strategies holds promise for improving the quality of life for individuals living with vitiligo.

Acknowledgement

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Conflict of Interest

None.

References

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