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Recent Advances in Phototherapy for Dermatological Disorders

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Abstract

Phototherapy has long been a mainstay in the treatment of various skin diseases, ranging from psoriasis and vitiligo to atopic dermatitis and cutaneous T-cell lymphoma. Over the past decade, innovations in light sources, wavelength optimization, and combination therapies have significantly enhanced the efficacy and safety of phototherapy. This article reviews the current understanding of phototherapy mechanisms, recent technological improvements, and clinical applications in dermatology. We also examine emerging techniques such as targeted excimer laser therapy, low-level light therapy, and combination regimens with biologics. Furthermore, we address the potential risks, including photodamage and carcinogenesis, and highlight strategies to minimize them. Current evidence suggests that phototherapy remains a valuable, cost-effective, and versatile treatment option, especially for patients unresponsive to systemic drugs, and future research is likely to refine its precision and expand its clinical utility.

Keywords: Phototherapy; Dermatology; Excimer laser; Psoriasis; Vitiligo; Ultraviolet light; Light-based Therapy; Atopic dermatitis; Low-level light therapy; Clinical advances

Introduction

Phototherapy involves the controlled use of ultraviolet (UV) or visible light to treat various dermatological disorders. Since its introduction in the early 20th century, phototherapy has evolved from simple sunlight exposure to sophisticated, wavelength-specific treatments. Conventional methods such as narrowband UVB (NB-UVB) and psoralen plus UVA (PUVA) have been widely used for decades. However, recent developments, including excimer laser devices, LED-based therapies, and targeted delivery systems, have broadened the therapeutic possibilities. The introduction of adjunctive regimens combining phototherapy with systemic agents has further enhanced clinical outcomes [1].

Description

NB-UVB remains the gold standard for many inflammatory skin diseases, including psoriasis and vitiligo, due to its favorable safety profile and efficacy. PUVA, although effective, has seen reduced use because of its higher risk of phototoxicity and long-term side effects such as skin aging and carcinogenesis. Targeted phototherapy techniques, including the 308 nm excimer laser, have improved treatment precision by delivering high-intensity UV light directly to affected areas, reducing exposure to surrounding healthy skin. Low-level light therapy (LLLT) using visible red or near-infrared wavelengths has shown promise in stimulating wound healing, reducing inflammation, and promoting hair growth in alopecia areata patients. Advances in device design, such as portable home-use units and wearable phototherapy patches, have improved treatment accessibility and patient adherence. Moreover, the integration of artificial intelligence in treatment planning has enabled tailored protocols based on skin type, disease severity, and previous response history [2,3].

Results

Recent clinical trials have demonstrated that NB-UVB therapy achieves over 75% improvement in Psoriasis Area and Severity Index (PASI) scores in 60–80% of patients after 12 weeks of treatment. Targeted excimer laser therapy has been shown to induce faster repigmentation in vitiligo patients compared to conventional NB-UVB, particularly for lesions on the face and neck. Studies on LLLT have revealed a 35–50% increase in hair density among alopecia patients after 16 weeks of treatment. Combination approaches, such as NB-UVB with biologics like ustekinumab or dupilumab, have resulted in earlier remission and reduced relapse rates. Additionally, portable home phototherapy devices have demonstrated equivalent efficacy to in-office treatment, with high patient satisfaction and lower overall healthcare costs [4].

Discussion

The rapid evolution of phototherapy technologies underscores its enduring relevance in dermatology. While biologic therapies have gained prominence, phototherapy remains a cost-effective and widely available option, especially in resource-limited settings. Safety remains a key consideration, with chronic exposure to UV light posing risks of photoaging and skin cancer. Therefore, ongoing research is focusing on minimizing cumulative UV dose while preserving therapeutic benefits. The integration of phototherapy with topical agents, oral medications, or biologics holds promise for refractory cases. Personalized phototherapy protocols, guided by AI and machine learning, may further optimize outcomes and reduce adverse effects. Finally, emerging modalities like blue light for acne and antimicrobial applications are expanding phototherapy's scope beyond traditional inflammatory diseases [5].

Conclusion

Phototherapy continues to be a versatile and valuable therapeutic approach in dermatology. Advances in device technology, targeted delivery, and combination regimens have enhanced its efficacy and safety. While risks such as photodamage persist, careful patient selection, individualized dosing, and ongoing monitoring can mitigate these concerns. As research progresses, phototherapy is likely to play an even greater role in managing dermatological conditions, bridging

the gap between topical and systemic therapies, and improving patient quality of life.

References

1. Zhiyong L, Gang F, Jianxiong X (2023 Jul) The rise of artificial intelligence in biomedical research. Nat Med 29:1618-1622.
2. David N, Paul H, Hamid RJ (2021 Apr) Innovations in peer review: a review of current approaches and future opportunities. Learn Publish 34:254-266.
3. Brian AN, Timothy ME, Jeffrey RS (2022 Jun 24) Reproducibility in science: Progress and remaining challenges. Science 376:1289-1295.
4. Malcolm RM, Marcus M, Chris C (2022 Oct 20) Open research practices are associated with high-quality science and career benefits. Nat Hum Behav 6:1472-1478.
5. Marcus M, Brian AN, Chris C (2023 Nov) How metascience can improve psychological science. Perspect Psychol Sci 18:1335-1349.