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Editorial: New technological devices for dermatological application: upgrades and efficacy

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Editorial on the Research Topic

[New technological devices for dermatological application: upgrades and efficacy](#)

The skin is the body's largest organ and plays a crucial role in maintaining our overall health and wellbeing. Advances in technology have provided a wealth of new tools and techniques for studying and treating skin conditions, from innovative imaging devices to novel drug delivery systems. As we deepen our understanding of the skin, non-invasive instruments and imaging devices are becoming increasingly important to aid in the treatments of skin conditions and helping to prevent and minimize signs of skin aging. [Pequeno and Bagatin](#) summarized the importance of ultrasound analysis in monitoring topical treatments for skin rejuvenation. High-frequency ultrasound has a crucial role in assessing skin aging through various parameters, such as skin thickness, subepidermal low echogenicity band (SLEB) characterization, and echogenicity assessment. This analysis can help guide more personalized interventions for each patient and assess the effectiveness of cosmetics and procedures (1). The scientific literature, through studies using high-frequency ultrasound, has shown that topical formulations with ascorbic acid 5% or tretinoin 0.05% provide a reduction in SLEB (2, 3). High-frequency ultrasound imaging is a real-time, important current device for the diagnosis, clinical management and therapy monitoring of skin conditions. It is also a valuable tool for assessing the performance of cosmetic and dermatological products.

Another technique that has emerged as a key tool for advancing skin science is reflectance confocal microscopy (RCM). Guerra et al. have introduced an innovative RCM-based method to assist in the quantification of skin cell transformation. It is well-established that actinic keratosis (AK) is a precancerous lesion associated with excessive sun exposure. Understanding the cellular changes that occur in actinic keratosis is crucial for comprehending the development of the disease and for monitoring the effectiveness of treatments. RCM is a modern and technological method of evaluating the structure of the epidermis, with the advantage of not requiring biopsies or invasive procedures (4). [Guerra et al.](#) show that RCM is a very important modern technique for providing visual microscopic information about the subclinical stages of AK, allowing the monitoring of disease progression and the assessment of treatments efficacy through disease

regression. The study reported in this RT provides a photographic scale to guide dermatologists in identifying the various signs of cellular transformation, which could be highly beneficial for early diagnosis, and evaluating the effectiveness of proposed treatments.

This Research Topic also presents two case studies using new technological devices for dermatological application. Song et al. highlighted the use of superficial radiotherapy in the treatment of keloids, through a literature review and case study. The use of radiotherapy in the treatment of keloids has been described since the beginning of the twentieth century, associated with surgical procedures to reduce scar formation or alone to induce scar atrophy. Recently, computerized technologies have enhanced the targeting of x-rays, allowing for precise control over their accuracy and intensity. This advancement minimizes harmful effects on the body and improves their application in therapies, such as keloid treatment. Superficial radiotherapy is a type of external radiotherapy used to treat diseases close to the surface of the skin, characterized by low penetrating power. It is typically administered using low-energy X-rays (photons) or electrons. The literature reports several studies about the use of superficial radiation in the treatment of keloids and skin cancer (5–7). In the present study, the authors observed the use of superficial radiation associated with trephination, shrinkage and flattening of hypertrophic keloid keloids in a boy with congenital syndactyly that cannot be treated by surgical excision.

Kishimoto et al. reported the use of 755-nm picosecond Alexandrite laser therapy on atypical henna-induced Riehl's melanosis. Picosecond lasers have very short individual pulse durations. In this way, they can be used to effectively and safely remove different types of pigmented lesions in a shorter period. Its mechanism of action is based on the rupture of pigment particles into very small fragments, which are phagocytosed and removed by macrophages (8, 9). An alexandrite laser uses an alexandrite crystal as a laser source producing a specific wavelength of light in the infrared spectrum, which is 755 nm, and is considered a red light laser. This laser works on the principle of photothermolysis for the treatment of a selected area (8). Riehl's melanosis can be defined as a disease characterized by numerous fine or reticulate, acquired macules of pigmentation of uncertain etiology (10). In this study, Kishimoto et al. reported safe and effective treatment of henna-induced-atypical Riehl's melanosis using a 755-nm picosecond Alexandrite laser. Immunohistochemical analyses revealed a potential role of CD8-positive lymphocytes in henna-induced inflammation and hyperpigmentation of the basal layer and a role of melanophages in the pigmented dermis of Riehl's melanosis.

The application of Artificial Intelligence (AI) in medicine has garnered enormous attention over the past decade (11, 12). A plethora of AI tools (13) has been proposed for dermatological applications, many of which use AI algorithms for skin cancer classification (14). Primiero et al. proposed a protocol to validate AI-based tools to perform a holistic analysis of the whole patient

using Total Body Photography (TBP) rather than the dermoscopic image of a single lesion. The goal of these tools is to assist clinicians in monitoring melanoma and perform patient risk profiling.

The proposed protocol describes the methods to construct a comprehensive dataset for machine learning based on patient data, including TBP, medical history and genetic risk factors. Algorithms developed with these datasets will address several clinically relevant gaps that previous skin lesion classifier algorithms often lack.

This Research Topic reflects recent innovations in technological devices for dermatological applications, which are expected to continue to evolve based on technological advances and the improved maturity of AI tools.

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Conflict of interest

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