

**Abstract N°: 172****Efficacy and Safety of an Ultraviolet Radiation Forecasting Model (SURF-UV-NET) Assisted Heliotherapy for Psoriasis: A Split-Side Randomized Controlled Trial**

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Introduction & Objectives: Access to phototherapy facilities is extremely limited. Heliotherapy, or sunbathing offers a potential solution to broaden accessibility and mitigate healthcare disparities. Previous studies have highlighted the benefits of supervised heliotherapy in improving psoriasis symptoms and patients' quality of life. We introduced a novel approach to self-administered heliotherapy, utilizing a deep learning model (SURF-UV-NET) for accurate ultraviolet radiation exposure prediction. This study aims to evaluate the efficacy and safety of the guided self-heliotherapy as a treatment for psoriasis.

Materials & Methods: Participants diagnosed with psoriasis were randomly assigned to sunbathe at designated sites on either the front or back of their bodies, with the opposite side serving as a control. The regimen consisted of sunbathing 5 days weekly for 6 weeks, starting from 5 standard erythema doses (SEDs) daily. This was subsequently increased by 15-20% every week, reaching up to 10.4 SEDs daily by the final week. The SURF-UV-NET, a deep learning model for ultraviolet radiation forecasting was used to determine the optimal treatment times required to achieve the prescribed UV exposure. Participants were provided with mobile phones to access SHADES, a web-based application for guided self-sunbathing, which also facilitated communication throughout the study. They were also equipped with handheld devices to measure real-time UV doses, which they were instructed to keep unshaded during sunbathing sessions to monitor actual UV exposure. The Psoriasis Area and Severity Index (PASI) and questionnaires to assess quality of life, mental health and sleep quality were evaluated at baseline, 3 weeks, and 6 weeks during the treatment, and 3 and 6 weeks post-treatment. Vitamin D levels were measured at baseline, 6 weeks, and the end of the study. Additional laboratory tests including blood sugar and lipid profiles were also performed.

Results: Nine participants completed the study (mean age 32 years (11.5); female: male 2:1; skin phototype III-V). At the end of the treatment, after a cumulative sunlight exposure 108.66 (39.98 - 200.06) SEDs, the treated sites showed a significant reduction in PASI scores from baseline (mean reduction: -2.06; 95% CI, -3.29 to -0.83), though no statistically significant difference was observed compared to control ($p = 0.30$). A significant decrease

in Dermatology Life Quality Index scores was noted starting from week 3 ($p = 0.001$), with the greatest reduction observed at week 6 ($p < 0.001$). Cholesterol and LDL levels also showed significant improvements by the end of the treatment ($p = 0.001$). Sun exposure of 75.01 , 90.61 ± 45.99 , 89.66 ± 70.26 SEDs for skin phototype III, IV and V respectively, covering 30–39% of the body surface area, resulted in an increase in vitamin D levels by 7.00, 4.27, and 2.75 ng/mL, respectively. The treatment regimen was well-tolerated with all patients reporting a strongly positive response to the approach.

Conclusion: Guided self-heliotherapy, facilitated by the SURF-UV-NET model, is an effective approach for providing safe and optimal sun exposure for treating psoriasis. This method could potentially serve a primary treatment option in various clinical and geographical settings, offering an accessible alternative to traditional phototherapy.

Figure 1 Change in PASI score between treatment group and control

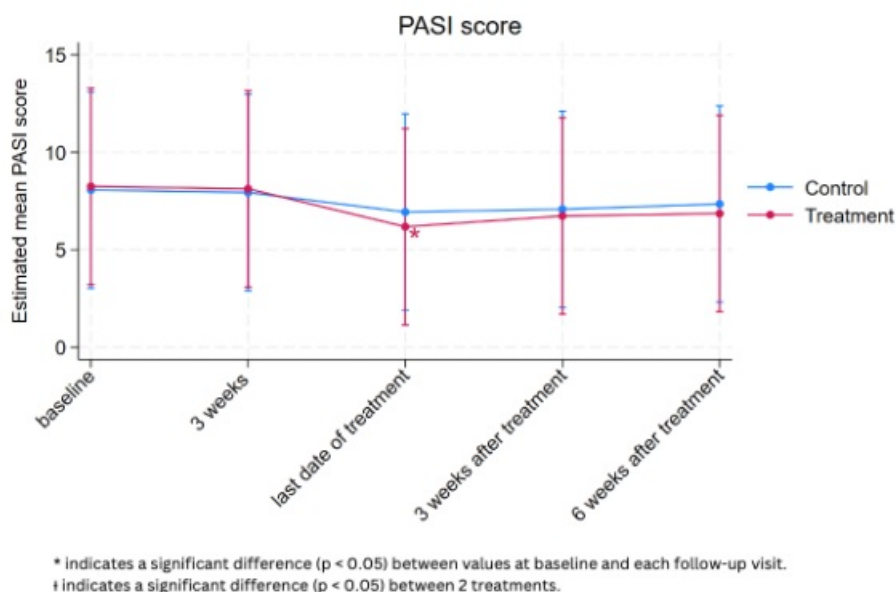
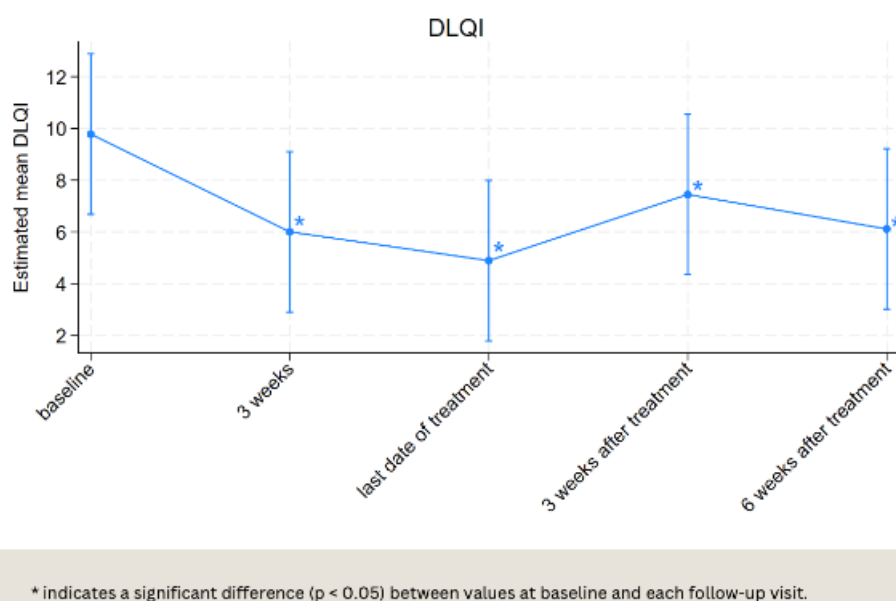


Figure 2 Change in Dermatology Life Quality Index scores





Abstract N°: 197

Improving Facial Photoprotection Through Immediate Sunscreen Reapplication

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Introduction & Objectives:

Suboptimal sunscreen application is widespread, with most individuals applying less than the recommended 2 mg/cm², especially on the face. This results in reduced photoprotection and a lower achieved SPF than the labeled value.

This study investigates whether immediate reapplication can improve sunscreen efficacy under real-world conditions. In three studies, untrained volunteers applied different broad-spectrum SPF 50+ facial sunscreens, with protection assessed after a second, immediate application.

The goal is to support evidence-based recommendations for more effective sunscreen use and improved facial photoprotection.

Materials & Methods:

In Study 1, Hybrid Diffuse Reflectance Spectroscopy (HDRS) and UV photography were used to assess effective SPF and visualize application homogeneity.

Study 2 tested three different SPF50+ products from different manufacturers and brands available in the market with varying sensory characteristics on different days. UV photography and gravimetric analysis were used to measure applied amounts and coverage consistency. All applications were performed by untrained volunteers under standardized conditions.

Study 3 used UV photography and image analysis tools to create a composite “mean face” showing sunscreen coverage after the first and second applications.

Results:

Study 1 showed that a single application generally failed to reach SPF 50+, whereas immediate reapplication led to a mean SPF exceeding 50+ in most participants. However, even larger quantities did not guarantee uniform coverage.

Study 2 revealed no significant differences in the amounts applied or in coverage uniformity across the three formulations from different brands, indicating that consumer application behavior was largely independent of the specific product formulation and brand.

Study 3 visualized the improvement in coverage after a second application using a “mean face” image, despite the use of an ultralight formulation.

Conclusion:

This research reveals persistent flaws in sunscreen application habits and underscores the importance of education

and proper technique. The “think twice” approach - encouraging immediate reapplication - is a simple, effective strategy to enhance facial UV protection. The findings offer important insights to refine sunscreen use for optimal real-life photoprotection.

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Abstract N°: 759

Shedding Light on Effective Management of Acne Keloidalis Nuchae: The Utility of Excimer Pulsed Light Therapy

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Introduction & Objectives:

Acne keloidalis nuchae (AKN) is a chronic inflammatory disorder of the posterior neck and occipital scalp, initially presenting as inflamed papules and plaques, which overtime, can progress to scarring alopecia. Currently, no standardised treatment exists, and common therapeutic approaches – including medical and surgical interventions – yield variable outcomes and often carry undesirable side effects. In recent years, light- and laser-based therapies have emerged as less invasive and potentially more effective alternatives, though supporting evidence remains limited.

Materials & Methods:

We present the case of a 34-year-old man with a 15-year history of pain, pruritus, discharge, bleeding, and progressive hair loss affecting the occipital scalp. A diagnosis of AKN was established through two biopsies. He was referred to our dermatology department following the failure of conventional medical therapy after previous management elsewhere.

Previous treatments included three intralesional triamcinolone injections at two-month intervals (10–40 mg/mL), a four-month course of topical fluocinolone acetonide gel, and oral lymecycline (408 mg daily), all of which had minimal impact. On presentation to our department, systemic medical therapies were offered, but the patient declined due to concerns over potential side effects affecting his professional life. A request for exceptional funding from the Integrated Care Board (ICB) for laser or surgical treatment was submitted but ultimately denied.

Given the inflammatory nature of AKN, phototherapy was considered, as it is widely used for other inflammatory dermatoses such as psoriasis and eczema. Although evidence is limited for its role in AKN management, a study demonstrated the efficacy of broadband Ultraviolet (UV) B delivered via a fiberoptic system. However, due to the local unavailability of broadband UVB and the limitations of conventional narrowband (NB) UVB, Excimer Pulsed Light (EPL) therapy was selected as an alternative. EPL delivers monochromatic 308 nm UVB light in a non-laser, pulsed form, providing targeted treatment while sparing healthy perilesional skin, thereby minimising risks such as burns and skin cancer.

Results:

The patient underwent six weekly sessions of EPL at a wavelength of 308 nm, with doses ranging from 100 to 650 J/cm². By the end of the treatment course, he reported complete resolution of symptoms, which was sustained at a three-month follow-up, with no reported adverse effects and excellent treatment tolerance.

Conclusion:

To our knowledge, this is the first reported use of EPL for AKN. While other UV wavelengths have demonstrated efficacy in previous studies, evidence supporting the use of UVB for this condition remains limited.

This case highlights EPL as a safe and effective treatment for AKN. EPL also provides advantages over NB UVB in terms of accessibility, cost, safety, and patient adherence.

Given the rarity of AKN, large-scale clinical trials remain challenging. Thus, documented positive outcomes contribute valuable evidence for optimising treatment strategies. EPL represents a promising therapeutic avenue, offering shorter treatment durations, improved safety, and greater patient satisfaction.

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Abstract N°: 914

Chronic Actinic Dermatitis: Unravelling the Familial Connection

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Introduction & Objectives:

Chronic Actinic Dermatitis (CAD) is an immune-mediated photodermatosis. This case series presents the first ever documented instance of CAD and Photo-aggravated Eczema (PAE) occurring within the same family across two generations. The aim is to explore potential familial patterns, overlapping phenotypes, and underlying immunopathogenesis.

Materials & Methods:

A descriptive, retrospective case series analysing clinical and investigative findings in three related individuals (father and two sons) presenting with possible photosensitivity disorders.

Clinical assessment included detailed history, dermatologic examination, and evaluation of atopy. Monochromator phototesting and solar simulator testing assessed UVA/UVB thresholds in all patients. Biopsies were planned to exclude differential diagnoses such as xeroderma pigmentosum.

Results:

The first case involves an 11-year-old South Asian boy (skin type V) with severe, recurrent photo-induced skin flares occurring in the Spring and Summer months. Monochromator photo-testing revealed reduced thresholds (between wavelengths 300-370nm) to UVB and UVA, confirming CAD. His 17-year-old brother exhibited less severe photosensitivity but was also diagnosed with CAD based on clinical features and monochromator testing (reducing thresholds between wavelengths 300-350nm). Their father, aged 48, displayed milder photosensitivity symptoms with normal monochromator testing. However, solar simulator provocation testing (10J/cm²) caused an eczematous response within 72 hours. Therefore, the history, examination and photo-testing were consistent with PAE. There was no history of consanguinity in the family, and skin biopsy results excluded an important differential – xeroderma pigmentosum.

Management for all cases included strict photoprotection, prescription sunscreens, vitamin D supplementation, and tailored use of topical or systemic therapies such as biologics or Janus kinase inhibitors (JAKi).

CAD is thought to be an immune-mediated photodermatosis characterised by pruritic, erythematous, lichenified plaques on sun-exposed skin. The prevailing hypothesis for CAD pathogenesis suggests a delayed type IV hypersensitivity reaction to photo-induced antigens, resembling the mechanism of allergic contact dermatitis (ACD).

Histopathological findings in CAD suggest dermal lymphocytic infiltration, with a predominance of CD8+ T cells distinguishing it from cutaneous T-cell lymphoma (CTCL). Atopy was present in all family members, aligning with literature suggesting possible links between atopic dermatitis (AD) and CAD. While AD and ACD patients may have a predisposed immune response, most do not develop CAD, suggesting additional unidentified factors.

Emerging evidence proposes a continuum of photosensitivity, as suggested by Chaibabutr et al.: photo-exacerbated AD, photosensitive AD, and CAD, supporting the hypothesis of overlapping pathophysiology among

these conditions.

Conclusion:

Our series presents the first ever reported cases of CAD/PAE within the same family, with worsening inter/intragenerational severity. We therefore speculate that there is significant overlap between CAD and PAE, and both conditions, in fact, represent a continuum of severity—PAE in the father and CAD in the two children.

Secondly, this series highlights a potential genetic association between PAE and CAD given their presentation within the same family unit.

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**Abstract N°: 1309****Evaluation of the benefits of Urea 30% emollient cream prior to PDT in AK treatment: results of a split scalp RCT**

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Introduction & Objectives:

Methyl-aminolevulinate photodynamic therapy (MAL-PDT) is commonly preceded by curettage of AK lesions to remove crusts and scales. However, curettage can cause discomfort and bleeding, potentially reducing patient satisfaction. Despite these drawbacks, it remains recommended as it enhances photosensitizer absorption, thereby improving treatment efficacy. The goal is to evaluate the absorption of MAL with or without Urea30% cream preparation before conventional PDT procedure.

Materials & Methods:

A split-scalp study was conducted on patients with multiple grade I and II actinic keratoses of the scalp. One half of each patient's scalp was randomly assigned to receive a 30% urea-based keratolytic cream once daily for two weeks before MAL-PDT, while the other half underwent PDT without any topical pretreatment. No curettage was performed. Following three hours of occlusive MAL application, fluorescence intensity was assessed by a blinded investigator using a visual scale (0-10) under Wood's lamp.

Results:

Thirty-four patients participated in the study. Areas pretreated with 30% urea exhibited significantly higher fluorescence than untreated areas ($p < 0.001$). There is no statistically significant difference in LSR and pain.

Conclusion:

Since fluorescence intensity correlates with MAL penetration and, consequently, treatment efficacy, pretreatment with 30% urea significantly enhances MAL-PDT effectiveness, even in the absence of curettage.



**Abstract N°: 1413****Phytophotodermatitis: a case report from the Dominican Republic**Vivian Ho¹, Pablo Socias-Pappaterra¹, Priscilla De Los Santos¹¹Hospital General Docente de la Policía Nacional (HOSGEDOPOL), Santo Domingo, Dominican Republic**Introduction & Objectives:**

Phytophotodermatitis is a non-immunologic cutaneous reaction caused by contact with photosensitizing compounds, such as furocoumarins, followed by exposure to ultraviolet A (UVA) light. These compounds are commonly found in plants, including citrus fruits like limes, lemons, celery, and grapefruit. Also commonly known as “lime disease” or “margarita burn”. Upon exposure to sunlight, these chemicals trigger a phototoxic response leading to skin inflammation characterized by erythema, edema, vesicles, or bullae resembling burns. Hyperpigmentation often follows and can persist for weeks or months. In some cases, hyperpigmentation might be the only symptom. Diagnosis relies on clinical history and lesion patterns, while treatment focuses on symptom relief and prevention of further exposure. It can be often challenging to diagnose or misdiagnose, due to its resemblance to other dermatological conditions.

Materials & Methods:

This case report discusses a 15 year old girl who developed two well-defined hyperpigmented, homogeneous, brown colored patches with sharp borders over her right hand. The biggest patch was located on the dorsal and lateral sides of the ring finger, and a small lesion in the lateral side of the thumb. She reported the lesions appeared abruptly without any skin inflammation such as erythema, edema, vesicles, or bullae. The lesions appeared without any other symptom or trauma.

Results:

Upon history taking, the patient reported a recent weekend trip to the beach, where she ordered fried fish with limes on the side for garnishing. She had applied lime juice to the fish and proceeded to eat while subsequently spending several hours in direct sunlight after the meal. Clinical examination revealed characteristic signs of phytophotodermatitis, including well-defined hyperpigmented patches, presenting in patterns consisting with direct contact and sun exposure. Treatment involved emollients to maintain skin hydration, and follow-up showed improvement of symptoms.

Conclusion:

This case highlights the importance of recognizing the wide spectrum of dermatological conditions, which can mimic different skin manifestations. It is particularly important for anyone who may unknowingly expose themselves to photosensitizing agents followed by UV light, and must be educated such as washing exposed skin and avoiding sunlight after contact with citrus fruits. Timely diagnosis and management, together with education and preventative measures are essential to reduce unnecessary treatments and recurrence.

**Abstract N°: 1743****Biological photoprotection bridges the UVA1 gap left by traditional UV Filters**

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Introduction & Objectives:

Sunscreens are photochemical systems containing chemical and physical filters that absorb, reflect, or scatter solar electromagnetic radiation before it reaches the skin's surface. Most currently available filters, however, offer limited protection against long-wavelength UVA1 rays (340–400 nm), which are known to significantly contribute to skin damage. Unlike UVB, UVA1 penetrates deeply into the dermis and exerts its harmful effects primarily through the generation of reactive oxygen species, leading to photoaging, immunosuppression, and hyperpigmentation. Biological photoprotection—through the use of non-filtering photoprotective ingredients (PINGs) that bolster skin's natural defense against solar radiation—offers a promising strategy to complement conventional UV filters and address their inherent limitations. This study aims to evaluate whether biological photoprotection is a viable approach to extending effective photoprotection into the UVA1 spectrum.

Materials & Methods:

To identify the most effective PINGs for UVA1 protection, a panel of antioxidants was screened against vitamin E (VE) based on their ability to limit UVA1-induced protein carbonylation in human organotypic skin explant cultures (hOSEC). The top-performing PINGs were incorporated into an SPF50 sunscreen and evaluated for their capacity to prevent oxidative damage to key macromolecules—specifically proteins (via protein carbonyl immunostaining), lipids (using 8-isoprostane ELISA), and DNA (via 8-hydroxy-2'-deoxyguanosine [8-OHdG] immunostaining). The efficacy of biological UVA1 photoprotection was evaluated against two commercially available sunscreens containing UVA filters that offer extended UVA1 coverage.

Results:

A phycoerythrin-rich extract from the microalgae *Porphyridium cruentum* (PCE) was identified as the most effective UVA1-protective PING, reducing UVA1-induced protein carbonylation in the epidermis by 52% ($p < 0.05$), compared to 23% achieved with VE alone. When combined, PCE and VE exhibited a synergistic effect, reducing oxidative protein damage by 91% ($p < 0.01$). Incorporation of this combination into an SPF50 sunscreen led to a 45.4% reduction in epidermal protein carbonylation ($p < 0.05$). In contrast, a placebo formulation, identical in composition but lacking PCE and VE, failed to confer any significant protection. Notably, the SPF50 sunscreen supplemented with these PINGs delivered UVA1 protection at least equivalent to that provided by sunscreens containing UVA1 filters.

Conclusion:

These results support the potential of biological photoprotection, enabled by targeted PING selection, to overcome the inherent shortcomings of traditional filters in the UVA1 range.



**Abstract N°: 1746****Photosensitivity Induced by Tribulus Terrestris Extract Supplement**Chee Hian Tan^{*1, 2}, Robert Stewart Dawe¹¹Ninewells Hospital, Photobiology unit, Dundee, United Kingdom²National Skin Centre, Singapore, Singapore

We present an intriguing case of photosensitivity potentially induced by *Tribulus terrestris* (TT), a plant-based supplement commonly utilized for enhancing athletic performance and sexual function. A 66-year-old man with skin phototype I developed painful, hot, burning skin rash affecting his trunk and upper limbs, which developed 2-3 weeks after returning from a sunny holiday abroad, where he spent prolonged periods outdoors. Since returning, he experienced flare-ups after his daily outdoor runs in the early morning or late afternoon. Clinical examination revealed widespread erythematous, scaly plaques on sun-exposed areas of the body, sparing regions shielded from sunlight. The patient had been using TT extract, along with other supplements such as tumeric, glucosamine and chondroitin, for about two years to boost performance and support bone health as a marathon runner.

Monochromator phototesting revealed mild delayed sensitivity to the ultraviolet B (UVB) waveband and moderately severe delayed sensitivity to the ultraviolet A (UVA) wavebands, leading us to suspect a drug-induced cause as more likely than chronic actinic dermatitis. Blood investigations including connective tissue screen, porphyria plasma screen, liver function test (including gamma-glutamyl transferase) and renal function showed no significant abnormalities. Given the patient's supplement regimen, we hypothesized that TT extract might be a trigger. TT has been shown to cause photosensitivity because of liver dysfunction in herbivorous animals, particularly sheep, through the accumulation of phylloerythrin, a chlorophyll derivative that, when activated by ultraviolet radiation, induces skin damage and photosensitivity.

Following the cessation of TT extract, the patient's symptoms gradually resolved, with follow-up phototesting six months later showing marked improvement in UVA sensitivity and resolution of abnormal UVB sensitivity. This case provides compelling evidence, supported by both on- and off-drug phototesting, and thus, adds to the limited body of literature regarding TT's potential to induce photosensitivity in humans. The mechanism of photosensitivity likely involves a non-immunologic, dose-dependent phototoxic response, typical of most systemic drug-induced photosensitivity. Such reactions can occur in any individual exposed to adequate phototoxins and ultraviolet irradiation, although idiosyncratic factors likely contribute to varying susceptibility. In addition, this case underscores the importance of considering non-pharmaceutical agents as potential triggers for drug induced photosensitivity. Clinicians should remain vigilant in identifying such agents, advising appropriate sun protection, and discontinuing the causative substance when indicated.

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Abstract N°: 1749

Synergistic enhancement of skin barrier function by vitamin B5 and *Helichrysum italicum* extract: A targeted approach for infant and pediatric skin

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Introduction & Objectives:

Infant and pediatric skin differs markedly from adult skin in its structure, composition, and functionality. It is notably thinner and more permeable, rendering it more vulnerable to environmental stressors, particularly ultraviolet (UV) radiation. As a result, strengthening the skin barrier is essential to enhance its protective capacity against sun exposure in early life stages.

The skin barrier is supported, among other factors by its physical barrier, consisting of the stratified epithelium, which limits transepidermal water loss (TEWL) and the penetration of harmful substances, and its chemical barrier, composed of lipids and natural moisturizing factors (NMFs), which support microbiome balance and helps maintain hydration.

In this context, we investigated the synergistic effects of two bioactive compounds—panthenol (Vitamin B5; PAN) and an extract from the Mediterranean plant *Helichrysum italicum* (HIE)—on the enhancement of these two components of skin barrier function in UV-exposed skin, with the aim of developing a sunscreen specifically tailored to the unique needs of infant and pediatric skin.

Materials & Methods:

The effects of PAN and HIE, both individually and in combination, on skin barrier function following UV exposure were evaluated using ex vivo human organotypic skin explant cultures (hOSEC). Physical barrier integrity was assessed by immunostaining for claudin-1, a critical component of tight junctions. Chemical barrier function was assessed by quantifying neutral lipid levels using Nile Red staining and evaluating filaggrin expression, a key component of NMF, via immunostaining.

TEWL was assessed in vivo by Tewameter at 30 minutes, 1 hour, 2 hours, and 4 hours after application of a SPF 50 sunscreen containing PAN and HIE to the forearm. TEWL values were compared to those obtained from an equivalent SPF 50 sunscreen formulation lacking PAN and HIE.

Results:

Table 1. Effect of PAN and HIE on the skin's physical and chemical barriers:

Skin barrier component	Biomarker	PAN	HIE	PAN + HIE
Physical*	Claudin-1	+20%	+32%*	+96%*
Chemical*	Filaggrin	+32%*	+54%*	+45%*
	Neutral lipids	+32%	+135%*	+131%*

*% increase vs. untreated control skin; $p < 0.05$.

Table 2. Effect of an SPF50 sunscreen containing PAN and HIE on TEWL in vivo:

	T30 min	T1H	T2H	T4H
SPF50 + PAN/HIE	-21.9%*	-16.9%*	-13.9%*	-8.6%*
SPF50 - PAN/HIE	-18.7%*	-13.9%*	-10.4%*	-0.5%

*% reduction vs untreated skin; $p < 0.05$.

Conclusion:

PAN and HIE both positively impact the barrier function of photoexposed skin. When combined, they act synergistically to enhance tight barrier formation, reinforcing the skin's physical defenses against external aggressors. This potent combination is particularly well-suited to the sensitive and vulnerable skin of infants and children, which requires additional protection and support.

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**Abstract N°: 1751****Full Spectrum sunscreens: Extending photoprotection beyond UV**Anthony Brown¹, Adrià Ribes¹, Blanca Martinez¹, Monica Foyaca¹¹Innovation and Development, ISDIN, barcelona, Spain**Introduction & Objectives:**

Sunscreens are designed to provide broad spectrum protection against ultraviolet radiation (UVR) by means of a combination of individual UVB and UVA filters. Most available filters, however, offer limited efficacy against long-wavelength UVA radiation, as well as non-UV environmental stressors such as high energy visible light (HEVL), infrared A (IRA) radiation, and pollution—all of which contribute significantly to cutaneous damage. Integrating non-filtering photoprotective ingredients (PINGs) that modulate the skin's biological response to these stressors—via antioxidant, DNA repair, immunomodulatory, and anti-inflammatory mechanisms—represents a promising strategy to enhance photoprotection beyond UV filters alone. This study investigated the ability of an SPF50 sunscreen, enhanced with rationally selected antioxidants, to confer full spectrum protection against molecular damage from environmental stressors not addressed by conventional UV filters.

Materials & Methods:

All studies were conducted using an SPF50 sunscreen formulated with broad-spectrum UV filters, supplemented with tocopheryl acetate (TOC) and an extract of the microalgae *Porphyridium cruentum* (PCE). To evaluate full-spectrum protective efficacy, a series of molecular biomarkers were assessed in human organotypic skin explant cultures (hOSEC):

1. UVB-induced DNA damage in the epidermis was quantified via cyclobutane pyrimidine dimer (CPD) immunostaining.
2. Broadband UVA (bbUVA)-induced oxidative DNA damage in the epidermis was assessed using 8-hydroxy-2'-deoxyguanosine (8-OHdG) immunostaining.
3. UVA1-mediated oxidative protein damage in the epidermis was measured via protein carbonyl immunostaining.
4. HEVL-induced oxidative stress in the dermis was detected by reactive oxygen species (ROS) generation, using dichlorofluorescein diacetate (DCFH-DA).
5. IRA-induced protein oxidation in the epidermis and dermis was evaluated via protein carbonyl immunostaining.
6. DPM-induced skin barrier dysfunction and oxidative stress were assessed by measuring Rhodamine B penetration through the epidermis and through detection of ROS in the dermis using DCFH-DA.

Results:

The SPF50 sunscreen significantly reduced macromolecular damage induced by environmental stressors, as summarized below:

Stress	Biomarker	Protective efficacy*
UVB	CPD	92% (p<0.001)
bbUVA	8-OHdG	100% (p<0.001)
UVA1	Protein carbonylation	45% (p<0.05)
HEVL	ROS	56% (p<0.01)
IRA	Protein carbonylation	58% (p<0.01)
DPM	Rhodamine B penetration	100% (p<0.01)
	ROS	89% (p<0.01)

*% reduction vs. untreated control skin.

Conclusion:

Comprehensive biomarker analysis demonstrates that full-spectrum photoprotection can be achieved by supplementing sunscreens with non-filtering ingredients that mitigate molecular damage induced by environmental stressors beyond the UV spectrum. These findings support the inclusion of molecular damage endpoints in the evaluation of sunscreens that claim comprehensive protection, highlighting the need for broader assessment criteria beyond UV filtration alone.

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**Abstract N°: 2043****Multifunctional tinted sun protection beyond UV for all skin tones**

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Introduction & Objectives:

Multifunctional sun protection offers a comprehensive defense against various environmental stressors, including UV radiation, blue light, and oxidative damage. Advanced formulations combine broad-spectrum UV protection with color pigments that provide an immediate skin tone enhancement, helping to even out complexion while protecting against harmful rays. The key challenge remains to provide matching shade and pleasant user experience to foster compliance of usage.

We developed, with support of a professional make-up artist, three new tinted sunscreens which match all skin tones. In our in vivo and in vitro studies, we investigated the formulas for their color match, sensory experience and efficacy-related benefits.

Materials & Methods:

To assess skin-tone color match and product perception, we tested the three product shades after single application with 63 subjects representing all phototypes. Expert grading was performed for skin tone and, additionally, questionnaires were completed.

Skin moisture was examined by means of Corneometer® CM 825 measurements on 32 subjects at baseline, 2 and 8 hours after application. The test products' tolerability was determined in a study under dermatological and ophthalmological control with 33 subjects, including all phototypes, applying the product twice daily for 4 weeks.

A user survey was conducted in two countries over two weeks with at least 110 volunteers for each of the three shades to assess product performance using a questionnaire.

To measure absorption of blue light, the product was applied on PMMA plates (1.3 mg/cm²). After an equilibration time, the blue-light transmittance was measured (400-500 nm) in 1 nm steps UV/VIS Spectrometer Lambda 650 S (PerkinElmer). A plate applied with glycerin served as a 100% transmittance reference.

Results:

Skin-tone color match of the three product shades (light, medium, bronze) was confirmed by clinical grading.

Instrumental measurement of moisture showed a significant increase in hydration after single application at timepoint 2 h and 8 h. Moisture improved by 41 % at timepoint 2 h.

In a two-week survey, at least 95 % of consumers confirmed that the shade used matches their respective skin tone and provides an even complexion. Additionally, they confirmed, at the same outstanding level, that the products have an ultra-light texture, are non-sticky and non-greasy and deliver a fresh skin feel.

Very good tolerability was confirmed by dermatological and ophthalmological assessment. The formula was highly

suitable even for sensitive skin.

The tinted products effectively absorb between 400 – 500 nm, thus providing protection against blue light, but also providing very high UVA protection exceeding recommended COLIPA ratio (UVB: UVA) with factor 1.2.

Conclusion:

Three tinted shades of a new, very well-tolerated advanced sun protection formula offer multifunctional benefits, in addition to a pleasant user experience that fosters user compliance. The formulas with antioxidant Licochalcone A fight against anti-oxidative stress, improve moisture, provide an even complexion and blue light and very high UVA protection. Developed with a make-up artist, all skin tones are able to be matched with only three shades.

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**Abstract N°: 2120****Efficacy and Tolerability Assessment of Half-Irradiance Photodynamic Therapy for the Treatment of Actinic Keratoses: An Intra-Patient Comparative Study**

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Introduction & Objectives:

Red-light photodynamic therapy (PDT) is an effective treatment for actinic keratoses (AKs) and field cancerization. Its main limitation is pain during illumination. We conducted a prospective study to compare the efficacy and tolerability of PDT using half-irradiance red light versus conventional red-light PDT for the treatment of AKs.

Materials & Methods:

We performed a prospective, longitudinal, intra-patient controlled study (split-scalp design). One half of the scalp was treated using the conventional PDT protocol with methyl aminolevulinate (MAL) and red light (61 mW/cm², 10 minutes, 37 J/cm²), while the other half received half-irradiance illumination (30.5 mW/cm², 10 minutes, 18.5 J/cm²). Follow-up visits were conducted at 12 and 24 weeks, with counts of persistent and new AKs at each visit. Pain was assessed using a visual analog scale (VAS), and local adverse events were recorded at 48 hours post-treatment. The study was approved by the ethics committee of Hospital Ramón y Cajal.

Results:

Twenty men with scalp field cancerization and a median age of 78.5 years completed the study. Phototype distribution was: type I (5%), type II (45%), and type III (50%). Forty-five percent had a history of non-melanoma skin cancer, and most (80%) had undergone prior AK treatments. A total of 699 AKs were treated (449 grade I and 250 grade II). Non-inferiority (delta = -10%) of the half-irradiance protocol was demonstrated at 12 weeks (mean AK reduction of 79.3% vs 79.1%) and at 24 weeks (74.5% vs 78.0%).

Median VAS pain scores were lower for half-irradiance PDT (5.0 vs 7.25; $p < 0.05$). No significant differences in local adverse events were observed at 48 hours.

Conclusion:

Half-irradiance MAL-PDT appears to be a better-tolerated alternative with comparable efficacy to conventional red-light PDT for treating AKs and field cancerization of the scalp.



**Abstract N°: 2140****UVA-1 Phototherapy for Morphea and Sclerosing Skin Disorders: Insights from a Decade-Long Retrospective Analysis**

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Introduction & Objectives:

Sclerosing skin disorders significantly impair physical and psychosocial wellbeing, often leading to reduced quality of life. Treatment options include topical therapy, phototherapy and systemic agents though conditions such as morphea can often be treatment resistant. Ultraviolet A1 (UVA1) phototherapy has emerged as a promising option with fewer side effects compared to systemic agents. However, the data on its efficacy remain limited and unclear.

Materials & Methods:

We conducted a retrospective and qualitative chart review of patients that received UVA1 treatment at the Phototherapy Clinic. Diagnoses included: morphea (generalized, circumscribed, pansclerotic, linear), eosinophilic fasciitis, graft-vs-host disease, lichen-sclerosus, and systemic scleroderma. Charts from January 1, 2010 to November 1, 2024 were extracted for demographics, diagnosis, treatment dose, clinical outcomes, modified Rodnan Skin Score (mRSS), adverse events, and previous/concurrent therapies. Improvement outcomes were derived from patient charts containing physician and patient-reported descriptions of progress during appointments. For the quantitative analysis, physician-reported improvements were categorized as none (0%), mild (<50%), moderate (50–75%), or marked (>75%). No patients worsened. For the qualitative analysis, patient perspectives were extracted and grouped into recurring themes.

Results:

The study included 50 patients, 37 with morphea and 13 other conditions. An initial course resulted in an 80% response rate with 56% showing mild improvement, 4% moderate, 20% marked, and 20% none. Among those with marked improvement, 90% (n=10) had generalized morphea. 18 patients had a second course with an 86% response rate with primarily (59%) mild improvement. Average mRSS decreased 9 points (n=5), surpassing the threshold for a clinically important difference. 5 patients discontinued treatment due to adverse effects. 57% of total patients had previously attempted systemic therapy with limited success. Among this refractory group, 67% reported improvement following UVA1 treatment. For the qualitative analysis, patients themes included their skin feeling softer, improved range of motion, relief from pruritus, and better sleep quality.

Conclusion:

UVA-1 is effective, tolerable, and beneficial for sclerosing skin disorders. Patients who respond to treatment often further improve from additional courses, showing high completion rates and few adverse effects. As a viable treatment for morphea and related sclerosing skin disorders, UVA1 is a valuable option, even for refractory cases.





Abstract N°: 2356

Efficacy of Methylene Blue-Mediated Photodynamic Therapy for Lichen Amyloidosis: A Single-blind, Quasi-randomized Controlled Trial

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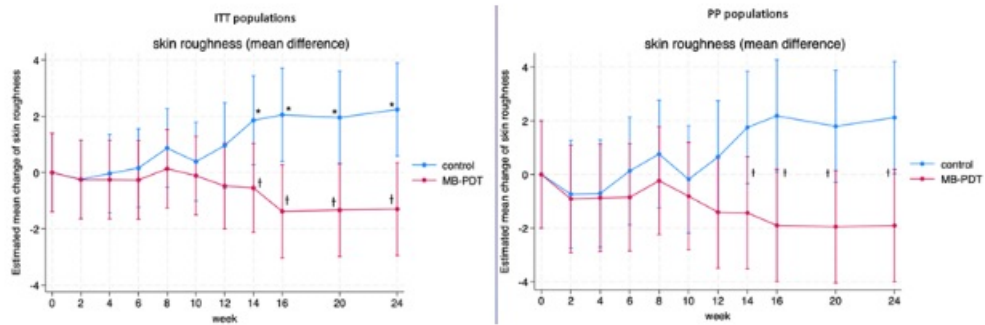
Introduction & Objectives: Lichen amyloidosis (LA), the most prevalent variant of primary localized cutaneous amyloidosis (PLCA), manifests as a chronic and debilitating skin condition with a complex etiology. Patients with PLCA exhibit considerable genetic susceptibility, including to mutations in oncostatin M receptor (OSMR) and IL31RA, which are associated with the dysregulation of the OSM/OSMR β /STAT5/KLF7 axis, causing abnormal keratinocyte proliferation and differentiation. Treating LA poses serious challenges, especially in those refractory to conventional topical or energy-based treatments. This study explores the novel application of photodynamic therapy by employing its immunomodulatory effects. Our primary objective was to assess the efficacy of methylene blue-mediated photodynamic therapy (MB-PDT) and to identify a potential mechanism of action that targets the underlying pathophysiology of LA.

Materials & Methods: Participants with long-standing sporadic LA located on their shins were enrolled. The affected area was divided into multiple 1.5 $\times$ 1.5 cm square sections. One randomly chosen section at the top or bottom of each study field served as the control. MB-PDT, at a dose of 150 J/cm², was administered weekly to the remaining sections for up to 16 weeks. The treatment was discontinued either upon complete lesion resolution or the completion of 16 weeks. Clinical photography and skin topography were conducted at baseline, biweekly during treatment, and at 4 and 8 weeks after treatment. The outcomes were analyzed employing a linear mixed-effects model for the intention-to-treat and per-protocol populations. The chi-square test was used to evaluate categorical data. Histopathology and immunohistochemistry analyses were performed prior to and following treatment on the five patients who consented to skin biopsies. Additionally, patient satisfaction and side effects were also methodically documented.

Results: Ten participants completed the study [mean age: 58 years (11.6); female: male 3:2; skin phototype III–V]. Beginning at week 14, participants in the treated group exhibited a significant improvement ($p = 0.011$) in skin roughness when compared to the control group. The most remarkable reduction was noted at the end of the treatment period in week 16 with a mean reduction of -1.38 (95% CI, -2.99 to 0.26) for the treated group versus an increase of 2.05 (95% CI, 0.44 to 3.70) in the control group ($p = 0.001$). Notably, this effect persisted and remained significantly different from the control throughout the follow-up period. Additionally, after therapy, there was a 50% reduction in the positivity percentage of IL-3, IL-31RA, and OSMR β ; however, these changes were not statistically significant ($p > 0.05$). No serious adverse effects were noted.

Conclusion: As a local treatment for refractory LA, MB-PDT has shown promise in significantly lowering skin roughness and influencing vital inflammatory markers. These findings that MB-PDT may modulate the underlying pathogenic mechanisms, offering a viable therapeutic strategy for this challenging dermatological condition.

Figure 1 Mean difference in skin roughness



* indicates a significant difference ($p < 0.05$) between values at baseline and each follow-up visit.

indicates a significant difference ($p < 0.05$) between 2 treatments.

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Abstract N°: 2439

Photosensitivity and Skin Topographic Changes in Asian Patients on Voriconazole: A 2-Year Follow-Up Cohort Study

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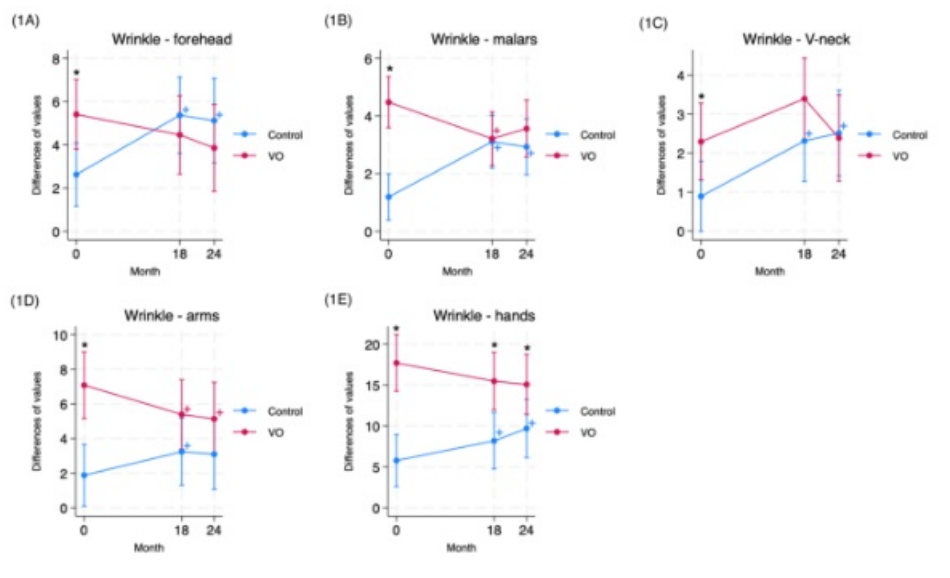
Introduction & Objectives: Voriconazole (VO) is known to induce photosensitivity, leading to keratinocyte carcinomas, particularly in Caucasians. Our previous study in an equatorial country, involving Asian patients with skin phototype IV-V demonstrated VO primarily induces asymptomatic photo-distributed telangiectasia and accelerates photoaging, with these adverse effects being dependent on the cumulative dose received. We aimed to assess further long-term changes in this same group of patients who have used VO, compared to age-, sex-, and organ transplant-matched controls.

Materials & Methods: Participants exposed to VO and age-sex-organ transplant-matched controls never exposed to VO underwent full skin examination, and skin photoaging evaluation using a digital skin analyzer. This analysis included assessments of wrinkles, texture, and melanin concentration in sun-exposed areas as well as the sun-covered lower abdomen. These evaluations were conducted at baseline, 18 and 24 months. Photoaging was determined by differences in wrinkles, texture, and melanin levels between the selected sun-exposed and covered areas. The association between VO exposure and photoaging was determined using a mixed-effects model that included an interaction term for VO group and time, adjusted for variables including hours of outdoor activity per week, sunscreen use, and immunosuppressant use. A separate sensitivity analysis was conducted splitting the VO exposure groups into those who had ceased VO by week 0, and those who were still using VO at baseline, with a time interaction term, adjusted for cumulative dose. Predicted values were estimated relative to their matched controls.

Results: Forty-two subjects were recruited (mean age: 61 years (SD 15); female to male 1:1; skin phototype IV-V), 20 with current (CVO, n=9; mean cumulative dose 43 gm) or past voriconazole (PVO) exposure (mean cumulative dose 61.8 gm; mean drug discontinuation period 16 months) and 22 matched controls. At baseline, the exposed group generally demonstrated a greater degree of photoaging across all sites when compared to controls, reaching statistical significance ($p < 0.001$ to 0.05). By 24months, the degrees of photoaging at most sites of the exposed group had converged towards that of the controls, resulting in no significant difference ($p > 0.05$). Further analysis of VO subgroups revealed similar changes in the degrees of wrinkles and textures in both CVO and PVO, with differences from controls becoming statistically insignificant by 18 months (mean drug discontinuation periods of 16 and 36 months, respectively). Notably, the CVO group exhibited a more rapid decrease in melanin concentration compared to the PVO group, achieving levels indistinguishable from controls at all sites by 18 months. The exception was the dorsal hands, where equivalence with controls by 24 months (predicted value: 0.094; 95% CI: -0.006 to 0.194). Actinic keratoses were observed in two individuals from the VO group and one from the control group. No cases of skin cancer were reported.

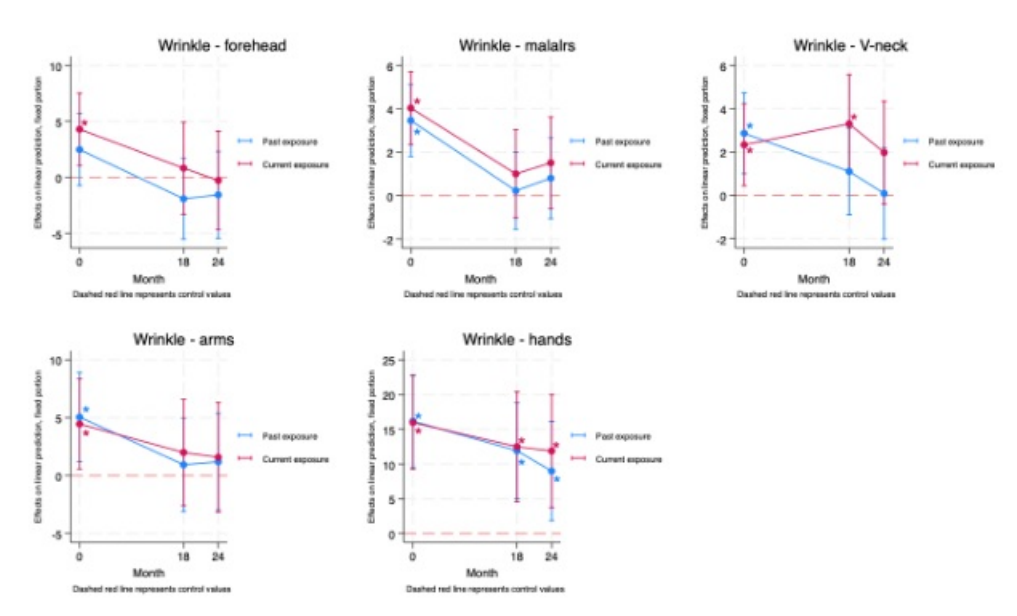
Conclusion: Unlike studies involving Caucasian subjects, our cohort showed a noticeable absence of clinical skin-related tumour development. Our findings that the primary effects of VO in Asian individuals, especially premature aging, may begin to reverse as early as 16 months after cessation of VO. Early management strategies in patients who take VO could reduce the incidence of persistent hyperpigmentation.

Figure 1. Severity of wrinkles in sun-exposed areas



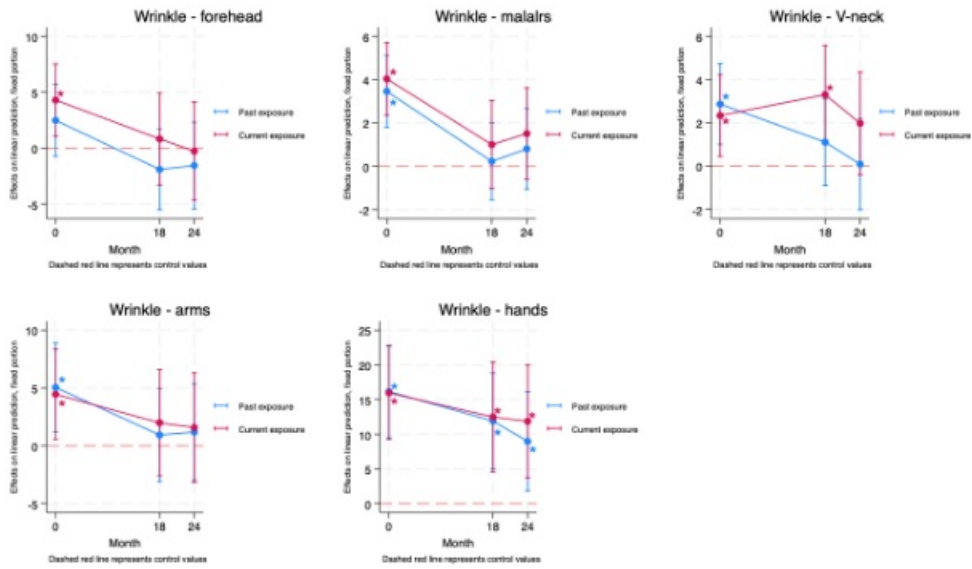
* significant difference between groups ($p < 0.05$); + significant change from baseline ($p < 0.05$) in the VO (red) and control (blue)

Figure 2. VO exposure subgroups and time in severity of wrinkles in sun-exposed areas



* significant difference between from controls in current exposure (red) and past exposure (blue) subgroups.

Figure 3. VO exposure subgroups and time in severity of melanin concentration in sun-exposed areas



* significant difference between from controls in current exposure (red) and past exposure (blue) subgroups.

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Abstract N°: 2591

Successful use of 308nm Excimer Pulsed Light in the treatment of Hailey-Hailey disease

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Introduction & Objectives:

Hailey-Hailey disease (HHD), also known as benign familial pemphigus, is a rare autosomal dominant condition which leads to recurrent vesicles and erosions particularly in flexural areas. Individuals suffer with itch and pain which significantly impacts on their quality of life. Hailey-Hailey disease is challenging to treat and may remain resistant to topical therapy. An alternative, effective treatment is needed. Excimer pulsed Light (EPL) at 308nm is emerging as an effective treatment for inflammatory skin disease responsive to UVB phototherapy.

Materials & Methods:

We describe the improvement of two patients with HHD using EPL following poor responses to conventional therapies. Both were young women and so unsuitable for acitretin. The diagnosis of HHD in both patients was supported by biopsy findings showing acantholysis in the epidermis. Case 1, a 36 year old woman, was diagnosed with HHD in 2018. She suffered with lesions affecting the back, abdomen, axillae, chest, neck and popliteal fossae with erosions, pustules and fissures. She had previously tried multiple topical treatments including corticosteroids, antimicrobials and calcineurin inhibitors, all with no reported benefit. Oral Doxycycline 100mg twice daily for 3 months was abandoned due to intolerable side effects. Patient 2, a 44 year old woman with a family history of HHD, was formally diagnosed with HHD in 2024 following biopsy. She suffered with lesions affecting the inframammary area, under arms, chest and neck which had failed to improve despite treatment with topical corticosteroids. This patient had also previously required short rescue courses of oral corticosteroids to control severe flares. Both patients received UVB Phototherapy via the 308nm Excimer Pulsed light (EPL).

Patient 1: Treated with 350mJ/cm² weekly for a total of 18 weeks. Patient 2: Treated with alternating doses of 100-200mJ/cm² weekly for a total of 12 weeks.

Results:

Both patients we treated reported reduced frequency, severity, and duration of flare ups.

Additionally, Patient 1 also noted that inflamed areas improved more rapidly when treated with EPL and did not require additional topical treatment. Furthermore, she also noted an improvement in soreness and itch.

Patient 2 experienced a significant improvement to lesions in her inframammary area which had been particularly resistant to topical treatment. During the course of treatment these lesions fully healed. As with case one, she also reported an improvement in pain associated with lesions.

Conclusion:

EPL appears to be a promising option for managing patients with HHD, with both our patients reporting improvement. Another case series demonstrated efficacy of EPL in successfully treating individual plaques in two patients with mild HHD using a single treatment leading to resolution of lesions within a few days. Our cases

provide further evidence to support use of EPL for more resistant disease.

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Abstract N°: 2665

Development of a new simplified *In Vivo* method for Blue Light Protection

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¹Coty, Monaco, Monaco

Introduction & Objectives:

Human exposure to sunlight has evolved over time, and it was in the 1920s that tanning became a symbol of good health and fashion. At the same time, early studies established the link between ultraviolet (UV) radiation, sunburn, and skin cancer. Today, the importance of effective sun protection to mitigate these risks is widely recognized. Since the 2000s, research has revealed that the visible spectrum, particularly blue light, may also induce biological effects, including oxidative stress and hyperpigmentation.

While UV protection measurement is well established, assessing photoprotection against blue light remains a challenge. *In vitro* approaches allow for evaluating the reduction of blue light transmission through a topically applied product, but we have focused on developing an *in vivo* method, as the cause-and-effect relationship in this wavelength range is not yet fully defined. Methods based on pigment darkening have been previously described in the literature, but they proved to be time-consuming and not well suited for screening purposes.

To address this, we developed a fast and simple *in vivo* method in our laboratory to measure the impact of topically applied products on blue light protection. This approach is based on the principles of existing ISO methods (ISO 24444), adapted to the specific wavelengths of blue light and its biological effects

Materials & Methods:

The principle of this method is to measure the ITA immediately after a single exposure to 420 nm light, with product applied to the skin of a panel of volunteers with different initial ITA values ranging from 0 to 35 (from phototype III to V). After several dose trials, the selected dose was set at 80 J/cm², as this is the minimum dose that allows for an unambiguous reading of the induced pigmentation on these skin types. The test is conducted on three distinct areas per volunteer, with one ITA measurement per area, across eight different volunteers, resulting in 24 measurements per product. These 24 measurements generate a scatter plot corresponding to a line, whose slope for unprotected skin is then compared to that of protected skin. The ratio between the slopes of the protected and unprotected models represents the variation in the ITA product's percentage of protection. The result expresses the level of protection against blue light.

Results:

Nineteen products were tested, including emulsions containing organic and inorganic filters, metallic oxides, and molecules potentially protective against blue light, such as antioxidants. The results confirm the superior efficacy of inorganic filters.

Conclusion:

These results demonstrate that this new *in vivo* method enables a fast and reproducible evaluation of skin protection against blue light exposure. It allows for clear discrimination and ranking of ingredients based on their efficacy. Given its simplicity and robustness, this method holds strong potential to become a standard for reliably assessing the effectiveness of actives designed to reduce the harmful effects of blue light on the skin.





Abstract N°: 2752

Narrowband UVB and PUVA phototherapy treatment for Mycosis Fungoides: A 17 year Retrospective Cohort Study in a University Teaching Hospital, 2007-2024

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Introduction & Objectives:

Mycosis Fungoides (MF) is the most common type of cutaneous T cell lymphoma. MF is typically managed with Narrowband UVB and psoralen plus UVA (PUVA) phototherapy in the early stages, though comparative data on their efficacy remains limited.

This study aimed to evaluate the treatment outcomes of NB-UVB and PUVA in early-stage MF and to identify clinical and demographic predictors of response.

Materials & Methods:

This was a retrospective cohort study consisting of 33 patients with biopsy proven MF treated with NB-UVA or PUVA between 2007 and 2024 in the Dermatology Department of a University Teaching hospital. Statistical analysis including ordinal logistic regression and non-parametric tests were used to assess associations.

Results:

Of 33 patients (median age: 58), 78.8% received NB-UVB, 15.2% PUVA, and 6.06% both. Complete remission was achieved in 45.5% of cases, partial remission in 45.5% of cases and only 9.09% showing no response. Hypopigmented MF had significantly better outcomes than hyperpigmented MF ($p = 0.0158$). Advanced stage at treatment initiation was associated with poorer outcomes ($p = 0.00933$). No significant difference was observed in response by sex, age, or type of phototherapy. Phototherapy was well tolerated, with adverse effects in 9.09% of patients.

Conclusion:

NB-UVB and PUBA are effective and well tolerated for the treatment of early-stage MF. Hypopigmented variants and early disease stage predicted better outcomes.





Abstract N°: 2952

A mixed-methods study of the factors influencing sunscreen use in conflict settings

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A mixed-methods study of the factors influencing sunscreen use in conflict settings

Introduction & Objectives:

The history of sunscreens is shaped by sociocultural and commercial influences, as exemplified by the genesis of the tanning ideal and the diversification of sunscreen products. In modern dermatology, the routine use of sunscreen is recommended as an effective sun protection measure. However, research in the region has revealed poor knowledge and practices related to sun protection. This study aimed to explore the factors influencing sunscreen use among young adults.

Materials & Methods:

This mixed-method study was conducted from September 2023 to October 2024 in two major cities. A survey assessed sunscreen use and related knowledge and attitudes among university students. The qualitative component used focus group discussions (FGDs) with university students and interviews with dermatologists, pharmacists, students, and workers at cosmetics stores via purposive sampling with maximal variation. Data collection was conducted face-to-face by two researchers. A hybrid inductive-deductive thematic analysis was employed. Data were coded separately, analysed manually using Microsoft Word, and cross-checked by the researchers.

Results:

A total of 542 participants completed the questionnaire. The qualitative component comprised 3 gender-based FGDs with students and 53 interviews with dermatologists, students, pharmacists, and cosmetics store employees. The prevalence of routine sunscreen use was 41.9%, while only 35.2% used it occasionally, and 22.9% did not use it at all. Most females used it routinely (56.3%), whereas the majority of males never used it (55.2%). Thematic analysis yielded 62 codes and 16 themes. The most frequently reported barriers were lack of awareness, masculinity norms, and high product costs, especially with the war-induced exacerbation of financial hardship (Table 1). Major facilitators included social media and positive recommendations from social networks (Table 2). Additionally, sunscreen use was driven by the socially constructed desire to maintain a lighter skin tone, while poor awareness of health risks was attributed to low-risk perception and inadequate guidance from physicians. Moreover, sunscreens were viewed as nonessential products in the local culture. Less frequently mentioned material- and application-related barriers included time constraints, inconvenient application settings, and unpleasant texture.

Conclusion:

Low sunscreen use may be attributed to lack of awareness, masculinity norms, and financial constraints, whereas social media might have encouraged its use. Dermatology has been overlooked in research, health promotion, and policymaking in the region. Population-wide interventions should adopt behavioural theories and audience analysis of knowledge, attitudes, and communication preferences to address the low-risk perception and hesitancy toward sunscreen effectiveness. Male-targeted messaging in social media campaigns may reduce the

influence of masculinity norms by engaging male influencers and reframing the beauty-cantered discourse around sunscreen to focus on health and sun protection.

Table 1: Themes and codes describing the barriers to sunscreen use as reported by participants

Barriers		
Domain	Theme	Code
Attitudes and beliefs	Lack of awareness	<i>Lack of awareness of:</i> general awareness; radiation-induced cancer; radiation-induced photoaging; sunscreen protection against cancer; sunscreen protection against photoaging; exposure to harmful radiation; suitability of sunscreen to skin type; lack of awareness among physicians; harmful sunscreen content
	Deprioritization of skincare	Lack of interest in skincare; overriding essential priorities
	Lack of compliance	Noncompliance; laziness
Subjective norms	Restrictive culture	Devaluation of sunscreen; absence of sunscreen culture; society refusal; family refusal; religion refusal
	Restrictive gender norms	Association with beauty products; association with femininity; female-oriented product; inappropriateness of using creamy products
Perceived behavioural control	Material-related barriers	Transparency; appearance; barrier sensation; texture; sweat induction; staining; allergy; interference with make-up; oily material; accumulation of material; sweaty feeling
	Time-related barriers	Time to apply; time to reapply
	Financial barriers	High cost; competing war-associated costs; resistance to consumerism
	Instruction-related barriers	general use instructions
	Place-related barriers	Place to apply; place to reapply

Table 2: Themes and codes describing the facilitators of sunscreen use as reported by the participants

Facilitators		
Domain	Theme	Code
Attitudes and beliefs	Increased awareness	General awareness; awareness of the impact of long sun exposure time; physician recommendations;
	Activities involving sun exposure	Swimming; vacation; travel;
	Desire to prevent sun exposure effects	Sunburn prevention; pigmentation prevention; wrinkle prevention; medical indication
Subjective norms	Positive culture	Emerging, encouraging culture; interest in skincare; increase in professionals in the beauty industry; improved education
	Influences of social environment	Positive experiences by others; positive recommendations by others; male experience; supporting family; supporting society
	Promotional massaging and social media	social media; influencers; advertisement
Perceived behavioural control	-	-



**Abstract N°: 3184****Evaluating the Key Features Influencing Ultraviolet Radiation Protection Effectiveness in Sunglasses**

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Introduction & Objectives:

Ultraviolet radiation (UVR) from sunlight, particularly UVA and UVB, can cause significant skin and ocular damage. While sunglasses are a critical form of protection and should meet minimum safety standards, their effectiveness varies and is not reliably indicated by brand, price, or point of sale.

To evaluate how various characteristics of commercially available sunglasses affect UVR protection.

Materials & Methods:

A total of 117 sunglasses used under real-world conditions were collected in Bangkok. Physical characteristics and usage data were recorded. UVA+B and UVB transmissions were measured with Solarmeter® devices during a high UV index (9-10) and clear-sky conditions. UVR protection levels were calculated and compared against international standards set by the American Academy of Ophthalmology (AAO), the Australian/New Zealand Standard (AS/NZS), and the American National Standard Institute (ANSI). Sunglasses providing less than 99% UVR protection were classified as non-compliant. Logistic regression was used to identify factors associated with UVR protection.

Results:

Of the 117 sunglasses tested, 87.18% met international standards for UVR protection, while 12.82% were non-compliant. Branded sunglasses were significantly more likely to provide adequate UVR protection (OR: 25.93, 95% CI: 2.87-234.38, $p = 0.004$). Compliant sunglasses showed consistently high UVA+B and UVB protection, with both lenses averaging over 99%. In contrast, non-compliant sunglasses showed considerable variability, particularly in UVB protection (mean right lens: 61.01%, left lens: 62.18%). Lens width was positively associated with protection (OR: 5.63; $p = 0.045$), while greater lens height was negatively associated (OR: 0.29; $p = 0.037$). Other characteristics, including price, usage duration, tint color, and coating, were not significantly associated with protection levels.

Conclusion:

Most sunglasses in Bangkok offer adequate UVR protection, especially those with brand tags and wider lenses. However, a notable proportion of unbranded sunglasses fail to meet safety standards. Since UVR protection cannot be accurately predicted by price or appearance alone, consumers should be encouraged to choose sunglasses certified for UVR protection to ensure effective eye protection.

Table 1. Characteristic of 117 sunglasses.

Characteristic	Compliant	Non-Compliant	Total
Number of sunglasses, n (%)	102 (87.18)	15 (12.82)	117 (100)
Branded tags, n (%)	78 (76.46)	3 (20)	81 (69.23)
Price, THB, median (range)	2,500 (45-13,000)	150 (18-6,500)	1,690 (18-13,000)
Duration of use, months, median (range)	36 (0.25-240)	24 (1-120)	36 (0.25-240)
UVB % protection, mean (SD)			
Right lens	99.98 (0.07)	97.75 (4.58)	99.70 (1.76)
Left lens	99.98 (0.10)	98.23 (4.02)	99.75 (1.52)
UVA+B % protection, mean (SD)			
Right lens	99.78 (0.14)	61.01 (35.53)	94.81 (17.94)
Left lens	99.76 (0.16)	62.18 (34.71)	94.95 (17.46)
Lens height, cm, mean (SD)	4.38 (0.64)	4.55 (0.45)	4.40 (0.62)
Lens width, cm, mean (SD)	5.52 (0.73)	5.23 (0.42)	5.48 (0.70)
Tint color, n (%)			
Black	57 (55.88)	6 (40.00)	63 (53.85)
Brown	19 (18.63)	4 (26.67)	23 (19.66)
Pink	7 (6.86)	2 (13.33)	9 (7.69)
Green	8 (7.84)	0 (0)	8 (6.84)
Blue	5 (4.90)	2 (13.33)	7 (5.98)
Orange	4 (3.92)	2 (13.33)	6 (5.13)
Yellow	1 (0.98)	0 (0)	1 (0.85)
Violet	1 (0.98)	0 (0)	1 (0.85)
Tint uniformity, n (%)			
Uniform	71 (69.61)	12 (80.00)	83 (70.94)
Gradient	31 (30.39)	3 (20.00)	34 (29.06)
Mirror coated lens, n (%)	11 (10.78)	1 (6.67)	12 (10.26)
Photochromic lens, n (%)	3 (2.94)	0 (0)	3 (2.56)

Abbreviations: SD, standard deviation; THB, Thai baht; UV, ultraviolet radiation; cm, centimetre

Table 2. Odds ratios for characteristic associated with compliant UVR protection in sunglasses

Characteristic	Odds ratio (95% CI)	p-value
Brand tagged	25.93 (2.87-234.38)	0.004*
Price	1.00 (0.99-1.00)	0.684
Duration of use	0.99 (0.97-1.01)	0.233
Lens height	0.29 (0.09-0.93)	0.037*
Lens width	5.63 (1.04-30.37)	0.045*
Mirror coated	0.50 (0.04-5.97)	0.580
Gradient tint	1.27 (0.20-7.39)	0.831
Photochromic lens	Not estimable	Not estimable
Tint color		
Brown	0.40 (0.06-2.47)	0.324
Light color	0.75 (0.15-3.70)	0.721

*A p-value < 0.05 indicates statistical significance.

Abbreviations: UV, ultraviolet radiation; CI, confidence interval



**Abstract N°: 3213****Pre-clinical study with pulsed magnetic fields or radiofrequency currents in combination with narrowband ultraviolet light: new therapies for the treatment of refractory vitiligo?**

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Introduction & Objectives: Vitiligo is a cutaneous pigmentation disorder of autoimmune origin that is very difficult to resolve. First-line treatment is narrowband UVB phototherapy (NB-UVB-311 nm). However, achieving maximum repigmentation requires prolonged treatment, which can increase the risk of developing skin cancer. Physical therapies based on electromagnetic fields (pulsed extremely low frequency, PELF, and radiofrequency, RF) are noninvasive therapies that have been shown in vitro to interact with the melanogenesis pathway. Our hypothesis is that treatment with RF or PELF, together with NB-UVB, can promote melanin synthesis and therefore improve current treatments for refractory vitiligo. **Objective:** To analyze the effect of RF or PELF together with NB-UVB on melanin synthesis in primary cultures of human melanoblasts.

Materials & Methods: Primary cultures of human melanoblasts (Human Melanoblast Stem Cell Cat. No.: 36011-12; CellProgen) were differentiated for 7 days. Next, the cultures were treated for 1 min with NB-UVB light (312 nm; 18 mJ/cm²; Biotech sl, Mod. VL-215.LM) followed by a 48 h treatment of RF (448 kHz; 100 µA/mm²; 5 min ON, 3 h 55 min OFF; Mod. Indiba Activ HCR 902) or PELF (50 Hz; 100 µT; 30 min ON every 24 h; Mod. Joy-it-JDS6600). The amount of synthesized melanin was assessed colorimetrically following the protocol of Siegrist et al. (1986). Values were normalized to the total protein content of the culture (BCA protein assay kit; Pierce, Rockford, IL, USA).

Results: RF electric current decreased the melanin content of the cultures by 25% ± 5% compared to the differentiated control. This difference was statistically significant (Unpaired t test; ****: p < 0.0001). This effect was lost when the RF treatment was* combined with NB-UVB. PELF treatment showed a higher melanin content in the treated cultures, alone or in combination with UVB, compared to the control. However, the effect was not statistically significant (Unpaired t test; NS p > 0.05).

Conclusion: In vitro results with RF suggest a depigmenting effect, and although it would not be applicable to vitiligo, it could be considered a potential therapy for skin conditions such as melasma. On the contrary, PELF results seem to show a trend towards pigmentation and therefore, this treatment could potentially be applicable for vitiligo. However, further research is needed to consider these physical therapies as new treatments for refractory vitiligo or melasma.



**Abstract N°: 3246****Efficacy and Tolerability of Two Low-Irradiance Red Light Photodynamic Therapy Regimens in Actinic Keratosis of the Head and Scalp: A Clinical Trial with BF-200 ALA**

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Introduction & Objectives:

Photodynamic therapy (PDT) with BF-200 ALA and red light is an effective treatment for actinic keratosis (AK), though pain during illumination remains a key limitation. Reducing irradiance and fluence may improve tolerability without compromising efficacy. The aim of this work is to compare the efficacy, tolerability, and safety of two low-irradiance, half-fluence PDT protocols using BF-200 ALA for the treatment of AKs on the head and scalp.

Materials & Methods:

In this clinical trial, 22 patients with grade I–II AKs on the head or scalp were allocated to two treatment groups following clinical and dermoscopic lesion assessment. After a 2-hour incubation with BF-200 ALA, Group A received red light illumination at 37 mW/cm² for 8 minutes (18 J/cm²), and Group B at 22 mW/cm² for 16 minutes (18 J/cm²). Lesions were documented photographically at each visit. Clinical response was assessed at 1- and 3-months post-treatment. Severity scores (AKASI, PGA, AKQoL) were recorded at all visits. Forty-eight hours after treatment, patients completed a blinded questionnaire evaluating erythema, oedema, crusting, and blistering (0–3 scale). At the 3-month visit, cosmetic outcomes (hyperpigmentation, hypopigmentation, atrophy, scarring; 0–3 scale) were assessed by an investigator.

Results:

Of the 22 patients (11 per group), most lesions were located on the scalp (77.27%). Baseline AK counts were similar (Group A: 28.45 ± 10.45; Group B: 29.36 ± 11.47; p = 0.948). Lesion clearance at 3 months was higher in Group A (–90.1%) compared to Group B (–72.14%; p = 0.008). However, clinical clearance in Group B remained excellent despite the lower irradiance. No significant differences were observed in AKASI (0.5 ± 1 vs. 1.26 ± 1.19; p = 0.386) or PGA scores (0.6 ± 0.55 vs. 1 ± 0.63; p = 0.284). Pain during illumination was significantly lower in Group B (3.36 ± 1.18) than in Group A (5.75 ± 1.67; p = 0.011). No significant differences were found in acute side effects or cosmetic outcomes between groups.

Conclusion:

Both half-dose PDT protocols demonstrated high efficacy and good tolerability for AKs on the head and scalp. While Group A achieved superior lesion clearance, Group B offered a significantly better pain profile with still excellent clinical outcomes. Both regimens may represent valuable options for treating mild-to-moderate cancerization fields, allowing for treatment individualization based on patient needs and tolerability.



**Abstract N°: 3343****The use of narrowband phototherapy with a wavelength of 311 nm in the treatment of patients with parapsoriasis**Tetiana Lytynska¹, Valeriia Kopach¹¹Bogomolets National Medical University, Department of Dermatology and Venereology with the course in cosmetology, Kyiv, Ukraine**Introduction & Objectives:**

Parapsoriasis is a heterogeneous group of chronic skin disorders characterized by inflammatory spots, papules, and/or plaques covered with fine lamellar scales. There is a steady rise in the incidence of this pathology, with a wide spectrum of clinical manifestations, an increasing number of severe cases, persistent diagnostic difficulties, and a lack of effective and safe treatment options.

Historically, parapsoriasis has been classified into two distinct categories: parapsoriasis (or parapsoriasis en plaques) and pityriasis lichenoides. Following modifications to the classification system, the term “parapsoriasis” now signifies two distinct forms: small plaque parapsoriasis (SPP) and large plaque parapsoriasis (LPP). The nomenclature and classifications proposed by various authors have been a recurring point of debate.

The present study aims to investigate the efficacy and safety of narrowband phototherapy with a wavelength of 311 nm in combination with a topical calcineurin inhibitor in the treatment of patients with parapsoriasis.

Materials & Methods:

Twenty-one patients with parapsoriasis were examined and treated, including 6 (28.57%) patients with large plaque parapsoriasis (LPP), 5 (23.81%) patients with small plaque parapsoriasis (SPP), 6 (28.57%) patients with pityriasis lichenoides chronica (PLC), and 4 (19.05%) patients with pityriasis lichenoides et varioliformis acuta (PLEVA). The age of the patients ranged from 19 to 53 years; there were 7 (33.33%) females and 14 (66.67%) males, and the duration of the disease ranged from 6 months to 5 years. Treatment consisted of narrowband phototherapy with a wavelength of 311 nm and topical calcineurin inhibitor.

Results:

Therapeutic efficacy was assessed based on the dynamics and degree of elimination of objective clinical manifestations and subjective symptoms, as well as long-term treatment outcomes and remission stability. At the conclusion of the treatment course, clinical recovery was observed in 16 (76.19%) patients, and significant improvement was noted in 5 (23.81%) patients. The treatment was well-tolerated overall, with no significant complications, adverse reactions, or side effects reported.

Conclusion:

Narrowband phototherapy with a wavelength of 311 nm, in combination with a topical calcineurin inhibitor, is an effective and safe method of treating patients with parapsoriasis.



**Abstract N°: 3379****Hydroxychloroquine and Photoprotection: New Insights into a Classic Drug**

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Introduction & Objectives: Hydroxychloroquine (HCQ) is one of the most widely used immunomodulatory agents in dermatology, particularly in the treatment of photodermatoses. One of its lesser-known properties is a potential photoprotective effect, attributed to its ability to absorb UV radiation and stabilize DNA. This study aimed to describe the effects of hydroxychloroquine on cell viability and oxidative stress in cultured human keratinocytes (HaCaT). As a secondary objective, we assessed its impact on absorbance and protection against UVB, UVA, and visible light when added to a standardized photoprotective formulation.

Materials & Methods: HaCaT cultures were exposed to blue light with cumulative doses of 9, 18, 36, and 72 J/cm². Prior to exposure, different concentrations of hydroxychloroquine (10 µM, 5 µM, and 1 µM) were added. Cell viability was assessed via the XTT assay, and reactive oxygen species (ROS) levels were measured by immunofluorescence. Oxidative stress enzymes (catalase, GPX, and SOD) were quantified using ELISA. In accordance with ISO 24443:2019, absorbance and the sun protection factor (SPF) of the standardized P8 photoprotective formulation, supplemented with 1% hydroxychloroquine, were also assessed.

Results: Light exposure significantly reduced cell viability at doses of 18 J/cm² and above. In parallel, a significant increase in ROS production was observed from 36 J/cm² onward. At 18 and 36 J/cm², HCQ at all concentrations (10 µM, 5 µM, and 1 µM) led to a slight, non-significant improvement in cell viability. At 36 J/cm², HCQ significantly reduced ROS levels at all tested concentrations. Cultures exposed to 9 J/cm² and treated with HCQ showed increased levels of catalase, GPX, and SOD, although only the increase in SOD was statistically significant. Addition of HCQ to the P8 formulation led to an increase in absorbance, improving the estimated photoprotective factor.

Conclusion: HCQ shows potential as a protective agent against blue light-induced oxidative stress, though further studies are required to confirm and expand upon these findings.





Abstract N°: 3443

Permanency of topical photoprotection on skin during sedentary indoor activity.

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Introduction and Objectives:

International guidelines recommend reapplying topical sunscreen every two hours to maintain its effectiveness. This recommendation accounts for factors that reduce the amount of product on the skin, such as sweating, friction, bathing, and the common habit of applying only one-third of the recommended dose of 2 mg/cm². The aim of this study was to evaluate the persistence of sunscreens with a Sun Protection Factor (SPF) 50+ after a single application of 2 mg/cm² on the face, under conditions of sedentary indoor activity.

Material and Methods:

A comparative experimental study was conducted involving 24 volunteers with Fitzpatrick skin phototype III. Ten different standard and commercially available SPF 50+ sunscreen formulations were tested. Each participant applied a different product on each hemiface, and after five minutes, ultraviolet (UV) photographs were taken using a Canon EOS 1100 camera equipped with UV-emitting flashes. This process was repeated at 1, 2, 3, and 5 hours, during which the participants remained indoors performing normal sedentary activities such as studying or working.

The images were digitally analyzed using Fiji (ImageJ) software to assess each product's degree of UV absorption and distribution uniformity. Based on a blue color scale ranging from 0 to 255 in the UV photographs, 0 represented the darkest tone (maximum absorbance) and 255 the lightest (minimum absorbance). As a reference point, untreated skin—appearing light in the UV images—was assigned a value equivalent to 100% light reflectance, representing the absence of sunscreen. A regression model was then developed to correlate changes in blue color intensity with SPF over time. For this purpose, a standard European SPF 50+ product (SPF 62) was applied at different concentrations: 2, 1.5, 1, and 0.5 mg/cm², corresponding to theoretical SPF values of 62, 46.5, 31.4, and 15.5, respectively.

Results:

At baseline, blue color levels ranged from 22% to 56%. Over time, this increased to a range of 41% to 75% (approaching the control), indicating a decrease in sunscreen presence. The overall color increase ranged between 16% and 25%, suggesting no significant degradation in the permanence of the tested formulas.

According to the regression model, an initial SPF of 50 or 50+ (i.e., >60) decreased to an approximate SPF of 30 after 5 hours, representing a reduction of around 50%. However, differences observed between formulations after 5 hours were not statistically significant ($p > 0.05$) to indicate a meaningful loss in photoprotective efficacy.

Conclusion:

UV photographic analysis demonstrated that various standard and commercial SPF 50+ sunscreens maintain sufficient protection for up to 5 hours of sedentary indoor activity. Despite an observed reduction of approximately 50% in SPF, the final level still provides adequate photoprotection. Under these specific indoor conditions, reapplying sunscreen every two hours may not be necessary, as long as a high-SPF product (SPF 50+) is applied at the recommended dose of 2 mg/cm².

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**Abstract N°: 3456****Tinted topical sunscreens as the Gold Standard for photoprotection beyond ultraviolet wavelengths**

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Introduction & Objectives: Wavelengths beyond the ultraviolet spectrum, such as high-energy visible light (HEV) and infrared A radiation (IRA), can induce pigmentation-related disorders and photoageing when acting upon the skin in sufficient amounts. These wavelengths may also contribute to skin carcinogenesis through increased oxidative stress. Currently, regulatory standards exist to evaluate the efficacy of sunscreens against biological effects as eritema, namely the Solar protection factor; mainly due to UVB and UVA protection by using the permanent pigmentation darkening effect. A new scale has been developed to assess protection against HEV light based on research studies taking into account the Immediate Pigment Darkening effect of those wavelengths close to 400nm. However, there is no official recommendation regarding the level of protection against IRA, as current formulations based on organic or traditional mineral filters are largely ineffective at these wavelengths. Tinted filters, particularly those containing iron oxides, may offer attenuation in this spectral range. To compare the efficacy of tinted and untinted sunscreen formulations against UVB, UVA, HEV light, and IRA, (based on different biological effects) and to attempt to identify a threshold that could aid in determining whether a sunscreen is effective in protecting against IRA.

Materials & Methods: Following ISO 24443 in vitro protocols for sunscreen efficacy evaluation, a total of 40 commercially available topical sunscreen formulations were analyzed: 20 tinted products and 20 untinted products (including 4 formulations containing only mineral filters and 16 non-mineral, untinted formulations). The transmittance spectrum of each product was measured across wavelengths ranging from 290 to 1,350 nm and protection factors against different biological effects covering different UV and HEVL regions were estimated as well as the % of transmitted in the region of IRA (760nm-1360nm).

Results: Tinted formulations exhibited higher values of protection factors than non tinted, based organic filters (SPF) (85.6 ± 21.7 vs. 64.89 ± 23.2), UVA-PF (58.8 ± 22.2 vs. 40.9 ± 15.2) and HE VLPF (2.4 ± 0.8 vs. 1.2 ± 0.1). The lower values of protection factors were observed in 100% mineral filters. Only the tinted formulations demonstrated potential for IRA absorption, reducing average transmission in this spectral range by up to 20%.

Conclusion: Tinted sunscreen formulations provide superior photoprotection profiles in the UVB, UVA, and HEV light ranges compared to untinted formulations. The inclusion of iron oxides contributes significantly to photoprotection efficacy within the IRA spectrum. Based on minimal doses of IRA skin damage, a decrease of 15% on transmittance could be enough to be considered as effective.



**Abstract N°: 3888****Evaluation of the Performance of Broad-Spectrum Sunscreens Efficacy Using Electrochemistry**

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Introduction & Objectives:

Solar ultraviolet radiation (UVR), consisting of ~95% UVA and ~5% UVB, can reach both the epidermal and dermal layers of the skin, contributing to acute and chronic cutaneous responses. Exposure to high doses of UV generates reactive oxygen species (ROS), leading to cellular damage and oxidative stress, plus an imbalance in endogenous antioxidants defenses. Using a novel device (Skin-Biosense) based on electrochemistry to monitor electron-donating skin markers, here we evaluated the photoprotective efficacy of two broad-spectrum sunscreen formulations against UV radiation in an ex-vivo skin model.

Materials & Methods:

Two formulations were investigated: Product A - inorganic SPF40 sunscreen, and Product B -hybrid SPF46 sunscreen (organic & inorganic UV filters). Electrochemical measurements were performed using the Skin-Biosense device, an electrochemical sensor, consisting of a small portable and non-wireless probe that is connected to a digital interface via Bluetooth. Human skin ex-vivo tissue explants (n = 3 explants per condition), obtained from female subject 42 years of age with skin phototype III were topically treated with each sunscreen (5 mg/cm²), then irradiated with UVR (UVA 18 J/cm² and UVB 0.6 J/cm²). Non-invasive ex situ electrochemical measurements with Skin-Biosense device were carried out before treatment and UV irradiation, plus 24 hours after irradiation. The Skin-Biosense score, based on the peak area of skin markers detected electrochemically, served as the primary readout (Figure 1). Additionally, tissue explants were analyzed for UV-induced sun burn cells quantification using hematoxylin and eosin staining.

Results:

Compared with negative control tissues (untreated and unexposed), the electrochemical score measured in untreated tissues that were irradiated with UV was significantly higher (+256%), suggesting that the Skin-Biosense device can detect an adaptive skin's response to UV stress. These initial findings indicate that by measuring electron-donating skin markers, such as antioxidants and/or certain vitamins (e.g. B12), Skin-Biosense can monitor the skin's regulatory mechanism in response to UV stress, with the aim of maintaining skin homeostasis. Following 24 hours after UV irradiation, the consistent elevated electrochemical score observed were consistent with the significant increase in sunburned cells in untreated tissues. The sharp drop in electrochemical score (-75%, Figure 2), including significant reduction of sunburned cells, observed with Sunscreen A (inorganic) shows that this formulation provided superior protection in greatly attenuating UV-induced skin stress response compared to Sunscreen B (hybrid), whose electrochemical score level was comparable to the positive control (untreated & UV-exposed).

Conclusion:

This knowledge study indicates that the efficacy of photoprotection offered by different sunscreens can be

assessed using a novel electrochemical sensor measuring electron-donating skin markers on an ex-vivo model following UV exposure. Our findings suggest that organic Sunscreen A provides better broad-spectrum photoprotection against UV-induced tissue damage than hybrid Sunscreen B.

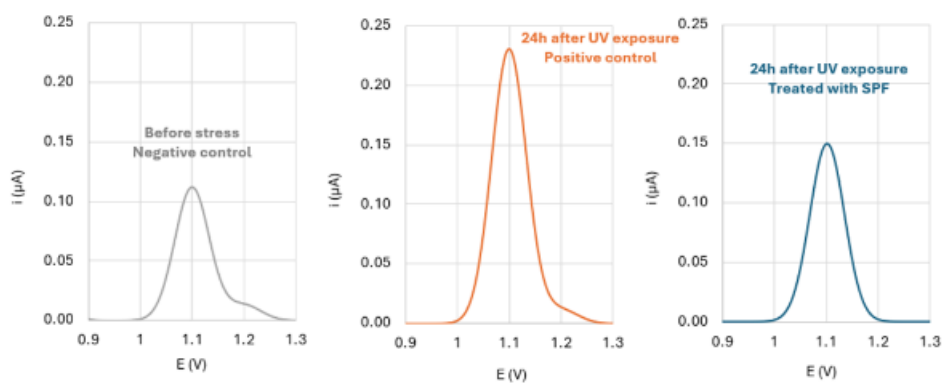


Figure 1: Skin-Biosense electrochemical measurements of skin explants.

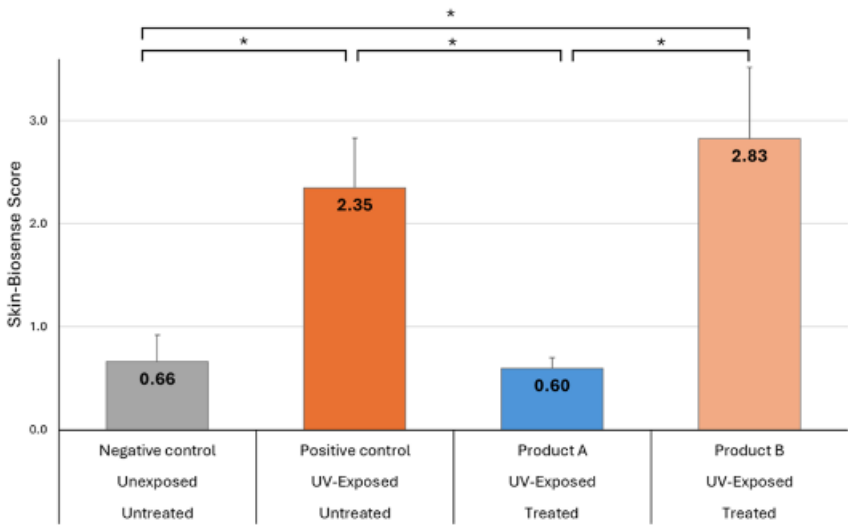


Figure 2: Skin-Biosense mean score values 24h after UVR exposure. A p -value < 0.05 was considered statistically significant (*) were analyzed using Welch's t -test.

**Abstract N°: 3908****New Perspectives in the Management of Multiple Actinic Keratoses: Efficacy of Combined Field Therapy**Korponai Judit^{*1}, Emese Gellén¹, Eva Remenyik¹, Eszter Janka¹, Dorina Juhász¹¹University of Debrecen, Department of Dermatology, Debrecen, Hungary**Introduction & Objectives:**

Actinic keratosis (AK) is a precancerous skin condition with increasing global prevalence. Due to the carcinogenic effects of UV radiation, distinguishing between lesional and non-lesional skin on severely photodamaged areas is clinically challenging. Consequently, field-directed therapies, such as photodynamic therapy (PDT) or the combination of calcipotriol and 5-fluorouracil (5-FU), are among the most effective treatment options. To objectively evaluate treatment outcomes, in vivo imaging technologies such as optical coherence tomography (OCT) and the Antera 3D imaging system offer promising possibilities.

Materials & Methods:

A total of 30 patients (20 men, 10 women) with multiple facial AKs were enrolled in this study. Participants were randomly assigned to one of three treatment arms. The first group (N=10) received a single session of PDT with 20% aminolevulinic acid (ALA) and red light illumination. The second group (N=14) applied a 1:1 calcipotriol+5-FU cream twice daily for four days. The third, combined group (N=6) underwent the same four-day calcipotriol+5-FU treatment followed by a single PDT session. Treatment efficacy was assessed before therapy and three months after its completion through clinical evaluation of AK number and severity, in addition to OCT and Antera 3D measurements.

Results:

Three months after treatment, the number of AK lesions significantly decreased in all three groups (PDT: $p < 0.001$, calcipotriol+5FU: $p = 0.002$, combined: $p = 0.005$). According to OCT measurements, vascularization significantly decreased during the 3-month follow-up in the calcipotriol+5FU group ($p = 0.009$) and the combined group ($p = 0.044$). Based on Antera 3D camera measurements, three months after treatment, the combined group showed a significant decrease in hemoglobin (Hgb) hyperconcentration ($p = 0.036$) and its variation ($p = 0.008$). In the PDT group, three months after treatment, the Hgb variation significantly decreased ($p = 0.030$). In the calcipotriol+5FU group, three months after treatment, the average Hgb level ($p = 0.030$), its variation ($p = 0.007$), and the average melanin level ($p = 0.013$) significantly decreased. Three months after treatment, compared to the calcipotriol+5FU group, the PDT-treated group showed a significant decrease in the volume of small ($p = 0.016$), medium ($p = 0.022$), and large pores ($p = 0.032$), as well as in the individual ($p = 0.036$), small ($p = 0.022$), medium ($p = 0.036$), and large textural features ($p = 0.040$), and in the depth of individual ($p = 0.027$), small ($p = 0.008$), medium ($p = 0.027$), and large wrinkles ($p = 0.021$). Three months after treatment, compared to the calcipotriol+5FU group, the combined treatment group showed a significant decrease in the volume of small ($p = 0.018$) and medium pores ($p = 0.032$), as well as in the individual ($p = 0.042$), small ($p = 0.023$), medium ($p = 0.042$), and large textural features ($p = 0.052$), and in the depth of small wrinkles ($p = 0.031$).

Conclusion:

During the short follow-up period, all three therapeutic approaches proved to be effective in reducing the number of AK lesions. The combined treatment and PDT showed more favorable cosmetic outcomes in improving photoaging compared to calcipotriol+5FU monotherapy. However, no significant difference was observed

between PDT and the combined treatment, which may have been limited by the small sample size.

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**Abstract N°: 4019****Comparison of the efficacy and safety profile for local NB-UVB, local PUVA and NB-UVB cabins in the treatment of non-segmental vitiligo**

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Introduction & Objectives: A chronic condition of unclear etiology, vitiligo is characterized by discolored hair and depigmented patches on different areas of the skin, and less frequently on mucous membranes because of a reduction in melanocytes. The primary drawback of this illness for the patient is the decline in psycho-emotional state (stigmatization-induced anxiety, depression). For the treatment of vitiligo, phototherapy is still essential. The primary criteria that decide whether localized or whole-body phototherapy should be employed are lesion distribution and extent. Furthermore, modest natural UV exposure is advised according to UV index, skin phototype, and safety considerations. Narrowband ultraviolet B (NB-UVB) at 311 nm and tailored UVA phototherapy are well known for their effectiveness and safety. This study compares the safety and efficacy of topical NB-UVB therapy, topical PUVA therapy and total NB-UVB therapy. To evaluate the efficacy and safety of topical NB-UVB, topical PUVA, and NB-UVB cabins in the treatment of non-segmental vitiligo.

Materials & Methods: 3 groups of 80 patients with stable non-segmental vitiligo were created: 1 group with 20 patients received treatment with local PUVA, 2 group with 30 patients received treatment with local NB-UVB 311 nm and 3 group includes 30 patients received treatment with total NB-UVB 311 nm. Both groups received therapy for six months, with control at the start, middle, and end of the trial. The Vitiligo Area Scoring Index (VASI) was used to measure the area of the lesion, the VitiQoL scale was used to measure the patients' quality of life and repigmentation was measured as a percentage of body surface area (BSA).

Results: Following three months of treatment, group 1's repigmentation results were better than those of groups 2 and 3. The three groups' levels of repigmentation did not significantly differ from one another following six months of treatment. The repigmentation rate, efficacy, and pronounced efficacy of patients in the topical, whole NB-UVB, and topical PUVA groups did not differ substantially. Patients in the topical PUVA group had a substantially higher BSA score at the third month compared to those in the topical NB-UVB UVB group and the outpatient NB-UVB group. By the sixth month, there were no discernible changes between the groups. At the third month, VASI decreased markedly in the Local PUVA group. In the Local UVB group and the total NB-UVB group, the VASI score before and after three months of treatment did not change significantly. The quality of life according to the VitiQoL scale in patients in the local PUVA treatment group improved significantly.

Conclusion: By the end of the sixth month of treatment, non-segmental vitiligo had been repigmented by local PUVA therapy, local NB-UVB, and whole NB-UVB phototherapy; there was no discernible variation in the degree of repigmentation among the three groups. According to our research, all treatments are safe and offer repigmentation with varying degrees of success. Local NB-UVB is the recommended treatment for lesions that are less than 5% since it does not cause any negative side effects on unaffected skin, such as erythema, pruritus, or further photoaging. Patients with active vitiligo may benefit from PUVA therapy, which demonstrated great clinical efficacy but did not improve their quality of life. Patients also tolerated the treatment well.





Abstract N°: 4863

Efficacy and safety of photodynamic therapy with or without 5-fluorouracil pretreatment for actinic keratosis: A systematic review and meta-analysis of randomized controlled trials

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Introduction & Objectives: Actinic keratoses (AK) are precancerous lesions induced by ultraviolet radiation, potentially progressing to squamous cell carcinoma. Although topical 5-fluorouracil (5-FU) and photodynamic therapy (PDT) are individually recommended treatments, guidelines on their combined use are limited. We will conduct a systematic review and meta-analysis comparing the efficacy and safety of PDT alone to PDT with 5-FU pretreatment for AK.

Materials & Methods: This review followed the Cochrane Handbook and PRISMA guidelines and was registered in PROSPERO (CRD420251011977). Databases (PubMed, Embase, Cochrane) were searched from inception to April 2025 for randomized controlled trials (RCTs). Outcomes included complete lesion clearance at 3 and 6 months, protoporphyrin IX (PpIX) accumulation, and incidence of erythema. Analyses utilized a DerSimonian-Laird random-effects model (≥ 3 studies) or fixed-effects model (2 studies), assessing heterogeneity with I^2 statistics. RStudio was used.

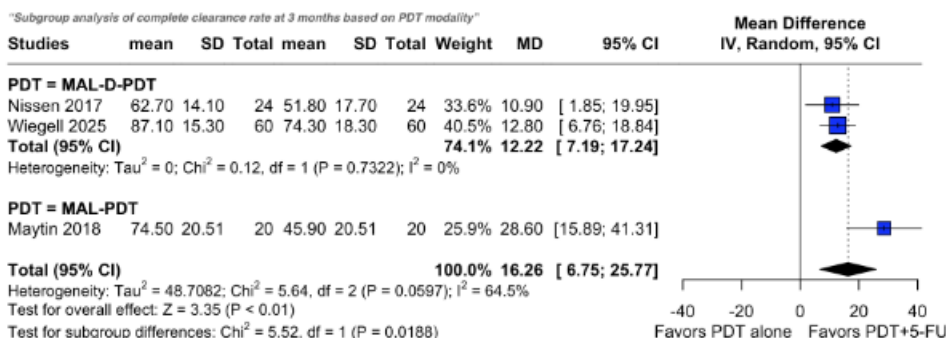
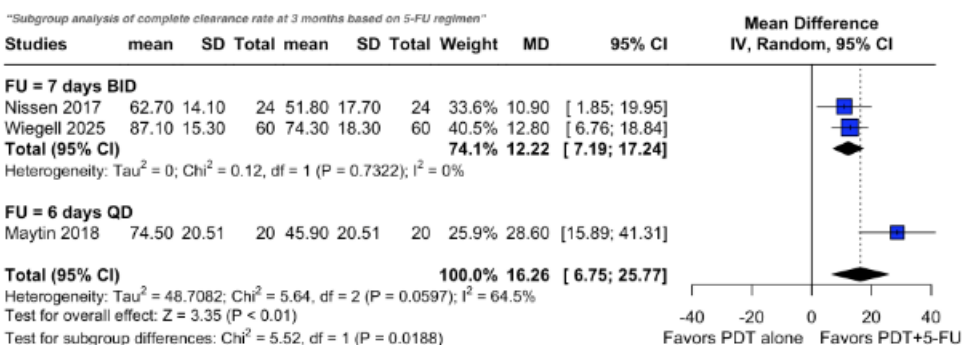
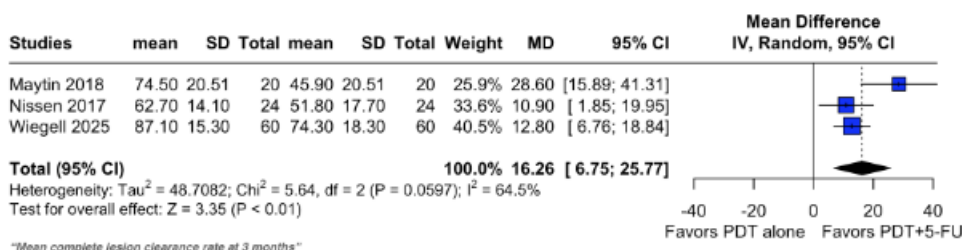
Results: We included 138 patients from 5 RCTs. The mean proportion of lesions achieving complete clearance was significantly higher in the combination group as compared to PDT alone after 3 months (MD 16.26; 95% CI 6.75–25.77; $p < 0.01$; $I^2 = 64.5\%$), 6 months (MD 17.13; 95% CI 10.75–23.51; $p < 0.01$; $I^2 = 44.4\%$), and 12 months (MD 11.65; 95% CI 4.37–18.93; $p = 0.01$). Within subgroup comparisons, methyl aminolevulinate PDT (MAL-PDT) with 6-day once-daily (QD) 5-FU showed significantly greater clearance than PDT alone (MD 28.60; 95% CI 15.89–41.31; $p < 0.0001$). Similarly, MAL daylight PDT (MAL-D-PDT) with 7-day twice-daily (BID) 5-FU also demonstrated higher clearance than without 5-FU (MD 12.22; 95% CI 7.19–17.24; $p < 0.0001$). Subgroup analysis revealed MAL-PDT with 6-day QD 5-FU pretreatment had superior clearance compared to MAL-D-PDT with 7-day BID 5-FU ($p = 0.01$).

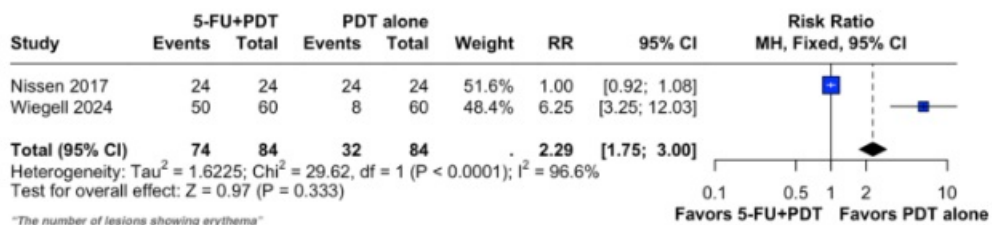
Additional evidence from two trials excluded from pooled analyses due to methodological differences further supported the efficacy of sequential therapy. Mean lesion counts notably decreased at 3 months (23 to 2.3 lesions in combination treatment of 5-FU-ALA-PDT vs. 38.9 to 8.2 lesions with ALA-PDT alone). At 6 months, median lesion reduction was 100% (mean 94.6%) with combination treatment versus 66.7% (mean 68.4%) with ALA-PDT alone ($p = 0.001$), and at 12 months, the median AK count reduction was 100% (mean 95.5%) with 5-FU-ALA-PDT, versus 82.6% (mean 70.3%) with ALA-PDT monotherapy. No significant differences were observed in PpIX fluorescence (SMD 1.78; 95% CI 1.04–4.60; $p = 0.22$; $I^2 = 92.2\%$) or erythema incidence (RR 2.29; 95% CI 1.75–3.00;

$p=0.33$; $I^2=96.6\%$) between groups.

Conclusion: Our study suggests that the combination of PDT and 5-FU significantly enhances the complete clearance of AK lesions without a significant increase in the risk of erythema. Further trials are needed to compare different combinations of approved modalities for AK.

Study	Patients, n	Age (years), mean	Male, n (%)	AK body site distribution	Photodynamic therapy	5-FU pre-treatment regimen	Total AK, n	Grade I AK, n	Grade II AK, n	Grade III AK, n	Follow-up
Wiegell 2024	60	73	54 (90)	Face Scalp	MAL-D-PDT	7 days BID	1547	1278	246	23	12 months
Maytin 2018	17	68.4	12 (70.6)	Face Scalp Forearm	MAL-PDT	6 days QD	NR	NR	NR	NR	6 months
Nissen 2017	24	73.3	16 (66.6)	Hand	MAL-D-PDT	7 days BID	799	234	442	129	3 months
Tanghetti 2015	20	NR	NR	NR	ALA-PDT	6-7 days (frequency NR)	NR	NR	NR	NR	3 months
Pei 2017	17	NR	14 (82.3)	Face Scalp Chest Back Upper extremities Lower extremities	ALA-PDT	7 days BID	50	NR	NR	NR	12 months





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**Abstract N°: 5355****Can blue light prime the skin for UV protection? A Pilot Study on skin hardening and photopigmentation**Natalia Bień^{*1}, Joanna Narbutt¹, Aleksandra Lesiak^{1, 2}¹Medical University of Lodz, Department of Dermatology, Pediatric Dermatology and Oncology, Lodz, Poland²Medical University of Lodz, Laboratory of Autoinflammatory, Genetic and Rare Skin Disorders, Lodz, Poland**Introduction & Objectives:**

Recent evidence suggests that visible blue light, when applied in appropriate doses, may stimulate melanin production in fair-skinned individuals without the harmful pigmentary effects typical of UV radiation. The aim of this study was to assess whether repeated blue light exposure may induce skin adaptation to UVB and provide a protective effect. Such an approach could offer new possibilities in the management of idiopathic photodermatoses.

Materials & Methods:

The study enrolled 14 healthy adults (both male and female) without chronic illnesses. Participants underwent a series of 10 blue light exposures (wavelength 453 nm, intensity 40 mW/cm², cumulative dose 36 J per 15-minute session) applied to the skin of the back. Minimal erythema dose (MED) was measured using a Saalux UV-Kamm DE device (311 nm) at baseline and after 5 and 10 sessions. Skin pigmentation and erythema were assessed in four quadrants of the back using the Skin Pigmentation Analyzer SPA99. Blood samples were also collected before and after the treatment series to evaluate selected parameters.

Results:

The group included 14 individuals (phototypes I-III), aged 23-55 years (mean 32.14). Baseline MED was 0.4 J/cm², increasing to 0.5 J/cm² after 5 exposures and 0.7 J/cm² after 10. Mean erythema values decreased from 36.27 to 25.45 and then to 16.39. Skin pigmentation increased steadily from a baseline of 10.46 to 20.20 after 5 sessions, reaching 29.88 after 10 sessions.

Conclusion:

Ten sessions of blue light exposure resulted in increased MED, reduced erythema, and enhanced pigmentation. These findings suggest that blue light may induce a skin-hardening effect, offering a potential preventive strategy for patients with idiopathic photodermatoses. Further studies in larger populations are warranted to confirm these results.



**Abstract N°: 5678****Assessing Quality of Life in Patients with Photodermatoses: An Evaluation of Dermatology Life Quality Index (DLQI), Hospital Anxiety and Depression Scale (HADS), and Patient-Reported Impact of Dermatological Disease (PRIDD) Tools in a Tertiary Photobiology Unit**

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Introduction & Objectives:

The photodermatoses are a heterogenous group of skin conditions, with a unique set of challenges that result in a profound impact on patients' quality of life (QOL). However, there are no specific, validated tools to address the impact of photosensitivity on QOL. Existing QOL measures fail to address the unique impact of photodermatoses on patients' lives or are restricted to a specific disease. Furthermore, most of the QOL tools routinely used in dermatology practice fail to meet the COSMIN (Consensus-based Standards for the Selection of Health Measurement Instruments) criteria.

Our objective was to evaluate and compare the effectiveness of three QOL assessment tools —Modified 12-month DLQI, HADS, and the newly validated PRIDD in assessing the burden of photodermatoses.

Materials & Methods:

In October 2024, the PRIDD tool was implemented alongside use of the modified DLQI and HADS assessments in patients referred to a tertiary photobiology service. A retrospective review of case notes and a photobiology database was conducted for patients diagnosed with photosensitive or photoaggravated dermatological conditions over a 6-month period, and responses across the three measures were analysed. Univariate regression analyses were performed with variables that might influence QOL. Kappa was used as a measure of agreement beyond chance.

Results:

Data from 77 patients (61% female) were included, with mean age at assessment of 50 (standard deviation (SD) 15, range 20-85)-years-old and mean age at diagnosis of 46 (SD 15, range 10-85)-years-old. Most patients had skin phototypes I (31%) and II (32%). The most common diagnoses were chronic actinic dermatitis (23 cases), polymorphic light eruption (18 cases), photoaggravated disease (20 cases) and solar urticaria (10 cases). Most cases (52%) reported a UV exposure time of <30 minutes to trigger rash, with the rash lasting between 1 and 7 days in 44%, with 59% reporting perennial disease activity. Head and neck areas were affected in 80%.

Analysis of patients' self-reported scores of impact showed notable variation for the time periods assessed. Twenty percent report severe or very severe impact over the past week, 25% over the past month and 58% over the past year. The median PRIDD score was 27.2 (IQR 21.2-33.1) indicating moderate impact. Twenty-five percent had PRIDD scores indicating severe or very severe impact over the previous month. The median DLQI was 15.5 (IQR 10-20) signifying very large effects on patient's life. A linear regression model ($PRIDD = 10.9 + 1.08 \times DLQI$) fitted reasonably with R^2 50% (meaning that DLQI "explained" 50% of PRIDD variation in this model), $p < 0.001$. The two measures did not agree well beyond chance (Kappa 0.0561), although the numbers were small ($p = 0.16$). Sex, diagnosis, head and neck involvement and duration of rash were not associated with PRIDD or DLQI scores. There was no agreement between 12 month modified DLQI and patient's assessment of impact over the past year (kappa -0.284) or between patient's assessment of impact over the past month and PRIDD score (kappa 0.0192).

Based on HADS scores, probable clinical anxiety and depression was present in 33% and 10% of patients respectively.

Conclusion:

PRIDD and modified DLQI show linear association but poor agreement. PRIDD was not associated with features that we would expect to worsen QOL with a photodermatosis. These findings support the need for more tailored assessment tools for the complex QOL impact of photodermatoses.

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**Abstract N°: 5712****Erythema ab Igne: A diagnostic challenge in an underappreciated condition.**

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¹Fattouma Bourguiba Hospital, Monastir, Tunisia

Erythema ab Igne: A diagnostic challenge in an underappreciated condition**Introduction & Objectives:**

Erythema ab igne (EAI) is characterized by reticulated erythematous hyperpigmentation associated with epidermal atrophy and telangiectasia, due to repeated and prolonged thermal exposure. We report the case of a patient presenting an unusual location of this condition, linked to the traditional use of the kanoun, a common domestic heat source in rural areas.

Materials & Methods:

NA

Results:

This is a 14-year-old girl, with no medical history, who has had a reticulated, asymptomatic dermatose for one month. Clinical examination reveals a brownish reticulated dermatitis, non-infiltrated, fixed, not blanching upon pressure, located on the palmar surfaces of both hands. The biological assessment was unremarkable. The patient's history reveals prolonged and repeated exposure to the kanoun, which she uses daily in the winter to warm herself. The diagnosis of EAI was made based on the clinical appearance and the interview data. Avoidance of exposure was recommended, and the lesions completely disappeared after two months.

Conclusion:

EAI is a dermatose induced by repeated exposure to infrared rays emitted by various heat sources (fireplaces, radiators, hot water bottles, heaters). It most commonly appears on the lower limbs, abdomen, lower back, and buttocks. However, our case is unusual due to its atypical location. The onset of lesions varies depending on the intensity of the heat source and the frequency of exposure. Clinically, EAI presents as a reticulated erythematous eruption, which then becomes brownish in pigmentation, asymptomatic. Chronic exposure to the heat source causes damage to superficial blood vessels, leading to vessel dilation and hemosiderin deposition. The reticulated "mesh-like" appearance corresponds to the vascular and anastomotic network of the skin. Diagnosis is primarily clinical, supported by the patient's history (exposure to a heat source). EAI typically resolves gradually over several months after cessation of exposure, although pigmentary sequelae may persist in cases of prolonged evolution. Rare cases of squamous cell carcinomas have been reported in chronic forms. Although this condition is not well-known, it is not uncommon in certain populations using traditional heating sources. It warrants greater awareness among practitioners to avoid unnecessary investigations and to provide appropriate preventive measures.



**Abstract N°: 5760****Systemic photoprotection**

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³Grenoble, Grenoble, France

Introduction & Objectives:

Skin cancer, the most prevalent malignancy worldwide, is primarily caused by ultraviolet radiation (UVR), which damages lipids, proteins, and DNA, leading to erythema, premature aging, and consequently skin cancer. The rising incidence of keratinocyte carcinomas emphasizes the need for improved photoprotective measures. Systemic photoprotection is increasingly utilized. This study evaluates the photoprotective effects of nicotinamide (NAM) and polypodium leucotomas (PL).

Materials & Methods:

This intraindividual controlled trial included 50 healthy, skin phototype I-III, participants, divided into two groups receiving either NAM (2000 mg daily) or PL (480 mg daily) for 30 days. The photoprotective effects of these substances were assessed using a narrowband UVB (TL01) light source. The minimal erythema dose (MED) was evaluated, along with cyclobutane pyrimidine dimers (CPDs) in urine and in nuclear DNA of skin biopsies before and after treatment.

Results:

Of the 50 participants, 47 completed the study. The NAM group showed no significant change in MED after treatment ($p=0.533$), with a median MED of 0.41 J/cm^2 pre-NAM and 0.47 J/cm^2 post-NAM. Conversely, the PL group exhibited a significant increase in MED ($p=0.00018$), with a median MED of 0.41 J/cm^2 pre-PL and 0.53 J/cm^2 post-PL. No significant difference in CPDs was observed between pre- and post-treatment in urine samples, NAM ($p=0.85$) and PL ($p=0.68$) groups after creatinine correction and likewise in the skin biopsies for both groups ($p>0.05$).

Conclusion:

PL reduced skin redness following UVB exposure but did not protect against DNA damage. NAM had no effect on inflammation of the skin after UVB exposure and did not protect against DNA damage. These findings suggest that while PL decreases redness upon UVB exposure, it does not prevent DNA damage and, consequently, skin cancer. Further studies are necessary to investigate reproducibility and with a light source with better resemblance to the solar UVR spectrum.



**Abstract N°: 6614****Sun Protection Begins at Home: A UK-Wide Survey of Sunscreen Practices Among Dermatology Clinicians**Amber Blood^{*1}, Aine Kelly², Emma Craythorne²¹School of Medicine - University of Dundee, Dundee, United Kingdom²St John's Institute of Dermatology, Guy's and St Thomas', London, United Kingdom**Title:** Sun Protection Begins at Home: A UK-Wide Survey of Sunscreen Practices Among Dermatology Clinicians**Introduction & Objectives:**

Dermatologists are trusted voices in sun safety—but are they leading by example? While clinicians routinely counsel patients on sunscreen use, little is known about their own adherence to sun protection guidelines. This study investigates how frequently UK-based dermatology clinicians apply SPF and what factors influence their habits.

Materials & Methods:

A cross-sectional survey was electronically distributed to 400 members of the British Society for Dermatological Surgery and the British Cosmetic Dermatology Group between May and July 2024. Respondents reported their SPF use and associated factors including training grade, age, gender, Fitzpatrick skin type, facial skin disease, sunscreen vehicle, brand preference, and concurrent topical treatments.

Results:

Among 154 eligible responses, only 10% of clinicians reported applying SPF more than once daily, the standard recommended by expert bodies. Frequency of application varied significantly by gender, training grade, skin type, sunscreen vehicle, and use of adjunctive topical agents. Clinicians using both SPF cosmetics and standalone sunscreens, or spray formulations, were most likely to reapply sunscreen. Notably, tretinoin users—despite increased photosensitivity—did not demonstrate higher SPF adherence. No association was found between facial skin disease and SPF use.

Conclusion:

While dermatology clinicians are central to public sun safety education, this study reveals wide variation in personal sunscreen practices. Rather than indicating a lack of commitment, these findings reflect the absence of unified guidance. Clearer, practical clinical recommendations may empower clinicians to model consistent SPF use and reinforce sun protection messages more effectively with patients.





Abstract N°: 6859

photoprotection in dermatology patients: knowledge, practices and risk perception

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Introduction & Objectives:

Exposure to ultraviolet (UV) radiation is a major risk factor for skin cancer, and a lot of photosensitive skin disorders.

Despite recommendations for sun protection, risky behaviors remain common, often due to a lack of awareness. This study aims to evaluate patients knowledge, practices, and awareness regarding the risks of sun exposure and the importance of photoprotection measures.

By assessing knowledge levels and identifying behavioral gaps, this research aims to inform targeted educational interventions to improve photoprotection practices among dermatology patients.

Materials & Methods:

We conducted a cross-sectional descriptive and analytical study using a questionnaire completed by patients in dermatology and venerology department.

Results:

A survey was conducted among dermatology patients to assess their knowledge, attitudes, and practices regarding sun protection.

A total of 550 patient participated, aged between 18-74years, a sex ratio (F/M) of 2.43 and predominantly from rural or semi-urban settings.

None of the respondents had a family history of skin cancer.

Regarding phototype, most identified as type III or IV, typically bronzing easily or burning rarely.

Regarding the use of sun protection, while 65% reported using some form of sun protection, none applied sunscreen regularly. Only 13% of participant mentioned using sunscreen, and even then, only during summer months. The most common methods were wearing hats/caps and covering clothing. Awareness of SPF (sun protection factor) was very low, and only 9% of participants indicated the use of specific SPF values.

When it comes to reapplication practices, none of the participants renewed sunscreen application every two hours as recommended. Reasons for not reapplying included ignorance and financial constraints.

Awareness of sun risks was high (81.2%), with 52.6% recognizing the link to skin cancer, 43.7% to pigmentation disorders, and 61% to skin aging. However, 49% believed sunbathing enhanced health.

Photoprotection awareness came mainly from social media (30.7%), and physicians (8.3%).

None of the patients had previously consulted a medical professional for photoprotection advice.

Significant gaps were identified in knowledge of sun protection factor (SPF) ratings and the use of physical sun-protection measures.

Conclusion:

The findings of this study highlight a concerning gap in patients knowledge and practices regarding sun safety, despite the well-established risks associated with UV exposure. Many patients remain unaware of effective photoprotection strategies, contributing to continued engagement in high-risk behaviors. These results underscore the urgent need for educational programs that promote sun-safe habits from an early age. By fostering awareness and encouraging consistent protective practices, such initiatives can play a crucial role in reducing the long-term incidence of skin cancer.

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**Abstract N°: 6874****Evaluation of ultraviolet radiation penetration in oily skin by fluorescence spectroscopy**

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Introduction & Objectives:

Skin protection is crucial, and sebum, a complex lipid mixture produced by the sebaceous glands, plays a key role. Epidermal lipids are among the first components exposed to ultraviolet (UV) radiation. Although sebum components, such as squalene, offer antioxidant properties, their excess can, paradoxically, intensify damage induced by visible light (400-700 nm). Sebum is known to influence the absorption, scattering, transmission and reflection of light in the skin, modulating the reflectance and scattering coefficients. For example, sebum concentration reduces the reflection of visible light, increasing absorption and exposure to its potential harmful effects. UVA radiation (320-400 nm) is known to have photoaging effects, but it is not known whether oilier skin is more permeable to this radiation, similar to what occurs with visible light. The objective of this study was to evaluate whether oily skin is more permeable to UVA radiation than normal skin, aiming to elucidate its potential deleterious effect on the skin.

Materials & Methods:

The methodology consisted of evaluating the permeability of oily skin to UVA radiation by assessing the intensity of dermal fluorophores using fluorescence spectroscopy. This technique allows counting with high sensitivity the number of photons that leave the sample after excitation with a light of a defined wavelength by a bifurcated optical fiber, allowing stimulation and measurement directly on the skin with a very low signal-to-noise ratio. This technique will measure the fluorescence produced by skin fluorophores, such as collagen, elastin, aromatic amino acids (tryptophan and tyrosine) and porphyrins.

Ex vivo skin model from a surgical procedure were divided into a group of skin without sebum (negative control). Through excitation scanning at the UVA radiation wavelength, the fluorescence spectra of the skin were obtained. Subsequently, to mimic the conditions of oily skin, the fragments were treated with increasing amounts of synthetic human sebum (0.25 mg/cm², 0.5 mg/cm², 1 mg/cm² and 2 mg/cm²), and 10 minutes after sebum application, the fluorescence spectra were captured again. The statistical difference between the groups was assessed using one-way ANOVA with Dunnett's post-test available in the OriginPro 9 SR0 software (Origin Lab Corp, USA, 2007).

Results:

Ten minutes after application of sebum in the amounts of 250 µg/cm², 1 mg/cm² and 2 mg/cm², a significant increase (P<0.0001) in the fluorescence intensity of the dermal fluorophores was observed compared to skin without sebum. The increase in fluorescence intensity demonstrates that, in a dose-dependent manner, skin with

sebum tends to increase the transmission of UVA radiation compared to skin that did not receive sebum, demonstrating that sebum can increase the penetration of UVA radiation into the skin and possibly cause greater damage. Large-scale studies are needed to elucidate this behavior and understand the impact on photoaging.

Conclusion:

The data from this study demonstrates that reducing skin oiliness is a key element in minimizing the penetration of UVA radiation and, consequently, its potential deleterious effects.

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Abstract N°: 6920

The use of 308nm Excimer Pulsed Light as a Therapy for Biopsy Proven Granuloma Annulare: A Case Series.

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Introduction & Objectives:

Granuloma Annulare (GA) is a benign skin condition which typically presents with erythematous papules arranged in an annular distribution. While localised GA is usually self-limiting, treatment is sometimes necessary, particularly in the disseminated subtype. Standard treatment includes topical corticosteroids, hydroxychloroquine and conventional phototherapy^{1,2}. More recently, pulsed dye laser (PDL), photodynamic therapy (PDT) and laser, including the Excimer laser³, have demonstrated efficacy in the treatment of GA, especially in refractory cases⁴. Studies report variable response rates to these light and laser-based treatments, and treatment choice depends on resource availability, extent of disease, side-effect profile and patient preference⁴.

The Excimer Pulsed Light (EPL) system operates at the same UVB wavelength as the Excimer laser but delivers it in pulses rather than a continuous beam. Here, we present a case series which highlights the use of EPL in the management of GA.

Materials & Methods:

We present a series of 4 patients with biopsy proven granuloma annulare (GA) treated with 308nm Excimer Pulsed Light (EPL). All the patients were seen in a UK public university teaching hospital dermatology department with confirmed granuloma annulare. A Minimal Erythema Dose (MED) test was carried out before treatment and severity scored using Physicians Global Assessment (PGA).

Results:

The patients were 3 women and 1 man with an average age of 56 years and Fitzpatrick Skin Phototype 2 or 3. One patient presented a second time with a separate patch of GA at another site which was treated with a further course. The average duration of disease before EPL treatment was 5.2 years (range 6 months to 17 years). All were confirmed histologically as granuloma annulare on skin biopsy except for the returning patient. Most had tried conventional therapy including topical corticosteroids, topical calcineurin inhibitors and oral hydroxychloroquine without success. The average MED test was 260mJcm⁻². The maximum dose achieved ranged from 350-1000mJcm⁻². The average starting PGA was 3.6. The average PGA at end of treatment was 0.6. All patients improved a minimum of 2 points. The number of sessions required ranged from 4 to 16.

Conclusion:

To our knowledge, this is the first dataset outlining the use of EPL in GA. All patients demonstrated clinically significant improvement, highlighting the potential of EPL as a safe and effective alternative to current treatments. Future studies with larger sample sizes, extended follow-up periods and direct comparisons to established light- and laser-based treatment regimens are warranted to support the use of EPL in GA.

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**Abstract N°: 7458****Clinical characteristics and treatment response of patients with mycosis fungoides treated with narrowband UVB phototherapy at a single tertiary hospital: An 8-year retrospective study**

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Introduction & Objectives:

Mycosis fungoides (MF) is the most common type of cutaneous T-cell lymphoma (CTCL), presenting initially with scaly patches or plaques on the skin and often causing significant discomfort due to pruritus. The disease follows a slow, chronic course with periods of remission and relapse. Phototherapy, particularly narrowband ultraviolet B (NB-UVB), is a first-line treatment for early-stage MF, offering a cost-effective approach with good potential for long-lasting remission. However, treatment regimens vary widely, and the optimal management for MF remains uncertain, particularly in regions like ours, where such studies are scarce.

This study aims to determine the clinical characteristics and treatment responses of patients with MF treated with narrowband UVB phototherapy at a tertiary hospital. Specific objectives include evaluating clinicodemographic data, treatment courses, clinical responses, relapse patterns, and associations between clinical courses and profiles.

Materials & Methods:

A retrospective, descriptive study was conducted through an 8-year chart review of clinically and histologically diagnosed MF patients who underwent NB-UVB treatment from January 2016 to December 2023 at a dermatology department in a single tertiary hospital. Data collected included demographic details, clinical manifestations, histopathologic findings, treatment courses, treatment responses, and relapse characteristics. Descriptive statistics, Fisher's exact test, and Wilcoxon rank-sum test were used to examine associations between clinical outcomes and demographic/clinical factors, with significance set at P-value < 0.05. Data analysis was performed using Stata version 16.

Results:

The study included 27 MF patients (59.3% female, median age 23 years [IQR=19-37]). All patients had Fitzpatrick skin type III-IV and early-stage disease (100%). The majority presented with patch-stage disease (96.3%), with only one patient presenting at plaque stage. Histopathological findings included superficial perivascular dermatitis (74.1%), epidermotropism (88.9%), and positive CD3 staining (77.8%). Common comorbidities included asthma (22.2%), atopic dermatitis (18.5%), and hypertension (18.5%). Most patients received topical corticosteroids (88.9%), and 55.6% were treated with systemic antihistamines. The median number of phototherapy sessions before discontinuation was 99 (IQR=86-158), with 37 sessions (IQR=31-43) needed for complete response. Median total dose was 58,973 mJ/cm² (IQR=45,886-76,804). Eight patients (29.6%) experienced relapses, with a median disease-free interval of 14 months (IQR=11-30) before recurrence.

Conclusion:

This study demonstrates that NB-UVB phototherapy is an effective treatment for early-stage MF, achieving a high rate of complete response in a relatively short period. The study also highlights the role of co-morbidities,

treatment course, and number of sessions in predicting relapse and remission. Despite the effectiveness of phototherapy, findings suggest that treatment intensity, measured by the number of sessions and total dose, may influence long-term clinical outcomes in MF patients. Further research is needed to refine treatment protocols and explore factors that may impact relapse in MF patients.

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**Abstract N°: 7916****A case of mycosis fungoides bullosa responsive to phototherapy**Krisha Lim^{*1}, Jerson Jerick Taguibao¹, Giselle Ver¹¹Philippine General Hospital, Dermatology, Manila, Philippines

Introduction & Objectives: Mycosis fungoides (MF) bullosa is characterized by (1) vesiculobullous lesions with or without typical skin lesions of MF such as patches, plaque, or tumors; (2) typical histologic features of MF; (3) negative immunofluorescence studies; and (4) negative evaluation for other dermatoses. It is a rare clinicopathologic variant with only 36 cases reported in literature. It has a predilection for elderly males, and is known to have a poor prognosis. Phototherapy has been utilized in early stages of MF and may also have a potential role in the management of bullous type MF through its photoimmunologic effects.

Materials & Methods: This is a case of a 25-year-old male presenting with a 5-year history of generalized fairly defined irregularly shaped erythematous scaly plaques with interspersed tense and flaccid bullae, erosions, ulcers and poikiloderma. There was associated pruritus, easy fatigability and weight loss, with no noted lymphadenopathies, hepatosplenomegaly, or mucous membrane involvement. The patient had no personal history of comorbid conditions or burn injuries. There was no family history of malignancy or autoimmune diseases..

Results: The patient was initially diagnosed as plaque stage MF, stage IB (T2 N0 M0), based on clinical findings and histologic findings of epidermotropic lymphocytes and dense proliferation of atypical lymphoid infiltrates spanning the whole dermis, positive for CD3 staining. His complete blood count, peripheral blood smear, serum chemistries and infectious workup were all unremarkable. PET-CT Scan with IV contrast showed multiple hypermetabolic cutaneous foci with unremarkable lymph node findings. Topical corticosteroids, oral methotrexate and narrowband UVB phototherapy were initiated with noted clearing of bullae. However, the patient would develop new-onset bullae with missed phototherapy sessions. The patient initially complied with medications and phototherapy but was lost to follow-up due to financial constraints and distance from the hospital. Exclusion of other autoimmune blistering diseases, hypersensitivity reactions, and other dermatitides as well as a repeat biopsy of a bullae showing subepidermal clefting in association with nodular to diffuse atypical lymphoid proliferation with epidermotropism and adnexotropism shifted the diagnosis to MF bullosa.

Conclusion: This case highlights bullous MF in a young adult, which is an uncommon epidemiologic presentation of this rare variant. This diagnosis should be considered when blisters occur in conjunction with typical MF lesions, after excluding other potential etiologies. While phototherapy has not been widely reported as a definitive treatment for bullous MF, this case demonstrates its pivotal role in disease management. Notably, adherence to a narrowband UVB phototherapy regimen was associated with the resolution of bullae, whereas noncompliance led to recurrences, underscoring the importance of consistent treatment in achieving optimal outcomes and the efficacy of phototherapy in controlling MF bullosa.





Abstract N°: 8071

Evaluating the Protective Effects of Broad-Spectrum SPF50+ Sunscreen on Atopic Dermatitis: Enhancing Skin Barrier Function Against Environmental Irritants and Sun Exposure

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Introduction & Objectives: Atopic dermatitis (AD) is a chronic inflammatory skin condition that compromises the skin barrier, causing intense itching, redness, and dryness. It significantly impacts quality of life and makes the skin particularly sensitive to environmental irritants like chlorine, salt, sand, and sweat, which can exacerbate discomfort. Sunscreens adapted for AD are crucial, especially during summer exposure. The skin's defense relies on the stratum corneum, which contains natural moisturizing factors (NMFs) and lipids like ceramides, crucial for maintaining skin integrity and hydration. In AD, increased skin permeability heightens sensitivity to irritants and allergens, with sun exposure further exacerbating these issues. The effectiveness of sunscreens in preventing these changes is not well understood, requiring more research. This study evaluates the protective effects of a broad-spectrum SPF50+ sunscreen on AD subjects, both *in vivo* and *in vitro*, to assess its impact on skin barrier function and lipids composition.

Materials & Methods: The protective effect of sunscreens was assessed *in vivo* through clinical evaluations on 42 adults with AD. Transepidermal water loss (TEWL) was measured after 21 days of application under real use conditions (sun exposure/swimming). *In vitro* approaches assessed the sunscreen's ability to protect and reinforce the skin barrier using reconstructed human epidermis (RHE) colonized with human microbiota and supplemented with human sebum. Tests were conducted under conditions of -no sunscreen and no simulated solar radiation (SSR), -no sunscreen with SSR, and -SPF50+ sunscreen with SSR. RHE samples were analyzed by shot-gun lipidomics and LC-HRMS metabolomics 24 h after SSR exposure.

Results: After 21 days, the sunscreen significantly reduced discomfort from sand (100%), salt (98%), chlorine (97%), and sweat (95%), allowing over 85% of subjects to space out their usual emollient application. A significant decrease in discomfort sensations ($p < 0.0001$) and TEWL ($p < 0.0001$) was observed, with improvements in numerous subjects, showing a protective effect on the skin barrier. 100% of adults appreciated the product. Significant metabolite changes (log2-fold, $p \leq 0.05$) included several NMFs. Sun exposure lowered free fatty acids and increased ceramides and cholesterol. An imbalance in NMFs and ceramides, along with increased pro-inflammatory lipids, can impair the skin barrier, causing dehydration and inflammation. The SPF50+ sunscreen prevented SSR-induced alterations in NMFs and lipids.

Conclusion: This broad-spectrum SPF50+ sunscreen effectively protects AD skin from environmental irritants and sun exposure. It reduces discomfort and TEWL, maintaining skin barrier integrity by preventing NMFs and lipids alterations. These findings highlight the importance of effective sunscreens for AD-sensitive skin and the potential of dedicated formulations to enhance skin barrier resilience.



**Abstract N°: 8123****Effectiveness of SPF50+ sunscreen containing high energy visible light filter in the prevention and the accompanying treatment of actinic keratosis**

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Introduction & Objectives:

Actinic keratosis (AK) is a common precancerous skin lesion caused by cellular and genomic damage induced by chronic exposure to UV radiation. AK lesions are susceptible to carcinogenesis in the field, and around 0.5 to 10% of them may develop into squamous cell carcinoma (SCC). Photoprotection is therefore essential to prevent AK development and worsening. We developed a SPF50+ sunscreen containing a very high photoprotective system with PHENYLENE BIS-DIPHENYLTRIAZINE (PBDT) dedicated to AK patients. SPF50+ sunscreen was evaluated using reconstructed human epidermis (RHE) on genoprotection and skin lipidome protection against sun exposure. Skin lipidome plays a critical role in the development and progression of AK by influencing the skin's barrier function and its ability to respond to UV-induced damage. The compatibility with methyl-5 aminolevulinic acid (MAL) daylight photodynamic therapy (dPDT) was also studied on RHE models. Skin tolerance and acceptability are key parameters for improving compliance and encouraging re-application of sunscreen among AK (actinic keratosis) patients; these two factors were evaluated in a clinical study.

Materials & Methods:

Efficacy in preventing UV-induced DNA damage and lipids modifications was assessed through in vitro studies. Dermatological tolerance and acceptability study was performed on 33 adults with grade I AK (mean age = 61 years old; from 48 to 79 years old) after 3 weeks of condition of use. Finally, the compatibility with MAL-photodynamic therapy was measured through in vitro study mimicking the dermatologists' protocol for daylight photodynamic therapy.

Results:

Preventing treatment with the sunscreen showed a high and significant protection of 94.4% ($p < 0.0001$) of UV-induced DNA lesions (CPDs, 64PPs and Dewar). Sphingolipid pathway was upregulated with sun exposure. We observed upregulation of 8 ceramides, 5 glucosylceramides but also 5 sphingosines. Ceramides can be considered as a hub in sphingolipid metabolism and can induce apoptosis by activating p53. Stress conditions such as sun exposure led to increase levels of ceramides in skin cells, which in turn can activate p53, leading to cell cycle arrest or apoptosis. When the SPF50+ sunscreen is used none of these lipids were still significantly modulated. Clinical evaluations concluded that the product showed an excellent cutaneous tolerance and a very good product acceptability (product providing comfortable, supple, and protected skin with a texture adapted to daily use). Finally, using the dermatologists' protocol for MAL-dPDT, we showed that pre-treatment with SPF50+ sunscreen with PBDT did not interfere with MAL-induced cell death, and therefore MAL activation.

Conclusion:

This work demonstrates the benefit of the application of SPF50+ sunscreen in preventing AK,

limiting its worsening, compatible with its MAL-treatment and showing an excellent skin tolerance and acceptability.

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Abstract N°: 8143

Assessing Broad-spectrum Sunscreens for UVA1 and Blue Light Protection in Hyperpigmentation and Photoaging Prevention

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Introduction & Objectives:

Exposure to solar radiation, particularly long UVA (UVA1) and blue light (BL), is a significant contributor to the process of skin aging. To mitigate the cumulative and long-term effects such as wrinkles and brown spots, daily photoprotection is essential when exposed to the sun. This study aims to demonstrate the effectiveness of different sunscreens in protecting against UVA1 and BL radiation and to assess the effectiveness of a well-balanced sunscreen formulations in preventing hyperpigmentation and photoaging through *in vitro* and *ex vivo* studies.

Materials & Methods:

The efficacy of various sunscreens in protecting against each waveband was assessed in independent laboratories. This included confirming the SPF level (and labelled SPF), UVA-Protection Factor (UVA-PF), UV-Critical Wavelength (UV-CW), and evaluating the protection against long UVA and BL in more detail. Various *in vitro* parameters were considered, including UVA1-PF/labelled SPF ratio, UVA1/UV ratio, percentage of BL blocked, and higher UV-CW and BL-CW. The efficacy of one of these sunscreens in preventing sun-induced hyperpigmentation and sun-induced dermal collagen degradation was measured through *in vitro* and *ex vivo* studies.

Results:

Standardized photobiology tests conducted according to ISO24444 and ISO24443 standards confirmed that all tested sunscreens exhibited at least high photoprotective efficacy. These sunscreens had an SPF level exceeding 50 and provided broad-spectrum protection against UVB and UVA radiation, with a CW greater than 370nm. Specific *in vitro* analyses revealed that some sunscreens offered a more well-balanced protection than others. Sunscreens containing phenylene bis-diphenyltriazine filter demonstrated a UVA1-PF/SPF ratio greater than 0.5, UV-CW exceeding 375nm, and extended protection against BL, with a BL percentage blocked exceeding 30% and a BL-CW greater than 385nm. Finally, the product applications increased the *in vitro* lightness L* parameter (+8% (p<0.0001) vs UV control) associated with color modification markedly detectable by human eye ($\Delta E=4$) on UV-pigmented epidermis. Moreover, repeated preventive application on photoexposed human skin explants showed significant prevention of dermal collagen alteration.

Conclusion:

This study demonstrates that well-balanced broad-spectrum sunscreens, particularly those containing phenylene bis-diphenyltriazine filter, have a high photoprotective potential in preventing cumulative and long-term damages caused by UVA1, BL radiation, and overall sun-induced photoaging damages. These sunscreens exhibit an extended protection range, high UVA1-PF/SPF ratio, and an ability to protect against BL. Additionally, the *in vitro* and *ex vivo* studies demonstrate that the repeated use of these sunscreens can effectively prevent dermal collagen degradation and improve skin lightness, resulting in visible color modification. These findings emphasize the critical importance of daily photoprotection to combat skin photoaging and maintain skin health.



**Abstract N°: 8347****Photodynamic Therapy in the Treatment of Onychomycosis: A Systematic Review**Thanos Emmanuel*¹¹Barts Health NHS Trust, London, United Kingdom**Introduction & Objectives:**

Onychomycosis is a common fungal nail infection of the nails that currently presents significant therapeutic challenges due to its treatment resistance, high recurrence rates and limited efficacy of conventional treatments. More recently, photodynamic antimicrobial therapy (PACT) has emerged as a novel photodynamic non-invasive therapeutic approach. This systematic literature review aims to identify and evaluate current published evidence on the use of PACT in the treatment of onychomycosis.

Materials & Methods:

We searched MEDLINE® (via Ovid), EMBASE and SCOPUS databases since 1990 with no language restriction using predefined 'Population, Intervention, Comparison, Outcome (PICO)' criteria using keywords such as "fungal nail infections", "onychomycosis" and "photodynamic therapy". Data were summarised in discrete thematic axes using a qualitative synthesis approach. Articles that were not performed on human subjects were excluded. Only studies that used photodynamic therapy for nail fungi were included. Studies using PACT to treat conditions other than onychomycosis were excluded. A total of 541 studies were identified out of which 30 involved PACT therapy in the treatment of fungal infections.

Results:

A total of 12 studies involving treatment for onychomycosis on human subjects were used for data synthesis. The three most common photosensitizers used were methylene blue (n=3), 5-ALA (n=3) and methyl-ALA (n=3). The total number of treatment sessions ranged from 1 to 22, with 3 sessions being the most common session frequency. Different wavelengths were used with the most common being 630nm (n=8). The most common light source was LED light (n=7). Outcome was assessed both clinically and mycologically. All of the in-vivo case studies and case reports demonstrated complete clinical and mycological cure post-treatment. Randomized-controlled and open trials showed a significant response to treatment by the end of the intervention with the majority of patients achieving complete or partial clinical and mycological cure. Adverse events from treatment were mild and rare and no individuals experienced systemic adverse events or phototoxicity. None of the participants had to drop out due to adverse events. The two most common side effects were burning sensation and mild discomfort.

Conclusion:

Photodynamic therapy appears to be a highly effective treatment for onychomycosis as evidenced by the high clinical and mycological cure rates observed in this review. Given the high rate of treatment failure, fungal resistance, side effects and non-compliance of standard treatments such as oral antifungal medications and topical therapy, there is a need for alternative efficacious and safe treatment interventions. The high cure rate demonstrated in this review gives a promising outlook for a potential gold-standard phototherapy treatment for onychomycosis.

