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Polymorphic light eruption with severe abnormal phototesting sensitivity (PLESAPS)

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Dear Sir, Polymorphic light eruption (PLE) affects 18% of people in Northern Europe (1). It is characterised by a delayed-onset pruritic photo-exposed site papular eruption after sun exposure (2). There is considerable heterogeneity in presentation, morphology and severity (3). Iterative provocation testing with a broadband source (usually UVA) is often positive (3, 4), whilst monochromator phototesting is normal in many patients (abnormal in 945 of 2432 patients diagnosed with PLE who had monochromator phototesting in Dundee until 2012) and only rarely severely abnormal. This contrasts with the immunological photodermatosis second most frequently seen in tertiary referral centres, chronic actinic dermatitis (CAD), in which a photo-distributed dermatitis, in association with severely abnormal broadband, often disproportionate ultraviolet B (UVB), photosensitivity is seen, usually also with multiple contact allergies. A diagnosis of classical PLE is typically straightforward. However, increasingly we have seen patients with a clinical presentation strongly suggestive of PLE, with markedly abnormal monochromator phototesting, raising the question as to whether this remains within the PLE spectrum. We have characterised this patient group, who represent approximately 1% of PLE cases diagnosed in our tertiary referral photodiagnostic unit (Scottish Photobiology Service; SPS) over a 10-year period.

We reviewed records of patients identified from the SPS database as having a clinical diagnosis of PLE with Severe Abnormal Phototesting Sensitivity (PLESAPS). The criteria for this diagnosis were: a database diagnosis of “PLE” and a minimal erythema dose (MED) with at least one monochromator waveband of <50% of the lowest population normal MED. In practice, our database did not allow for searching based on monochromator MED values and patients were identified by screening records of those with a low narrowband UVB MED (≤ 0.05 J/cm^2). Demographic data, photosensitivity characteristics, investigation findings and outcomes were documented.

Assessment included monochromator phototesting (5), with normal population reference ranges derived from healthy volunteer populations (6), narrowband UVB MED testing,

iterative broadband UVA (20 J/cm²; 400 W metal halide lamp; h1 filter) provocation testing and lupus and porphyria screening. Diagnostic biopsy was performed where feasible and in all but one this was from an abnormal phototest site as patients usually did not have any signs of naturally provoked disease at the time of assessment due to the seasonal and intermittent nature of photosensitivity.

Nineteen patients were studied, including three identified prospectively. One patient had had a narrowband UVB MED >0.05 J/cm^2 but monochromator sensitivity of <30% normal at 335±[half-maximum bandwidth]30 nm and 365±30 nm wavebands. Sixteen (84%) were female, with median age of photosensitivity onset of 29 (range 4-54) years. Fitzpatrick skin types were: I (n=5), II (n=5), III (n=2), V (n=3), unspecified (n=4).

The median duration of sun exposure to provoke the eruption was 30 minutes (range "seconds" to "hours"). The interval between exposure to onset of rash was a median of 6 (0.5-12) hours and rash duration was 7 (1-14) days. Provocation through glass, clothing and by artificial lighting was reported by 79%, 16% and 5% respectively. Most patients had involvement of arms (87%), upper chest (77%), face (69%) and back of hands (57%).

Importantly, most patients presented with a seasonal, delayed onset papular/papulo-vesicular or plaque-like clinical picture, with resolution within days and only a minority described swelling or perennial symptoms, thus the clinical characteristics were strongly suggestive of PLE **(Table 1).** Most did not have any history of preceding eczema, with only three (16%) having a history of atopic dermatitis.

Information on sunscreen use was available for 13 patients, indicating benefit in seven and lack of effect in six. Prescribed medication was not considered relevant in any case. Broadband UVA provocation testing was abnormal, with erythemal, oedematous and/or

papular responses in 79% of patients. Monochromator phototesting was abnormal in all patients, with prominent UVA_{II} and/or UVB sensitivity in most **(Table 2)**.

One patient had a positive ANA (1:160), but all had negative extractable nuclear antigens and none had features of connective tissue disease. Plasma porphyrin analysis was negative in all patients. Fourteen patients (74%) had skin biopsies taken from phototest sites (with the exception of one where pre-existing lesional skin was biopsied). Histopathology showed changes suggestive of classical PLE in 33%, eczematous features in 39%; features supportive of phototoxicity in 11% and 17% were indeterminate. The varying features, including usually mild spongiosis, were all consistent with PLE (7).

Fifteen patients underwent patch testing, of which 14 (93%) had one positive reaction, with common allergens such as nickel and fragrance represented. Four patients (27%) had three or more contact allergies. Asteraceae allergy was seen in two subjects (13%). Photopatch testing was performed in 16 patients; four had positive reactions (25%) and two of these patients had multiple positive photocontact reactions. The commonest culprit was oxybenzone.

All of the 19 patients were offered follow-up and 11 attended for repeat phototesting. This was generally carried out between 6 and 12 months after initial assessment. The diagnosis of only one patient subsequently changed to CAD. This patient had a changed, worsening clinical picture, with development of photo-exposed site dermatitis, in combination with a papular response after sun exposure and worsening UVB/UVA monochromator sensitivity over a 5-year period. It was felt that this patient had developed CAD on a background of PLE. The clinical picture, investigation findings and diagnosis of the other 10 patients who had repeat phototesting remained unchanged with follow-up.

During follow-up, 10 patients were offered narrowband UVB phototherapy. Of seven patients for whom outcome data were available, four (57%) reported benefit and three no improvement. One patient was successfully treated with UVA1 phototherapy.

The key characteristics of PLESAPS emerging from this patient cohort are:

- Female preponderance (84%)
- Age at onset <33yrs (75%)
- Seasonal photosensitivity (79%)
- Papular/papulovesicular rash morphology (89%)
- Sunlight provocation through window glass (79%)
- Severe monochromator sensitivity to UVB/ UVA_{II} (>80%)
- Abnormal response to UVA provocation (79%)
- High prevalence of contact allergy (93%)
- Potential to benefit from narrowband UVB phototherapy (57%)

Whilst some of these characteristics occur in CAD, many more features are supportive of a diagnosis of PLE; such as predominant occurrence in young females and the clinical features of photosensitivity, particularly with regards to the seasonal nature, morphology and time-course of rash, with delayed onset and resolution over a week in most patients. So, although it may be impossible to diagnose with certainty some patients in the early stages of CAD, we consider this group of patients to have severe PLE.

Although there are shared features with classical PLE, patients with PLESAPS are more severely affected, with more (69%) facial involvement than expected in classical PLE. Furthermore, abnormal iterative UVA provocation testing showed positive responses in 79%. Previous studies have indicated both UVA- and UVB- wavelength dependency in PLE, with

disproportionate UVA dependence (3, 4). In our patient group, 68% of patients also had abnormal sensitivity in the visible spectrum.

The high prevalence of contact allergy in the PLESAPS group is of interest as of course multiple contact allergies typically occur in CAD (8). However, there is some evidence to support increased contact allergy in PLE and most of our cohort had at least one positive patch test. This warrants further study.

The immunopathogenesis for both PLE and CAD is not yet fully understood, but both share features of a delayed type hypersensitivity reaction (3, 9), and CAD has been reported in association with PLE (9). It is important to highlight that of those who engaged with follow-up, the clinical picture, investigation findings and diagnosis of PLESAPS remained unchanged in all except one, whose clinical presentation changed and deteriorated, with development of photo-exposed site dermatitis and worsening of broadband abnormal photosensitivity over a 5-year period. It was felt this patient had indeed developed CAD on a background of PLE, highlighting the need for vigilance and follow-up with repeat phototesting.

Indeed, it is of interest to review a recent report of CAD, which included 29 patients, with median age at presentation of 40 years, who were of higher skin phototypes V and VI, as the majority had a history of atopic disease or preceding eczema of other type and photo-exposed site dermatitis (10). This again emphasises the clear differences from our patient group, with respect to demographics and clinical characteristics.

Several important points can be drawn from this patient review. There is little justification to split PLESAPS from the PLE spectrum. We did initially consider that this might be a different diagnostic group from ‘normal’ PLE, but the findings of this review suggest that PLESAPS is better considered as severe PLE. Treatment options do not significantly differ from those

considered for PLE in general. The high prevalence of contact allergy supports the need for patch testing in this group.

The identification of this group of severely affected PLE patients, with objectively severe abnormal monochromator phototesting, emphasises that PLE although often considered relatively ‘minor’ despite its important quality of life effects (11), can be a severe immunological photodermatosis.

Table 1: Clinical characteristics of PLESAPS in 19 patients

Characteristics	**Number of Patients (%)**
Pruritus	19 (100)
Swelling	4 (21)
Pain	1 (5)
Papules	17 (89)
Vesicles	7 (37)
Plaques	2 (11)
Photosensitivity in UK	17 (89)
Photosensitivity overseas	2 (11)
Perennial symptoms	4 (21)

Table 2: Monochromator phototesting results in 19 patients with PLESAPS

Waveband ± half maximum bandwidth (nm)	Number of patients with abnormal sensitivity (%) (n=19)	Number of patients (%) with MED <50% of lowest normal dose (n=19)	Number of patients (%) with MED <20% lowest normal dose (n=19)
305±5 (UVB)	17 (89)	7 (37)	3 (16)
335±30 (UVA_{II})	18 (95)	12 (63)	4 (21)
365±30 (UVA_{I})	12 (63)	10 (53)	3 (16)
400±30 (UVA_{I}/visible)	13 (68)	10 (53)	0
430±30 (visible)	13 (68)	2 (11)	0

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