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Pustular allergic contact dermatitis caused by fragrances

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Pustular allergic contact dermatitis (ACD) is rare, with reactions to the topical antibacterial nitrofurazone (1), isoconazole nitrate (2), topical minoxidil 2% (3), 1% fluorouracil (4), black rubber (5) and trichloroethylene (6) having been reported. The clinical appearance of pustular ACD has been reported to comprise multiple small pustules, only 0.5–1 mm in size, on a background of erythema and swelling, and the condition is associated with marked pruritus. Histologically, there are features consistent with ACD (epidermal spongiosis, dermal oedema, and perivascular mononuclear infiltrate), in addition to epidermal pustules composed of lymphocytes and occasional neutrophils (7). Cultures of the pustules must be sterile for a diagnosis of pustular ACD to be made, and the condition must also be distinguished from the more common conditions pustular psoriasis and acute generalized exanthematous pustulosis (AGEP).

A case is reported of an elderly man who presented with both eczematous and pustular rashes, and who showed multiple eczematous and pustular patch test reactions.

Case Report

An 80-year-old retired office worker had a 10-year history of foot dermatitis, which was described as being both eczematous and pustular. He had also experienced a recent micropustular eruption involving the body, face, and scalp. He was well and afebrile, and had not started to use any new medications. There was no history of psoriasis, eczema, or other skin conditions. His hobbies included gardening and woodwork. He had previously used both tea tree oil and Betadine (Sanofi-Aventis Healthcare Pty

Ltd, Macquarie Park, New South Wales, Australia) as antiseptics, and denied using hair dye.

At the time of patch testing, the patient had erythematous scaly papules and plaques on his arms and abdomen, with small pustules additionally involving his abdomen and back. An initial swab of the pustules grew *Staphylococcus aureus* (light growth), which was treated with a course of cephalexin for 1 week, with a minimal response – indicating that this was probably a contaminant. A repeat swab showed no organisms. A skin biopsy taken from the abdomen was reported to show acanthosis and spongiosis, with formation of a spongiotic vesicle superficially containing neutrophils. The underlying dermis contained a superficial, predominantly perivascular, inflammatory cell infiltrate composed of lymphocytes, histiocytes, and scattered eosinophils. No fungi were seen on periodic acid Schiff staining.

The patient was patch tested with our local baseline series, cosmetics series, and shoe series, as well as with his own items, including samples from his boots and aftershave. Patches were applied to the upper back with AllergEAZETM chambers, and left on for 48 hr. Reactions were assessed at 48 hr (D2) and at 96 hr (D4) according to International Contact Dermatitis Research Group guidelines. Positive reactions were assessed for relevance.

The patient's multiple patch test reactions are summarized in Table 1.

Interestingly, the patient had pustular reactions to black rubber mix, *p*-phenylenediamine, glycerine/white soft paraffin/liquid paraffin in aqueous cream, tea tree oil, butylated hydroxyanisole (BHA), and fragrances (*Evernia prunastri* (oakmoss absolute), fragrance mix II, and citral) (Fig. 1). His own fragrance, Black SuedeTM, which he had been applying to his cheeks, also caused a pustular eruption on D2 and D4.

Iodopropynyl butylcarbamate was present in the patient's facial moisturizer, QVTM face cream (Ego

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Table 1. Patient's patch test results

Allergen	Result		Pustular reaction
	D2	D4	
Rubber chemicals			
Diphenylguanidine	+	+	Absent
Dibutylthiourea	–	+	Absent
Dodecylmercaptan	–	+	Absent
Carba mix	+	+	Absent
Black rubber mix	+	+	Present
Emulsifiers/moisturising cream			
Cetearyl alcohol	++	+	Absent
Dodecyl gallate	–	–	Absent
Glycerin/white soft paraffin/liquid paraffin in aqueous cream	–	+	Present
Preservatives/antioxidants			
Chloroxylenol	+	+	Absent
	–	+	Absent
2-Bromo-2-nitropropane-1,3-diol			
Iodopropynyl butylcarbamate	–	+	Absent
Butylated hydroxyanisole (BHA)	–	+	Present
Phenoxyethanol	–	+	Absent
Fragrance-related			
Fragrance mix 1	++	++	Absent
Fragrance mix 2	++	++	Present
<i>Evernia prunastri</i> absolute	++	++	Present
Citral	++	++	Present
<i>Myroxylon pereirae</i> (balsam of Peru)	–	+	Absent
Tea tree oil	++	++	Present
Black Suede™ aftershave	+	+	Present
o-Limonene	+	+	Absent
Miscellaneous			
Betadine	+	+	Absent
Budesonide	–	+	Absent
p-Phenylenediamine	–	+	Present
Glove (upper)	–	+	Absent
Boots (upper)	–	+	Absent

Pharmaceuticals Pty Ltd, Braeside, Victoria, Australia). Cetearyl alcohol and phenoxyethanol were present in his compounded moisturizer (10% glycerin, 10% white soft paraffin, and 10% liquid paraffin in aqueous cream), which he had recently used as a general body moisturizer. Cetearyl alcohol was also present in his previously used soap substitute, QV™ intensive wash (Ego Pharmaceuticals) and QV™ intensive moisturizer (Ego Pharmaceuticals).

Our patient was diagnosed with:

- 1 Pustular ACD of his body, probably caused by cetearyl alcohol and phenoxyethanol in his

**Fig. 1.** Pustular eruption caused by fragrance mix II.

compounded aqueous cream moisturizer. Cetearyl alcohol was also present in his previously used soap substitutes. However, it did not cause a pustular reaction on patch testing.

- 2 Pustular ACD of his face and possibly scalp, probably caused by fragrance in his aftershave, Black Suede™. He reacted to oakmoss and citral, as well as to Black Suede™. Unfortunately, we were unable to obtain details of the fragrances in Black Suede™.
- 3 ACD caused by rubber chemicals (diphenylguanidine, dibutylthiourea, carba mix and dodecyl mercaptan), which were likely to have been relevant for his foot dermatitis. He also reacted to a sample of his rubber boot.
- 4 Pustular ACD caused by black rubber mix, which probably played a role in his previous foot dermatitis.
- 5 ACD caused by iodopropynyl butylcarbamate in his QV™ face cream.
- 6 Contact allergy to tea tree oil, Betadine, and Novasone™ ointment – past relevance.
- 7 Contact allergy to PPD – unknown relevance (may cross-react with black rubber mix).
- 8 Contact allergy to chloroxylenol, 2-bromo-2-nitro propane-1,3-diol, dodecyl gallate, budesonide,

Table 2. Clinical presentation and histological features of the relevant differential diagnoses of pustular eruptions

	PACD	Pustular psoriasis	AGEP
Clinical presentation	Multiple 0.5–1-mm pustules on a background of erythema, swelling, and pruritus. No systemic symptoms	Coalescence of pustules into lakes and sheets of pus on a background of erythema with the presence of systemic symptoms	Multiple small pustules on a background of erythema with the presence of fever, facial oedema, and systemic symptoms. History of recent new medication intake
Histological features	Epidermal spongiosis, dermal oedema, and perivascular mononuclear infiltrate with epidermal pustules composed of lymphocytes and some neutrophils	Absent spongiosis and dermal oedema with neutrophil-filled pustules	Spongiosis and minimal acanthosis of the epidermis with neutrophil-filled epidermal pustules

AGEP, acute generalized exanthematous pustulosis; PACD, pustular allergic contact dermatitis.

D-limonene, *Myroxylon pereirae*, and BHA – unknown relevance.

The patient was followed up shortly after discontinuing his use of aftershave, moisturizing creams, and the other sources of allergens. He was also advised to avoid using his rubber boots. His micropustular eruption had largely resolved on review.

Discussion

It is well recognized that patch tests with metal salts may produce pustular reactions on patch testing (8). These reactions are more common in patients with atopic dermatitis, and are generally thought to be caused by irritation (9, 10). They are characterized by the formation of small, 1–2-mm pustules, and there is typically absence of erythema, oedema, and vesicles. Histologically, intercellular oedema is minimal to absent, and epidermal pustules are composed of a mixture of neutrophils and mononuclear cells. However, allergic pustular reactions are very uncommon, as is the clinical presentation of pustular ACD (Table 2).

Pustular ACD needs to be differentiated from the more common causes of pustular rashes. AGEP is an uncommon skin eruption presenting with widespread erythema studded with multiple small pustules, and associated with fever. Typically commencing on the face or in the armpits and groin, the rash then becomes more widespread. Histologically, the pustules are filled with vast numbers of neutrophils, in contrast to the occasional neutrophils seen in pustules associated with pustular ACD (7).

Pustular psoriasis may present with pustules on a background of erythema and oedema. However, the cutaneous features are usually accompanied by systemic symptoms, including fever, arthralgias, and malaise.

Furthermore, coalescence of pustules into lakes or sheets of pus is characteristic (1, 11). Histologically, spongiosis and dermal oedema are absent, and pustules are filled with neutrophils. We were satisfied that our patient did not have either AGEP or pustular psoriasis.

Our patient had a surprising number of reactions, but most had clinical relevance, and so an angry back presentation was thought to be unlikely. The multiple patch test results in our patient undoubtedly represent the phenomenon of polysensitization, whereby an allergy to three or more allergens is shown, and which occurs in ~5% of patients with ACD (13). An as yet unidentified genetic factor may be the reason for the heightened susceptibility to the development of allergy. Polysensitization is an important condition to recognize, in that these patients are likely to be more susceptible to the development of additional contact allergy, and repeat patch testing should be considered if patients present with new symptoms suggestive of contact dermatitis (12).

In summary, pustular ACD is rare and, to our knowledge, has not previously been reported to be associated with fragrances. Unlike other reported cases, this patient also showed polysensitization. Punch biopsy confirmed a primary ACD with microbiological exclusion of infection. Recognition of the clinical and histological features of this rare variant of ACD is critical for the appropriate diagnosis and management of patients who present with this disorder.

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