Table I. Summary of 21 non-BP inpatients with abnormal serum BP180 autoantibodies

Case no./sex/age, y	Diagnosis	BP180, U/mL	DIF	IIF pattern	IIF titer
1/M/33	Stevens-Johnson syndrome	23.1	Negative	Negative	<1:10
2/M/75	Stevens-Johnson syndrome	13.4	Negative	Negative	<1:10
3/F/28	Stevens-Johnson syndrome	12.4	Negative	Negative	<1:10
4/M/54	Stevens-Johnson syndrome	12.3	Negative	Negative	<1:10
5/M/24	Toxic epidermal necrolysis	17.1	Negative	Negative	<1:10
6/M/44	Lichen planus	24.5	Negative	Negative	<1:10
7/M/36	Atopic dermatitis	20.8	Negative	Negative	<1:10
8/M/49	Erythema annulare centrifugum	10.8	Negative	Negative	<1:10
9/M/67	Erythrodermic psoriasis	12.2	Negative	Negative	<1:10
10/M/60	Pemphigus erythematosus	15	IgG/C3 intercellular	Intercellular	1:40
11/F/45	Pemphigus vulgaris	11.5	IgG/IgM/C3 intercellular	Intercellular	1:10
12/M/17	Paraneoplastic pemphigus	11.3	IgG/C3 intercellular	Intercellular	1:40
13/M/49	Disseminated eczema	20.9	Negative	Negative	<1:10
14/F/64	Disseminated eczema	18.3	Negative	Negative	<1:10
15/M/57	Disseminated eczema	13.5	Negative	Negative	<1:10
16/F/71	Disseminated eczema	11.3	Negative	Negative	<1:10
17/F/57	Prurigo nodularis	19.8	Negative	Negative	<1:10
18/F/25	Erythema multiforme	35.5	Negative	Intercellular	1:10
19/F/56	Behcet disease	26.7	Negative	Negative	<1:10
20/M/39	Cutaneous T-cell lymphoma	30.3	Negative	Negative	<1:10
21/F/60	Pyodermatitis-pyostomatitis vegetans	80	Negative	Negative	<1:10

BP, Bullous pemphigoid; *BP180*, bullous pemphigoid 180; *C3*, complement 3; *DIF*, direct immunofluorescence; *IIF*, indirect immunofluorescence.

BP180 autoantibodies in patients with senile pruritus[3] (12%, N = 25), lichen planus[4] (17%, N = 47), and lichen sclerosus[5] (6%, N = 51).

In addition, we found that the cutoff value of 27.2 U/mL might achieve a satisfying specificity of 98.0%, which should be validated in further studies with larger sample sizes. Establishment of the proper cutoff value could better the diagnostic performance of the BP180 autoantibody ELISA test in future clinical practice.

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2-Methoxymethyl-*para*-phenylenediamine–containing hair dye as a less allergenic alternative for *para*-phenylenediamine–allergic individuals

To the Editor: *Para*-phenylenediamine (PPD) is the most common allergen specifically associated with allergic contact dermatitis to hair dyes.[1] The rate of positive PPD patch test results is approximately 6.2% in North America and 4% in both Europe and Asia.[1]

Table I. Patients who used ME-PPD and their demographics

Patient	Age, y	Sex	Years dyeing hair	Duration of clinical reactions to dying hair, mo	Patch test to PPD	Reaction to dyeing with ME-PPD–based dye
1	62	F	40	8	3+	No
2	69	F	20	4	3+	No
3	49	F	15	6	2+	No

ME-PPD, 2-Methoxymethyl-*para*-phenylenediamine; *PPD*, *para*-phenylenediamine.

Allergy to hair dye is an important health concern because of continued use by patients for personal and social purposes despite obvious allergy. Many hair dyes are advertised as nonallergenic or PPD-free. However, these products typically contain cross-reactive chemicals such as toluene-2,5-diamine sulfate, to which almost 50% of PPD-allergic patients are also allergic.[1] Because of this well-known cross-reactivity, dermatologists generally recommend that PPD-allergic patients discontinue the use of permanent hair dye; however, patients are frequently unwilling to follow this advice and choose to continue dying their hair and accepting the itching and rash that follows.

Four recent publications have analyzed the recently formulated less allergenic PPD derivative 2-methoxymethyl-PPD (ME-PPD).[2-5] ME-PPD has been shown to attenuate the innate and adaptive immune responses triggered by PPD and toluene-2,5-diamine sulfate while maintaining an equivalent hair coloring performance.[3]

The decreased allergenic potential of ME-PPD has been postulated to be secondary to its methoxymethyl side chain. As ME-PPD–based hair dye encounters the surrounding epidermis and/or dermis, this side chain inhibits binding to the CD86 costimulatory marker on antigen-presenting cells that is necessary for T-cell activation.[3] In PPD-allergic patients, ME-PPD has been shown to create a hapten complex that is poorly recognized by PPD-specific T cells. The concentration of ME-PPD necessary to induce a local lymph node immune response is reported as 3% to 4% as opposed to 0% to 1% for the more allergenic PPD.[4] Zahir et al[2] performed open testing with ME-PPD in 20 patients known to be allergic to PPD and found that all 6 patients with a 1+ reaction to PPD tested negative to ME-PPD. Of 7 patients with 2+ reactions to PPD, 6 tested negative to ME-PPD and 1 had an uncertain– reaction. Of the 7 patients with 3+ reactions to PPD, 2 tested negative to ME-PPD, 1 had a +/– reaction, 2 had 1+ reactions, and 2 had 2+ reactions.[2]

Existing literature and marketing materials promote the use of ME-PPD as a way to avoid becoming allergic to hair dye, but the crucial unanswered question is whether it can be used in the real world as an alternative dye by individuals who are already allergic to PPD. We present 3 cases to demonstrate that ME-PPD is in fact a viable alternative for individuals who are already allergic to PPD (Table I).

In summary, ME-PPD appears to be a relatively safe permanent hair dye for PPD-allergic patients. We still recommend that PPD-allergic patients avoid all permanent hair dye, but if they are going to continue dying their hair despite our advice, we recommend a ME-PPD–based dye. We inform them that they may still react to the dye, but that at a minimum, the reaction can be expected to be much less severe than their prior reactions to PPD-based dyes.

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Aggravation of mild axillary hidradenitis suppurativa by microwave ablation: Results of a randomized intrapatient–controlled trial

To the Editor: Hidradenitis suppurativa (HS) is a common chronic, recurrent, autoinflammatory skin disease of the hair follicle with limited treatment options.[1] No definitive treatment exists for this debilitating entity. MiraDry (Miramar Labs Incorporated, Santa Clara, CA) is a microwave device targeting the eccrine and apocrine sweat glands as well as hair follicles through thermolysis in the dermal-hypodermal junction.[2,3] We hypothesized that this noninvasive ablative technique could potentially improve the clinical symptoms of HS by reducing the number of hair follicles (primary action) and the destruction of the inflammatory cell infiltrate (secondary action) in HS lesions. We, therefore, evaluated the efficacy and safety of miraDry treatment for mild axillary HS in a randomized intrapatient–controlled trial (ethical approval by the IRB of the Erasmus University Medical Center; MEC-2017-390).

We aimed to include 20 HS patients for random allocation to a single miraDry treatment (5.8 GHz, energy level 5, manufacturer-recommended settings) of 1 axilla under tumescent anesthesia. Patients were required to have a total of 3-5 abscesses or nodules per axilla with ≤1 abscess or draining sinus. Additional inclusion and exclusion criteria are available at https://www.clinicaltrials.gov (identifier NCT03238469). The primary outcome was a left-right comparison of the axillary areas using the Hidradenitis Suppurativa Clinical Response (HiSCR). Secondary outcomes included a numerical rating scale on pain per axilla, treatment satisfaction, and a hair follicle count. Two independent blinded observers performed lesion counts at baseline and 3 months after the procedure.

Only 9 of 20 HS patients were tested; negative clinical outcomes during the recruitment period made it pertinent for us to do an interim analysis, resulting in the decision to discontinue the study. One of the randomized patients did not tolerate the miraDry treatment due to extreme pain during the procedure, despite the use of several local anesthetics. Of the 8 patients who concluded the miraDry treatment (all women, median age 31.5, interquartile range [IQR] 28.0-39.0 years), 7 completed the 3-month follow-up; 1 patient dropped out because of worsening of HS symptoms in the axilla treated by miraDry. Two patients achieved the HiSCR in the miraDry-treated axilla, and 2 patients achieved the HiSCR in the comparator axilla ($P = 1.00$) (Table I). In total, 5 of 8 patients showed worsening of their disease after miraDry treatment, with an increase in the abscess and nodule and sinus count (Fig 1). Patients suffered from active lesions for a median of 43.0 (IQR 4.0-90.0) days in the miraDry-treated axilla versus a median of 5.5 (IQR 2.0-26.0) days in the contralateral axilla ($P = .14$). After 3 months, the median numerical rating scale score for pain in the miraDry-treated axilla was 7.0 (IQR 2.0-8.0) versus 0 (IQR 0-5.0) for the untreated axilla ($P = .07$). One patient developed cellulitis of the upper arm after miraDry treatment, requiring antibiotic treatment, which was classified as a severe adverse event.

We observed that the number of hair follicles after 3 months was numerically lower in the miraDry-treated axilla, median 4.0 (IQR 3.0-5.0)/cm^2, a 50.9% decrease from baseline, compared with the untreated counterpart, median 8.5 (IQR 6.0-10.0)/cm^2, a 2.0% decline from baseline ($P = .07$). Because the miraDry device targets the dermal zone rather than a particular structure, its nonselectivity might have resulted in the poor study outcomes. Accordingly, we argue that the microwave energy is able to rupture pre-existing and subclinical or microscopic HS precursor lesions (cysts), subsequently resulting in an intense inflammatory response beyond the initially visible lesions.

Although the intervention was completed in only 8 patients, our findings indicate that microwave ablation using the miraDry device has no apparent clinical benefit and could even be harmful in patients with mild HS. Commercial miraDry clinics in the Netherlands also observed a few cases of flaring of the disease in HS patients (A. Roopram and W. Venema, personal communication, May 2018). Taken together, we question the utility of microwave ablative therapy in patients with HS in clinical practice.