

before each treatment. Patients in the needle-free group were treated with intralesional injections of 5-FU with an injector (INJEX). An approximate 0.05- to 0.3-mL mixture of 5-FU (10 mL, 0.25g) and lidocaine (5 mL, 0.1g) was injected vertically into each wart. Participants in the cryotherapy group received 3 serial applications in which liquid nitrogen was applied with a spray during each session (Supplementary material II, available via Mendeley at <https://data.mendeley.com/datasets/m47gy8g8cc/1>).

The warts were observed and detected by dermoscopy.⁴ Responses to treatment were classified as complete response (CR), partial response (PR; decreased area of warts was >50%), and no response (NR; decreased area of warts was <50%). Analysis was conducted using the SPSS software package. χ^2 test and Mann-Whitney test were used as appropriate. *P* values of <.05 were considered significant. All patients completed the study. Baseline characteristics of the studied patients are shown in Table I.

In the needle-free injection group, 24 (63.16%) patients showed CR, 10 (26.32%) showed PR, and 4 (10.53%) showed NR. In the cryosurgery group, 8 (21.05%) patients had CR, 24 (63.16%) had PR, and 6 (15.79%) had NR (*P* < .001). The visual analog scale of the needle-free injection group ranged from 1 to 7, with a median of 3, whereas the median visual analog scale of cryotherapy was 6.5 (*P* < .001) (Table II; Supplementary Fig 1, available via Mendeley at <https://data.mendeley.com/datasets/m47gy8g8cc/1>).

Serious adverse effects were not observed in both groups. The most common adverse effect of the injector was a mild bruise immediately after injection caused by high pressure, which could be handled easily by some rest. On the other hand, intense pain and localized blisters were reported in most patients in the cryosurgery group. No recurrence of warts was reported during 6-month follow-up period in both groups.

Our study suggests that needle-free injection of 5-FU is a promising therapy, especially for patients who are pain averse and needle phobic. The limitations of the study included small patient numbers and the inability to blind the participants. The response rate of needle-free injections of 5-FU was attractive, where 34 of 38 (89.5%) patients had CR or PR. To the best of our knowledge, this is the largest randomized clinical trial regarding the use of needle-free jet injection in warts.

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Conflicts of interest

None disclosed.

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The impact of cancer history on the prevalence of type IV hypersensitivity: A 9-year matched retrospective cohort study



To the Editor: Alterations in immune function have the potential to impact the incidence and/or prevalence of allergic contact dermatitis (ACD), an immune-mediated hypersensitivity reaction.¹ Because the underlying immunologic state of patients with cancer differs from the general population, patients with active cancer or a history of cancer are an important population to study ACD.^{2,3}

In this age and sex-matched retrospective cohort study, we identified 50 patients with active/history of

Table I. Characteristics and test results of patients that underwent patch testing

Demographics	No. (%)	
	History of cancer	No history of cancer
No. of patients	50 (100)	100 (100)
Age, mean ($\pm$ SD), y	53.9 ($\pm$ 15.7)	53.9 ($\pm$ 15.6)
Sex		
Female	38 (76)	76 (76)
Male	12 (24)	24 (24)
Active cancer or history of cancer	50 (100)	0 (0)
Active cancer	4 (8)	0 (0)
Recent cancer history*	39 (78)	0 (0)
Remote cancer history [†]	7 (14)	0 (0)
Underwent patch testing	50 (100)	100 (100)
No. of patches tested, mean ($\pm$ SD)	111.2 ($\pm$ 4.3)	109.2 ($\pm$ 2.8)
Patch test data		
Positive reaction	36 (72) [§]	88.0 (88)
Cumulative positive allergens, positive/total patches (%)	103/5560 (1.9) [§]	273/10,937 (2.5)
Allergens [‡]		
Carmine	5 (10)	4 (4)
Iodopropynyl butylcarbamate	5 (10)	15 (15)
Nickel sulfate hexahydrate	5 (10)	18 (18)
Dodecyl gallate	2 (4)*	18 (18)
Shellac	2 (4)	14 (14)
Propolis	1 (2)*	18 (18)

*Recent history defined as cancer within 5 years of patch testing.

[†]Remote history is defined as 5-12 years since active cancer.

[‡]Three most prevalent allergens in each cohort were reported.

[§] $P < .05$ on 2-tail Fisher exact test.

Table II. Cancer type and treatment history in the study group

Demographics	No. (%)
Cancer type*	
Breast cancer	17 (34)
Leukemia	9 (18)
Acute myeloid leukemia	6 (12)
Chronic myeloid leukemia	2 (4)
Unspecified	1 (2)
Lymphoma	9 (18)
B-cell lymphoma	2 (4)
Mycosis fungoides	2 (4)
Hodgkin lymphoma	1 (2)
Marginal zone	1 (2)
Non-Hodgkin lymphoma	1 (2)
T cell unspecified	1 (2)
Unspecified lymphoma	1 (2)
Ovarian cancer	3 (6)
Treatment history	
Treated for cancer	50 (100)
History of immunotherapy [†] treatment	4 (8)
Patients with ongoing treatment at the time of patch testing	11 (22)
Treatment for active cancer	4 (8)
In remission with maintenance therapy	7 (14)

*Four most prevalent categories of cancer reported.

[†]Immunotherapy defined as checkpoint inhibitors, targeted monoclonal antibodies, or cytokines.

noncutaneous cancer and 100 age and sex-matched patients without cancer who underwent patch testing from January 1, 2013, to January 15, 2022, using the American Contact Dermatitis Society screening series and a standard supplemental series developed at Weill Cornell. Any noncutaneous cancer was valid for inclusion in the group with cancer and all 150 patients presented with a history of dermatitis in which patch testing was indicated. Additionally, patients with a history of hereditary immunodeficiencies, organ transplant, or systemic corticosteroid use at the time of testing were excluded. The race was not accounted for in the matching process because many patients did not disclose this information. A standard patch test protocol and grading system were used for all patients. Statistical analyses were performed on Prism 9 (GraphPad) using Fisher exact tests and the Research Electronic Data Capture platform was used for data collection.

Patient characteristics and patch test results are presented in Table I. There was a statistically significant decrease in the patch test positivity rate in patients with cancer (72%) compared with patients without cancer (89%) ($P = .02$). Additionally, there was a statistically significant decrease in the cumulative number of positive allergens in the cohort with cancer (103/5560) compared with the matched cohort (273/10937) ($P = .009$). Cancer types and treatment history for the study group are presented in Table II.

Notably, carmine exhibited a 2.5 times increased prevalence in the study group (10%) compared with the matched group (4.0%). The small sample size likely prevented this difference from reaching statistical significance, although this trend is noteworthy.

Whereas existing literature evaluates type I hypersensitivity and cancer,⁴ this study reveals new insight into the relationship between cancer and ACD, a type IV hypersensitivity response. A statistically significant inverse relationship was found between cancer and type IV hypersensitivity. These data suggest that patients with a history of cancer exhibit a reduced prevalence of ACD or are deficient in mounting immune responses during patch testing. The small sample size and retrospective design are 2 study limitations but should serve as an impetus for further investigation. It remains to be confirmed whether cancer itself, the therapies used to treat cancer, or other factors, such as differences in rates of irritant contact dermatitis or health-seeking behaviors more significantly affect the likelihood of positive patch tests in this population. Future investigation, with larger cohorts, is warranted to better describe the prevalence of ACD and to elucidate the pathophysiologic reasons for ACD in patients with cancer.

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The spectrum of cutaneous immune-related adverse events in patients with skin of color



To the Editor: Cutaneous immune-related adverse events (cirAE) occur in approximately 50% of patients on immune checkpoint inhibitor (ICI) therapy and include maculopapular eruption, lichenoid dermatitis, eczematous dermatitis, psoriasiform dermatitis, vitiligo, and pruritus.^{1,2} There is a paucity of data on cirAE in patients with skin of color (SOC). This study aims to promote awareness of cirAE presentations in SOC.

A retrospective series was conducted at Yale New Haven Health. We completed a search for all patients treated with an ICI and referred to our Oncodermatology Clinic for cirAE. Patients were included in this cohort if they identified as Black, Hispanic, Asian, or American Indian or Alaskan Native. Patients who were seen for a concern other than cirAE were excluded.