

that will be most beneficial. Further studies would benefit from a larger sample, more precise characterization of asthma (to rule out other illnesses that can cause elevated FeNO levels, such as eosinophilic bronchitis), and an assessment of medication adherence.

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Contact hypersensitivity to triclosan



Triclosan is a broad-spectrum antibacterial and antifungal compound used extensively during the past decades to inhibit bacterial growth on skin and other surfaces. It is widely used in personal care products and in sportswear, beddings, and toys.^{1,2} Contact hypersensitivity to triclosan is a rare but recognized condition, with frequencies of sensitization usually reported below 1% of tested individuals.² Because triclosan is a high-volume production chemical that is widely used occupationally, with up to 10 million pounds produced annually in the United States alone³ and its use continuing to increase,² we investigated whether a change in prevalence rates of triclosan hypersensitization has occurred during the last 20 years.

Only recently, a new role for triclosan in IgE-mediated allergies has been described. Two independent studies found an association of increased urinary levels of triclosan in patients with aeroallergen and food sensitizations.^{1,4} The pathophysiologic features behind this observation remain unclear, but early studies point toward an immunomodulatory effect of this compound in atopy.^{3,5}

Atopy and contact hypersensitization are generally considered to be independent of each other.⁶ However, because triclosan is a rare cause of contact hypersensitivity and a putative augmentation factor for allergies, triclosan hypersensitivity and atopy may be associated. Thus, we investigated independent risk factors in our population with and without triclosan sensitization in addition to prevalence rates, focusing especially on associated atopic diseases.

We performed a retrospective analysis of data from the Information Network of Departments of Dermatology (IVDK) from 1993 to 2012. The IVDK stores patch test results and clinical data for 113,162 patients tested with triclosan, 2% pet.⁷ The IVDK receives patch test results and clinical data from 56 specialized departments of dermatology and allergology for contact allergy diagnostics in Germany, Switzerland, and Austria. A positive reaction was observed in 363 tested patients (0.32%). In 180 of 331 reported positive cases (54.4%), the results were clinically relevant. However, details were given in only a few patients, mentioning external drugs as sources in 33 patients and body care products in 27 patients.

In patch testing, not only (wanted) clear-cut positive reactions but also (unwanted) doubtful and irritant reactions occur. To measure the diagnostic quality of a distinct patch test preparation

in this concern, the reaction index (RI) was established, ranging from +1, if all nonnegative reactions observed are positive, to –1, if all reactions are doubtful or irritant.^{8,9} A good test preparation should have a positive RI. The positivity ratio (PR) indicates the percentage of weak positive reactions among all positive reactions. Ideally, it should be significantly less than 80%.^{8,9} The RI of triclosan, 2% pet, was –0.22, and its PR was 80.4%.

From 1993 to 2012, the percentage of positive reactions varied in a narrow range from 0.18% to 0.47%, without a uniform time trend. Patient numbers tested with triclosan among the total test population per year revealed constant proportions between 49.5% and 59.3%, with 3 exceptions: 1993 (40.0%), 2001 (64.0%), and 2004 (44.5%). Hence, a selection bias by a stricter or more deliberate indication for testing procedures seems rather improbable. Considering the unfavorable RI and PR, which marked triclosan, 2% pet, as a problematic allergen,⁹ it can be assumed that some positive reactions did not indicate contact sensitization but rather irritation. This assumption is supported by the low proportion of clinically relevant reactions.

Detailed analysis of patient characteristics (MOAHLFA [Male, Occupational dermatitis, Atopic dermatitis, Hand dermatitis, Leg ulcers, Facial dermatitis, and Age older than 40 years] index)¹⁰ and prognostic factors are given in Table 1. A closer look at the test population revealed that among patients 40 years or older, there were significantly more patients with leg dermatitis and fewer with atopic dermatitis, allergic rhinitis, hand dermatitis, and occupational dermatitis (data not shown). This is a common finding among patients with contact dermatitis. To disentangle interactions of these factors, we calculated a logistic regression analysis, using a positive reaction to triclosan as the target variable and all factors listed in Table 1 as explanatory variables. Only 3 of the explanatory variables had a significant independent effect on the outcome: leg dermatitis (odds ratio [OR], 1.7; 95% confidence interval [CI], 1.3–2.2), age of 40 years or older (OR, 1.5; 95% CI, 1.1–1.9), and hand dermatitis (OR, 0.5; 95% CI, 0.4–0.8). Of note, allergic rhinitis and asthma were not associated with triclosan hypersensitivity.

Summarizing our results of the largest available study of patients patch tested with triclosan, we found a continuously low prevalence and no increase in triclosan sensitization despite its increasing use. Furthermore, although the prevalence of allergies is

Table 1MOAHLFA index and atopic diseases in patients with and without sensitization to triclosan^a

Item	Triclosan-negative patients, % (n = 112 231)	Triclosan-positive patients, % (n = 363)	P value (χ^2 test)
Male sex	36.6	35.8	Not significant
Occupational dermatitis	17.4	8.3	<.001
Atopic dermatitis	21.2	14.9	.002
Hand dermatitis	32.0	16.0	<.001
Leg dermatitis	12.3	25.3	<.001
Face dermatitis	17.1	16.3	Not significant
Age ≥ 40 years	66.5	79.3	<.001
Allergic rhinitis	17.8	14.9	.047
Allergic asthma	6.2	5.5	Not significant

Abbreviation: MOAHLFA, Male, Occupational dermatitis, Atopic dermatitis, Hand dermatitis, Leg ulcers, Facial dermatitis, and Age older than 40 years.

^aFor this data analysis, patch test reactions at day 3 were selected. Statistical analyses were performed using SAS statistical software, version 9.3 (SAS Institute Inc, Cary, North Carolina).

constantly increasing in developed countries during the last decades,⁴ we found no correlation of allergic rhinitis or asthma with triclosan sensitization. Thus, considering the unique antimicrobial efficacy of triclosan, its use in the professional medical setting should be continued without modifications. Whether the extensive application of triclosan in personal care products has any influence on atopy prevalence warrants further investigation. Limitations of this study comprise the retrospective study setting and the unavailability of information concerning earlier triclosan exposition of patients with negative patch test results.

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The dry needle technique

Local cutaneous reactions are a frequent occurrence during allergen immunotherapy.^{1–3} Systemic anaphylactic reactions also can occur while patients receive allergen immunotherapy. In addition, patients can experience pain from the immunotherapy injections. In a previously reported survey, the dry needed technique was used by 13% of allergists in an effort to prevent or limit the size of local reactions to immunotherapy.⁴ The dry needle technique is a non-evidenced-based intervention used by allergists as a way to decrease the size of local reactions to immunotherapy. The technique is performed by using a separate (ie, dry) needle to inject the allergen extract into the patient's arm rather than using the needle from which the extract was drawn up into the syringe. We surveyed patients in a clinic using the dry needle technique to assess their perceptions about the technique and its effect on their reactions to immunotherapy.

A survey was provided to patients undergoing allergen immunotherapy at the Wilford Hall Ambulatory Surgical Center Allergy Clinic. The survey was approved by the Wilford Hall Ambulatory Surgical Center Institutional Review Board. The survey asked patients whether the dry needle technique helped decrease their risk of local reactions, systemic reactions, and pain.

Disclosures: Authors have nothing to disclose.

Disclaimer: The opinions or assertions herein are the private views of the authors and are not to be construed as reflecting the views of the US Department of the Air Force or the US Department of Defense.

A total of 344 of 363 immunotherapy patients (94.8%) (age range, 4–80 years) completed surveys. Of 338 patients (6 of the 344 patients did not respond), 276 (81.7%) were receiving aeroallergen immunotherapy alone, 51 (15.1%) were receiving venom immunotherapy alone, and 11 (3.2%) were receiving both. Of the 343 patients who responded regarding the length of immunotherapy, 103 (30.0%) had been receiving immunotherapy for less than 12 months, 76 (22.2%) for 12 to 23 months, 52 (15.2%) for 24 to 35 months, 40 (11.7%) for 36 to 47 months, 19 (5.5%) for 48 to 59 months, and 53 (15.5%) for more than 59 months. When asked whether they knew the meaning of the term *dry needle technique*, 88 of 335 (26.3%) answered yes, 247 of 335 (73.7%) answered no, and 9 of 344 did not respond.

In the questionnaire, we explained the meaning of the term *dry needle technique* (Table 1). Patients were asked whether the dry needle technique helped decrease their risk of local reactions, large local reactions, systemic reactions, or pain. For local reactions smaller than the size of their palm, 75 of 134 (56.0%) thought that the dry needle technique moderately or mostly decreased or completely resolved their risk of local reactions. For large local reactions larger than the size of their palm, 79 of 127 (62.2%) noted that the dry needle technique moderately or mostly decreased or completely resolved their risk of large local reactions. For systemic reactions, 75 of 110 (68.2%) thought that the dry needle technique moderately or mostly decreased or completely resolved their risk of systemic reactions. Finally, 75 of 127 (59.1%) stated that the dry needle technique moderately or mostly decreased or completely

