

Prevalence of Evaluation for Latex Allergy and Association With Practice Characteristics in United States Dermatologists: Results of a Cross-Sectional Survey

Erin M. Warshaw and David Nelson

Background: Natural rubber latex allergy is a potentially life-threatening, immunoglobulin E (IgE) mediated reaction. Despite great strides in identification of high-risk groups, methods for diagnosis remain limited in the United States and most evaluations are performed by allergists.

Objective: The objective of this study was to estimate the prevalence of evaluation for latex allergy and association with practice characteristics in United States dermatologists.

Methods: A cross-sectional survey of one third of United States Fellows of the American Academy of Dermatology.

Results: The survey response rate was 43%. Of responding dermatologists, 17% stated that they evaluate patients for latex allergy, most commonly with a radioallergosorbent (RAST) or use test. Only 3.6% stated that they perform prick or scratch tests for latex allergy in their office, and most of these dermatologists (86%) prepare their own latex prick test solutions. Evaluation for latex allergy was significantly associated with patch testing, photopatch testing, an interest in contact dermatitis, and number of contact dermatitis books owned, but not with number of years in practice.

Conclusions: Most United States dermatologists do not evaluate patients for latex allergy, most likely because of lack of available antigens and because methods for diagnosing latex allergy are not familiar to most dermatologists.

Copyright © 2001 by W.B. Saunders Company

ALLERGY TO NATURAL RUBBER latex is a type I, immediate, immunoglobulin E (IgE)-mediated reaction to proteins found in the sap of the rubber tree, *Hevea brasiliensis*. In the last two decades, awareness has grown of this potentially life-threatening reaction. In 1991, after receiving over 1,000 reports of systemic allergic reactions to natural rubber latex medical devices, the Food and Drug Administration (FDA) issued a medical alert identifying the risk of anaphylaxis to natural rubber latex products.¹ Many medical centers now have latex committees to address education, management, and prevention issues. Despite great strides in identification of major risk groups such as health care workers²⁻⁶ and individuals with spina bifida⁷⁻⁹ as well as elucidation of responsible antigens,^{10,11} practical methods for diagnosing latex allergy remain limited in the United States. Most evaluations are performed by allergists. Because latex allergy often presents with cutaneous symptoms, it is important that dermatologists

be familiar with methods for diagnosis as well as management of natural rubber latex allergy.

There are three practical methods for diagnosis of allergy to latex: radioallergosorbent test (RAST), prick test, and use test.¹² Several FDA-cleared RASTs (or closely related tests) are available in the United States; Immuno-Cap (Upjohn-Pharmacia, Kalamazoo, MI) and AlaSTAT (Diagnostic Products Corporation, Los Angeles, CA) are widely available. RASTs are relatively inexpensive blood tests. Results are reported as a quantitative amount of circulating antilatax IgE antibodies; however, the sensitivity of these tests is relatively low (73.3% to 76.3%),¹³ making these poor screening tests.¹⁴

Because of specificities of 74% to 100% and sensitivities of 72% to 100%,¹⁴⁻¹⁷ skin prick testing is considered by most allergists to be the gold standard for diagnosis of type I allergy to latex. A lancet is used to gently prick through a drop of latex solution dropped onto the patient's forearm. A positive reaction consists of an urticarial wheal at least half the size of the histamine positive control. Because there are no FDA-cleared latex solutions commercially available in the United States (A latex skin prick test solution produced by Greer Labs is currently under consideration by the FDA,) physicians often resort to preparing their own mixtures from latex glove squares, which might result in variable sensitivity and specificity of this test.¹⁸ Unavailability of commercial latex solutions and risk of anaphylaxis during testing also have discouraged many United States physicians from performing this test.

A use test involves sequentially applying larger pieces of

From the Department of Dermatology and the Center for Chronic Disease Outcomes Research, Minneapolis VA Medical Center; and the Department of Dermatology, University of Minnesota, Minneapolis, MN.

Supported by the Minneapolis Veterans Affairs Medical Center.

Presented, in part, at the American Contact Dermatitis Society Meeting Hershey, Pennsylvania, July 1999.

The views expressed in this article are those of the authors and do not necessarily represent the views of the Department of Veterans Affairs.

No reprints available.

Copyright © 2001 by W.B. Saunders Company

1046-199X/01/1203-0002\$35.00/0

doi:10.1053/ajcd.2001.22775

a highly allergenic glove to a patient's moistened hand. A positive reaction consists of urticarial wheals. This test is not standardized; there is no FDA-cleared latex glove used specifically for diagnostic testing. Sensitivity ranges from 78% to 92%.^{14,16} Because of risk of anaphylaxis and lack of standardization, many physicians in the United States do not perform this test.

The first objective of this study was to estimate the prevalence of evaluation for latex allergy by United States dermatologists and their approach to this diagnosis. The second objective of this study was to identify associated practice characteristics for latex allergy evaluation and testing by dermatologists. We hypothesized that dermatologists who patch test, photopatch test, have an interest in contact dermatitis, and own more books on allergic contact dermatitis would be more likely to evaluate patients for latex allergy and perform latex prick testing. We also hypothesized that dermatologists in their early years of practice would be more aware of latex allergy issues (as it has only been widely recognized in the last ten years) and therefore more likely to evaluate patients for latex allergy.

Methods

In 1997, a written questionnaire was sent to one third (3,215) of all United States dermatologists. Dermatologists were chosen in a systematically sampled fashion. Briefly, every third consecutive Fellow with a United States address listed in the 1995-1996 American Academy of Dermatology Directory was mailed a questionnaire entitled "Patch Test Questionnaire." The aim of this survey was to evaluate United States dermatologists' patch testing methodology and approach to latex allergy. The survey consisted of 18 questions regarding number of years in practice, interest in allergic contact dermatitis, number of books owned on contact dermatitis, patch testing and photopatch testing practices, and approach to latex allergy diagnosis. Data pertaining to latex allergy are presented in this article. Specifically, the survey included the following questions regarding latex allergy:

1. "Do you evaluate patients for latex allergy?" If this question was answered affirmatively, respondents were then asked to choose from the following 6 ordered diagnostic algorithms:
 - a. RAST, Prick/Scratch Test, Use Test;
 - b. RAST, Use Test, Prick/Scratch Test;
 - c. Use Test, RAST, Prick/Scratch Test;
 - d. Use Test, Prick/Scratch Test, RAST;
 - e. Prick/Scratch Test, RAST, Use Test; or
 - f. Prick/Scratch Test, Use Test, RAST.

Respondents could also choose "Other" and write in an answer.

2. "Do you perform prick or scratch testing in your office?"

If this question was answered affirmatively, respondents were then prompted to answer specific questions regarding how latex solutions were made or obtained.

Returned questionnaires were computer-scanned and the results verified using Teleform (Cardiff Software, San Marcos, CA). Data was tabulated using Access (Microsoft Company, Redmond, WA) and analyzed with SAS (Statistical Analysis System, SAS Institute Inc., Cary, NC). Fifty randomly chosen questionnaires were manually verified by comparing Teleform scanned images and Access data for data quality assurance.

A Pearson χ^2 test was used to test for an association between most of the assessed practice characteristics and the evaluation for latex allergy or prick/scratch testing. In certain situations, Mantel-Haenszel mean score χ^2 tests were used to test for an association between practice characteristics and latex allergy testing or prick testing. These Mantel-Haenszel tests were employed in situations in which the data did not meet conditions needed for use of Pearson's χ^2 test. The actual scoring method employed in the tests presented did not have an impact on the results because the scored variable had only two levels. A significance level of 0.05 was used in each of the χ^2 tests. Given the exploratory nature of this investigation into the association of latex allergy with certain practice characteristics, no multiple comparison procedures were employed.

This article focuses on the differences in the rate of latex allergy evaluation and prick testing among different subgroups of dermatologists as formed by the assessed practice characteristics. For ease of interpretation in discussing the analysis results of 2, this article focuses on the relative risks of evaluating for latex allergy and relative risks of prick testing. Additional summary measures of association are presented in the accompanying tables.

In constructing confidence intervals for the rates of latex allergy evaluation, prick/scratch testing, and the use of specific tests for latex allergy, we employed standard large sample techniques except in those cases in which the observed rates were exceedingly low. In these cases we constructed exact confidence intervals (CIs). For presentation of percentages, n refers to the number of respondents who answered the specific question. For associations of 2 practice characteristics, n refers to the number of respondents who answered both questions.

Results

Evaluation for Latex Allergy

Of 3,215 questionnaires mailed, 1,372 (43%) were returned. Response rates to individual questions varied from question to question. A total of 17% (218 of 1,269; 95% CI 15.0% to 19.2%) of responding dermatologists stated that they evaluate patients for latex allergy. A Pearson χ^2 test using the data in Table 1 did not indicate an association

Table 1. Association Between Practice Characteristics and Evaluation for Latex Allergy

<i>Evaluate for Latex Allergy</i>	<i>Practice Characteristic</i>			
	Years in Practice			
	0-10	11-20	21-30	> 30
Evaluate	60 (14.7%)	90 (18.6%)	52 (18.1%)	14 (16.1%)
Do not evaluate	347 (85.3%)	394 (81.4%)	235 (81.9%)	73 (83.9%)
N = 1,265			Pearson $\chi^2 = 2.63$, df = 3, $P = .452$	
	Number of Patients Patch Tested per Month (for Dermatologists Who Patch Test)			
	< 6	6-10	11-15	> 15
Evaluate	136 (14.8%)	46 (28.9%)	7 (43.8%)	10 (62.5%)
Do not evaluate	783 (85.2%)	113 (71.1%)	9 (56.2%)	6 (37.5%)
N = 1,110			Mantel-Haenszel $\chi^2 = 48.01$, df = 3, $P < .001$	
	Number of Patients Photopatch Tested Per Year (for Dermatologists Who Photopatch Test)			
	< 6	6-10	> 10	
Evaluate	36 (37.5%)	7 (50.0%)	12 (85.7%)	
Do not evaluate	60 (62.5%)	7 (50.0%)	2 (14.3%)	
N = 124			Mantel-Haenszel $\chi^2 = 11.62$, df = 2, $P = .003$	
	Books Owned on Contact Dermatitis			
	0	1-3	4-6	> 6
Evaluate	3 (9.7%)	153 (15.0%)	42 (22.7%)	20 (50.0%)
Do not evaluate	28 (90.3%)	865 (85.0%)	143 (77.3%)	20 (50.0%)
N = 1,274			Pearson $\chi^2 = 38.90$, df = 3, $P < .001$	

NOTE. Pearson χ^2 test tested for a general association between evaluation for latex allergy and the practice characteristic. Mantel-Haenszel χ^2 test examined whether the rate of latex allergy evaluation varied between the different levels of the practice characteristic.

between length in practice and latex allergy evaluation ($P = .452$).

As shown in Table 2, almost half of all dermatologists who evaluate for latex allergy did not choose listed algorithms but instead wrote in other methods, such as RAST, use test (5.5%); RAST only (5.0%); or patch test (5.0%). Of dermatologists who chose a listed algorithm, most used 1 of the following 2 diagnostic algorithms: use test, RAST, prick test; or RAST, use test, prick test (15.1% each).

Association of Latex Allergy Evaluation and Patch Testing

A Pearson χ^2 test resulted in evidence of an association between patch testing and evaluation for latex allergy ($P = .001$, Table 3). Almost all dermatologists who evaluate patients for latex allergy also stated that they perform patch testing (201 of 218 = 92.2%; 95% CI 88.7% to 95.8%). Dermatologists who perform patch testing were twice as likely to evaluate patients for latex allergy than dermatologists who do not patch test (RR [relative risk] = 2.07; 95% CI 1.30 to 3.32, Table 3). As illustrated in data presented in Table 1, the rate of latex evaluation was greater for those who patch test more patients ($P < .001$). Dermatologists who patch test with expanded antigens were 2.6 times more likely to evaluate for latex allergy compared with dermatologists who only use the 20 to 24 standard antigens (RR = 2.60; 95% CI = 2.02 to 3.36, Table 3).

Association of Latex Allergy Evaluation and Photopatch Testing

The results of a Pearson χ^2 test provided evidence of an association between photopatch testing and evaluation for latex allergy ($P < .001$, Table 3). Dermatologists who photopatch test were 3 times more likely to evaluate for latex allergy than dermatologists who do not photopatch test (RR = 3.14; 95% CI = 2.46 to 4.03, Table 3). As shown in Table 1, the rate of latex allergy testing was greater for those who photopatch test more patients per month ($P = .003$).

Association of Latex Allergy Evaluation and Interest in Contact Dermatitis

Dermatologists with a special interest in contact dermatitis were 2.3 times more likely to evaluate for latex allergy (RR = 2.29; 95% CI = 1.81 to 2.90, Table 3). As the number of books on contact dermatitis owned increased, the rate of latex allergy testing also increased ($P < .001$, Table 1).

Latex Prick Testing

An affirmative answer to the question "Do you perform prick and/or scratch testing for latex allergy?" was given by 3.5% of dermatologists responding to this question (45 of 1,285; 95% CI = 2.5% to 4.5%). Of the 40 dermatologists who performed prick testing and who answered more spe-

Table 2. Specified Methods of Latex Allergy Evaluation

<i>Method</i>	<i>Number Responding (%)</i>	<i>95% Confidence Interval</i>
Other:	96 (44.0%)	37.4, 50.6
RAST, use	12 (5.5%)	3.9, 9.4
RAST	11 (5.0%)	2.5, 8.9
Patch test	11 (5.0%)	2.5, 8.9
Use	10 (4.6%)	2.2, 8.3
Refer*	9 (4.1%)	1.9, 7.7
History	8 (3.7%)	1.6, 7.1
Test with gloves	6 (2.8%)	1.0, 5.9
Use, RAST	3 (1.4%)	2.8, 4.0
RAST, patch	2 (0.9%)	1.1, 3.3
patch test (TRUE Test)	2 (0.9%)	1.1, 3.3
Patch, RAST	1 (0.5%)	0.01, 2.5
Open patch test	1 (0.5%)	0.01, 2.5
Patch with latex, RAST	1 (0.5%)	0.01, 2.5
Patch, use, scratch, RAST	1 (0.5%)	0.01, 2.5
Prick, patch	1 (0.5%)	0.01, 2.5
Use, patch, RAST	1 (0.5%)	0.01, 2.5
Patch, use, refer	1 (0.5%)	0.01, 2.5
RAST, patch-open and closed	1 (0.5%)	0.01, 2.5
Did not specify	14 (6.4%)	3.6, 10.6
RAST, use, prick	33 (15.1%)	10.4, 19.9
Use, RAST, prick	33 (15.1%)	10.4, 19.9
Use, prick, RAST	25 (11.5%)	7.2, 15.7
RAST, prick, use	19 (8.7%)	5.0, 12.5
Prick, use, RAST	7 (3.2%)	1.3, 6.5
Prick, RAST, use	5 (2.3%)	0.7, 5.3
Total	218	

* In addition to the 9 respondents who evaluated for latex allergy but only specified "refer," 15 respondents who did not evaluate patients for latex also wrote in "refer."

cific questions on latex solutions, 35 (87.5%; 95% CI = 73.2% to 95.8%) made latex solutions from gloves and 5 (12.5%; 95% CI = 4.2% to 26.8%) obtained commercial latex solutions from Europe or Canada.

Characteristics Associated with Prick Testing for Latex Allergy

As presented in Table 4, the rate of latex prick testing was greater for dermatologists who expressed the following characteristics compared with dermatologists who did not express these characteristics: patch test (RR = 7.66; 95% CI = 1.06 to 55.28); perform expanded patch testing (RR = 7.26; 95% CI = 3.62 to 16.49); photopatch test (RR = 6.62; 95% CI = 3.71 to 11.81); and have a special interest in contact dermatitis (RR = 4.59; 95% CI = 2.56 to 8.21). As shown in Table 5, the rate of latex prick testing was greater for those who: patch test more patients per month ($P < .001$); photopatch test more patients per year ($P < .001$); and own more contact dermatitis books ($P < .001$). There was no association between latex skin prick testing and the number of years in practice ($P = .238$).

Discussion

There are several limitations to this study. First, the response rate of 43% was moderate but comparable with response rates from other surveys on contact dermatitis of 42%¹⁹ and 46% (unpublished data). This might be attributable to the fact that many of the addresses listed in the 1995-1996 American Academy of Dermatology Directory may have been outdated in 1997 when the questionnaires were mailed. We also did not attempt to contact nonresponders. Second, a response bias is likely, because dermatologists who are interested in allergic contact dermatitis were probably more motivated to complete the survey than dermatologists not interested in this subject. Response bias could have been addressed if a second survey were performed on a subset of nonresponders. Because of logistical factors, this was not done. Third, this study could have been improved by employing random sampling rather than systematic sampling. Randomization assures a nonbiased

Table 3. Association Between Practice Characteristics and Evaluation for Latex Allergy

<i>Practice Characteristic</i>	<i>Latex Allergy Evaluation</i>		<i>Measures of Association</i>		
	<i>Evaluate</i>	<i>Do Not Evaluate</i>	<i>Odds Ratio</i>	<i>Relative Risk for Latex Evaluation</i>	<i>Relative Risk for Characteristic</i>
Patch test	201 (18.6%)	882 (81.4%)	2.32	2.07	1.10
Don't patch test	17 (9.0%)	173 (91.0%)	1.38, 3.91	1.30, 3.32	1.05, 1.16
N = 1,273			$\chi^2 = 10.52, P = .001$		
Expanded patch testing	118 (30.3%)	272 (69.7%)	3.30	2.60	1.93
Standard patch testing	80 (11.6%)	608 (88.4%)	2.40, 4.53	2.02, 3.36	1.66, 2.24
N = 1,078			$\chi^2 = 57.61, P < .001$		
Photopatch test	56 (44.8%)	69 (55.2%)	4.89	3.14	3.78
Do not photopatch test	140 (14.2%)	843 (85.8%)	3.29, 7.26	2.46, 4.03	2.75, 5.18
N = 1,108			$\chi^2 = 71.12, P < .001$		
Interest in CD	93 (29.9%)	218 (70.1%)	2.84	2.29	2.05
No interest in CD	124 (13.0%)	826 (87.0%)	2.09, 3.86	1.81, 2.90	1.69, 2.49
N = 1,261			$\chi^2 = 46.70, P < .001$		

NOTE. All tests presented in this table were Pearson χ^2 tests with 1 df.

Table 4. Association Between Practice Characteristics and Prick/Scratch Testing

Practice Characteristic	Prick/Scratch Testing Practice		Measures of Association		
	Prick Test	Do Not Prick Test	Odds Ratio	Relative Risk for Prick Testing	Relative Risk for Characteristic
Patch test	44 (4.0%)	1047 (96.0%)	7.94	7.66	1.15
Do not patch test N = 1,270	1 (0.5%)	189 (99.5%)	1.09, 58.00 $\chi^2 = 5.87, P = .015$	1.06, 55.28	1.10, 1.21
Expanded patch testing	35 (8.9%)	358 (91.1%)	8.38	7.26	2.37
Standard patch testing N = 1,087	8 (1.2%)	686 (98.8%)	3.85, 18.26 $\chi^2 = 39.7, P < .001$	3.62, 16.49	2.01, 2.80
Photopatch test	19 (15.3%)	105 (84.7%)	7.64	6.62	4.64
Do not photopatch test N = 1,118	23 (2.3%)	971 (97.7%)	4.03, 14.49 $\chi^2 = 51.6, P < .001$	3.71, 11.81	3.17, 6.77
Interest in CD	27 (8.6%)	286 (91.4%)	4.93	4.59	2.57
No interest in CD N = 1,270	18 (1.9%)	939 (98.1%)	2.67, 9.07 $\chi^2 = 31.4, P < .001$	2.56, 8.21	1.98, 3.33

NOTE. All tests presented in this table were Pearson χ^2 tests with 1 df.

selection of a sample population and, on average, should result in a representative sample; however, the large proportion of the total population selected for the systematic sample should minimize any bias caused by the nonrandom sampling method. Fourth, the title of the survey, "Patch Test Questionnaire," might have created a bias for finding an association between patch testing and evaluation for latex allergy. This title might have discouraged dermatologists who did not patch test (but might still have evalu-

ated for latex allergy) from completing and returning the questionnaire.

Many of the results of this survey are not surprising. The percentage of United States dermatologists responding to this survey who evaluated patients for latex allergy, 17.1%, is low and much lower than members of the American Contact Dermatitis Society (70%) (unpublished data). Lack of knowledge, lack of interest, lack of resources, or the impression that latex allergy evaluation is managed

Table 5. Association Between Practice Characteristics and Prick/Scratch Testing Patterns

Prick Testing Pattern	Practice Characteristic			
	Years in Practice			
	0-10	11-20	21-30	> 30
Prick test	14 (3.5%)	12 (2.5%)	14 (4.8%)	5 (5.8%)
Do not prick test N = 1,273	391 (96.5%)	475 (97.5%)	281 (95.2%)	81 (94.2%)
	Pearson $\chi^2 = 4.2, df = 3, P = .238$			
	Number of Patients Patch Tested Per Month (for Dermatologists Who Patch Test)			
	< 6	6-10	11-15	> 15
Prick test	21 (2.3%)	12 (7.6%)	2 (11.8%)	7 (43.8%)
Do not prick test N = 1,118	905 (97.7%)	147 (92.4%)	15 (88.2%)	9 (56.2%)
	Mantel-Haenszel $\chi^2 = 85.7, df = 3, P < .001$			
	Number of Patients Photopatch Tested Per Year (for Dermatologists Who Photopatch Test)			
	< 6	6-10	> 10	
Prick test	9 (9.4%)	3 (21.4%)	7 (50.0%)	
Do not prick test N = 124	87 (90.6%)	11 (78.6%)	7 (50.0%)	
	Mantel-Haenszel $\chi^2 = 15.9, df = 2, P < .001$			
	Books Owned on Contact Dermatitis			
	0	1-3	4-6	> 6
Prick test	0 (0%)	25 (2.4%)	10 (5.3%)	10 (25.6%)
Do not prick test N = 1,282	31 (100%)	999 (97.6%)	178 (94.7%)	29 (74.4%)
	Mantel-Haenszel $\chi^2 = 62.7, df = 3, P < .001$			

NOTE. Pearson χ^2 test tested for a general association between prick testing and the given practice characteristic. Mantel-Haenszel χ^2 test examined whether the rate of prick testing varied between the different levels of the practice characteristic.

by nondermatologists could explain these findings. The percentage of dermatologists in the United States performing latex prick testing, 3.5%, is also very low (and much lower than members of the American Contact Dermatitis Society, 24%) (unpublished data). This is expected for the following reasons: prick testing is not a procedure taught in most dermatology training programs; there is no FDA-approved commercial latex solution currently available; and there is a risk of anaphylaxis while performing this test. It is possible that more dermatologists might evaluate and test for latex allergy when a commercial latex prick test solution is cleared by the United States FDA.

It is difficult to draw definite conclusions from the methodologies used by dermatologists for diagnosis of latex allergy for several reasons. First, few dermatologists evaluated for latex allergy. Second, the listed diagnostic algorithms might have been confusing, especially if the respondent did not perform skin prick tests or use tests. This most likely explains the 42% of "Other" hand-written answers. We also could have provided definitions of type IV and type I allergy as well as specified type I allergy to latex. Third, the word *evaluate* is subjective. A physician may extensively evaluate patients for latex allergy with a detailed history and exam but then refer to an allergist for diagnostic testing. Another physician may obtain minimal or no history and just refer. We assumed that the 9 respondents who stated they evaluated for latex but only specified "refer" as their methodology represented the former category, and that the 15 respondents who stated they did not evaluate for latex allergy but also wrote in "refer" represented the latter category. Rather than reassigning these 15 respondents to the "evaluate for latex" category, we felt that their answer to the first question "Do you evaluate patients for latex allergy?" should categorize their responses into "evaluate" and "do not evaluate." These categories were used for all tests of associations of practice characteristics with evaluation for latex allergy.

Of methods employed by dermatologists evaluating for latex allergy, it is not unexpected that noninvasive tests such as RAST and use test would be more commonly employed than prick or scratch tests. Interestingly, 23 dermatologists included "patch test" as one of their other methods of diagnosing latex allergy and 6 specified "test with gloves." In Table 2, we reported answers verbatim, but it is still unclear if some of these dermatologists were patch testing with rubber accelerators to determine type IV allergy, performing use tests (open patch tests) in an effort to diagnosis type I allergy to latex, or applying closed patch tests to diagnosis type IV allergy to latex, a recently recognized form of latex allergy.²⁰ Because type IV allergy to latex was not well known in 1997 when this survey was conducted, the latter explanation is unlikely. Because natural latex rubber gloves contain accelerators such as mercaptobenzothiazoles, carbamates, and thiurams that commonly cause type IV allergy,²¹ patch testing to glove

squares will most likely yield reactions to these chemicals, rather than to natural rubber latex. As the TRUE Test series does not contain natural rubber latex, patch testing with this kit will also yield information regarding type IV allergy to rubber accelerators.

Because of the overlap in interest between type I and type IV allergic reactions, it is predictable (and was as we expected) that dermatologists who are interested in contact dermatitis, own many books on contact dermatitis, or photopatch test were 2 to 3 times more likely to evaluate for latex allergy than dermatologists without these characteristics. The relative risks for latex prick testing for these same characteristics were even greater (4.5 to 7.7 times more likely). This finding is consistent with the presumption that dermatologists who are motivated to obtain latex solutions from foreign sources or prepare their own latex solutions are probably specialists in allergic skin reactions.

Contrary to our initial hypothesis, we found that dermatologists in early years of practice were no more likely to evaluate patients for latex allergy or perform latex prick testing than dermatologists later in their careers. In fact, there were no significant associations between numbers of years in practice with evaluation for latex allergy or latex prick testing. This might indicate that dermatologists in the United States in all stages of their careers are well-versed on latex allergy issues.

Latex allergy is an important medical and legal issue. Dermatologists, in addition to allergists, should be familiar with the evaluation, diagnosis, and management of this condition. Despite the limitations of this study, it is evident that most United States dermatologists do not evaluate patients for latex allergy, and most of those who do have characteristics expected for specialists in allergic contact dermatitis. As the medical/legal climate matures and the FDA approves more accurate testing methods, more dermatologists (including those not specializing in contact dermatitis) might perform evaluations for latex allergy.

Acknowledgments

This study would not have been possible without the tireless efforts of Kaye Williams who addressed, numbered, mailed, and collated these questionnaires.

References

1. Allergic reactions to latex-containing medical devices. FDA Medical Alert, March 29 MDA91-1: 1-2, 1991
2. Rankin KV, Jones DL, Rees TD: Latex glove reactions found in a dental school. *J Am Dent Assoc* 13:1-4, 1993
3. Kaczmarek RG, Silverman BG, Gross TP, et al: Prevalence of latex-specific IgE antibodies in hospital personnel. *Ann Allergy Asthma Immunol* 76:51-56, 1996
4. Lagier F, Vervloet D, Lhermet I, et al: Prevalence of latex allergy in operating room nurses. *J Allergy Clin Immunol* 90:319-322, 1992

5. Bubak MF, Reed CE, Fransway AF, et al: Allergic reactions to latex among health-care workers. *Mayo Clin Proc* 67:1075-1079, 1992
6. Heese A, von Hintzenstern J, Peters KP, et al: Allergic and irritant reactions to rubber gloves in medical health services: Spectrum, diagnostic approach, and therapy. *J Am Acad Dermatol* 25:831-839, 1991
7. Tosi LL, Slater JE, Shaer C, et al: Latex allergy in spina bifida patients: prevalence and surgical implications. *J Pediatr Orthop* 13:9-12, 1993
8. Beaudouin E, Prestat F, Schmitt M, et al: High risk of sensitization to latex in children with spina bifida. *Eur J Pediatr Surg* 4:90-93, 1994
9. Meeropol E, Kelleher R, Bell S, et al: Allergic reactions to rubber in patients with myelodysplasia. *N Engl J Med* 323:1072, 1990
10. Slater JE, Chhabra S: Latex antigens. *J Allergy Clin Immunol* 89:92-97, 1992
11. Czuppon AB, Chen Z, Rennert S, et al: The rubber elongation factor of rubber trees (*Hevea brasiliensis*) is the major allergen in latex. *J Allergy Clin Immunol* 92:690-697, 1993
12. Warshaw EM: Latex allergy. *J Am Acad Dermatol* 39:1-24, 1998
13. Hamilton RG, Biagini RE, Krieg EF: Diagnostic performance of Food and Drug Administration-cleared serologic assays for natural rubber latex-specific IgE antibody. *J Allergy Clin Immunol* 103:925-30, 1999
14. Kadambi A, Field S, Charous BL: Diagnostic testing in latex allergy. *J Allergy Clin Immunol* 197:99:S503, 1997(suppl) (abstr)
15. Rueff F, Thomas P, Przybilla B: Skin prick tests (SPTs) with natural latex milk (NLM), and a natural latex SPT solution (NLS). *J Allergy Clin Immunol* 99:S158, 1997 (suppl) (abstr)
16. Turjanmaa K, Reunala T, Rasanen I: Comparison of diagnostic methods in latex surgical glove contact urticaria. *Contact Dermatitis* 19:241-247, 1988
17. Ebo DG, De Clerck LS, Bridts CH, Stevens WJ: Comparison of latex-specific IgE, Skin testing and lymphocyte transformation (LTT) in latex anaphylaxis. *J Allergy Clin Immunol* 99:S157, 1997 (suppl) (abstr)
18. Blanco C, Castillo R, Quirarte J, et al: Comparison of skin prick test and specific IgE determination for the diagnosis of latex allergy. *J Allergy Clin Immunol* 99:S503, 1997 (suppl) (abstr)
19. James WD, Rosenthal LE, Brancaccio RR, et al: American Academy of Dermatology patch testing survey: Use and effectiveness of this procedure. *J Am Acad Dermatol* 26:991-994, 1992
20. Wilkinson SM, Burd R: Latex: A cause of allergic contact eczema in users of natural rubber gloves. *J Am Acad Dermatol* 39:36-42, 1998
21. Conde-Salazar L, del-Rio E, et al: Type IV allergy to rubber additives: A 10-year study of 686 cases. *J Am Acad Dermatol* 29:176-180, 1993