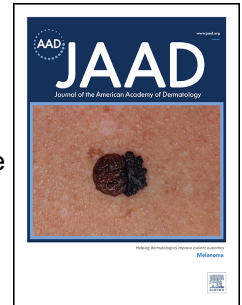


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Medical Adhesive Allergens: Retrospective Analysis of Cross-Sectional Data from the North American Contact Dermatitis Group, 2001-2018

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Abstract

Background: Identification of allergens causing medical adhesive contact allergy is difficult.

Objective: Characterize the demographics, clinical characteristics, patch test results and occupational data for North American Contact Dermatitis Group (NACDG) patients with medical adhesive contact allergy.

Methods: Retrospective study of 43,722 NACDG patients patch-tested 2001-2018, with: 1) medical adhesive (tapes/band aids/adhesive aids/suture glue) source, 2) positive patch test, and 3) final primary diagnosis of allergic contact dermatitis.

Results: 313 (0.7%) patients met inclusion criteria. Compared to other patients with final primary diagnosis of allergic contact dermatitis, medical adhesive allergy patients were less likely male (odds ratio 0.58, 95% confidence interval [0.45-0.77]) and/or age >40 (0.76 [0.6-0.96]). The most common NACDG screening series allergens were colophony (80.7%), balsam of Peru (3.9%), 2-hydroxyethyl methacrylate (2.7%) and carba mix (2.7%). One-fourth (79/313, 25.2%) had positive patch test reactions to supplemental allergens/materials, and 17.3% (54/313) only had reactions to supplemental allergens/materials.

Limitations: Results of comprehensive patch testing may be prone to referral population selection bias and may not be representative of the general dermatology population.

Conclusion: Colophony was the most common allergen. Supplemental allergens and materials should be tested in the evaluation of suspected medical adhesive contact allergy.

Introduction

Medical adhesives are used in medical, home and occupational settings. The occlusive nature of adhesives, combined with application to damaged skin, mechanical distortion and prolonged contact can increase their allergic and irritant potential.^{1,2} While the majority of medical adhesive cutaneous reactions are the result of irritant contact dermatitis (ICD),^{1,3} allergens reported for allergic contact dermatitis (ACD) include colophony, epoxy resin, acrylates, methacrylates, cyanoacrylates, rubber, para-tertiary butylphenol formaldehyde resin, benzoyl peroxide, and dodecyl maleamic acid.^{1,2,4-6} In practice, ICD and ACD medical adhesive reactions can be difficult to differentiate, especially as most have resolved by the time of presentation.

Identifying the allergens responsible for medical adhesive contact allergy can be challenging as manufacturers often do not share ingredients due to proprietary formulations.¹ Here, we describe demographics, clinical characteristics, relevant allergens, and occupational data for the North American Contact Dermatitis Group (NACDG) allergen source code “Miscellaneous Health Aids – tapes/band aids/adhesive aids/suture glue”.

Methods

This retrospective study was approved by the Duke University Health System Institutional Review Board. From 2001-2018, 43,722 patients were patch tested with the NACDG screening series, the exact composition of which changes every 2 years.⁷⁻¹⁴ Supplemental allergens and/or medical adhesive materials were tested as indicated by patient history. Screening allergens were supplied by Chemotechnique Diagnostics (Malmö, Sweden) and AllergEAZE (Smartpractice, Calgary, Canada) and applied with Finn chambers (Smartpractice, USA) and Scanpor tape

(Norgesplaster AS, Vennesla, Norway). The patch test process followed NACDG protocol.¹² Readings were designated as +++ (very strong), ++ (strong), + (mild), +/- (weak/doubtful), irritant (IR) or negative (-); relevance was designated definite, probable, possible, past, or unknown. In addition, a final interpretation of “allergic” (positive) or “not allergic” (negative) was coded based on allergen characteristics and patch test patterns. Up to 3 anatomic sites of dermatitis, up to 3 final diagnoses, allergen source codes, industry/occupational codes, and occupational relevance were recorded. Only one supplemental allergen/material source was recorded; if multiple sources were positive, the most clinically relevant was recorded. Names of supplemental allergens/materials were not collected.

This study included patients with medical adhesive (miscellaneous health aids – tapes/band aids/adhesive aids/suture glue) documented as the source of a positive patch test reaction to either a NACDG screening allergen or a supplemental allergen/material. The study cohort was patients with medical adhesive source, final patch test interpretation of “allergic”, and a final primary diagnosis of ACD (Study Group). The comparison group consisted of individuals with 1) a final primary diagnosis of ACD and 2) no medical adhesive source (Comparison Group).

Patient demographics and clinical characteristics were summarized with frequency counts and percentages for non-missing data. Odds ratios (OR) together with 95% confidence intervals (CI) for certain variables between groups are reported. If the CI did not include 1, it was used as a proxy to indicate the presence of a statistically significant association; however, the converse does not necessarily indicate a lack of association but was used as a proxy for less association

unless otherwise noted. The significance of association was assessed at $\alpha=0.05$. All statistical analyses were performed using SAS version 9.4 (SAS institute Inc., Cary, NC).

Results

Of 43,722 patients patch tested, 405 (0.93%) had a relevant medical adhesive source to NACDG screening series and/or supplemental allergens/materials. (**Figure 1**). A total of 313 patients met inclusion criteria with a medical adhesive source, final interpretation of “allergic”, and final primary diagnosis of ACD (Study Group).

Patient demographics and clinical characteristics are described in **Table 1**. The Study Group included 21.5% male patients, with 63.1% over age 40. In comparison to “allergic” patients without medical adhesive contact allergy (Comparison Group), Study Group patients were statistically less likely male (Odds Ratio (OR) 0.58; confidence interval (CI) [0.45-0.77]) and/or less likely over age 40 (OR 0.76; CI [0.6-0.96]). The most common dermatitis site was trunk (24.0%), followed by scattered generalized (22.7%), hand (22.4%), arm (18.5%), face (18.2%) and leg (16.3%). Study group patients were more likely to have trunk (OR 2.12; [1.63-2.75]) and leg (OR 1.63; [1.2-2.21]) involvement, and less likely to have involvement of hands (OR 0.76; CI [0.58-0.99]), face (OR 0.72; CI [0.54-0.96]), eyelids (OR 0.48; CI [0.3-0.77]) or lips (OR 0.47; CI [0.22-1.00]).

Screening Series Allergens

Of Study Group patients, 82.7% (259/313) had positive patch test reactions to screening series allergens (**Table 2**). Colophony was the most prevalent screening series allergen, accounting for

80.7% (209/259) of positive reactions (**Table 2**); the proportion of colophony positivity was relatively constant over time (data not shown). Other identified allergens included balsam of Peru (3.9%; 10/259), 2-hydroxyethyl methacrylate (2-HEMA) (2.7%; 7/259), carba mix (2.7%; 7/259), thiuram mix (2.3%; 6/259), and methyl methacrylate (MMA) (2.3%; 6/259).

Current relevance (definite, probable, or possible) was 100% for balsam of Peru (BOP), 2-HEMA, carba mix and MMA. Thiuram mix had 83.3% current relevance, and colophony had only 47.6% current relevance; this was consistent over data cycles, with no identified trend over time (range 26.7%-66.6%; 2001-2002 33.4%, 2017-2018 47.8%). Additional analysis of relevance revealed definite or probable relevance for thiuram mix in 33.3% of cases (2/6), MMA 33.3% (2/6), colophony 22.5% (47/209), BOP 20% (2/10), 2-HEMA 14.3% (1/7) and carba mix 7.1% (4/7).

Supplemental Allergens

25.2% (79/313) of medical adhesive contact allergy patients had at least one positive patch test reaction to a supplemental allergen/material, and 17.3% (54/313) *only* had positive reactions to supplemental allergens/materials.

Occupation

Occupation related medical adhesive contact allergy occurred in 3.5% (11/313) of patients. Occupational information was available for 10 of the 11 patients: 50% (5/10) had professional specialty occupations (4 registered nurses, 1 physician); 20% (2/10) were in the category of supervisors and proprietors, sales occupations; and 10% (1/10) each of 1) administrators,

education & related fields; 2) police & detectives, public service; and 3) automobile mechanics. Medical adhesive contact allergy was less likely occupation related (OR 0.2, CI [0.11-0.37]) compared to the Comparison Group.

Discussion

This study focused on patients with a medical adhesive source of contact allergy and a final diagnosis of ACD. For NACDG screening allergens, colophony was the most frequent allergen, representing 80.7% of reactions, followed by balsam of Peru, 2-HEMA, carba mix, thiuram mix and MMA, each representing about 2-4% of reactions. Although 82.7% of medical adhesive contact allergy patients had positive patch test reactions to a screening series allergen, testing with the screening series alone would have missed at least one medical adhesive reaction in one-quarter of patients. This exemplifies the need for testing supplemental allergens and materials in the setting of suspected adhesive-related contact allergy. Identification of recommended supplemental allergens is dependent on clinical history and examination; several publications address medical adhesive allergens (Table 3).^{2,5,6,18}

Demographics and Clinical Characteristics

Study Group patients were more likely female compared to those in the Comparison Group (78.5% vs 68.1%). They were also younger (age <40 36.9% vs 31%). The most common dermatitis sites were trunk, scattered generalized, hand, arm, face and leg; Study Group patients were more likely to have trunk and leg dermatitis. Most publications on the topic of medical adhesive contact allergy are limited to case reports and series, so direct comparison to our larger study is difficult. Spencer et al⁶ documented 7 patients with ACD to acrylates in wound

dressings; all were age >40, 57% (4/7) were female, and all had a dermatitis site of leg or feet. Reasons for the greater female and younger age predominance of medical adhesive contact allergy in our study are unknown, but could include differences in exposure and reporting patterns. In our anecdotal experience, patients tend to present for patch testing for medical adhesive allergy after an adverse reaction related to a surgical procedure such as port placement, cutaneous surgery, laparoscopic surgery or orthopedic procedure; many major surgical procedures occur on the trunk, extremities and face, thus the identified dermatitis locations in this study are not surprising. In addition, we theorize that patients presenting for evaluation of bandage or band-aid cutaneous reactions may be contributing to the younger population identified in this study.

Medical Adhesive Allergens

Here, colophony was the most frequent allergen associated with medical adhesives. Historically, it was commonly used in bandages and medical adhesives,³ but modern bandages typically employ pressure-sensitive acrylate-based adhesives.¹ Nevertheless, in this study, colophony was consistently the top allergen. Relevance was designated as current (definite/probable/possible) in about half of cases, with a consistent trend over time. However, when only definite/probable relevance were analyzed, colophony dropped significantly, with under a quarter of cases in this category. Regardless, despite changing trends in bandage materials, colophony continues to be a relevant allergen. In fact, a 2020 study of allergens in bandages identified abietic acid, a main component of colophony, in 5 of 16 tested medical adhesive products.⁵

Balsam of Peru (*Myroxylon pereirae*) is an aromatic liquid used for natural flavoring and fragrance. Its importance as a medical adhesive allergen is related to the fact that it cross reacts with benzoin, found in tincture of benzoin/compound tincture of benzoin, and balsam of tolu (*Myroxylon balsamum*, BOT), which is found in compound tincture of benzoin.¹⁵ There are a number of reports of tincture of benzoin contact allergy, including 11 patients with allergy to compound tincture of benzoin, with reactions to tincture of benzoin, BOT, and BOP.¹⁵ Some products, such as Tuf-Skin, contain both benzoin and colophony.¹⁶

The acrylates 2-HEMA, MMA, and ethyl acrylate (EA) were identified as medical adhesive allergens. Spencer et al (2002-2015) reviewed 52 patients with acrylate allergy; the most prevalent reactions were to 2-hydroxyethyl acrylate (2-HEA) (32/52; 61.5%), 2-hydroxypropyl methacrylate (2-HPMA) (29/52; 55.8%), 2-HEMA (29/52; 55.8%), ethylene glycol dimethacrylate (EGDMA) (28/52; 53.8%), EA (25/52; 48.1%) and hydroxypropyl acrylate (HPA) (24/52; 46.2%).⁶ MMA was only positive in 15/52 (15%). There were 7 cases of contact allergy to wound dressings, and of the top 6 acrylates, 3/7 had positive reactions to 2-HEA, EGDMA, EA and HPA, and 2/7 had positive reactions to 2-HPMA and 2-HEMA. A recent study by Tam et al⁵ identified multiple acrylates in medical adhesives, including tetrahydrofurfuryl methacrylate, triethyleneglycol dimethacrylate, 1,6-hexandiol diacrylate, N,N-dimethylaminoethyl methacrylate and tetraethyleneglycol dimethacrylate. Many allergens in these 2 studies are not part of the NACDG screening series or American Contact Dermatitis Society (ACDS) core series.¹⁷ This highlights the importance of supplemental allergen testing when medical adhesive allergy is suspected.

Ethyl cyanoacrylate (ECA) was only included in the NACDG screening series 2011-2014. There were no cases of medical adhesive allergy attributed to ECA in this study; consumer “krazy glue” or “super glue”, when not used in a medical setting, is coded to a different source code, “adhesives/glues/bonding agents”. However, it could be an important screening allergen when medical adhesive allergy is suspected, as it sometimes cross reacts with octyl cyanoacrylate (OCA), the active ingredient in Dermabond.² Cook et al reported that OCA was positive in 17/21 (81%) of patients who reported Dermabond ACD, and ECA was only positive in 6/21 (29%).² Testing with higher concentrations of OCA and testing of Dermabond as-is on abraded skin increased the yield of allergen identification. Tam et al¹⁸ described a patient with positive reactions to 3M Steri-Strips and ECA. Steri-strips contain a pressure sensitive acrylate adhesive, but the authors were not able to confirm the presence of ECA with the manufacturer. Lists of acrylate-free bandage adhesives are available in Scheman et al.⁴

Rubber accelerators (carba and thiuram mixes) may be present in medical adhesives. Rubber is used to formulate the flexible base of bandages and medical adhesives,¹⁹ and is present in medical adhesives including medical transfer tape and polyester film tape; Scheman et al compiled a list of rubber-free bandage adhesives.⁴

Testing medical adhesive products “as-is” is important for adequate identification as documented for Dermabond,^{2,20-26} Dermabond Prineo,^{27,28} Dermabond Advanced,²⁹ Liquiband,²³ Venaseal,³⁰ Histoacryl,³⁰ and Band-Aid.¹ Cook et al² tested Dermabond “as-is” on *abraded* skin; this increased the yield of allergen identification. They abraded the skin with a #10 blade scalpel to induce erythema, then applied Dermabond to a patch test chamber and occluded for 48 hours.

This resulted in positive patch test reactions, and they were able to confirm Dermabond as the allergen source.

Irritant Contact Dermatitis to Medical Adhesives

ICD is the most common cutaneous reaction to medical adhesives. Widman et al patch tested 26 subjects suspected of having a bandage or tape contact allergy,³ and only 1 had a clinically relevant allergic reaction to a medical adhesive, Mastisol. Of the 26, 2 had irritant reactions to at least one bandage or tape at 48 hours; in addition, 8/11 had irritant reactions to at least one bandage or tape at 7 days. The authors concluded that skin reactions to medical adhesive tapes and bandages are primarily ICD.

Smith and Zirwas¹ noted that from 2006-2014, 0.35% (9821/2,829,241) of general patients at a United States medical center reported tape allergy in the medical record, whereas the estimated prevalence of tape ACD in their patch tested population was only 0.03% (2/6000). The authors concluded that “nonallergic tape reactions” (NATR) are more common than tape ACD. They suggested that these reactions are likely related to a combination of occlusion, skin distortion, skin damage, and/or prolonged contact. This description of NATRs is consistent with the more commonly used term, irritant contact dermatitis.

Smith and Zirwas proposed criteria for differentiating between tape ACD and NATR/ICD¹: True tape allergy has 1) Reactions to one or a few specific tapes and 2) Reactions are consistently reproducible on testing with the implicated tape; NATR/ICD reactions 1) have reactions to many different types of tape, including tapes with different backings and differing levels of skin

adhesion and 2) reactions are not consistently reproducible on testing with implicated tapes. Additional studies are needed to verify these criteria.

Limitations

Results of comprehensive patch testing may be prone to referral population selection bias and may not be representative of the general population. Patch test interpretation is dependent on clinical judgment. Details of supplemental allergens and materials are not recorded, limiting applicability. Dermatitis sites are not directly correlated with source code. Surgical glue was added as a source code in 2010 and may therefore be under-represented. There are 2 adhesive-related source codes: 1) Miscellaneous health aids - tapes/band aids/adhesive aids/suture glue and 2) Chemical - adhesives/glues/bonding agents; differences in physician source coding could affect results. While medical devices used for diabetes management may contain adhesives, they are not addressed in this study, because they are not included in the miscellaneous health aid source code.

Conclusions

The most common NACDG screening series medical adhesive allergens were colophony, balsam of Peru, acrylates and rubber accelerators. One quarter of patients had at least 1 medical adhesive allergen/material identified on supplemental testing, demonstrating the importance of testing supplemental allergens and materials.

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Table 1: Demographics and Clinical Characteristics^a

	Study Group	Comparison Group	Odds Ratio
	Medical Adhesive Source, Final Interpretation “Allergic”, & Final Primary Diagnosis ACD (N=313)	Final Primary Diagnosis ACD, Excluding Study Group (N=20131)	Study Group vs. Comparison Group
Male	67 (21.5%)	6413 (31.9%)	0.58 [0.45, 0.77]
Atopic triad			
Hay fever	89 (28.5%)	5563 (27.8%)	1.04 [0.81, 1.33]
Eczema	67 (21.5%)	4146 (20.7%)	1.05 [0.8, 1.37]
Asthma	51 (16.3%)	2830 (14.1%)	1.19 [0.88, 1.61]
any of the three	138 (44.2%)	8392 (41.8%)	1.11 [0.88, 1.38]
Age > 40 years	197 (63.1%)	13938 (69.3%)	0.76 [0.6, 0.96]
Race			
Caucasian	278 (89.1%)	17262 (86.6%)	1.27 [0.88, 1.81]
Asian	21 (6.7%)	1007 (5.1%)	1.36 [0.87, 2.12]
Hispanic	5 (1.6%)	359 (1.8%)	0.89 [0.36, 2.16]
Other	5 (1.6%)	327 (1.6%)	0.98 [0.4, 2.38]
Black	3 (1.0%)	979 (4.9%)	0.19 [0.06, 0.59]
Dermatitis site			
Trunk	75 (24.0%)	2607 (13.0%)	2.12 [1.63, 2.75]
Scattered generalized	71 (22.7%)	4532 (22.5%)	1.01 [0.77, 1.32]
Hand	70 (22.4%)	5536 (27.5%)	0.76 [0.58, 0.99]
Arm	58 (18.5%)	3333 (16.6%)	1.15 [0.86, 1.53]
Face	57 (18.2%)	4745 (23.6%)	0.72 [0.54, 0.96]
Leg	51 (16.3%)	2147 (10.7%)	1.63 [1.2, 2.21]
Neck	27 (8.6%)	2106 (10.5%)	0.81 [0.54, 1.2]
Foot	24 (7.7%)	1310 (6.5%)	1.19 [0.78, 1.82]
Eyelid	18 (5.8%)	2281 (11.3%)	0.48 [0.3, 0.77]
Scalp	12 (3.8%)	1260 (6.3%)	0.6 [0.33, 1.07]
Other	8 (2.6%)	468 (2.3%)	1.1 [0.54, 2.24]
Lips	7 (2.2%)	929 (4.6%)	0.47 [0.22, 1.00]
Anal/genital	7 (2.2%)	589 (2.9%)	0.76 [0.36, 1.61]
Most exposed areas	4 (1.3%)	257 (1.3%)	1 [0.37, 2.7]
Ears	4 (1.3%)	463 (2.3%)	0.55 [0.2, 1.48]
Only under clothing	2 (0.6%)	245 (1.2%)	0.52 [0.13, 2.11]
Eyes	1 (0.3%)	177 (0.9%)	0.36 [0.05, 2.59]
Nose	0	21 (0.1%)	1.49 [0.09, 24.68]
Erythroderma	0	17 (0.1%)	1.83 [0.11, 30.55]
Occupational relevance ^b	11 (3.5%)	3067 (15.2%)	0.2 [0.11, 0.37]

^a Variables with missing values were excluded from percentage calculation.^b Only patients with final interpretation “allergic” were examined for occupational relevance.

Table 2: Percentage, Strength and Clinical Relevance of Allergic Reactions for Study Group Patients*

Allergens	N (%) ^a	Second Read Code n (%) ^b				Relevance n (%) ^c			
		+++	++	+	+/-	Definite	Probable	Possible	Past
Colophony 20% pet	209 (80.7%)	62 (29.8%)	63 (30.3%)	67 (32.2%)	16 (7.7%)	14 (6.7%)	33 (15.9%)	52 (25%)	109 (52.4%)
Balsam of Peru 25% pet	10 (3.9%)	1 (11.1%)	1 (11.1%)	6 (66.7%)	1 (11.1%)	0	2 (20%)	8 (80%)	0
2-hydroxyethyl methacrylate 2% pet (d)	7 (2.7%)	3 (42.9%)	2 (28.6%)	1 (14.3%)	1 (14.3%)	0	1 (14.3%)	6 (85.7%)	0
Carba mix 3% pet	7 (2.7%)	1 (14.3%)	0	5 (71.4%)	1 (14.3%)	0	4 (57.1%)	3 (42.9%)	0
Thiuram mix 1% pet	6 (2.3%)	1 (16.7%)	2 (33.3%)	3 (50%)	0	0	2 (33.3%)	3 (50%)	1 (16.7%)
Methyl methacrylate 2% pet	6 (2.3%)	0	3 (50%)	2 (33.3%)	1 (16.7%)	1 (16.7%)	1 (16.7%)	4 (66.7%)	0
p-tert-butylphenol formaldehyde resin 1% pet	5 (1.9%)	0	2 (40%)	3 (60%)	0	0	2 (40%)	2 (40%)	1 (20%)
Ethyl acrylate 0.1% pet	4 (1.5%)	1 (25%)	2 (50%)	1 (25%)	0	0	1 (25%)	3 (75%)	0
Benzisothiazolinone 0.1% pet (e)	3 (1.2%)	0	2 (66.7%)	1 (33.3%)	0	0	0	2 (66.7%)	1 (33.3%)
Mercaptobenzothiazole 1% pet	3 (1.2%)	0	2 (66.7%)	0	1 (33.3%)	0	0	1 (33.3%)	2 (66.7%)
Neomycin sulfate 20% pet	3 (1.2%)	1 (33.3%)	1 (33.3%)	1 (33.3%)	0	0	3 (100%)	0	0

^a Percentage of patients with positive patch test reactions (denominator n=259). >1 positive reaction occurred in some cases.

^b Raw percentage. Discrepancies in positive reaction numbers and second read code will differ due to final interpretation.

^c Raw percentage. "Unknown" clinical relevance was included for percentage calculation but is not shown in table.

*Only allergens with >1% prevalence are reported

Test Cycles: All allergens were tested 2001-2018, except for: (d) 2007-2018; (e) 2017-2018

Abbreviations: Aq, aqueous; Pet, petrolatum.

Table 3: Medical Adhesive Allergens

Allergen	Patch Test Series or Supplier
1,6-hexandiol diacrylate 0.1% pet	D
2,6-ditert-butyl-4-cresol (BHT) 2% pet	B, D
2-hydroxyethyl acrylate 0.1% pet	D
2-hydroxyethyl methacrylate 2% pet	A, B, D
2-hydroxypropyl methacrylate 2% pet	D
Abietic acid 10% pet	D
Bacitracin 20% pet*	A, B, C, D
Benzalkonium chloride 0.1% pet*	A, B, D
Benzisothiazolinone 0.1% pet	A, D
Butyl acrylate 0.1% pet	D
Butyl hydroxyanisole (BHA) 2% pet	D
Butyl cyanoacrylate 10% pet	E
Carba mix 3% pet	A, B, C, D
Colophony 20% pet	A, B, C, D
D&C Violet 2 (Solvent violet 13) 2% pet	E
Diphenylguanidine 1% pet	A, B, D
Ethyl acrylate 0.1% pet	A, B, D
Ethyl cyanoacrylate 10% pet	A, B, D
Ethylene glycol dimethacrylate 2% pet	D
Formaldehyde 2% aq	A, B, C, D
Hydroquinone 1% pet	D
Hydroxypropyl acrylate 0.1% pet	D
Isooctyl acrylate%	E
Mercapto mix 1% pet	B, C, D
Mercaptobenzothiazole 1% pet	A,B, C, D
Methyl methacrylate 2% pet	A, B, D
<i>Myroxylon perei</i> resin (balsam of Peru) 25% pet	A, B, C, D
<i>Myroxylon toluiferum</i> resin (balsam of Tolu) 20% pet	D
N,N-dimethylaminoethyl methacrylate 0.2% pet	D
Neomycin sulfate 20% pet*	A, B, C, D
Octyl cyanoacrylate 10% pet	E
p-tert-butylphenol formaldehyde resin 1% pet	A, B, C, D
<i>Pentacia lentiscus</i> (mastic) gum 2% pet	E
Polymyxin B 5% pet*	A, B, D
Sodium polyacrylate%	E
Styrax 2% pet	D

Tetraethyleneglycol dimethacrylate 2% pet	D
Tetrahydrofurfuryl methacrylate 2% pet	D
Thiuram mix 1% pet	A, B, C, D
Tributyl acetylcitrate%	E
Tributyl citrate%	E
Triethyleneglycol dimethacrylate 2% pet	D
Test suspected products “as-is” (mastisol, tincture of benzoin, tapes, bandages, dressings, surgical glue)#	n/a

Medical adhesive allergens and products that can be patch tested for patients with suspected medical adhesive contact allergy. This table is developed based on a comprehensive review of the literature. The NACDG database does not identify names of positive supplemental allergens.

Patch Test Series/Suppliers: A) NACGG screening series 2021-2022; B) American Contact Dermatitis Society Core 80 Series 2020; C) T.R.U.E. Test (T.R.U.E test vehicle; concentration per package insert); D) Available for purchase from patch test allergen suppliers; E) Not available for purchase from commercial patch test suppliers.

*Allergens occasionally impregnated in medical dressings for their antibacterial qualities. Patch testers may also wish to consider testing medicaments applied prior to dressing application.

#Additional training is usually required for accurate selection and patch testing of patient products

%Best test concentration and vehicle not known

Abbreviations: Aq, aqueous; Pet, petrolatum

Capsule Summary:

- Colophony, balsam of Peru, acrylates, rubber accelerators are the culprit allergens in the majority of cases of medical adhesive contact allergy
- Testing of supplemental allergens and materials is important for evaluation of suspected medical adhesive contact allergy