

Prevalence of Preservatives Across All Product Types in the Contact Allergen Management Program

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Background: Preservatives are known causes of allergic contact dermatitis.

Objective: The aim of this study was to determine the prevalence of preservatives in each product category in the Contact Allergen Management Program and compare prevalence with reported rates of allergic contact dermatitis.

Methods: Contact Allergen Management Program product information was queried based on the 53 approved preservatives for cosmetic products by the European Union and Association of Southeast Asian Nations plus 5 additional preservatives used in US products.

Results: Phenoxyethanol and parabens were the most common preservatives with 23.9% of products containing phenoxyethanol and 20.75% of products containing parabens. Methylisothiazolinone (MI) was found in 12.9% of products, most commonly in hair care and household products. Preservatives like MI and methylchloroisothiazolinone (MCI) that are both common in products and have a high incidence of allergic contact dermatitis are of greatest concern as contact allergy hazards. Phenoxyethanol and parabens are common and have weak sensitizing power, making them preferred preservatives.

Conclusions: Evaluating the prevalence of preservatives provides important information on allergen exposures. Using current positive reaction rates, the risk of sensitization to a given preservative can be more accurately estimated and may affect the use of certain preservatives by industry in the future.

Preservatives are an essential ingredient in personal care products, topical medications, household products, and industrial products to prevent microbial contamination and protect consumers against infection. Several previous studies have cited fragrances and preservatives as being the 2 most common sources of allergy in cosmetic and household products, although allergic contact dermatitis (ACD) from household products is rarely reported in the literature.^{1–5} Given the pervasive use of topical, household, and industrial products in society and the outbreaks of ACD caused by preservatives over the last few decades, determining the frequency of use of preservatives in different types of products is important to not only medical practitioners but also product manufacturers.^{5–7}

The European Union (EU) and the Association of Southeast Asian Nations (ASEAN) have published identical lists of 53 preservatives approved for use in cosmetic products.^{8,9} These documents also outline limitations for each preservative regarding approved product types (eg, rinse-off products, leave-on products, and so on), maximum authorized concentrations, and conditions of

use and warnings that must be printed on the product label. In the United States, the Food and Drug Administration (FDA) maintains a list of prohibited preservatives and requires cosmetic products to pass a preservative efficacy test and comply with the safety standards set forth by the Federal Food, Drug, and Cosmetic Act.¹⁰

The Contact Allergen Management Program (CAMP) is an American Contact Dermatitis Society database that contains full ingredient information for nearly 5000 common products. Providers can use CAMP to generate a list of safe products for patients with ACD to better assist them with allergen avoidance. There are 8 total product categories in CAMP: eye care, hair care, household products, makeup, medications, nail care, oral, and skin care. The products included in the CAMP database are taken from 3 sources: product labels, manufacturer websites, and the FDA DailyMed website. Most data come directly from product labels found on products in Walgreens and Sephora. CAMP strives to include a wide variety of manufacturers to obtain a representative cross-section of the products found in the US market. Larger product lines are limited to 50 products per brand so that around 5000 products are maintained in the database.

The present study involved mapping preservative usage in all CAMP product categories to determine the prevalence of preservatives in each product category as well as different product types. This study will help patch testing specialists determine which preservatives are relevant in different types of topical products and allow industry to identify trends in preservative usage in various products. Because the sensitization rates for preservatives change over time, it is important for dermatologists

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and industry alike to evaluate the frequency of their use in the market. This study demonstrates the use of CAMP data for identifying the prevalence of preservatives in assorted topical and household products. By comparing the prevalence of preservatives with their current positive reaction rates, the risk of sensitization to a given preservative can be more accurately estimated and may affect the use of certain preservatives by industry in the future.¹¹

METHODS

The Contact Allergen Management Program was queried based on the 53 EU and ASEAN approved preservatives in cosmetic products plus 5 additional preservatives used in U.S. products: methyl-dibromo glutaronitrile (MDBGN), quaternium-15, cetrimonium chloride/bromide, cetylpyridinium chloride, and polyaminopropyl biguanide. The CAMP data were extracted and collated in Microsoft Excel (Microsoft, Version 15.17.1, 2016). Raw data for the 8 CAMP product categories were also mapped, and all results were exported as a Microsoft Excel worksheet for further sorting and analysis. The prevalence of each preservative in the different product types as well as the prevalence of preservatives in each product category was determined. This study focuses on the 20 most common preservatives, with an expanded discussion on recognized preservatives that were less commonly found in CAMP. The prevalence of preservatives in CAMP was then contrasted with positive reaction rates published by the North American Contact Dermatitis Group (NACDG).

RESULTS

A total of 4737 products were queried in the CAMP database. Fifteen preservatives were not found in any of the products listed in CAMP. Twenty preservatives were present in at least 30 different products (of the total 4,737) in the CAMP database. The prevalence of the 20 most common preservatives used in CAMP products is reported in Table 1.

Non-Formaldehyde-Releasing Preservatives

Phenoxyethanol (PE) was the most common preservative found in CAMP with 23.9% (1132/4737) of the products containing PE. Though PE is most frequently patch tested in combination with MDBGN, MDBGN was only found in 1 sunscreen product listed in CAMP. Parabens were the second most common preservative with 20.75% (983/4737) of products containing at least 1 paraben. Methylisothiazolinone (MI) was also very common and was found in 12.9% (611/4737) of CAMP products. Out of these 611 products, 68% (416) contained both MI and methylchloroisothiazolinone (MCI), whereas the remaining 32% (195) contained MI alone. Iodopropynyl butylcarbamate was found in 4.05% (192/4737) of CAMP products.

Formaldehyde-Releasing Preservatives

Most of the formaldehyde-releasing preservatives (FRPs) that were included in the search were ranked among the 20 most common

TABLE 1. Twenty Most Common Preservatives Found in CAMP Across All Product Categories

Preservative	No. Products (n = 4737)	Percent of Total Products
(1) Phenoxyethanol	1132	23.90%
(2) Parabens	983	20.75%
(3) Methylisothiazolinone	611	12.90%
(4) Benzyl alcohol	602	12.71%
(5) Benzoic acid	545	11.51%
(6) Methylchloroisothiazolinone	416	8.78%
(7) Sorbic acid	391	8.25%
(8) DMDM hydantoin	278	5.87%
(9) Salicylic acid	275	5.81%
(10) Iodopropynyl butylcarbamate	192	4.05%
(11) Cetrimonium chloride	181	3.82%
(12) Diazolidinyl urea	139	2.93%
(13) Chlorphenesin	136	2.87%
(14) Dehydroacetic acid	118	2.49%
(15) Sulfites	105	2.22%
(16) BAC	102	2.15%
(17) Imidazolidinyl urea	53	1.12%
(18) Chlorhexidine	42	0.89%
(19) Formic acid	41	0.87%
(20) Quaternium-15	32	0.68%

preservatives in CAMP. Dimethylol dimethyl (DMDM) hydantoin, diazolidinyl urea, imidazolidinyl urea, and quaternium-15 were found in 5.87% (278/4737), 2.93% (139/4737), 1.12% (53/4737), and 0.68% (32/4737) of CAMP products, respectively. Two formaldehyde releasers, sodium hydroxymethylglycinate and 2-bromo-2-nitropropane-1,3-diol, were only found in 0.27% (13/4737) and 0.08% (4/4737) of CAMP products, respectively. A more recent CAMP query found that 9.86% (460/4666) of CAMP products contain at least 1 of the 5 most common FRPs: quaternium-15, diazolidinyl urea, imidazolidinyl urea, DMDM hydantoin, and 2-bromo-2-nitropropane-1,3-diol.

Prevalence of Preservatives in Each Product Category

Table 2 illustrates preservative prevalence by product category. Phenoxyethanol was among the most common preservatives in the 8 product categories, except for oral and eye care, which had only 8 products and 1 product, respectively, containing PE. Three product categories—skin care, makeup, and nail care—were found to contain either PE or parabens in a majority of its products. Specifically, 44.43% (311/700) and 36.86% (258/700) of makeup products and 29.79% (468/1571) and 22.92% (360/1571) of skin care products contained PE and parabens, respectively. Eight (10.81%) of 74 and 10 (13.51%) of 74 nail care products contained PE and parabens, respectively. One hundred eighty (21.66%) out of 831 medication products also contained parabens. Salicylic acid was found in 10.83% (90/831) of medications listed in CAMP, though potentially as an active ingredient and not a preservative. Acne/rosacea medications comprised 80% (72/90) of salicylic acid-containing medications, whereas over-the-counter

TABLE 2. Most Common Preservatives in Each Product Category in CAMP

Skin Care (n = 1571)	Hair Care (n = 914)	Medications (n = 831)	Makeup (n = 700)
Phenoxyethanol, 29.79%	Methylisothiazolinone, 37.09%	Parabens, 21.66%	Phenoxyethanol, 44.43%
Parabens, 22.92%	Methylchloroisothiazolinone, 33.48%	Salicylic acid, 10.83%	Parabens, 36.86%
Benzoic acid, 13.94%	Benzyl alcohol, 30.63%	Benzyl alcohol, 7.22%	Sorbic acid, 14.71%
Benzyl alcohol, 12.60%	Phenoxyethanol, 27.24%	Phenoxyethanol, 6.62%	Dehydroacetic acid, 13.86%
Methylisothiazolinone, 11.20%	Benzoic acid, 22.65%	BAC, 5.29%	Benzyl alcohol, 6.71%
Sorbic acid, 9.93%	Cetrimonium chloride, 17.40%		Benzoic acid, 6.14%
DMDM hydantoin, 8.85%	Parabens, 16.74%		Chlorphenesin, 5.86%
Iodopropyl butylcarbamate, 7.26%	DMDM hydantoin, 13.46%		
Salicylic acid, 5.60%	Sulfites, 8.53%		
Chlorphenesin, 5.41%	Salicylic acid, 7.77%		
Methylchloroisothiazolinone, 5.28%	Iodopropyl butylcarbamate, 5.47%		
Household products (n = 303)	Oral (n = 259)	Eye care (n = 85)	Nail care (n = 74)
Methylisothiazolinone, 23.10%	Benzoic acid, 12.36%	BAC, 28.24%	Parabens, 13.51%
Formic acid, 12.87%	Cetylpyridinium chloride, 8.88%	Polyaminopropyl biguanide, 9.41%	Phenoxyethanol, 10.81%
Phenoxyethanol, 10.56%	Parabens, 8.11%	Sorbic acid, 8.24%	
Sorbic acid, 7.59%	Sorbic acid, 6.56%		
	Salicylic acid, 6.56%		
	Benzyl alcohol, 5.41%		

Only the preservatives found in at least 5% of the products in each category are listed in Table 2.

(OTC) anesthetic/pain relief/first aid medications comprised 7.78% (7/90) and prescription psoriasis medications comprised 4.44% (4/90).

Methylisothiazolinone was the most commonly found preservative in hair care and household products. MI was listed in 23.10% (70/303) of household products, followed by formic acid and PE, which were found in 12.87% (39/303) and 10.56% (32/303) of household products, respectively. Hair care products had some of the highest preservative use in the CAMP database, as seen in Table 2. MI was found in 37.09% (339/914) of hair care products, benzyl alcohol in 30.63% (280/914), PE in 27.24% (249/914), benzoic acid in 22.65% (207/914), cetrimonium chloride in 17.40% (159/914), and parabens in 16.74% (153/914).

Only 9 preservatives were found in oral products. The preservatives, in descending order of prevalence, were benzoic acid, cetylpyridinium chloride, parabens, sorbic acid, salicylic acid, benzyl alcohol, PE, triclosan, and benzalkonium chloride (BAC). Similarly, only 8 different preservatives were listed in eye care products: BAC, polyaminopropyl biguanide, sorbic acid, chlorhexidine, benzyl alcohol, PE, parabens, and chlorobutanol. BAC was the most common preservative, appearing in 28.24% (24/85) of eye care products. For the preservatives included in the most recent NACDG standard series (2011-2012), the prevalence of the preservative in CAMP and its current positive reaction rate were recorded (Table 3) and plotted (Fig. 1).

Notable Preservatives in Different Product Types

Benzoic acid, along with benzoic esters and salts, are emerging allergens in topical products and were found in 11.5% of CAMP products, including 52.16% of the shampoos in CAMP. Sulfites were found in 2.22% of CAMP products and 82% of these products were

hair dyes or prescription fading products. In the past, it was very difficult to find any facial makeup products which did not contain parabens.¹³ Currently, the only facial makeup category where more than 50% of CAMP products contain parabens is mascara (68%). Our data document a major industry change in facial makeup preservatives.

Dehydroacetic acid is a fairly common preservative found in 2.49% of CAMP products. Over 82% of products with this preservative are facial makeup products. BAC chloride was found in 2.15% of CAMP products, of which over half were eye products or

TABLE 3. Prevalence in CAMP and Positive Reaction Rate for Preservatives Tested in the NACDG Standard Series

Preservatives	Percent of Total Products	Positive Reaction Rates, %
Formaldehyde	0.11%	6.6
Quaternium-15	0.68%	6.4
MCI/MI	8.78%	5.0
Iodopropynyl butylcarbamate	4.05%	4.2
Diazolidinyl urea	2.93%	2.1
DMDM hydantoin	5.87%	1.6
Imidazolidinyl urea	1.12%	1.6
2-Bromo-2-nitropropane-1,3-diol	0.08%	1.6
Glutaraldehyde	0.00%	1.5
Parabens	20.75%	1.4
Chloroxylenol	0.19%	0.5
Benzyl alcohol	12.71%	0.4

This table provides the CAMP prevalence and positive reaction rates for the preservatives tested in the most recent NACDG core allergen series.¹² MDBGN and PE have been intentionally omitted from the table since the most recent NACDG data tests MDBGN/PE in combination rather than individually.

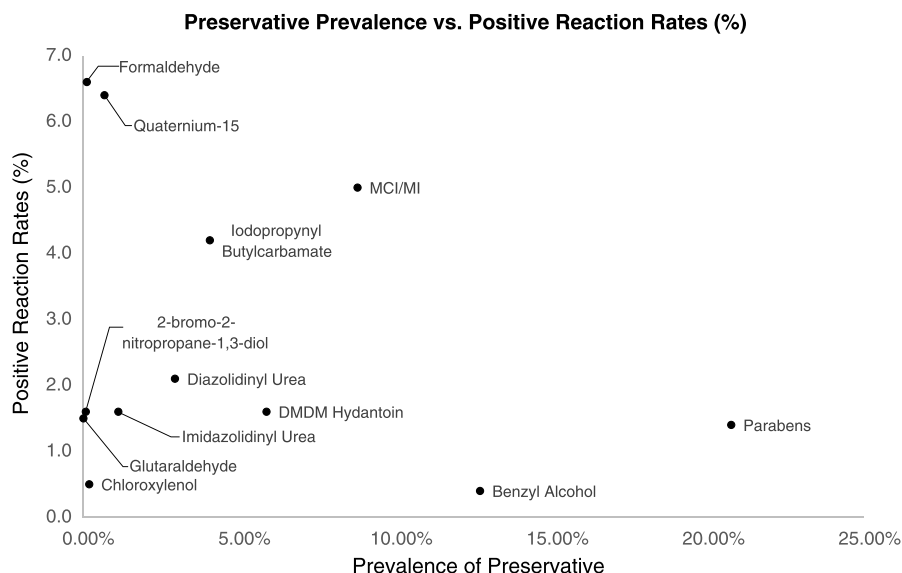


Figure 1. The plot illustrates the data provided in Table 3. Preservatives in the upper right quadrant (especially MCI/MI) are of the greatest concern as contact allergy hazards because these preservatives are both common in products and have a high incidence of ACD. Preservatives with a low incidence of contact allergy and a high prevalence in topical products (eg, parabens) are of the lowest concern.

OTC acne products. BAC chloride is also found in many antimicrobial wipes; however, these are not listed in CAMP because these products typically only list active ingredients and do not provide full ingredient lists. Chlorphenesin is found in 2.87% of CAMP products, of which most are either makeup products, moisturizers, or sunblock products. Cetrimonium chloride is a common preservative found in 3.82% of CAMP products, 86% of which are hair products.

Less Common Preservatives in CAMP Products

Fifteen of the EU and ASEAN approved preservatives were not found in any of the products in CAMP, and an additional 25 are found in less than 1% of CAMP products (Table 4). Because many of these have been reported as contact allergens in the literature, it is useful to note that contact allergy to these preservatives is not likely to be of concern. Glutaraldehyde, chloroacetamide, polyhexamethylene biguanide, benzylhemiformal, Bioban 1246, and orthophenylphenol were not identified in any CAMP products. Formaldehyde (0.11% of CAMP products) was only found in antiparasitic medications and nail strengtheners in CAMP but is also used in keratin hair straightening products (a product type not currently included in CAMP). 2-Bromo-2-nitropropane-1,3-diol (0.08%) usage is uncommon and only currently found in 4 CAMP products.

For chlorhexidine (0.89%), over 50% were hair products (conditioners, hair dyes, styling products). For polyaminopropyl biguanide (0.59%), another biguanide related to chlorhexidine, over 67% were contact lens products, sunblocks, or makeup removers. The majority of products containing triclosan (0.25%) surprisingly were not antimicrobial cleansers or “complete” toothpastes. For cetylpyridinium chloride (0.53%), 92% are oral care

products, especially mouthwash. Benzethonium chloride (0.57%) can be found as an active ingredient in antimicrobial cleansers/sanitizers and first aid products; however, this only accounts for 26% of its usage in CAMP products. Chloroxylenol (PCMX) (0.19%) was only found in nine assorted products but is also used in industrial hand cleansers which are not listed in CAMP. Parachlorometacresol (0.44%) was only found in 20 prescription topical steroids and 1 prescription topical antifungal.

The use of thimerosal (0.06%) and phenylmercuric acid (0.02%) as preservatives in prescription topical medications has decreased over the years; thimerosal was only found in 2 otic and 1 ophthalmic medications, whereas phenylmercuric acid was only found in 1 ophthalmic medication. Another preservative, chlorobutanol (0.06%), was also found exclusively in eye products. Zinc pyrithione (0.57%) was only found as an active ingredient in shampoos, conditioners, and soaps. Triclocarban was also found exclusively as an active ingredient in five deodorant cleansers. Formic acid (0.87%) is a common preservative in household products but otherwise was only found in 2 hair styling products. Hexamidine (0.34%) is also found mostly in household products but is also found in a few other topical products.

DISCUSSION

Preservatives in personal care products, medications, and household products are known causes of ACD. Phenoxyethanol was the most common preservative found in CAMP. Large epidemiological studies, such as those conducted by the NACDG, have historically tested PE in combination with MDBGN given it is most typically found in products as a 1:4 mixture of MDBGN/PE, also known by the trade name Euxyl K400.^{12,14–17} However, since its

TABLE 4. Preservatives Found in Less Than 1% of CAMP Products

Preservatives	No. Products (n = 4737)	Percent of Total Products
(1) Chlorhexidine	42	0.89%
(2) Formic acid	41	0.87%
(3) Quaternium-15	32	0.68%
(4) Polyaminopropyl biguanide	28	0.59%
(5) Zinc pyrithione	27	0.57%
(6) Benzethonium chloride	27	0.57%
(7) Cetylpyridinium chloride	25	0.53%
(8) 4-Chloro-m-cresol	21	0.44%
(9) Hexamidine	16	0.34%
(10) Sodium hydroxymethylglycinate	13	0.27%
(11) Triclosan	12	0.25%
(12) Chloroxylenol	9	0.19%
(13) Undecanoic acid	8	0.17%
(14) Piroctone olamine	8	0.17%
(15) Formaldehyde	5	0.11%
(16) Triclocarban	5	0.11%
(17) 2-Bromo-2-nitropropane-1,3-diol	4	0.08%
(18) Chlorobutanol	3	0.06%
(19) Thimerosal	3	0.06%
(20) Propionic acid	2	0.04%
(21) Hexamethylenetetramine	2	0.04%
(22) Phenylmercuric acid	1	0.02%
(23) Isopropyl-m-cresol	1	0.02%
(24) 1-Phenoxy-2-propanol	1	0.02%
(25) Methylidibromoglutaronitrile	1	0.02%
(26) 2,4-Dichlorobenzyl alcohol	0	0.00%
(27) 5-Bromo-5-nitro-1,3-dioxane	0	0.00%
(28) Benzylhemiformal	0	0.00%
(29) Bioban 1246	0	0.00%
(30) Bromochlorophene	0	0.00%
(31) Chloroacetamide	0	0.00%
(32) Chlorophene	0	0.00%
(33) Climbazole	0	0.00%
(34) Dibromohexamidine	0	0.00%
(35) Dimethyl oxazolidone	0	0.00%
(36) Ethyl lauroyl arginate	0	0.00%
(37) Glutaraldehyde	0	0.00%
(38) Hexetidine	0	0.00%
(39) Orthophenylphenol	0	0.00%
(40) Polyhexamethylene biguanide	0	0.00%

ban in the EU for leave-on and rinse-off products, MDBGN has been rarely encountered in the US market.^{7,18} Although dermatologists have started to patch test to PE alone in recent years, there remains no data estimating the reaction rates of PE alone. Previous studies have reported that MDBGN is the main sensitizing agent in Euxyl K400, and though PE has been implicated in hand dermatitis and contact urticaria, contact allergy to PE is extremely rare with a presumed low sensitization rate.^{17,19} One of the authors (A.S.) reports that of 1107 patients tested in his office from January 1, 2014, through June 30, 2016, only 1 (0.09%) tested positive to PE.

Despite being one of the oldest preservatives, parabens are still by far the most commonly used due to their high efficacy, low toxicity, low cost, and weak sensitizing power.⁶ The data collected from CAMP revealed that parabens were the second most common preservative in the database, and data reported by the NACDG show they are among the least sensitizing preservatives in commercial use (Table 3).¹² Given that parabens fall in the lower right quadrant of Figure 1, it is clear that they pose a very small risk of contact allergy despite their widespread usage. The Centers for Disease Control and Prevention used data from the National Health and Nutrition Examination Survey to show that parabens were detected in up to 99% of participants, depending on the type paraben.²⁰ Given their wide use and decreasing positivity rate over more than 2 decades, parabens remain the preferred choice of the NACDG among the common and effective preservatives.^{6,7,12} The CAMP data, as well as previous studies, show medications as a significant source of paraben exposure in the general population.²⁰

Of the preservatives plotted in Figure 1, those in the upper right quadrant, particularly MCI/MI, are of the greatest concern as contact allergy hazards since these preservatives are both common in products and have a high incidence of ACD. In the last decade, MI alone has become increasingly prevalent in the market, doubling in its use in cosmetics from 2007 to 2010.⁶ After several studies showed ACD to MI was likely missed by testing MCI/MI in combination, many institutions added MI alone to their standard screening series.^{21–23} Although sensitization data for MI in the United States remain to be published, several other countries and groups in Europe have reported increasing sensitization rates, starting between 0.6% and 1.9% in 2009 and jumping to between 3.8% and 4.4% in 2011.^{6,23} As of July 2016, MI is banned for use in leave-on cosmetics in the EU, and its concentration in rinse-off products has been restricted, further calling into question its safety and continued use in US products.²⁴ Aside from concentrations limits, no U.S. legislation restricts the use of MI in leave-on products.

According to the NACDG data, formaldehyde is the most common preservative allergen in the United States; 6.6% of patch tested patients are sensitive to this compound.¹² The use of free formaldehyde has been vastly reduced in personal care products since being classified as a carcinogen by the US Department of Health and Human Services in 2011.^{12,25} Incidentally, NACDG data have shown that the incidence of formaldehyde allergy has been decreasing, largely due to the replacement of free formaldehyde with FRPs.^{6,12,14–16} The CAMP data reflect these industry trends given that free formaldehyde was found in only 0.11% (5/4737) of products. Quaternium-15 was found in 0.68% (32/4737) of CAMP products, most commonly in makeup (50%, 16/32), skin care products (25%, 8/32), and medications (21.88%, 7/32). Despite its low prevalence, quaternium-15 has the second-highest positive reaction rate among preservatives tested, perhaps because it has the greatest potential for formaldehyde release, with 0.1% solution generating 100 ppm of free formaldehyde on average.^{6,12} Though both formaldehyde and quaternium-15 are present in few CAMP products, their high sensitization rates are still concerning.

The other FRPs tested in the NACDG standard series—diazolidinyl urea, DMDM hydantoin, imidazolidinyl urea, and 2-bromo-2-nitropropane-1,3-diol—have much lower positive reaction rates. Their frequency of use in CAMP products, as previously reported, was also lower than anticipated given prior reports on the use of FRPs, resulting in a cluster of these FRPs in Figure 1. Using data from the FDA's Voluntary Cosmetic Registration Program Database, a 2010 study determined that nearly one fifth of all cosmetic products contain a FRP.²⁶ The CAMP data revealed that almost 1 of every 10 products in CAMP contain at least 1 of the 5 most common FRPs. Recently, several large manufacturers (eg, Johnson & Johnson) have eliminated FRPs from their products, which could account for their decreased prevalence in CAMP.^{12,27} This may also explain the significant decrease in the rate of positive reactions from the previous decade for all FRPs as noted by the NACDG.¹²

The main limitation of this study is that the analysis only includes products in CAMP. Although CAMP strives to be a good representation of ingredient usage in the overall marketplace, it is possible that the product sampling in CAMP may not perfectly represent the marketplace as a whole. The inclusion of smaller, sometimes “hypoallergenic,” product lines in CAMP may also skew the data, as these products are specifically included for patients with known ACD. However, these products encompass only a small percentage of the overall products in CAMP.

A confounding factor in this analysis is multiple possible uses for certain chemicals. For instance, chemicals like salicylic acid are found in products as either preservatives or active ingredients. Though salicylic acid was found in 90 medications (n = 831) in CAMP, this may not accurately represent its prevalence as a preservative given that 72 of these medications are categorized as OTC acne/rosacea products in which this chemical likely serves as an active ingredient. Salicylic acid was also present in 88 skin care products (n = 1571), but 76 of these products are classified under product types that likely contain this chemical as an active ingredient (eg, antiaging/antiwrinkle/skin firming, soap/cleanser, and moisturizer). Still, salicylic acid is also found in other product types, including 22% of hair dyes listed in CAMP. Similarly, benzyl alcohol can be either a preservative or chemical fragrance. The Fair Packaging and Labeling Act does not require chemical fragrances to be disclosed on the ingredient label and can instead be referred to as a “fragrance,” resulting in chemicals, such as benzyl alcohol likely being underreported and complicating allergen avoidance for patients.²

CONCLUSIONS

Phenoxyethanol and parabens proved to be the most commonly encountered preservatives in the CAMP database. MCI and MI were also found in a significant proportion of CAMP products. Although formaldehyde and MDBGN were infrequent, FRPs were among the most common preservatives in the database, with 1 in 10 CAMP products containing at least 1 FRP. This study on the prevalence of preservatives in CAMP provides important

information on allergen exposures in various topical products, which is valuable to physicians and product manufacturers alike.

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