

[ORIGINAL RESEARCH]

Part 2 of a 4-part series

Hair Products: Trends and Alternatives

Data from the American Contact Alternatives Group

^aANDREW SCHEMAN, MD; ^bSHARON JACOB, MD; ^cRAJANI KATTA, MD; ^dSUSAN NEDOROST, MD;
^eERIN WARSHAW, MD; ^fMATT ZIRWAS, MD; MANPREET BHINDER, BS

^aNorthwestern University Medical Center, Chicago, Illinois; ^bUniversity of California San Diego, San Diego, California;

^cBaylor College of Medicine, Houston, Texas; ^dCase Western Reserve School of Medicine, Cleveland, Ohio;

^eUniversity of Minnesota Medical School; ^fOhio State University Medical School, Columbus, Ohio

Current data on the prevalence of known cosmetic allergens in cosmetic and skin care products is invaluable information for contact allergy specialists. Knowledge of current ingredient usage is instrumental in choosing relevant allergens for patch testing patients with suspected contact allergy to different types of topical products. In addition, knowledge of the most common potential allergens in each type of topical product allows the patch testing specialist to identify key alternative products that can be used by patients with proven contact allergy to skin, hair, and cosmetic products.

In this four-part series, the American Contact Alternatives Group (ACAG) provides data on the prevalence of cosmetic allergens on the American Contact Dermatitis Society core screening tray of 80 allergens in 5,416 skin, hair, and cosmetic products listed on the CVS website. From this data, suitable potential alternative products are listed for use by patients with proven contact allergy. Part 1 discusses facial cosmetic products, part 2 covers hair care products, part 3 discusses lip and oral care products, and part 4 covers miscellaneous categories of topical products. Two additional installments on moisturizers and cleansers will follow at a later date.

ABSTRACT

Objective: To provide updated data on usage of ingredients that are common potential contact allergens in several categories of hair products. To identify useful alternative products with few or no common contact allergens. **Design:** In November 2009, the full ingredient lists of 5,416 skin, hair, and cosmetic products marketed by the CVS pharmacy chain was copied from CVS.com into Microsoft Word format for analysis. Computer searches were made in Microsoft Word using search/replace and sorting functions to accurately identify the presence of specific allergens in each website product. **Measurements:** Percentages of American Contact Dermatitis Society core series allergens (and other common preservatives and sunblocks) were calculated. **Results:** The usage of American Contact Dermatitis Society core series allergens (and other preservatives and sunblocks) in hair products is reported. **Conclusion:** Data on allergens and alternatives for hair products is not widely published. This article reviews some of the common potential allergens in hair products, including shampoos, conditioners, and styling products. Suitable available alternative products for patients with contact allergy are listed. (*J Clin Aesthet Dermatol.* 2011;4(7):42–46.)

In November 2009, the American Contact Alternatives Group (ACAG) collected data from the CVS website,¹ which contains the full ingredient lists for 5,416 skin, hair, and cosmetic products marketed by this pharmacy chain. Evaluation of this data provides a large representative sample of the products currently being marketed in one major drugstore chain in the United

States and provides an excellent overview of the ingredients being used in products currently on the market. This type of data is important to help guide which allergens need to be tested in order to identify most cases of contact allergy to topical products. These data also allow easy identification of available alternative products for patients with contact allergy.

DISCLOSURE: The authors report no relevant conflicts of interest.

ADDRESS CORRESPONDENCE TO: Andrew Scheman, MD; E-mail: ajs@scheman.com

Finding alternative products free of specific allergens plays a crucial role in obtaining clinical improvement in patients with contact allergy. There have been several papers published previously that discussed contact allergy alternatives.²⁻⁵ Since the earliest articles only provided information for a small number of common allergens,²⁻⁴ information on contact allergy alternatives was sparse for most of the allergens on the North American Contact Dermatitis Group (NACDG) standard screening series. Therefore, ACAG was formed in order to provide periodically updated contact allergy alternatives for a wider array of contact allergens. ACAG has previously published alternatives information for all of the allergens on the 2007 NACDG standard screening tray.⁵

In 2010, the American Contact Dermatitis Society (ACDS) unveiled a recommended core screening tray of contact allergens that would identify a significant proportion of contact allergies.⁶ In this paper, ACAG discusses the ACDS core screening tray allergens found in various types of hair products and gives updated information on available hair products that can serve as alternatives for patients with contact allergy to cosmetic ingredients. Also, these products were screened for other preservatives and sunblock ingredients not found on the ACDS core series and for decyl glucoside (on the NACDG standard tray but not on the ACDS core series). When there was no alternative in the CVS database free of certain allergens, other suitable alternative products were located.

A total of 796 hair products were evaluated (279 shampoos, 231 conditioners, and 286 styling products). Table 1 gives an overview and comparison of the allergens found in these products. By far, the hardest allergen to avoid in hair products is fragrance, which was found in 97 percent of hair products evaluated. For patients who are not allergic to fragrance, numerous alternative products are available. In contrast, for individuals allergic to fragrance, only a few alternatives exist. If a patient is allergic to fragrance and a second common allergen, there may only be one or two available alternative products.

METHODS

In November 2009, the full ingredient lists of 5,416 skin, hair, and cosmetic products marketed by the CVS pharmacy chain was copied from CVS.com into Microsoft Office Word 2003 format for analysis. Comparison of CVS website data versus actual product labels showed an occasional discrepancy; however, the vast majority of the information is correct and provides an accurate analysis of overall trends in ingredient usage in various types of products found in CVS stores within a small margin of error. The authors chose to analyze the website data

TABLE 1. ACDS core allergens and other preservatives, sunblocks, and glucosides in hair products

SHAMPOOS	Fragrance (96%)
	Cocamidopropyl betaine (63%)
	Methylisothiazolinone/methylchlorisothiazolinone (52%)
	Cetylstearyl alcohol (36%)
	Formaldehyde releasers (34%)
	Propylene glycol (33%)
	DMDM hydantoin (30%)
	*Sodium benzoate (30%)
	Parabens (30%)
	Sorbitan sesquioleate (15%)
	Phenoxyethanol (12%)
	Vitamin E (11%)
	Cocamide DEA (11%)
	Iodopropynyl butylcarbamate (9%)
	Triethanolamine (8%)
	Rosin (7%)
	Benzophenone-4 (6%)
	*Decyl glucoside (6%)
	Sorbic acid (4%)
	Diazolidinyl urea (3%)
	*Benzoic acid (3%)
	Cinnamates (3%)
	Oxybenzone (3%)
	Lanolin (3%)
	Propolis (3%)
	Imidazolidinyl urea (2%)
	Quaternium 15 (1%)
	*Avobenzone (1%)
BHT (1%)	
CONDITIONERS	Fragrance (98%)
	Cetylstearyl alcohol (85%)
	Cocamidopropyl betaine (35%)
	Sorbitan sesquioleate (29%)
	Propylene glycol (28%)
	Vitamin E (26%)
	*Chlorhexidine digluconate (11%)
	Methylisothiazolinone/methylchlorisothiazolinone (9%)
	Lanolin (8%)
	Triethanolamine (8%)
Benzophenone-4 (5%)	

*Not on ACDS core series

TABLE 1 Continued. ACDS core allergens and other preservatives, sunblocks, and glucosides in hair products

CONDITIONERS (continued)	*Avobenzone (5%)	
	Rosin (4%)	
	Cinnamates (3%)	
	Oxybenzone (3%)	
	Propolis (3%)	
	*Benzoic acid (2%)	
	*Sodium benzoate (2%)	
	Cocamide DEA (2%)	
	*PABA (1%)	
	2-bromo-2-nitropropane-1/3-diol (1%)	
	BHT (1%)	
	STYLING PRODUCTS	Fragrance (97%)
		Propylene glycol (43%)
Cetylstearyl alcohol (22%)		
Sorbitan sesquioleate (22%)		
*Benzoic acid (21%)		
Benzophenone-4 (17%)		
Vitamin E (17%)		
Lanolin (14%)		
Triethanolamine (14%)		
Cinnamates (13%)		
Oxybenzone (9%)		
Methylisothiazolinone/methylchloroisothiazolinone (8%)		
*Sodium benzoate (7%)		
Cocamidopropyl betaine (5%)		
*Avobenzone (3%)		
Propolis (2%)		
BHT (2%)		
*PABA (1%)		
*Chlorhexidine digluconate (found in 1 product)		
Quaternium 15 (found in 1 product)		
Benzalkonium chloride (found in 1 product)		

*Not on ACDS core series

difficult to decide which additional ingredients to consider as possible cross-reactants. That is, the usefulness of alternatives information is only as good as the definitions that are programmed into the computer. The exact cross-reactant definitions used have not been stated in previously published articles on contact allergy alternatives.^{2-5,7} Unfortunately, there is limited data on allergen cross-reactants and therefore decisions regarding what to consider as potential cross-reactants is made using the best available information.

In this article, fragrance was defined as the presence of “fragrance,” “perfume,” any of the components of fragrance mix I or II (Chemotechnique, Malmo, Sweden), or any of the 26 fragrances required to be listed by name in Europe on product labels. In this article, fragrance also included essential oils, which were defined as any plant extract that is described in Wikipedia as having a fragrant odor that might qualify as a “natural” fragrance ingredient. For cocamidopropyl betaine, the authors considered betaines, sultaines, and dimethylamines (and related chemicals) to be possible cross-reactants. Lanolin components (e.g., lanolin acid, lanolin oil), “lanolates,” and wool wax derivatives were included as lanolin. For propylene glycol, any ingredients containing the exact words “propylene glycol” or “PG” were included as possible cross-reactants. “Rosinates,” abietic acid (and derivatives), and colophony were included as “rosin.” Potassium sorbate was included as sorbic acid. Cosmetic grade beeswax often contains propolis as an impurity and will be included as “propolis” in this discussion. The authors defined potential cross-reactants of sorbitan sesquioleate to include sorbic acid, sorbates, sorbitol, sorbitans, and polysorbates. The possible cross-reactants for cetylstearyl alcohol were the most problematic. The authors included cetyl alcohol, cetearyl alcohol, ingredients with the words “ceteth” or “ceteareth,” stearyl alcohol, stearic acid, and stearyl ingredients as possible cross-reactants, but not all stearates. Benzoic acid was defined to include all benzoates. Decyl glucoside was defined to include all glucosides.

Using the above definitions and known synonyms for individual allergens, computer searches were made in Microsoft Word using search/replace and sorting functions to accurately identify the presence of specific allergens in each website product. Recommended alternatives were chosen that had few ACDS core allergens. These were specifically checked for accuracy by author review of the product ingredient labels.

FRAGRANCE IN HAIR PRODUCTS

Fragrance was found in 97 percent of hair products evaluated (96% of shampoos, 98% of conditioners, 97% of styling products). Specific NACDG standard tray fragrance

“as is” to avoid researcher bias. However, since there were occasional errors in the CVS website data, all alternative products recommended in this article were rechecked for accuracy using the ingredient lists on the actual product label.

When writing about contact allergen alternatives or designing contact alternative databases,⁷ it is always

TABLE 2. Alternative hair products with few or no ACDS core series allergens

	PRODUCT	ACDS CORE ALLERGENS	OTHER ALLERGENS
SHAMPOOS	Aveeno Nourish + Moisture Shampoo	CPB, CSA, F, PH	—
	DHS Tar Shampoo	CD	—
	Free & Clear Shampoo (800-325-8232)	—	DG
	Herbal Essence Hydralicious Reconstructing Shampoo for Dry/Damaged Hair	F, MZ	BA, SB
	Loprox Shampoo (Rx)	—	—
	Magick Botanicals Shampoo (800-237-0674)	P	—
	Neutrogena T/Sal	CPB, PG	—
	Pert Plus Shampoo + Conditioner Medium	CSA, F, MZ	BA, SB
CONDITIONERS	Aveeno Nourish + Condition Leave-In-Conditioner	CSA, F, PG, PH	—
	Bumble and Bumble Super Rich Conditioner	CSA, F, P, PH	—
	DHS Conditioning Rinse (800-423-2341)	CSA	—
	Free & Clear Hair Conditioner (800-325-8232)	CPB, CSA, PG, SA, SS, VE	—
	Magick Botanicals Conditioner (800-237-0674)	CSA, P	—
STYLING PRODUCTS	Aveda Brilliant Anti-Humectant Pomade	F	—
	Biolage Gelee Firm Hold Gel	F, P, PG, PH, SS	—
	Cristophe Beverly Hills Volumizing Mousse	F, MZ	—
	Free & Clear Hair Spray Soft or Firm Hold (800-325-8232)	—	—
	Free & Clear Styling Gel	—	—
	Magick Botanicals Hair Spray (800-237-0674)	—	—
	Magick Botanicals Styling Gel	P, PG, T	—
	Pantene Pro-V Classic Unforgettable Hair Spray Non-Aerosol Maximum Hold	F	—
White Rain Classics Hair Spray Non-Aerosol Extra Hold Unscented	F	—	

BA=benzoic acid; CD=cocamide diethanolamine; CPB=cocamidopropyl betaine; CSA=cetyl stearyl alcohol; DG=decyl glucoside; F=fragrance; MZ=methylisothiazolinone/methylchloroisothiazolinone; P=parabens; PG=propylene glycol; PH=phenoxyethanol; SA=sorbic acid; SB=sodium benzoate; SS=sorbitan sesquileate; VE=vitamin E

allergens were sometimes noted on ingredient lists. Benzyl alcohol, d-limonene, and compositae extracts were common in all three product types. A few products contained peppermint, jasmine, tea tree oil, or lavender.

PRESERVATIVES IN HAIR PRODUCTS

In shampoos, the following preservatives (including ones that are not on the ACDS core tray) were identified. In descending order or frequency they were as follows: methylisothiazolinone/methylchloroisothiazolinone 52 percent, formaldehyde releasers 34 percent (DMDM hydantoin 30%, diazolidinyl urea 3%, imidazolidinyl urea 2%, quaternium 15 1%), parabens 30 percent, sodium

benzoate 30 percent, phenoxyethanol 12 percent, iodopropynyl butylcarbamate nine percent, sorbic acid 4 percent, and benzoic acid three percent (Table 1).

Table 1 also shows the corresponding percentages of preservatives in conditioners. Although the numbers are slightly different, the percentages of individual preservatives in conditioners are very similar to those seen in shampoos. There were a few notable differences. Sodium benzoate was found in 30 percent of shampoos but only two percent of conditioners. In contrast, chlorhexidine digluconate was not found in shampoos, but was found in 11 percent of conditioners. Also, there were no conditioners with quaternium 15; however, one percent contained 2-bromo-2-

nitropropane-1/3-diol (which was not in any shampoos).

In styling products, the general preservative trends were similar to those of shampoos and conditioners as seen in Table 1. Again, there were a few differences. Most notably, methylisothiazolinone/methylchlorisothiazolinone was found in 52 percent of shampoos and nine percent of conditioners, but only in eight percent of styling products. In contrast, benzoic acid was found in three percent of shampoos, two percent of conditioners, and 21 percent of styling products. Unlike shampoos, but similar to conditioners, only a small percentage of products (7%) contained sodium benzoate (vs. 30% of shampoos). Chlorhexidine digluconate, quaternium 15, and benzalkonium chloride were each found in only one product and 2-bromo-2-nitropropane-1,3-diol was not found.

SUNBLOCK INGREDIENTS IN HAIR PRODUCTS

Sunblocks are occasionally added to hair products to protect color-treated hair from fading too rapidly. The authors monitored for the presence of oxybenzone as well as several sunblocks not on the ACDS core tray (avobenzone, PABA and derivatives, and cinnamates). Since sunblocks will be most effective in leave-on products, they were found more commonly in styling products than in other hair products.

Benzophenone-4 was seen in 17 percent of styling products, but only six percent of shampoos and five percent of conditioners. Other sunblocks found were cinnamates (styling products 13%, conditioners and shampoos 3%), oxybenzone (styling products 9%, shampoos and conditioners 3%), avobenzone (styling products 3%, conditioners 5%, shampoos 1%), and PABA (styling products and conditioners 1%), as seen in Table 1.

OTHER ACDS CORE ALLERGENS IN HAIR PRODUCTS

Several other ACDS core allergens were found in hair products. They were as follows: cocamidopropyl betaine (shampoos 63%, conditioners 35%, styling products 5%), propylene glycol (shampoos 33%, conditioners 28%, styling products 43%), cetylstearyl alcohol derivatives (shampoos 36%, conditioners 85%, styling products 22%), sorbitan sesquioleate derivatives (shampoos 15%, conditioners 29%, styling products 22%), vitamin E (shampoos 11%, conditioners 26%, styling products 17%), cocamide DEA (shampoos 11%, conditioners 2%), triethanolamine (shampoos 8%, conditioners 8%, styling products 14%), rosin and derivatives (shampoos 7%, conditioners 4%), lanolin (shampoos 3%, conditioners 8%, styling products 14%), propolis (shampoos 3%, conditioners 3%, styling products 2%), and butylated hydroxytoluene (BHT) (shampoos 1%, conditioners 1%, styling products 2%). A NACDG standard tray allergen (not on the ACDS core tray), decyl glucoside, was found in six percent of shampoos.

A few trends are worth noting. Cocamidopropyl betaine and derivatives are found not only in shampoos but also fairly frequently in conditioners and styling products. Likewise, cocamide DEA is found in shampoos and some conditioners.

Although lanolin is found in all three types of products, it is found in a higher number of styling products, as would be expected since these products often contain emollient ingredients. Decyl glucoside (and lauryl or coco-glucoside) is found in shampoos only. Cetylstearyl alcohol derivatives are found frequently in conditioners, but fortunately are a relatively uncommon cause of contact allergy.

ALTERNATIVE PRODUCTS

Table 2 lists suitable alternative products for patients with contact allergy. Most of the listed alternative products are fragrance free since these are the most difficult alternatives to find.

SUMMARY

The overwhelming majority of hair products contain fragrance. Cocamidopropyl betaine is the second most common ACDS core allergen in shampoos and is commonly found in conditioners and styling products. The most common ACDS core preservatives are methylisothiazolinone/methylchlorisothiazolinone, DMDM hydantoin, and parabens; however, other formaldehyde releasers, iodopropynyl butylcarbamate, phenoxyethanol, and sorbic acid are also found in lesser frequency. Non-ACDS core preservatives (sodium benzoate, benzoic acid, and chlorhexidine digluconate) should also be considered in patients with suspected contact allergy. Benzophenone-4 is the most common sunblock in these products, but some contain oxybenzone, cinnamates, avobenzone, or PABA. Other ACDS core allergens to be considered are propylene glycol, vitamin E, cocamide DEA, rosin, lanolin, propolis, cetylstearyl alcohol (especially in conditioners), sorbitan sesquioleate, triethanolamine, and BHT. Finding alternatives for individuals with fragrance allergy is challenging, but some available alternatives are listed. One limitation of this study is that the data is specific to products found in CVS stores and the exact percentages of given ingredients in other stores may differ depending on their inventory.

REFERENCES

1. <http://www.cvs.com>. 1999–2011.
2. Adams RM, Fisher AA. Contact allergen alternatives: 1986. *J Am Acad Dermatol*. 1986;14:951-969.
3. Scheman A. Contact allergy testing alternatives: 1996. *Cutis*. 1996;57:235-240.
4. Scheman A, Katta R. Contact dermatitis alternatives: 2003. *Advances in Dermatology*. 2003;19:113-138.
5. Scheman A, Jacob S, Zirwas M, et al. Contact allergy: alternatives for the 2007 North American Contact Dermatitis Group (NACDG) standard screening tray. *Disease-a-Month*. 2008;54:1-156.
6. Warshaw E, Powell D, Pratt M, et al. ACDS Core Allergen Series Breakfast Symposium. 21st Annual Meeting of American Contact Dermatitis Society; March 4, 2010; Miami Beach.
7. Yiannias JA, Miller R, Kist JM. Creation, history, and future of the Contact Allergen Replacement Database (CARD). *Dermatitis*. 2009;20:322-326. ●