

Letter to the Editor

Is there a risk using hypoallergenic cosmetic pediatric products in the United States?

To the Editor:

Health care providers wisely advise the parents of children with atopic dermatitis (AD) to apply emollients to treat xerotic and inflamed skin. So-called hypoallergenic products are typically recommended because patients with AD have an elevated risk of contact allergy to fragrances, surfactants, and preservatives.¹⁻³ This is likely explained by more frequent allergen exposure via topical products in combination with an impaired skin barrier facilitating allergen penetration.⁴

Chronic exposure to contact allergens in cosmetics increases the risk of not only allergic contact dermatitis (ACD) but also AD.⁵ Repeated cutaneous exposure to skin sensitizers initially leads to ACD characterized by T_H1 inflammation, but then a gradual shift toward T_H2 inflammation, resulting in AD.⁴ In addition, AD skin has a specific initial propensity to T_H2 programming following exposure to contact allergens in contrast to the normal T_H1 programming in non-AD skin.⁶

Anecdotally, we have observed a lack of correlation between marketing terms highlighting hypoallergenicity or dermatologist/pediatrician-recommended status and the actual content of contact allergens in topical products. We therefore evaluated the allergen content of 187 unique pediatric cosmetics marketed in the United States as hypoallergenic. Inclusion criteria were products marketed as pediatric and “hypoallergenic,” “dermatologist recommended/tested,” “fragrance free,” or “paraben free.”

Products from 6 different retailers in and around Redlands, California, were purchased or photographed in September 2013. The ingredients, name, brand, type, and advertising term for each product were recorded. To identify contact allergens, the ingredients were compared with allergens in the North American Contact Dermatitis Group standard screening tray using a customized search algorithm programmed into Matlab 7.4 (Mathworks, Natick, Mass).

We found that 167 (89%) of the 187 products contained at least 1 contact allergen, 117 (63%) 2 or more, and 21 (11%) 5 or more (Table I). The average number of allergens in each product was 2.4 (95% CI, 2.05-2.51). The most prevalent single allergen was cocamidopropyl betaine, found in 45 (24%) followed by propolis/beeswax in 35 (19%), phenoxyethanol in 33 (18%), tocopherol in 25 (13%), and DMDM hydantoin in 24 (13%) (Table II).

TABLE II. Most prevalent allergens found in products analyzed

Allergen occurrences	n	Percent
Cocamidopropyl betaine	45	24.1
Beeswax/propolis	35	18.7
Phenoxyethanol	33	17.6
Tocopherol/vitamin E	25	13.4
DMDM Hydantoin	24	12.8
<i>Lavandula angustifolia</i> (lavender) extract	24	12.8
Methylisothiazolinone	21	11.2
Methylchloroisothiazolinone	20	10.7
Propylparaben	20	10.7
Decyl glucoside	19	10.2
Methylparaben	19	10.2
Propylene glycol	16	8.6
Oxybenzone	15	8.0
Benzyl alcohol	14	7.5
Benzoic acid	12	6.4
Limonene	12	6.4
Lanolin	9	4.8
Iodopropynyl butylcarbamate	8	4.3
Ethylparaben	7	3.7
Butylparaben	6	3.2
Chamomile extract	6	3.2
Quaternium-15	5	2.7
Arnica montana flower extract	4	2.1
Isobutylparaben	4	2.1
Cananga odorata (ylang ylang) flower oil	3	1.6
Geraniol	3	1.6
Balsalm of Peru	3	1.6
Citronellol	2	1.1
Green tea leaf extract	2	1.1
<i>Jasminum officinale</i> (jasmine) oil	2	1.1
Coumarin	3	1.6
Dipropylene glycol	1	0.5
Farnesol	1	0.5
Hexyl cinnamal	1	0.5
Peg-150 distearate	1	0.5
Polymethyl methacrylate	1	0.5
Yarrow extract	1	0.5

Of note, 11.2% of the products contained methylisothiazolinone. By allergen category, the most prevalent sensitizers were preservatives 108 (58%) and fragrances 55 (29%).

This study shows that “hypoallergenic” products marketed to American children frequently contain contact allergens,

TABLE I. Number of allergens in products according to the advertising term used

	Total n	Percent with ≥1 allergen (n)	Percent with ≥2 allergens (n)	Percent with ≥3 allergens (n)	Percent with ≥4 allergens (n)	Percent with ≥5 allergens (n)	95% CI*
All products	187	88.8 (166)	62.6 (117)	38.5 (72)	22.5 (42)	11.2 (21)	NA
By advertising term:							
Dermatologist recommended	66	78.8 (52)	50.0 (33)	21.2 (14)	9.1 (6)	3.0 (2)	73.8-83.8
Fragrance free	52	80.8 (42)	55.8 (29)	30.8 (16)	17.3 (9)	11.5 (6)	75.3-86.2
Hypoallergenic	135	88.2 (119)	65.2 (88)	42.2 (57)	23.7 (32)	11.1 (15)	85.2-90.9
Paraben free	72	88.9 (64)	56.9 (41)	29.2 (21)	18.1 (13)	5.6 (4)	85.2-92.6

NA, Not applicable/available.

*95% CI reflects the CI for % with 1 or more allergen.

potentially eliciting ACD and worsening AD. Interestingly, cocamidopropyl betaine and DMDM hydantoin found in 24% and 13% of the products, respectively, were recently identified as culprit allergens in patients with AD from an American patient cohort, suggesting that these chemicals indeed cause contact allergy in patients with AD.^{2,3} Alarmingly, methylisothiazolinone was found in 10% of the products. This very allergenic preservative was elected allergen of the year in 2013 by the American Contact Dermatitis Society and is about to be banned from cosmetics in the European Union because of the severe cases of ACD.⁷ Currently, the US Food and Drug Administration has no directives regulating the use of the term hypoallergenic. This is problematic because it then might prove very difficult for the parents of patients with AD to avoid applying personal care products that contain skin sensitizers. Obviously, physicians could emphasize to the parents of their patients with AD that they should read the ingredient label to limit exposure, and they could even provide lists of potent preservatives and fragrances. This is, however, a burdensome and complicated task for patients, and it is clear that confusion regarding the true meaning of marketing terms such as hypoallergenic and dermatologist recommended is the root of the problem if not regulated. Although our study does not provide information on use concentrations, we show that a high proportion of hypoallergenic pediatric personal care products in the United States contain contact sensitizers that not only increase the risk of ACD in children but also perhaps AD morbidity.

Carsten R. Hamann, BA^a
 Stewart Bernard, BS^a
 Dathan Hamann, MD^b
 Ronald Hansen, MD^c
 Jacob P. Thyssen, MD, PhD^d

From ^aLoma Linda University School of Medicine, Loma Linda, Calif; ^bthe Department of Internal Medicine, Division of Dermatology, The Ohio State University, Columbus, Ohio; ^cPhoenix Children's Hospital, Phoenix, Ariz; and ^dthe Department of Dermato-Allergology, National Allergy Research Centre, Copenhagen University Hospital Gentofte, Denmark. E-mail: hamann511@gmail.com.

Disclosure of potential conflict of interest: The authors declare that they have no relevant conflicts of interest.

REFERENCES

1. Herro EM, Matiz C, Sullivan K, Hamann C, Jacob SE. Frequency of contact allergens in pediatric patients with atopic dermatitis. *J Clin Aesthet Dermatol* 2011;4:39-41.
2. Shaughnessy CN, Malajian D, Belsito DV. Cutaneous delayed-type hypersensitivity in patients with atopic dermatitis: reactivity to topical preservatives. *J Am Acad Dermatol* 2014;70:102-7.
3. Shaughnessy CN, Malajian D, Belsito DV. Cutaneous delayed-type hypersensitivity in patients with atopic dermatitis: reactivity to surfactants. *J Am Acad Dermatol* 2014;70:704-8.
4. Thyssen JP, McFadden JP, Kimber I. The multiple factors affecting the association between atopic dermatitis and contact sensitization. *Allergy* 2014;69:28-36.
5. McFadden JP. The great atopic diseases epidemic: does chemical exposure play a role? *Br J Dermatol* 2012;166:1156-7.
6. Newell L, Polak ME, Perera J, Owen C, Boyd P, Pickard C, et al. Sensitization via healthy skin programs Th2 responses in individuals with atopic dermatitis. *J Invest Dermatol* 2013;133:2372-80.
7. Castaneda-Tardana MP, Zug KA. Methylisothiazolinone. *Dermatitis* 2013;24:2-6.

<http://dx.doi.org/10.1016/j.jaci.2014.07.066>