

Allergies to Cosmetic Ingredients

T. Bombeli, MD, BBA. Most individuals can use cosmetic products without difficulty. However, despite intensive efforts to formulate hypoallergenic products, there is a small percentage of people suffering from skin irritations and allergic contact dermatitis with cosmetic use. The overall frequency of dermatitis produced by cosmetics is difficult to determine. If the consumer experiences a reaction that is mild and transient, he/she will not usually seek medical attention, but simply stop using the suspected product. In addition to eczema, there is sometimes burning, stinging, or itching without visible skin lesions.

Major Allergens

There are 3 categories of cosmetic ingredients that induce allergies more often than others:

- Fragrances
- Preservatives
- Hair colorants & agents for permanent waves

Fragrances are the most frequent allergens, but specific allergen avoidance is complicated by the fact that manufacturers are not required to disclose the exact fragrance ingredients in products. Also, when a product lists essential oils, patients may not recognize this as fragrance.

Another important cause of contact dermatitis caused by cosmetics is the variety of preservatives added to the cosmetic products to maintain freshness. There are a number of preservatives used in cosmetics that can cause eczema in the sensitive consumer. For example, formaldehyde releasers are very frequent allergens.

Other important causes of contact allergy include the active agents in hair- and nail-care products such as those for permanent hair waves, permanent hair coloring, artificial nails, and nail polishes.

Fragrances

Fragrance is the most common cause of contact allergy caused by cosmetics according to the North American Contact Dermatitis Group (NACDG) 1998–2000 patch-test results. Fragrances can be naturally derived from plants or synthesized in laboratories. Although >5000 different fragrance chemicals are known, it is possible to identify up to 95% of fragrance allergic patients by testing the following 11 substances: cinnamic aldehyde, cinnamic alcohol, geraniol, eugenol, isoeugenol, oak moss absolute, alpha-amyl cinnamic alcohol, sandalwood oil, hydroxycitronellal, narcissus absolute, and ylang-ylang oil.

After a fragrance allergy is once established, the patient should avoid indefinitely all products that contain fragrances. If somebody is sensitive to only a single or a few fragrances, avoidance of those particular fragrances may allow the successful use of others. But again, because of the fact that fragrances are not required for package labeling, it is essentially impossible to knowledgeably avoid a particular fragrance.

Balsam of Peru

Balsam of Peru is a natural mixture of aromatic chemicals produced from a tree in Central America (*Myroxylon pereirae*). It has a pleasant odor from cinnamein, cinnamic acid and vanillin. Besides its use as fragrance it is also used as antibacterial, antifungal, and antiscabetic agent. Balsam of Peru contains also other allergens, such as benzoic acid, benzyl acetate, cinnamic alcohol, coniferyl alcohol, eugenol, cinnamic aldehyde, and methylcinnamate. Interestingly, patients sensitive to balsam of Peru have been found to be also allergic to certain spices, oranges, chocolate, Coca-Cola, cinnamon, and vermouth.

Botanicals

Little has been reported about allergic reactions to botanicals. However, with the current popularity of botanicals in cosmetics, more reports will surely be seen. In the dermatological literature cases with allergic dermatitis have been reported with aloe vera, arnica, Asiatic pennywort, lavender, tea tree, peppermint, cucumber, rosemary, sage, stinging nettle tea, chamomile tea, and witch hazel. Although many people think that allergies are primarily related to synthetic ingredients, allergic reactions can also occur with any natural ingredient independent on its processing (e.g. plant extracts, essential oils, herbal powders).

Sunscreens

Several sunscreen agents on the market are capable of producing contact dermatitis. In the past, paraaminobenzoic acid (PABA), was the most common sensitizer. As a result, PABA is currently used in only few sunscreen products. Today, oxybenzone (benzophenone-3) is the most commonly reported sunscreen sensitizer with 0.6% of persons reacting. Avobenzone is a less frequent cause of allergic reactions. Derivatives of PABA, benzophenones, cinnamates, and dibenzoyl-methanes can all cause photo-allergic dermatitis (allergy that occurs only upon sun exposure).

Allergens in Hair Care Products

The active agents in hair care products, including hair colorants and permanent waves, are the third most common source of allergic reactions to cosmetic products. One of the most common allergen is paraphenylenediamine (PPD), a chemical used for permanent hair colorants. Up to 5% of all women show allergic reactions to PPD. Once the hair colorant is fully developed, PPD is no longer an allergen. Therefore, patients sensitive to PPD will recover from their allergies once PPD is oxidized and do not need to cut their hair. The agents used in permanent waves are also an important cause of dermatitis. Glyceryl thioglycolate is found in acid (heat) permanent waves used exclusively by salons and can cause allergies in 2.0% of test persons. Ammonium thioglycolate is the chemical in alkaline permanent wave products intended for home use and can also cause dermatitis. Patients who react to glyceryl thioglycolate permanent solutions can typically tolerate ammonium thioglycolate-based perms and vice versa.

How to Test

It often becomes necessary to test persons who have allergic reactions to cosmetics. A widely used allergen patch skin test with a series of allergens is the TRUE Test®. It is applied on the back and then the results (local skin reactions to the allergens) are read after 48h. The test includes the 23 most common allergens as: nickel sulfate, wool alcohols, neomycin sulfate, potassium dichromate, caine mix, fragrance mix, colophony, paraben mix, balsam of Peru, ethylenediamine dihydrochloride, cobalt dichloride, p-tert-butylphenol formaldehyde resin, epoxy resin, carba mix, black rubber mix, Cl+Me- Isothiazolinone, quaternium-15, mercapto-benzothiazole, p-phenylenediamine, formaldehyde, mercapto mix, thimerosal, and thiuram mix.

Sources:

Marks JG, et al. American J Contact Dermat 2003;14:59
Ortiz KJ, et al. Dermatologic Therapy 2004;17:264

NACDG* List of Most Frequent Allergens

Balsam of Peru	12.3 %
Fragrance mix	11.7 %
Thimerosal	10.8 %
Formaldehyde	9.3 %
Quaternium-15	9.0 %
p-Phenylenediamine	4.9 %
p-Aminobenzoic acid	3.2 %
2-Bromo-2-nitropropane-1,3-diol	3.1 %
Imidazolidinyl urea	2.5 %
Lanolin alcohol	2.4 %
Glyceryl thioglycolate	2.0 %
DMDM hydantoin	1.9 %
Kathon CG	1.4 %
Toluene sulfonam. formaldeh. resin	1.3 %
Methyl methacrylate	1.3 %
Parabens	1.0 %
Oxybenzone	0.6 %

*North American Contact Dermatitis Group