

Acute Allergic Contact Dermatitis of the Lips from Peppermint Oil in a Lip Balm

Anh Tran, Melanie Pratt, and Joel DeKoven

The etiology of cheilitis is often not readily apparent. We present a case series of four patients with allergic contact cheilitis (ACC) secondary to exposure to peppermint oil contained in a lip balm product. These patients developed eczematous dermatitis involving their lips and perioral skin. They were tested with the North American Contact Dermatitis Group standard series as well as with an expanded series of flavoring agents, sunscreens, plant and fragrance components, and their own products. The lip balm contained potential sensitizers such as propolis, lanolin, coconut oil, almond oil, peppermint oil, and vitamin E. Our patch-test results showed that peppermint oil was the most likely culprit in these patients' ACC. Peppermint oil is less commonly reported as causing ACC than are more common contactants such as balsam of Peru or nickel sulfate. However, with the widespread use of lip balms containing peppermint oil, more cases of peppermint oil-induced ACC may be expected.

ALLERGIC CONTACT DERMATITIS of the lips is more common in women than in men. This is most likely because women use more cosmetic products such as lipstick.¹ We report on four patients with acute allergic contact dermatitis (ACD) of the lips. Lip ACD (ie, allergic contact cheilitis) is usually caused by lip cosmetics² and flavoring agents. Acute allergic contact cheilitis (ACC) presents with erythema, edema, and papulovesicular eruptions on the areas of contact and often spreads to the perioral regions. Reviews have been extensively done on the lipstick ingredients.²⁻⁴ Shah and colleagues assembled a comprehensive list of possible allergens that should be considered when patients with oral symptoms are patch-tested (Table 1).⁵

Our case analysis focuses on a lip balm containing peppermint oil that is widely used. This lip balm contains numerous potential sensitizers, such as peppermint oil, lanolin, beeswax and propolis, vitamin E, and rosemary extract, along with coconut oil, almond oil, sunflower oil, and comfrey root extract. We present four cases of ACC after the use of this lip product.

From the Division of Family Medicine, McMaster University, Hamilton, Ontario, Canada; the Division of Dermatology, University of Ottawa, Ottawa, Ontario, Canada; and the Division of Dermatology, Department of Medicine, University of Toronto, Toronto, Ontario, Canada.

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Case Reports

The first patient was a 56-year-old male who used Burt's Bees Beeswax Lip Balm (Burt's Bees, Durham, NC), Aveeno Daily Moisturizing Lotion (Johnson & Johnson Inc., New Brunswick, NJ), and other lip products and who developed ACC. The second patient was a 14-year-old female who experienced two episodes of ACC while using the same Burt's Bees lip balm; she had a family history of atopy. The third patient was a 41-year-old female who used Burt's Bees Beeswax Lip Balm, Burt's Bees Res-Q Ointment, and Burt's Bees Hand Salve; she experienced two episodes of ACC, in December 2006 and February 2007. The last patient was a 43-year-old female with 6-month history of cheilitis who used three different Burt's Bees lip products (lip balm, lipstick, and lip shimmer).

The Burt's Bees Beeswax Lip Balm contained the following: peppermint oil, beeswax, lanolin, tocopheryl acetate, tocopherol (vitamin E), coconut oil, sunflower oil, comfrey root extract, and rosemary. The Burt's Bees lipstick and Burt's Bees lip shimmer also contained peppermint oil, beeswax, lanolin, and vitamin E.

All of the patients developed erythematous, edematous, papulovesicular, and eczematous dermatitis involving their lips and perioral skin (Fig 1). The third patient's allergic reaction was more extensive, involving her cheeks, jaw, chin, ears, and neck. The patients' eruptions evolved into scale and fissuring, healing with postinflammatory hyperpigmentation. Clinical evaluations took place in the spring and summer of 2007, after the episodes had resolved.

The first three patients were tested with the North American Contact Dermatitis Group (NACDG) standard

Table 1. Patch-Test Series Allergens for Testing Patients with Oral Symptoms

Preservatives	Dental	Medicaments
Chlorocresol	Benzoyl peroxide	Gentamicin
Chloroxylenol	Mercury (elemental)	Chloramphenicol
Imidazolidinylurea	Potassium dicyanoaurate	Betamethasone-17-valerate
Butylated hydroxytoluene	Methyl methacrylate	Hydrocortisone-17-OH-butyrate
Butylated hydroxyanisole	Hexachlorophene	Clobetasol propionate
Sorbic acid*	Hydroquinone	Tixocortol pivalate
Triclosan	Procaine HCl	Triamcinolone acetonide
Propylene glycol	Cinchocaine HCl	Achromycin ointment
Propolis†	Anethole	Fucidin ointment
Perfumes and flavors	n,n-Dimethyl-p-toluidine	Soframycin ointment
Cinnamyl alcohol	Ethylene glycol dimethacrylate	Bakery
Cinnamaldehyde	Triethylene glycol dimethacrylate	Vanillin
Eugenol	Bisphenol A glycidyl dimethacrylate	Sodium benzoate
α-Amyl-cinnamaldehyde	(Bis-GMA)	Menthol
Hydroxycitronellal	Amalgam	Cinnamyl alcohol
Geraniol	Tetracaine HCl	Cinnamaldehyde
Isoeugenol	Lidocaine HCl	Anethole
Oak moss absolute	Metals	Benzoic acid
Benzyl salicylate	Sodium thiosulfatoaurate	Propionic acid
Clove oil	Ammoniated mercury	Octyl gallate
Orange oil	Ammoniated tetrachloroplatinate	Dipentene
Vanillin	Palladium chloride	Ammonium persulfate
Benzaldehyde	Copper sulfate	Propyl gallate
Benzylcinnamate	Aluminium chloride	Dodecyl gallate
Cedarwood oil	Tin (elemental)	Vehicle, emulsifier, and facial
Eucalyptus oil	Cadmium chloride	Hydrogenated lanolin
Laurel oil	Zinc (elemental)	Amerchol L-101
Lemongrass oil	Silver nitrate	Triethanolamine
Lemon oil		Sorbitan sesquiolate
Neroli oil		Cetylstearyl alcohol
Peppermint oil		
Salicylaldehyde		

Adapted from Shah M et al.⁵

HCl = hydrochloride.

*5-Chloro-2-methyl-4-isothiazolin-3-one + 2-methyl-4-isothiazolin-3-one.

†Not included in the original table.

screening series (Chemotechnique Diagnostics AB; Malmö, Sweden); the sunscreen series, flavoring and fragrance agents, and plants series (all from Chemotechnique Diagnostics); and their own products, including Burt's Bees Beeswax Lip Balm. Finn Chambers (Epitest Ltd Oy, Tuusula, Finland) affixed with Scanpor tape (Norgesplaster Alfarma A/S, Vennesla, Norway) were used. All three patients tested positive to their own Burt's Bees products, ylang ylang oil, and peppermint oil 2% in petroleum. The second and third patients were positive to Compositae mix. Reactions for all patients were read at 48 and 96 hours, according to guidelines established by the International Contact Dermatitis

Research Group.⁶ We tested the last patient with the European Standard series (Chemotechnique) and other allergens (just as with the other three patients) using Finn Chambers and Scanpor tape. She had positive results for peppermint oil and the Burt's Bees products (lipstick, lip shimmer, and lip balm) (Table 2) (Fig 2).

Discussion

Common sensitizers involved in the development of ACC are usually found in cosmetics, oral hygiene products, medicaments, and flavoring agents.⁷ Allergens mentioned in the literature concerning ACC include nickel sulfate,

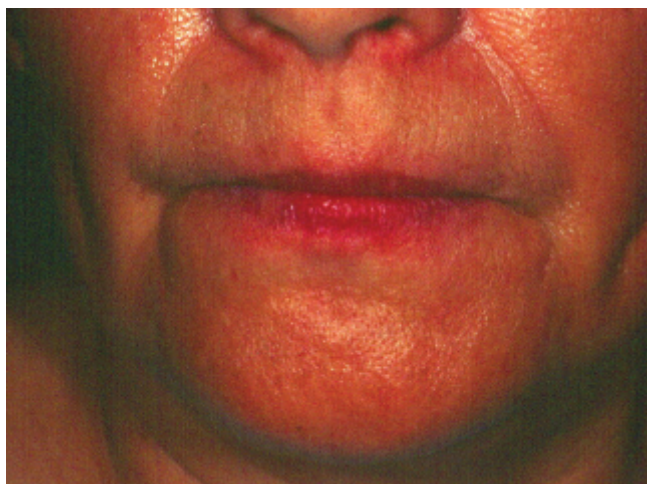


Figure 1. Chronic ACC (patient #4).

thimerosal, cobalt chloride, balsam of Peru, and fragrance mix.^{7,8} Peppermint oil, beeswax, coconut oil, vitamin E, lanolin, comfrey root extract, rosemary, and colophony have not been reported as common allergens associated with ACC.¹

Peppermint oil, a common ingredient in lip balms, belongs to the family of plants that includes *Mentha x piperita*, a type of perennial flower.⁹ The oil can be extracted from different parts of the plants, such as stems and leaves.⁹ Peppermint oil contains mainly menthol and menthone^{10,11} and is often used as a flavoring or fragrance agent.^{9,11} It also cross-reacts with balsam of Peru.¹² All four patients had positive reactions to peppermint oil, rendering this allergen the most likely culprit in their ACC.

Peppermint oil is often found in cosmetic and oral hygiene products such as facial cleansers, lipsticks, body splashes, body lotions, and toothpastes. Historically, it has been considered a safe ingredient.¹¹ Dermal irritation



Figure 2. Positive patch tests to peppermint oil and peppermint-containing lip balms (Patient #4).

secondary to peppermint oil application has been studied.^{11,13} Dermal absorption is known to be rapid, especially due to the menthol component of the oil.¹¹ Peppermint oil has been reported to cause immediate^{11,14} and delayed contact reactions.¹¹ Doooms-Goossens and colleagues reported a case of ACD of the lips and oral mucosa from peppermint oil that was induced by turpentine oil.¹⁵ ACC induced by peppermint oil has also been reported by large dermatologic centers.⁴ Besides peppermint oil, various food additives have been reported to cause ACC. Lewis and colleagues reported five cases of ACC from menthol, dodecyl gallate, butylated hydroxyanisole, and octyl gallate, in addition to peppermint oil.¹⁶ The gallates can be found in margarines, fats, pastries, and cosmetics.

Many lip balms contain beeswax, which is obtained from the honeycombs of bees. The composition of the beeswax varies depending in the type of bees. Sensitization

Table 2. Patch-Test Results of Four Patients

Patient 1	Patient 2	Patient 3	Patient 4
BB lip balm, +++	BB lip balm, +++	BB lip balm, +++	BB lipstick, ++
Peppermint oil, +++	Peppermint oil, +++	BB Res-Q Ointment, +++	BB shimmer, +
Ylang ylang oil, +	Ylang ylang oil, +++	BB Hand Salve, +++	BB lip balm, +
Rosin (colophony), +	Compositae mix, +++	Peppermint oil, +++	Peppermint oil, +
	Colophony, +++	Ylang ylang oil, +++	MCI/MI, +
	Balsam of Peru, +	Compositae mix, ++	
		Nickel, +++	
		Cobalt, +++	
		Lavender, +++	
		Balsam of Peru, +	

BB = Burt's Bees; MCI/MI = methylchloroisothiazolinone/methylisothiazolinone.

to this substance was reported once in the literature.¹⁷ Sometimes, beeswax products are contaminated with propolis. Whether Burt's Bees beeswax is purified or contaminated with propolis is not known. Contact sensitization to pine beeswax is rare; most reported cases are due to beeswax contamination by propolis.^{17,18}

Propolis is the resinous lipophilic secretion of poplar,¹⁸ birch, and willow buds, extracted by bees to build their hives. Also known as "bee glue," it is different from beeswax. Bees use propolis to seal and repair the hives.¹⁹ The main allergenic components in propolis are 3-methyl-2-butenyl caffeate and phenylethyl caffeate. Numerous cases of ACD from propolis are reported in the literature.¹⁹ Hausen and colleagues reviewed cases of propolis-induced allergy that occurred after cosmetic use.²⁰ There are a few reported cases of ACC from propolis in the literature.¹⁸ In January 2007, the NACDG included propolis in the standard screening series. Of interest, Shah and colleagues did not list propolis in their table of oral allergens (see Table 1).⁵ We believe that the inclusion of propolis to the Shah series is justified on the basis of the existing literature.

Colophony, also known as rosin, is a natural residue derived from distilling the volatile oil of oleoresin, which comes from plants of the Pinaceae family (eg, pine trees).¹² There are three types of colophony: gum rosin (turpentine oil and gum rosin residue), wood rosin, and tall oil rosin. Colophony consists of 90% resin and 10% neutral products.¹² Cross-reactions between turpentine oil, balsam of Peru, propolis, and fragrance mix have been reported.¹² Colophony can cause ACC.⁸ Our first and second patients both were positive to colophony. However, colophony is not a listed ingredient in the Burt's Bees lip balm. Propolis cross-reacts with colophony; beeswax, which is often contaminated with propolis, is a component of the lip balm. It is possible that our first two patients could have reacted to propolis in the beeswax and that colophony could just be a cross-reactor.^{12,17,18}

Sunflowers contain sesquiterpene lactones (SLs), a part of the Compositae mix. Sunflower oil is an ingredient in the Burt's Bees lip balm. Our second and third patients reacted positively to Compositae mix. Extracts from Compositae (also known as Asteraceae) plants are widely found in cosmetics and medicinal products.¹² Many species are represented in the Compositae mix; *Arnica* and German chamomile have been studied best epidemiologically.²¹ Compositae mix has been reported to yield positive reactions in patch-tested patients with ACC.¹⁰ It is unclear whether sunflower oil contained in the lip balm has residual extracts of SL.

Vitamin E (tocopherol acetate) is a known potential contact sensitizer.^{12,22} It is a lipophilic antioxidant and has been used for many years. In 2005, Thiele and colleagues reviewed the clinical use of vitamin E in dermatology.²³ It was noted that ACD from vitamin E is rare and that both tocopherol and tocopherol acetate are considered safe for skin care products. However, the NACDG has found that the incidence of sensitization to vitamin E has been increasing.¹ Tocopherol acetate is found in the Burt's Bees lip balm and may be incorporated into a number of lip care products and cosmetics. Vitamin E has been reported to cause widespread ACD on the body, including a case involving the face, penis, and extremities. However, the literature has reported no cases of ACC due to vitamin E.

Lanolin is often used in cosmetics as an emulsifier or emollient and is present in the Burt's Bees lip balm. The potential sensitizers in lanolin are wool-wax lanolin alcohols.² The wool wax is derived from the secretions of the sebaceous glands of sheep.²⁰ Lanolin is a common ingredient in lipstick known to cause ACC² although irritant reactions may also be possible.²⁴

Comfrey root extract has been used for many years for wound healing.¹² Comfrey (*Symphytum officinale*) has antiinflammatory and analgesic properties.^{25,26} There are no reports in the literature showing that it could cause ACC.

Rosemary (*Rosmarinus officinalis*) is a plant from the labiate family, which includes mint, sage, thyme, and lavender. It is used in cosmetics and for medicinal purposes.¹² ACC from rosemary has been reported.²⁷⁻²⁹

Balsam of Peru is derived from the sap of the tree *Myroxylon pereirae* and contains 250 components.¹² This substance has been reported more frequently than other ingredients listed in the Burt's Bees lip balm to cause ACC.¹ The NACDG reported it to be the third most common clinically relevant allergen identified from 2001 to 2004 for patients with positive patch-test reactions for ACC.¹ In 2000, Lim and Goh reported on 12 patients with ACC who had positive patch-test reactions to this allergen.⁷ Balsam of Peru cross-reacts with peppermint oil¹² and could be a contributing cause of ACC in our second and third patients.

Our second patient was positive to lavender, which was present in her Burt's Bees Res-Q Ointment and Burt's Bees Hand Salve. Lavender is not an ingredient in the lip balms.

Ylang ylang oil comes from the flowers of *Cananga odorata* and is a common allergen in Asian populations. There are few reports in the literature that link ylang ylang oil to cases of ACC.¹² Of interest, three of our four patients reacted to it on patch testing. However, it should be noted that ylang ylang oil is not an ingredient in Burt's Bees lip

products or any of their other products. It is also not known to cross-react with other substances; therefore, it does not appear to have clinical relevance with respective to Burt's Bees products.

Conclusion

Peppermint oil is found in many oral hygiene products and cosmetics. We have reported on four patients in whom acute contact cheilitis (ACC) was likely in large part due to a contact allergy to peppermint oil in a lip balm. The role of peppermint oil as a potential allergen should be considered when patients with suspected ACC are patch-tested.

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