

## Patch Testing to Essential Oils

Solveig L. Hagen, BA,\*†‡ Katherine R. Grey, BA,\*†‡  
and Erin M. Warshaw, MD, MS†‡§

### PRECIS

We present 2 cases of clinically relevant contact allergy to ylang-ylang oil and sandalwood oil.

### DISCUSSION

The first patient is a 55-year-old woman who presented with a 1-year history of dermatitis that began on her right medial calf after a shave biopsy. She subsequently developed an infection at the biopsy site and began treatment with MelaGel (Melaleuca Inc, Idaho Falls, Ind), an unknown over-the-counter antibiotic cream, and an unknown prescription antibiotic ointment. She developed a periincisional red, indurated, weepy plaque, which subsequently spread to involve her lateral leg (Figs. 1A–C). Additional treatments included lavender oil, Cortisone-10 Ultra Moisturizing Cream (Sanofi, Chattanooga, Tenn), desonide 0.05% cream, and an over-the-counter 1% hydrocortisone cream. The patient reported using other essential oils on her skin as well in an aromatherapy diffuser (Figs. 1D–G). The patient noted previous thin-layer rapid use epicutaneous tests with unknown results.

The second patient is a 39-year-old woman who presented with a 1-year history of dermatitis that began on the anterior shins and was treated with a variety of essential oils in coconut and sweet almond carrier oils. Her dermatitis initially improved but then flared again after a vacation during which she used essential oils (Figs. 2A–D). The patient developed bilateral eyelid swelling and pruritus, which spread to involve her right ear and drained clear fluid. Flares had involved the nasal ala, neck, face, and legs, and she had required 2 courses of oral steroids. Additional treatments included triple antibiotic ointment, desonide 0.05% gel, and desoximetasone 0.25% ointment. She used an aromatherapy diffuser at home and applied essential oils to herself and family members.

From the \*University of Minnesota Medical School; †HCMC Parkside Occupational and Contact Dermatitis Clinic; ‡Department of Dermatology, Minneapolis Veterans Affairs Medical Center; and §Department of Dermatology, University of Minnesota Medical School, Minneapolis, MN.

Address reprint requests to Solveig Hagen, Dept 111 K, 1 Veterans Dr, Minneapolis, MN 55417. E-mail: hagen333@umn.edu.

This study was supported in part by the Minneapolis Veterans Affairs Medical Center. The authors have no funding or conflicts of interest to declare.

The contents of this publication do not represent the views of the Department of Veterans Affairs or the US Government.

DOI: 10.1097/DER.0000000000000207

© 2016 American Contact Dermatitis Society. All Rights Reserved.

Both patients were tested to the North American Contact Dermatitis Group screening series (70 haptens) as well as other relevant series and personal products including essential oils. The results are summarized in Table 1.

These cases illustrate clinically relevant contact dermatitis to a variety of essential oils and fragrances including ylang-ylang and sandalwood oils. Relevant positive reactions may have been missed had we not directly inquired about essential oil use and tested to the patients' personal products, including essential oils and homemade cosmetics.

Essential oils are incorporated in a variety of medicinal, personal care, household, and food products.<sup>1</sup> Distillation of essential oils dates back to the Catalan physician, Arnald de Villanova (1235–1311).<sup>2</sup> Although essential oils have deep historical roots, there has been a modern resurgence of their use and popularity. In our experience, patients report contact with essential oils in diverse settings including home, work, hospitals, and exercise and wellness facilities. There is a growing market for essential oils, and many essential oil retailers also promote complementary consumer goods such as essential oil-containing cosmetics and household products, wellness coaching, and club memberships. Many of the personal care products that our patients reacted to were homemade cosmetics with essential oils or products that contained a variety of botanicals and fragrances purchased from essential oils retailers.

The North American Contact Dermatitis Group screening series includes 4 essential oils (tea tree oil, lavender oil, peppermint oil, ylang-ylang oil), 1 absolute (jasmine absolute), and several fragrance-related allergens.<sup>3</sup> Although both patients reacted to additional fragrance markers, these chemicals do not consistently detect fragrance allergy.<sup>4</sup> Without testing to auxiliary series and personal products, many relevant reactions would have been missed.

### PEARL

As the use of essential oils grows, it is increasingly important not only to obtain a history of exposure to these potential allergens but also to patch test with these products.

### REFERENCES

1. de Groot AC, Schmidt E. Essential oils, Part I: introduction. *Dermatitis* 2016;27(2):39–42.
2. Guenther E. *The Essential Oils - Vol 1: History - Origin In Plants - Production - Analysis*. New York, NY: Read Books Limited; 2013. <https://books.google.com/books?hl=en&lr=&id=cTN9CgAAQBAJ&pgis=1>. Accessed April 10, 2016.
3. Cheng J, Zug KA. Fragrance allergic contact dermatitis. *Dermatitis* 2014; 25(5):232–245.
4. Uter W, Geier J, Zug K, et al. Contact sensitivity to essential oils in consecutive patients – results from North America and Central Europe. Abstract submitted to European Society of Contact Dermatitis; September 14–17, 2016; Manchester.

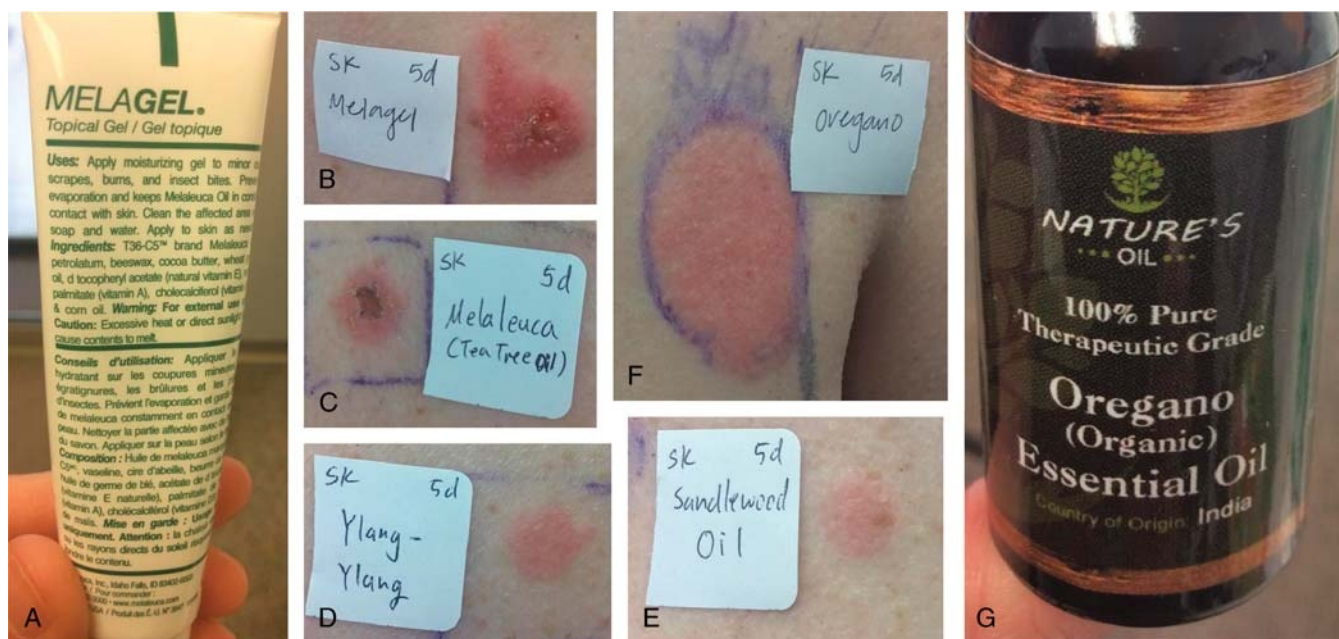


**Figure 1.** Photo of patient's personal product, a tea tree oil-containing topical gel. Photos of day 5 patch test results depicting an extreme (3+) reaction to patient's MelaGel and extreme (3+) *Melaleuca alternifolia* (tea tree) oil (A–C). Photos of day 5 patch test results depicting strong (2+) reactions to ylang-ylang oil and sandalwood oil (D, E). Photos of day 5 patch test results depicting a strong (2+) reaction to oregano essential oil and photo of patient's personal product, an oregano essential oil (F, G).

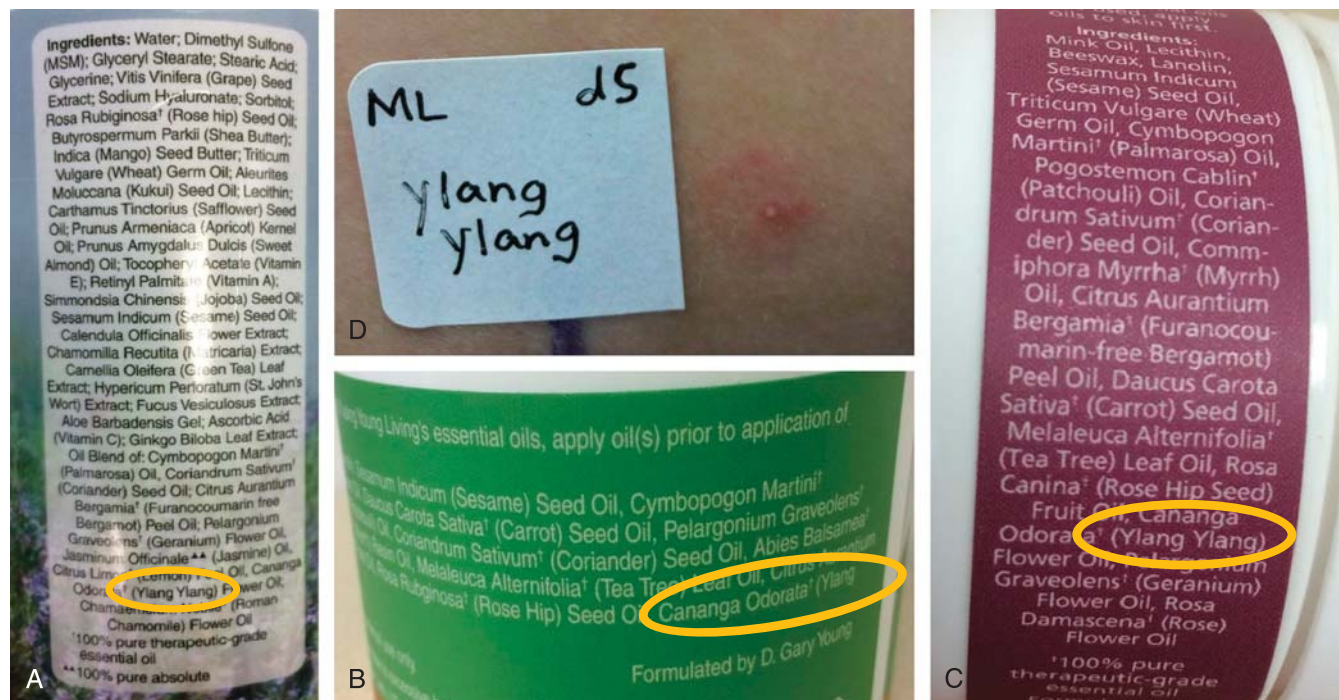


**Figure 2.** Photos of patient's personal products purchased from an essential oils retailer (a lavender body lotion, an aroma silk genesis body lotion, and rose ointment), all containing ylang-ylang oil (A–C). Photo of day 5 mild (1+) reaction to ylang-ylang oil (D).

**TABLE 1. Positive Patch Test Results to Botanicals**

| Allergen: Essential Oils, Botanicals, Fragrances                                                 | S.K. <sup>*</sup> (Day 5) | M.L. <sup>†</sup> (Day 5) |
|--------------------------------------------------------------------------------------------------|---------------------------|---------------------------|
| Animal Scents Ointment, tested as is (PP)                                                        | NT                        | +                         |
| Aroma Silk Genesis body lotion, tested as is (PP)                                                | NT                        | +                         |
| Bacitracin, 30% pet                                                                              | ++                        | Neg                       |
| Balsam of Peru, 25% pet                                                                          | +                         | Neg                       |
| Balsam of Tolu, 10% alc                                                                          | ?                         | +                         |
| Benzyl salicylate, 2% pet                                                                        | Neg                       | ?                         |
| Cinnamic alcohol, 2% pet                                                                         | Neg                       | ?                         |
| Cinnamic aldehyde, 1% pet                                                                        | Neg                       | +                         |
| Cobalt, 1% pet                                                                                   | ++                        | Neg                       |
| Colophony, 20% pet                                                                               | ++                        | Neg                       |
| Compositae mix, 6% pet                                                                           | +                         | +                         |
| Formaldehyde, 2% aq                                                                              | Neg                       | ?                         |
| Fragrance mix I, 8% pet                                                                          | Neg                       | +                         |
| Fragrance mix II, 14% pet                                                                        | Neg                       | +                         |
| German Chamomile oil, tested semiopen (PP)                                                       | NT                        | +                         |
| Homemade lotion with essential oils, tested as is (PP)                                           | NT                        | +                         |
| Homemade purification moisturizer with peppermint and lavender essential oils, tested as is (PP) | NT                        | ++                        |
| Hydroperoxides of limonene, 2% pet                                                               | +++                       | +                         |
| Ladybug Hair Care Mint Spray, tested as is (PP)                                                  | NT                        | ?                         |
| Lavender hand and body lotion, tested as is (PP)                                                 | NT                        | +                         |
| Lemon essential oil, tested semiopen (PP)                                                        | +                         | NT                        |
| Lemon grass oil, 2% pet                                                                          | ?                         | ?                         |
| Lemon grass oil, tested semiopen (PP)                                                            | NT                        | ?                         |
| MelaGel, tested as is (PP)                                                                       | +++                       | ++                        |
| <i>M.alternifolia</i> (tea tree) oil 5% pet                                                      | +++                       | Neg                       |
| Neomycin sulfate, 20% pet                                                                        | ?                         | Neg                       |
| Oregano essential oil, tested semiopen                                                           | ++                        | Neg                       |
| Propolis, 10% pet                                                                                | Neg                       | ?                         |
| Purell Hand Sanitizer, tested as is (PP)                                                         | ?                         | NT                        |
| Rose Ointment, tested as is (PP)                                                                 | NT                        | +                         |
| Sandalwood oil, 2% pet                                                                           | ++                        | Neg                       |
| Thieves Waterless Hand Purifier, tested as is (PP)                                               | ++                        | NT                        |
| Treasure of the Season oil, tested semiopen (PP)                                                 | NT                        | ?                         |
| Triple antibiotic ointment, tested as is (PP)                                                    | ++                        | NT                        |
| Ylang-ylang oil, 2% pet                                                                          | ++                        | +                         |

? indicates doubtful (macular erythema).

+ indicates mild (erythema and infiltration, possible papules).

++ indicates strong (edematous or vesicular).

+++ indicates extreme (spreading, bullous, ulcerative).

\*Pertinent negative results included vehicle and corticosteroid panels. Previous positives that were not retested included *p*-tert-butylphenol formaldehyde resin, nickel, thimerosal, and gold.

†Pertinent negative results included preservative, plants/woods, and vehicle panels.

NT indicates not tested; Neg, negative; and PP, personal product.