

MYROXYLON PEREIRAE (BALSAM OF PERU)

The modern usages of *Myroxylon Pereirae* include 3 major applications in the pharmaceutical, fragrance and flavoring industries.

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Allergic contact dermatitis (ACD) is an important disease that notably affects 14.5 million Americans each year.¹ The economic impact of this disease is high in terms of both patient morbidity and loss of income, school and work, not to mention significant expenditures for visits to healthcare providers and for medicaments. A correct diagnosis of ACD will improve, prevent or “cure” the dermatitis and decrease overall costs to the healthcare system.¹ Once patch testing is performed and a culprit has been identified, education becomes the critical intervention to ensure adherence to an avoidance regimen. With allergen avoidance, remission of the dermatitis ensues. If patients are unable to comply with the avoidance regimen, they become at risk for recurrent

or sustained dermatitis or progression to a systematized presentation.^{2,3}

The 2 main types of contact dermatitis are irritant and allergic, with irritant contact dermatitis (ICD) being the most common. ICD may occur in anyone who is exposed to an irritating substance with significant duration or in significant concentrations such as chronic or frequent water exposure, abrasive cleansers, detergents and soaps. It is important to note that ICD can at times precede or be a concomitant diagnosis with ACD.^{4,5} ACD is a delayed-type-IV hypersensitivity reaction that can occur due to a large number of chemicals from poison ivy to fragrances in shampoos. The evaluation of ACD fits well with theranostic theory, as the epicutaneous patch test diagnostic evalua-

tion dictates the avoidance management in each individual patient.

Although ACD is not “curable,” many individuals will achieve complete remission with assiduous avoidance. In this article, we highlight ACD and explore top relevant allergens, regional-based dermatitis presentations, topic-based dermatitis presentations and clinical tips and pearls for diagnosis and treatment. This article will focus on *Myroxylon pereirae* (MP).

MYROXYLON PEREIRAE: A BRIEF HISTORY

MP, aka balsam of Peru (BOP), has remained 1 of the 5 most prevalent allergens detected by both the thin-layer rapid use epicutaneous (TRUE) test and the North American Contact Dermatitis Group over the last decade.^{6,7} Notably, the first cutaneous allergic manifestation was described by Mögling in 1880, well after it had been used in Europe for over 300 years.⁸

BOP was so named because it was originally shipped to Europe from the port of Callao in Peru; however, the tree does not grow in Peru. This tree is native to present day El Salvador⁹ and goes by a number of other names (**Table 1**). The sap was so highly prized as a sacramental ointment by the Spanish clergy that a papal decree was issued in 1562 that forbid the destruction of the balsam trees. Notably, since the times of the Incan Empire, the balsam extracts have been used to relieve bronchitis, colds, coughs, fevers and infections. The Aztecs were among the first to cultivate the tree in their royal gardens make to compresses with the mashed leaves to speed the healing of wounds.¹⁰

MODERN UTILIZATION

The modern usages of MP include 3 major applications in the pharmaceutical, fragrance and flavoring industries. Notably, because of its mild bactericidal action and capillary-bed stimulant effects, MP is widely used in topical medicines for wounds, burns and hemorrhoids. In the fragrance industry, MP (or a cross-reacting derivative) may be used in a variety of consumer products from aftershave lotions, baby diaper salves and powders to deodorants, fragranced bathing products, hair products, perfumes and sunscreens (**Table 2**). MP

may also be found in “flavored” tobacco, coffees and teas, and in a significant number of foods.

THE COMPOSITION OF *MYROXYLON PEREIRAE*

MP is a dark brown, complex viscous fluid that is exuded from the wounded mature *Myroxylon balsamum* tree. El Salvador, the main exporter of BOP, produces approximately 50 metric tons annually. The vanilla and cinnamon aroma can be attributed to the volatile cinnamyl oils (which contain cinnamates, eugenol and vanillin), a combination of cinnamic acid, benzoyl cinnamate, benzoyl benzoate, benzoic acid and nerolidol.¹¹ Several potential contact allergens exist within MP and can be grouped into the cinnamyl oils, benzoic acid derivatives and coniferin derivatives.²

While the MP extract can be found in wound healing preparations and diaper salves, it is not commonly added to cosmetic products,¹² rather derivatives (eg, benzyl alcohol) or chemically related

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cross-reactors may be.¹³ Because of this, it is considered a marker for fragrance allergy. Unfortunately, for some patients, avoidance of fragrance alone may not control their dermatitis (especially when it is systematized) and a low-balsam diet may be warranted.^{3,14} The low-balsam diet is based on eliminating foods high in MP constituents such as eugenol, cinnamates, vanillin and benzoic acid derivatives, such as citrus fruits, tomatoes and condiments (Table 3).

Hausen et al identified distinct subgroups of allergens in MP and suggested a specific screening series to more accurately identify the allergic component specific to the patient and better guide avoidance^{2,13,14} (Table 4).

MYROXYLON PEREIRAE DERIVATIVES IN FOODS

Tomatoes are the most common relevant/provocative food item that triggers flares in MP-sensitized patients. They contain eugenol, cinnamates, ferulic acid and coniferin alcohol and should

Table 1. OTHER NAMES FOR *MYROXYLON PEREIRAE*

Balsamum peruvianum
Black balsam
China oil
Honduras balsam
Indian balsam
Peru balsam oil
Surinam balsam
Toluifera Pereira balsam
Reference: DermNet NZ. http://dermnetnz.org/dermatitis/balsam-of-peru-allergy.html . Accessed February 25, 2014.

be avoided by patients allergic to these subgroups.¹⁵ In the culinary arts, they are used for soup bases, sauces and in condiments, such as ketchup, barbeque and steak sauce.¹⁶

Citrus peel from cumquats to grapefruits, limes and oranges may be used in the production of marmalade, candies and garnishes. Citrus peel represents the second most commonly reported food

source leading to flare-up dermatitis in MP-sensitized individuals. It contains cinnamates and ferulic acid.¹⁷

Cinnamon is one of the top provocateurs reported by MP-sensitive patients. It specifically contains eugenol, cinnamates and benzoates.¹⁷ Cinnamon is used in sweet foods, such as pastries, cereals, candies, cookies, cakes, pies and muffins. Cinnamon is used as a seasoning for savory dishes and meats, and can also be added to teas, hot chocolate and rum.¹⁷

Chocolate contains significant amounts of the MP-derivatives: eugenol, cinnamates and vanillin. It is used as a sweetener, a drink and a glaze for chicken and is an industry in itself. Cola contains the same MP-derivatives as chocolate (namely eugenol, cinnamates and vanillin) and contains ferulic acid. It is known for its use as a soda beverage, where notably the MP-derivate sodium benzoate is added as a preservative and also as a marinade for meats.¹⁷

Table 2. EXAMPLES OF PRODUCTS CONTAINING OR CROSS-REACTING WITH *MYROXYLON PEREIRAE*

Hemorrhoidal ointment and suppositories such as Anusol (MP)
Butt Paste (MP)
Calamine lotion
Cough medicine, lozenges
Crest Whitening Expressions toothpaste (cinnamon)
Dental cement
Granulex wound healing ointment (MP)
Minus-Sol sunscreen (cinnamates)
Xenaderm wound healing ointment (MP)
Tiger balsam (clove oil)
Tincture of benzoin
Reference: DermNet NZ. http://dermnetnz.org/dermatitis/balsam-of-peru-allergy.html . Accessed February 25, 2014.

Table 3. OVERVIEW OF LOW-BALSAM OF PERU DIET³

Products that contain citrus fruits
Flavoring agents (mentholated)
Spices (cinnamon, cloves, vanilla, curry)
Chocolate
Wine, beer, vermouth
Ice cream
Cola and spiced sodas
Tomatoes and products containing tomatoes
Chili, pizza, red sauces

Table 4. SUBGROUP COMPONENTS OF *MYROXYLON PEREIRAE*^{13,14}

Benzoic acid derivatives
Cinnamates
Coniferins
Eugenol
Ferulic acid derivatives
Vanillin

Cloves are the dried flower buds of *Syzygium aromaticum*, which contain eugenol and vanillin. They are used in the preparation of curries, marinades, sausage, pies, pickles and cigarettes. Clove oil is also used in synthetic vanilla.¹⁷

Vanilla bean and/or extract are commonly used to flavor desserts, in smoothies and teas and as a counterpoint to tomatoes and chili peppers in Latin cuisine.¹⁷ Vanilla contains vanillin and benzoic acid.

SENSITIZATION AND TESTING TO
MYROXYLON PEREIRAE

The 3 most commonly reported sites of MP-induced dermatitis are the hands, face and anogenital regions. That said, it has been reported in association with an MP-anti-scabetic ointment⁸ and leg ulcerations.¹⁸ Furthermore, an increasing number of ACD reactions to MP have been seen in infancy and childhood, likely due to an increased use of perfumes and baby care products containing fragrances.^{19,20}

Patch testing for MP allergy can be accomplished with the commercially available patch test device (TRUE Test, Smartpractice USA) or through standard comprehensive testing systems (Allergeaze and Dormer).

Cross-reactions with MP may occur to colophonium (rosin), fragrance mix 1, balsam of Tolu, wood and coal tars, resorcin monobenzoate, turpentine, propolis, coniferyl benzoate and benzoin (Table 2). Occupations at risk for sensitization include dentists (dental cement), bakers (flavoring agents), beekeepers (to beeswax), painters (turpentine), violinist (rosin) and laboratory technicians (fixatives used in the preparation of histology slides).

PRACTICALS OF PATCH TESTING

As discussed, patch testing is often necessary to confirm the diagnosis of ACD and to identify the relevant allergen(s) responsible. Screening patch test trays are available, which isolate the most common chemicals and offer the provider clues for potential sources. The American Contact Dermatitis Society (ACDS) Standard Series includes 80 allergens from several different categories,²¹ additional supplemental trays are also available.²² When it comes to MP, patch testing with the constituents and cross-reactors may increase the chance of demonstrating a relevant positive reaction and allow for more specific avoidance instructions.²³

PEARLS OF TREATMENT: EVERY DOSE COUNTS

A person might be exposed to and subsequently sensitized to a contact allergen (eg, a fragrance) for days to years before demonstrating the clinical picture of ACD. With each exposure, there is an increased risk of reaching a point

at which the immune system meets its metaphorical “threshold” and subsequent exposures can lead to elicitation of a cutaneous response.²⁴ Just as repeated contact over time led to this immune response, repeated avoidance of the majority of exposures over time will be required to induce remission.

Avoidance of specific allergens in personal care products can prove to be a tedious task; however, there are programs available to aid in this endeavor. Both the Contact Allergen Management Program, a service offered through the ACDS,²⁵ and the Contact Allergen Replacement Database, developed by Mayo Clinic,²⁶ allow for a provider to enter a patient’s known contact allergens, and produce a “shopping list” of products void of those particular chemicals. The programs also can exclude cross-reactors. Additionally, education for patients can be accessed through online programs, such as mypatchlink.com²⁷ and through the ACDS website. ■



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Disclosure: Dr. Jacob is an investigator for the safety and efficacy trial of the SmartPractice Thin-layer Rapid Use Epicutaneous (TRUE) Test in children and adolescents.

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