THE LANOLIN-WOOL WAX ALCOHOL UPDATE

The 4 characteristics of lanolin contribute to the difficulty in determining its relevance as an allergen.

SHARON E. JACOB, MD

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, an estimated economic cost of $3 billion per year[1]. 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. Quality of life is improved with correct identification of the offending allergen(s), especially when the dermatitis is present for less than 3 years.[1] 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]

Contact dermatitis is commonly separated into 2 main categories based on the type of exposure – either irritant or allergic. Irritant contact dermatitis (ICD) is the most common cause of contact dermatitis and may occur in anyone who is exposed to the irritant with significant duration or in significant concentrations. Common irritants include 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] Unlike ACD, ICD can occur on the first exposure with an irritating or abrasive substance. Contact urticaria (wheal and flare reaction), on the other hand, represents the least prevalent form of CD. It is important to note that it is an immune-mediated phenomenon whose hallmark is an IgE and mast cell-mediated immediate-type hypersensitivity reaction. We acknowledge this form of hypersensitivity due to the severity of the potential deleterious anaphylactic type reactions and direct the reader to key sources.[6,7]

The most common sites of ACD are those with the most common contact with the allergen-containing topical products or source, such as the hands, face and scalp, though any body region may preferentially develop an ACD reaction, or ICD for that matter. At times, another primary dermatosis is present and an ACD occurs as a secondary phenomenon due to symptomatic treatment with a myriad of topical products, as can occur with lanolin.

Confirming diagnosis of ACD is done with the epicutaneous patch test procedure. Once a patient's spectrum of allergy is defined, education regarding their specific set of chemicals and products to avoid is crucial. Although ACD is not "curable," many individuals will achieve complete remission with assiduous avoidance. ICD, on the other hand, does not have a specific diagnostic procedure, but it is "curable" through com-

plete avoidance of the inciting agent(s). Correct identification of ACD and/or ICD is essential for successful long-term management of dermatitis. 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.

FOCUS ON LANOLIN

The history of "wool wax" dates back several thousand years to the ancient Greeks, who were the first to recognize that water in which wool had been washed contained a valuable oilated substance. That substance, wool wax, derived from the sebaceous glands of sheep was found to be an outstanding emollient. It was referred to by several names including Hyssopus, Oesypum and the most common form Oesypus.

Over time, refining methods for "purifying" lanolin were developed. Early on, the extraction process of wool wax was simply a version of the modern foam flotation process. The wool washings were poured from a height into a receptacle, so that the wool wax formed as a froth-foam that could then be skimmed off and allowed to collapse, separating the wool wax to the surface. Technical advancements included acid cracking, which destabilized and separated the wax into a lower sludge state that could be filtered, and a method based on the addition of metals in the trivalent state to cause wax coagulation. Finally, it was the centrifugal separator that brought the extraction procedure into the new millennium, which has remained the preferred modern method of extraction.[8]

HOW IT IS USED

Lanolin is routinely found in a wide range of products from metal lubricants and rust preventers to skincare emollient, wound care products and a vehicle for topical therapeutics (**Table 1**). This has lead to lanolin making the "A-List" for top allergens.[9,10]

SENSITIZATION AND TESTING

Lanolin continues to be a significant sensitizer. Specifically, there is a high prevalence of delayed-typed hypersensitivity to lanolin in patch tested pediatric populations.[11] Also, there are a number of factors, which can affect the ability to properly gauge the frequency of sensitization. One factor is that lanolin is a bio-product whose lipid composition may vary based on the origin of the product; for example, the type of sheep and their habitat.[12] Furthermore, several lanolin derivatives exist which further confound the difficulty in identifying the responsible component (**Table 2**). False negative reactions may occur on intact skin. Both contribute to what is known as the 'lanolin paradox.'[9,13]

Notably, Matiz et al reported 2 patients who had negative reactions to the commercially prepared lanolin preparations: one to Thin-layer Rapid Use Epicutaneous (Allerderm; Phoenix, AZ) and one to Allergeaze (Calgary, AB, Canada), but positive reactions to the lanolin 30% in petrolatum attained from Beiersdorf, in addition to the patient's own AHO product.[14] **Testing with the patient's own products**, at the same time as patch testing lanolin 30% in petrolatum and amerchol L101 50% petrolatum **may be necessary to rule out lanolin causation** of ACD.[5] Furthermore, Miest et al discuss the fact that "the exact frequency of ad-

Table 1. POTENTIAL PRODUCTS CONTAINING WOOL ALCOHOLS (LANOLIN)

Cosmetics products: eyeliner, eye shadow, foundations, lip balms, lip sticks, make-up removal creams, mascara
Emollient products: creams, lotions, ointments
Hair removal preparations, shaving creams, after shave creams
Nail polish removers
Healing salves: diaper creams, nipple creams, hemorrhoid preparations

Table 2. LANOLIN DERIVATIVES

Degras
Glyceridic oils
Lanolin alcohol
Wool alcohols
Wool wax

LANOLIN PARADOX

"Adapted from Fisher's 'paraben paradox,' the lanolin paradox describes 4 characteristics of lanolin that contribute to the difficulty in determining its relevance as an allergen. First, lanolin-containing topical medicaments tend to be more sensitizing than lanolin containing cosmetics. Second, patients with ACD after applying lanolin-containing topical medicaments to damaged or ulcerated skin often can apply lanolin-containing cosmetics to normal or unaffected skin without difficulty. Third, false negative patch test results often occur in lanolin sensitive patients. Fourth, patch testing with a single lanolin containing agent (lanolin alcohol [30% in petrolatum]) is an unreliable and inadequate method of detecting lanolin allergy."[5]

verse reactions to lanolin in the general population is difficult to assess because most individuals with such reactions simply discontinue use of the suspected trigger and seldom consult physicians. In addition, proponents of lanolin as a relevant allergen suspect that contact allergy to lanolin is under-diagnosed because clinicians are not testing with the appropriate type or number of lanolin derivatives."[12]

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 isolate the most common chemicals and offer the provider clues for potential sources. The American Contact Dermatitis Society (ACDS) North American Standard Series includes allergens from several different categories, which are available to healthcare providers;[15] however, supplemental trays are also available.[16] The idea behind using supplemental allergens is that by including constituents and cross-reactors of the allergen in question, the chance of demonstrating a relevant positive reaction is greater.[17] In summary, these chemicals and products may overcome a threshold for reactivity.

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.[18] 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,[19] and the Contact Allergen Replacement Database, developed by Mayo Clinic,[20] 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.com[21,22] and through the ACDS website. ■

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Sharon E. Jacob, MD

Dr. Jacob, the Section Editor of Allergen Focus, is a Pediatric Contact Dermatitis Specialist at Rady Children's Hospital – UCSD in San Diego, CA.

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