

a shared common allergen in these three products causing an allergic contact dermatitis.

Case Report

A 25-year-old healthy, atopic female patient presented with a story of the sequential use of three self-tanning products in the winter of 2007; she was on no medication. Instead of getting a bronzed skin, she developed an itchy, red, scaly rash at the sites of application. The skin lesions typically appeared 1–2 days after the use of the self-tanning products. On cessation of these creams, the rash cleared within a few days.

Initial patch testing with the European baseline series (Trolab[®]; van der Bend, Brielle, the Netherlands; 2-day occlusion, readings on D2 and D3) and the three suspected self-tanning products produced positive reactions to all three self-tanning products (all ++, International Contact Dermatitis Research Group grading criteria), in addition to a known contact allergy to fragrance mix (+) and cobalt chloride (++) . Because all three self-tanning products contained dihydroxyacetone (1,3-dihydroxy-2-propanone, CAS 96-26-4), a contact allergy to this substance was suspected (1). Additional patch testing to all separate ingredients of two of the three self-tanning products produced ++ reactions with indurated erythema with some small papules and micro-vesicles (2D occlusion, readings D2 and D3 by HJB) to 7% and 10% aqueous dihydroxyacetone solutions. These were the dilutions present in the two self-tanning products. All other tested ingredients of products, 42 in total, were negative.

Contact dermatitis to self-tanning products

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Self-tanning products are available as bronzing creams that do not require ultraviolet light to obtain a darker skin. We here describe a patient who used three different self-tanning creams, resulting in eczematous areas on the skin. This raised a suspicion to

Discussion

The investigated self-tanning products all shared one common agent, dihydroxyacetone, which is responsible for the bronzing effect. Only one clinical report of contact dermatitis because of this particular agent exists (1). However, a recent study showed that dihydroxyacetone may cause severe contact dermatitis in Mexican hairless dogs after prolonged exposure (2).

Dihydroxyacetone is a triose carbohydrate (Fig. 1). It is a white powder, with a sweet cooling taste and a characteristic odour. It is derived by the fermentation of glycerine (3).

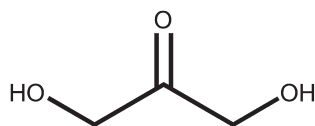


Fig. 1. Chemical structure of dihydroxyacetone.

Dihydroxyacetone was first coincidentally recognized as a skin colouring agent in the 1920s by German scientists. In the 1950s, Wittgenstein and colleagues further studied dihydroxyacetone and introduced the substance as an oral drug for children with a glycogen storage disease. Nurses, pharmacists, and treated children noticed a discoloured skin after accidental dihydroxyacetone exposure on the skin (3–5).

Topical agents containing dihydroxyacetone are safe and effective in camouflage treatment of vitiligo (6, 7). However, there is no proven photoprotective effect of the melanoidins created by dihydroxyacetone in vitiligo.

Studies have shown that the artificial bronzing effect of dihydroxyacetone is non-toxic and depends on a reaction between dihydroxyacetone and amino acids of the keratin of the stratum corneum: the so-called Maillard reaction. The resulting pigments are called melanoidins. This pigmentation effect does not penetrate beyond the stratum corneum (8, 9). Perhaps, this is a reason that the prevalence of dihydroxyacetone contact allergy is relatively low. However, penetration into the epidermis is necessary to obtain a type IV allergic contact reaction.

Contact dermatitis to dihydroxyacetone has been reported only once in human and once in hairless dogs (1, 2). Most described cases of contact allergy to tanning products are because of other ingredients in the tanning product preparation, such as preservatives, plant extracts, dyes, sunscreens, or fragrances. However, the present case clearly illustrates that dihydroxyacetone is a potential contact allergen that should be considered when encountering skin reactions to self-tanning products, especially when there are reactions to multiple tanning products.

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