

Contact allergy to capryloyl salicylic acid

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Searching for the cause of cosmetic dermatitis by testing the ingredients of suspected products is often rewarded by the identification of a rare or previously unreported allergen as the culprit.

Case Reports

Patient 1

A 63-year-old woman presented to one of us (T.R.) with dermatitis of the face that had started 3 months earlier. She was advised to stop the use of her cosmetic products,

and was treated with a corticosteroid cream, after which the facial eruption quickly subsided. Patch tests were performed with the European baseline series, a cosmetic series, and her personal cosmetic products. There were positive reactions to both a day and a night cream of the same brand and type, tested undiluted (both: D2, +; D3, +; D6, +). Later, the patient was again patch tested with these cosmetic products and with their ingredients, obtained from the manufacturer. The night cream again gave positive reactions (D2, ?+; D3, +; D4, +), as did the day cream (D2, +; D3, +; D4, +). In addition, there were positive patch test reactions to capryloyl salicylic acid 1% in alcohol, which was tested twice, as it was present in both creams (both: D2, +; D3, +; D4, +). There was no reaction to capryloyl glycol 1% pet. or to any other ingredient. The patient has remained free of dermatitis since stopping the use of these products.

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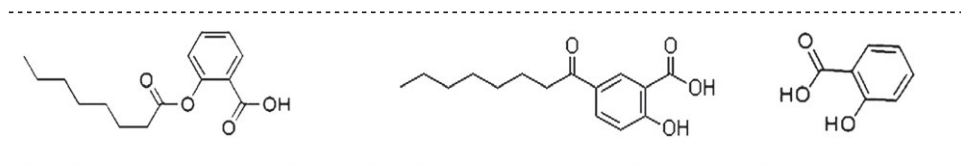


Fig. 1. Structural formulas. (a) Capryloyl salicylic acid (CAS no. 70424-62-3) as indicated by CosIng and the CAS database. (b) Capryloyl salicylic acid (CAS no. 78418-01-6) as indicated by most chemical databases and (6). (c) Salicylic acid (2-hydroxybenzoic acid).

Patient 2

A 44-year-old woman presented to one of us (T.R.) with dermatitis of the face that had started 6 months earlier. Previously, the patient had experienced a facial eruption several times, and she was suspected to be allergic to fragrances. Patch tests were performed with the European baseline series, a cosmetic series, and her personal cosmetic products. There were positive reactions to fragrance mix I, cinnamyl alcohol, ylang-ylang oil (*Cananga odorata* flower oil), lanolin, paraben mix, propyl gallate, and to a night cream of the same brand and type as used by patient 1 (D2, +; D3, +; D7, +). Later, the patient was again patch tested with this cosmetic product and with its ingredients, obtained from the manufacturer. The night cream again gave positive reactions (D2, –; D3, +; D4, +). In addition, there were positive patch test reactions to capryloyl salicylic acid 1% in alcohol (D2, –; D3, +; D7, +) and three other ingredients: paraffinum liquidum/cera microcrystallina/paraffinum pure, sorbitan tristearate 5% in mineral oil, and tocopherol 10% pet. There was no reaction to capryloyl glycol 1% pet. or to the fragrance of the product. The patient has remained free of dermatitis after stopping the use of the night cream and avoiding other products containing the allergens to which she reacted.

We informed the manufacturer of these results, and requested some more capryloyl salicylic acid material for the performance of control tests, but, unfortunately, our request was declined.

Discussion

We have found contradictory descriptions of capryloyl salicylic acid. In the database of the Personal Care Products Council (the former Cosmetic, Toiletry and Fragrance Association) (1), capryloyl salicylic acid is described as the ester of salicylic acid and caprylic acid (synonym: octanoic acid). A structural formula is not provided, but $C_{19}H_{20}O_4$ is indicated as the empirical formula, which is incorrect, as caprylic acid and salicylic acid combined have 15 C atoms. Reference is made to a publication of the Cosmetic Ingredient Review Expert Panel discussing the safety of capryloyl salicylic acid and

other salicylic acid derivatives, but neither a CAS number nor a structural formula is given there (2).

In CosIng, the European Commission database with information on cosmetic substances, capryloyl salicylic acid is defined with the CAS no. 70424-62-3 and benzoic acid, 2-octanoyloxy- (= 2-octanoyloxybenzoic acid, *o*-octanoyloxybenzoic acid) as a synonym (3). In the CAS Scifinder database (4), this number indeed indicates capryloyl salicylic acid with the following synonyms: benzoic acid, 2-[(1-oxooctyl)oxy]-; octanoic acid, ester with salicylic acid; *o*-octanoyloxybenzoic acid. The structural formula of this compound is shown in Fig. 1a.

However, literature data indicate that the CosIng, CAS and Personal Care Products Council description of capryloyl salicylic acid may be incorrect. In a study with capryloyl salicylic acid performed by a cosmetic manufacturer, 2-hydroxy-5-octanoyl benzoic acid was given as a synonym (5). This chemical has number 78418-01-6 in the CAS database. Synonyms include 5-octanoylsalicylic acid, β -lipohydroxy acid and – indicated in another publication by the same cosmetics manufacturer – C₈-lipohydroxy acid (6). Its structural formula is shown in Fig. 1b (in which the salicylic acid moiety can be recognized; Fig. 1c). Most chemical databases that recognize the term capryloyl salicylic acid (ChemicalBook, ChemID-plus, and ChemNet) give the CAS number and structural formula as shown in Fig. 1b, and the same goes for commercial suppliers of the material. The manufacturer of the creams used by our patients has confirmed that the capryloyl salicylic acid in their products conforms to CAS no. 78418-01-6. This chemical is unknown to CosIng (3), but its use in cosmetics is allowed in the EU.

Capryloyl salicylic acid was developed in the late 1980s, and has appeared in the literature under various names (6). Studies have indicated that this lipophilic derivative of salicylic acid may have the potential to increase cell renewal in the epidermis, stimulate dermal collagen formation, counteract the effects of chronic cutaneous photodamage (5), increase the skin's resistance to ultraviolet-induced damage, and have comedolytic (7), anti-acne (8), antibacterial, antidandruff (9) and anti-inflammatory activity (6). Capryloyl salicylic acid is used as a skin conditioner in various cosmetic products,

notably skin care and cleansing products (1). EWG's Skin Deep Cosmetics Database indicates its presence in 52 of >74 000 products whose formulas are on file, mostly facial moisturizers, anti-ageing preparations, acne treatment products, sunscreens, and facial cleansers (10). All cosmetics were from French manufacturers: L'Oréal (n = 17), La Roche-Posay (n = 17), Vichy Laboratoires (n = 11), Garnier (n = 6), and Nutriniste (n = 1).

We propose that the 2 patients presented here had contact allergy to capryloyl salicylic acid and allergic contact dermatitis resulting from its presence in cosmetic products. We recognize, of course, that definite proof for this is lacking, as we have been unable – owing to a lack of cooperation by the manufacturer – to retest the patients with capryloyl salicylic acid and exclude irritancy by proper control testing. Nevertheless, positive patch test reactions to the chemical in two products with no other established allergens (patient 1), reactions that remained the same up to D4 (patient 1) and a crescendo reaction lasting up to D7 (patient 2) may support our hypothesis.

Also, the prompt clearance of dermatitis after avoidance of the products (and others in patient 2) supports an allergic mechanism for the patch test reaction to the creams.

The allergenic part of the molecule is unknown, but is more likely to be in the benzoic or salicylic part than in the caprylic acid moiety. Unfortunately, neither patient agreed to be tested with benzoic acid, salicylic acid, or derived substances (e.g. benzyl salicylate, PABA, phenyl salicylate, 4-tert-butylbenzoic acid, sodium benzoate, benzocaine, and benzyl benzoate). We have been unable to find previous descriptions of contact allergy to capryloyl salicylic acid.

The data in this article have been collected, evaluated and presented here in the framework of Consumer Exposure Skin Effects and Surveillance (11), a Dutch Cosmetovigilance system that monitors the side-effects of cosmetics in The Netherlands, and that is initiated and executed by the National Institute for Public Health and the Environment by order of and sponsored by the Netherlands Food and Consumer Product Safety Authority.

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