

A rare case of allergic contact dermatitis caused by 3-o-ethyl-L-ascorbic acid in skin-whitening cosmetics identified under immunosuppressive therapy

Miki Hamanaka, Hiromi Kanto, Hitomi Mikai, Hiroko Tanaka, Takashi Ito, Kumiko Washizaki, Akira Ishiko

Department of Dermatology, Toho University School of Medicine, Tokyo, Japan

Correspondence: Hiromi Kanto, Department of Dermatology, Toho University School of Medicine, 6-11-1 Omorinishi, Ota-ku, Tokyo 143-8541, Japan.

E-mail: hiromi@med.toho-u.ac.jp

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Allergic contact dermatitis caused by 3-o-ethyl-L-ascorbic acid (CAS no. 86404-04-8) is very rare. Here we report a case in which patch tests were useful even under immunosuppressive therapy.

Case Report

A 72-year-old non-atopic woman presented with a 4-year history of erythema on her face. She suffered from rheumatoid arthritis treated with methotrexate and etanercept. Face dermatitis had been treated with corticosteroid ointments but the eruptions recurred and spread. As her eruption worsened over the past 3 weeks, she presented to our hospital with erythema and vesicles on her face (Fig.1 A, B), arms and legs. From the medical history and clinical picture, allergic contact dermatitis due to cosmetics was suspected. We suggested her to stop her daily cosmetics and use only moisturizer and foundation. By application of topical tacrolimus ointments, her symptoms were eliminated completely.

We conducted patch tests with her cosmetics “as is”, the Japanese baseline series, a metal allergen series and a cosmetic allergen series of our department. Patch tests were performed using Finn Chambers and Patch tester Tori, and the reactions were read on day (D) 2, D3 and D9 in accordance with the International Contact Dermatitis Research Group (ICDRG) criteria. There were positive reactions to a skin-whitening lotion (D3, ?+; D9, ?+), a skin-whitening cream (D3, +; D9, ?+), and 3-o-ethyl-L-ascorbic acid 10% aq. (D3, +; D9, +). 3-o-Ethyl-L-ascorbic acid was contained in the skin-whitening cream ingredients. The diagnosis of allergic contact dermatitis caused by 3-o-ethyl-L-ascorbic acid was made. There were also positive reactions to *p*-phenylenediamine (D3, +; D9, ?+), thiomersal (D3, ++; D9, +), and fradiomycin sulfate (D3, +; D9, +). Discontinuation of the use of the skin-whitening cosmetics resulted in complete healing of the erythema without relapse.

Discussion

Vitamin C has been used in skin-whitening cosmetics for a long time, however, due to its instability, derivatives have been developed to be used in cosmetics. 3-o-ethyl-L-ascorbic acid is a derivative of vitamin C with an ethyl group bound to the third carbon

position. It is chemically stable and is more easily absorbed through the skin than the other vitamin C derivatives¹⁾. 3-o-ethyl-L-ascorbic acid is thought to act by reducing the expression of tyrosinase and tyrosinase-related protein-2 (TRP-2) at the protein level, reducing melanin production, and stimulating procollagen synthesis¹⁾.

Besides our case, there are only 5 previous cases of allergic contact dermatitis caused by 3-o-ethyl-L-ascorbic acid²⁻⁶⁾, all of them associated with skin-whitening cosmetics. Most notable in our case, we were able to identify her allergen by patch testing, although she had been treated with methotrexate and etanercept.

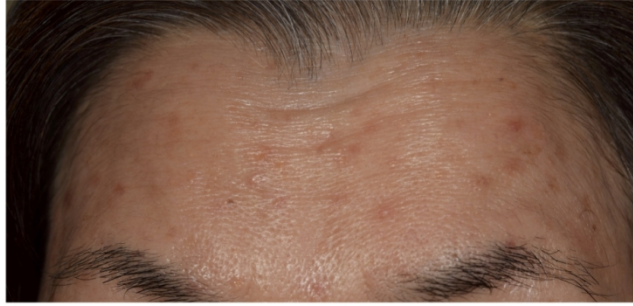
Although vitamin C derivatives were considered to be relatively safe, due to their increasing use, such exposure is becoming more frequent. Therefore, they must be kept in mind as potential allergens in those using skin-whitening products.

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Figure 1. Erythema were seen on the forehead (A) and the cheeks (B).

(A)



(B)

