Palpebral eczematous dermatitis caused by nickel in an eye pencil

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All pigmented make-up products may contain metal allergens, including nickel (1). A possible association between nickel in eye pencils and allergic contact dermatitis on the eyelids, the thin skin of which facilitates skin penetration, has previously been reported (2, 3).

Case Report

A 67-year-old non-atopic Caucasian woman was referred to the Contact Allergy Unit in Leuven in October 2012 because of a history of eyelid eczema, apparently coinciding with the use of an eye pencil, that is, the Estée Lauder® Duo-Tone blue eye pencil (Estée Lauder,
Nickel in an Eye Pencil

Fig. 1. The eye pencil causing eyelid dermatitis.

Fig. 2. Positive reactions to both the blue and grey parts of the eye pencil.

Oevel, Belgium). Changing to another brand had led to a noticeable improvement in the erythema and scaling of both eyelids. In the past, patch tests had revealed positive reactions to nickel, explaining the patient’s intolerance to costume jewellery, and also to thiomersal, for which no relevance had been found.

Patch tests were again performed with the European baseline series, a cosmetic series, disodium tetrachloropalladate (test substance for palladium allergy, tested in the framework of a multicentre European Environmental and Contact Dermatitis Research Group study), and the patient’s own personal care products, with IQ Ultra® patch test chambers (Chemotechnique Diagnostics, Vellinge, Sweden). Positive reactions were observed to nickel (D2, ++; D4, ++), thiomersal (D2, +; D4, ++), Amerchol (D5, +), palladium (D2, +; D4, +), and the two coloured parts of the Estée Lauder® Duo-Tone blue eye pencil tested as is (D4, ++) (Figs. 1 and 2).

Chemical Analysis

Samples from the eye pencil were analysed with high-performance liquid chromatography (HPLC) for the presence of thiomersal. One hundred and thirty-six milligrams of the blue paste and 247 mg of the grey paste were each extracted in 2 ml of water in an ultrasonic bath for 10 min. The extracts were analysed by HPLC with diode array detection, according to a method described elsewhere (4). Thiomersal could not be detected. The estimated detection limit was 0.0002% wt/wt (2 ppm) in the two colour pastes of the eye pencil.

Gas chromatography–mass spectrometry (GCMS) was used to investigate whether lanolin was present in the eye pencil. A 2-mg sample from the blue paste was dissolved in 0.5 ml of ethyl acetate and filtered. Details of this analysis are described elsewhere (5). The analysis showed that the creamy base for the paste consisted of esters of fatty acids, silicon oil, silicon wax, and some fatty acids; however, no lanolin or lanolin derivatives could be detected in the sample.

Analysis of metals in the Estée Lauder® eye pencil was performed with atomic absorption spectrometry (AAS). Samples from the eye pencil were treated with 0.5% nitric acid, and heated at 70°C for 1 hr. The resulting solution was filtered and analysed with AAS. The spectrometer was equipped with Zeman correction and a graphite furnace (AAAnalyst 800; Perkin Elmer Instruments, Norwalk, CT, USA). The samples were analysed for the presence of nickel and palladium. The analysis showed that the grey part contained 0.029 μg nickel/g eye pencil and the blue part 0.015 μg nickel/g eye pencil. No palladium was detected.

Concerning the clinical relevance, these amounts could be compared with the amounts of nickel in an ordinary patch test with 20 mg nickel sulfate hexahydrate 5% in a Finn Chamber®, the amount of nickel under those patch test conditions being 460 μg/cm².

Discussion and Conclusion

From the chemical analysis, we can draw the conclusion that thiomersal, lanolin, lanolin derivatives or palladium did not cause the patient’s dermatitis. Moreover, the GCMS analysis did not show any other suspected allergen in the pencil. Our results indicate that the detected amount of nickel did indeed cause the dermatitis.

Analytical data have shown that consumer products constitute a rather minor source of contact with nickel, and the traces found in consumer products will not be the primary cause of sensitization to these metals: levels will be too low and exposure too brief. Indeed, most nickel-allergic subjects become primarily sensitized by daily contact with jewellery and other metal objects, as in this case. It is therefore necessary to focus on decreasing the high level of exposure to these transition metals from other sources, rather than on possible trace
amounts found in consumer products (6). Investigation of safe levels of nickel in consumer products showed that they should not contain more than 5 ppm (μg nickel/g) of nickel, and that the ultimate target level should be 1 ppm (6). However, even a low nickel content of an eye pencil (or other eye make-up product) can elicit allergic contact dermatitis by repeated application, leading to accumulation of the allergen. Moreover, the eyelids are particularly prone to the development of allergic contact dermatitis, even at low concentrations of the allergen, or with short exposure times.

References


