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Title: Allergic contact dermatitis to Apple AirPods Pro®

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Allergic contact dermatitis to in-ear headphones, with increasingly prevalent use, is an emerging cause of ear dermatitis. We report an interesting case of allergic contact dermatitis to different parts of the Apple AirPods Pro®.

CASE REPORT

A 25-year-old Chinese female was referred to our contact dermatitis clinic by the otorhinolaryngologist after failing treatment for otitis externa. She reported a 3-month history of pruritic exudative rash in both ears.

She recalled changing her in-ear headphones to a new pair of Apple AirPods Pro®, 3 months prior. She only used these new headphones twice a week; during exercise and virtual meetings, for approximately 30 mins each occasion. She noted itching within 1 hour after wearing, and the rashes developed within a few days. She did not use any ear-digging implements and personal hygiene products were unchanged. No cleaning agents were ever used on her headphones. She recalled previous dermatitis with earrings but no longer wears them. She reported no problems with her older pair of Apple EarPods®, used for a few years. Her past medical history included vitiligo and well-controlled flexural atopic dermatitis.

Initial examination showed symmetrical dermatitis of the bilateral conchae bowl, external auditory meatus with normal tympanic membrane.

In view of the early onset of itch reported, we performed initial contact urticaria patch-tests (read at 15, 30, 45, 60 mins) to the product parts which were negative.

Patch tests were then performed with the department's standard, cosmetic series, and the patient's own AirPods Pro® parts, using IQ Ultra chambers (Chemotechnique Diagnostics, Vellinge, Sweden). For the AirPods Pro®, we tested her to the three parts that would have been in contact with skin when worn, namely the silicon ear tip, the headphone's white plastic housing and the black stainless steel acoustic mesh. (Fig. 1a,b,c) A small piece was cut from the ear tip while the other parts were shaved for testing. Patches were removed at 48 hours with readings taken at 72 hours, reactions measured according to the International Contact Dermatitis Research Group recommendations.

Patch tests results (Figure 2) showed strong positive (+++) reaction to the silicon ear tip and weak positive (+) reaction to the white plastic housing. These were deemed to be of current relevance. She also had a doubtful (+/-) reaction to the black stainless steel acoustic mesh.

Other results included potassium dichromate(+), diazolidinylurea (+), and a doubtful(+/-) reaction to formaldehyde. Potassium dichromate was deemed of past relevance as she reported some metal contact reactions previously and diazolidinylurea was labelled with doubtful relevance as there was no recalled specific exposure and it was not found in

her current products. The diagnosis of allergic contact dermatitis to her own AirPods Pro® was made. Avoidance of use led to complete clinical resolution.

DISCUSSION

Allergic contact dermatitis is an important cause of eczematous otitis externa. Whilst cosmetic and metal(jewellery) allergens are known causes, in-ear headphones are an increasingly common cause to consider, used daily by many, often for prolonged periods of time, with the moist environment ideal for occlusion and penetration of potential allergens. Whilst Apple Inc. gave a basic description of components for their headphones on their website (e.g. nickel from stainless steel acoustic mesh, trace amounts of acrylates and methacrylates from adhesives),¹ many other commercial companies do not. This often results in difficulty identifying product materials used in individual headphones/parts, leading to difficulty determining relevance of positive reactions to standardized panels of allergens on patch testing. In another reported case related to Apple AirPods®, acrylates were suspected but unconfirmed relevant culprits in the plastic components of the in-ear headphones.² In our patient, the silicon ear tip as well as the plastic materials showed positive results to patch tests. Acrylate patch-testing was not performed as it remains unclear what specific acrylates were used as adhesives in AirPods Pro®, with risks of active-sensitization with acrylate testing, without clear further benefit. In conclusion, it is important to test to the individual components of the ear pieces when evaluating for allergic contact dermatitis. Improved material composition labelling of product devices should be advocated for consumer protection.

References

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Figure legends:

Figure 1: (a), Silicon ear tip. (b), White plastic housing. (c) Black stainless steel acoustic mesh.

Figure 2: Strong positive (+++) patch-test reaction to (a), weak positive (+) reaction to (b), and doubtful (+/-) reaction to (c).

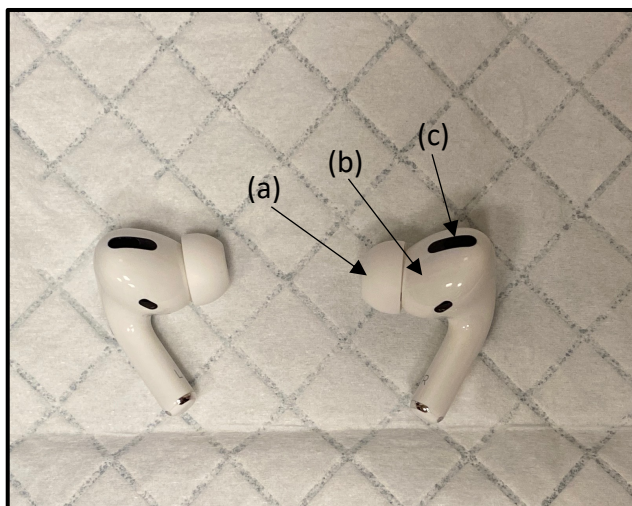


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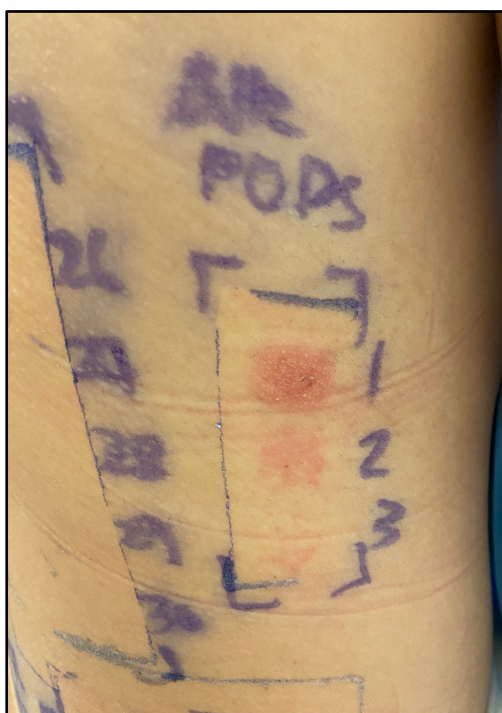


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