

DISCUSSION

As our patient's rash closely coincided with the distribution of the reflective tape and subsequently improved upon restricting his exposure to the tape, possible causes included irritant contact dermatitis (ICD) or a lichenoid allergic contact dermatitis (ACD). Despite the interface dermatitis reaction pattern observed on histology, we favour the diagnosis of ICD to the reflective tape, based on his negative patch test result with cut-outs from the reflective tape of his shirt and the absence of the identified allergens in its composition. We hypothesize that excessive sweating and the occlusive nature of the tape may have been factors contributing to his reaction. An ongoing lichenoid ACD secondary to residual sodium metabisulfite or benzalkonium chloride in the tape seems less likely, particularly as disinfection measures involving those allergens could not be definitively confirmed. High-visibility reflective tape has only previously been implicated in the medical literature for causing first-degree burns of the mid-back, secondary to overheating in sunny conditions.¹ To our knowledge, this is the first report of high-visibility reflective tape potentially inducing ICD.

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CONFLICT OF INTEREST

All authors declare no conflicts of interest.

AUTHOR CONTRIBUTIONS

Frank Po-Chao Chiu: Conceptualization (equal); data curation (equal); formal analysis (equal); investigation (equal); methodology (equal); project administration (equal); writing – original draft (equal); writing – review and editing (equal). **Rosemary Nixon:** Formal analysis (equal); investigation (equal); methodology (equal); supervision (equal); writing – original draft (equal); writing – review and editing (equal). **Adriene Lee:** Formal analysis (equal); investigation (equal); supervision (equal); writing – review and editing (equal). **Aaron Edward Boyce:** Conceptualization (equal); data curation (equal); formal analysis (equal); investigation (equal); methodology (equal); resources (equal); supervision (equal); writing – original draft (equal); writing – review and editing (equal).

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Allergic contact dermatitis to gold in the parts of in-ear headphones

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With the widespread use of wireless, in-ear headphones there have been increasing reports of contact dermatitis caused by them.¹⁻³ Here, we report a case of contact dermatitis localized to the bilateral antihelices, caused by gold parts in in-ear headphones.

CASE REPORT

A 48-year-old man presented to the outpatient clinic with a complaint of itchy erythema confined to the bilateral antihelices (Figure 1A,C). He

had started daily use of in-ear headphones 4 months earlier. According to information from manufacturer, the headphones consisted of acrylic resin, non-latex rubber, and gold-plated metal parts (Figure 2). Patch tests were performed with the Japanese baseline series 2015 (Patch Test Panel (S); Sato, Tokyo, Japan), mercuric chloride 0.05% aq. and urushiol 0.002% pet. (Torii, Tokyo, Japan), and supplemental (meth)acrylates (SmartPractice Denmark, Hillerød, Denmark) series. The patient refused to be tested using the headphones' parts themselves. After 48 hours of occlusion, positive results were observed only to gold sodium thiosulfate (day (D) 2: irritant reaction, D3/7: 2+). There were

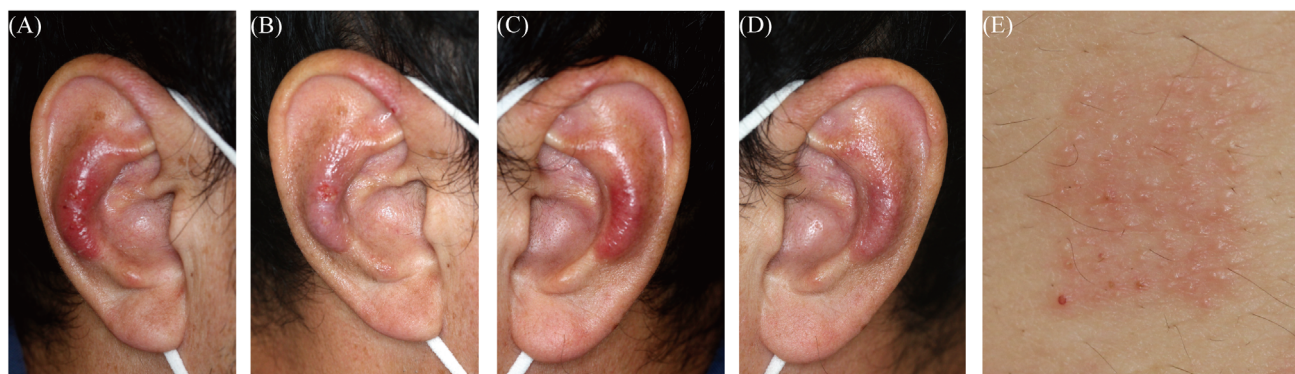


FIGURE 1 (A, C) Swollen erythematous patches with exudate on the bilateral antihelices. There was no eruption on any other parts, including the face. (B, D) The swollen erythema became depigmented with topical corticosteroid treatment within 2 weeks. (E) According to ICDRG guideline, positive results were observed only to gold sodium thiosulfate on day 3 (day [D]2: irritant reaction, D3, 7:2+)

no other positive findings regarding rubber and (meth)acrylates. Based on the distribution of the eruption and the results of the patch test, the diagnosis of contact dermatitis caused by the golden parts of earphones was made. All eruptions became depigmented with topical corticosteroid treatment within 2 weeks (Figure 1B,D). The patient has stopped using the headphones and there has been no recurrence.

DISCUSSION

Identifying the causes of contact dermatitis triggered by electrical appliances is difficult without information from the manufacturers. In previous reports of contact dermatitis to in-ear headphones, some cases were suspected to be caused by acrylates and methacrylates,^{1,2} while in other reports no specific substance was detected.^{1,3} Contact dermatitis caused by hearing aids has also been reported to be caused by rubber, gold, and dyes as well as acrylates and methacrylates.⁴ Low accessibility to information on constituting substances makes it harder for physicians to diagnose, or even suspect these devices to be the

cause of contact dermatitis and, therefore, many cases tend to be misdiagnosed as seborrheic dermatitis.

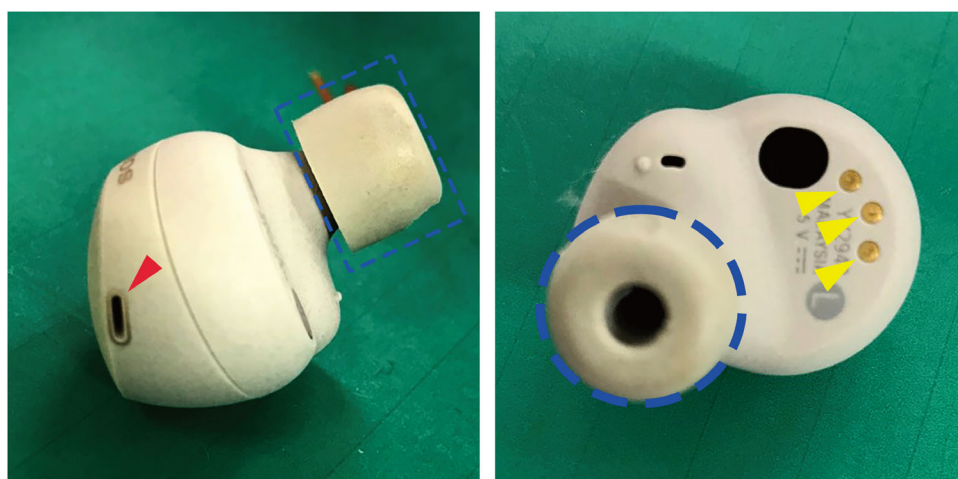
In our case, the dermatitis was localized to the bilateral antihelices, suggesting contact dermatitis due to the earphones. The parts in contact with the eruption area were acrylic resin and golden microphones, and the patch test results suggested that gold was the cause. Erythema with blisters was seen on D3 and D7, so we concluded that the reaction was not due to sensitization.⁵ Although gold is a relatively inert metal, the prolonged wearing and the moist environment of the ears may have contributed to its ionization. The gold-plated charging ports did not touch the skin directly and, therefore, did not cause dermatitis on the cymba.

Given the high, worldwide use of in-ear headphones, it is expected that the number of potential sufferers with similar symptoms will be quite high. Contact dermatitis due to in-ear headphones should be considered when examining patients with dermatitis in both ears.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

FIGURE 2 The same earphones used by the patient. Red arrow pointed a microphone. The area enclosed by the blue border is the non-latex earpiece. Yellow arrows indicate gold-plated charging ports



AUTHOR CONTRIBUTIONS

Michitaro Hayakawa: Conceptualization (lead); investigation (lead); methodology (lead); visualization (lead); writing – original draft (lead); writing – review and editing (lead). **Chihiro Suzuki:** Supervision (lead); writing – original draft (supporting); writing – review and editing (lead). **Yingyao Zhu:** Writing – review and editing (supporting). **Hidemi Anzai:** Supervision (supporting); writing – review and editing (supporting).

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