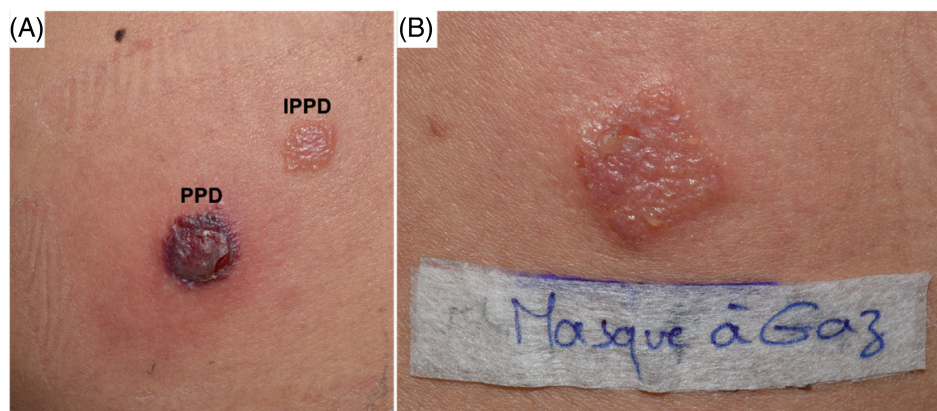


FIGURE 2 Positive patch test reaction to both PPD and IPPD (A) and the black rubber of his own gas mask (B).



mask. Obtaining information from the manufacturers was important to help us to find an appropriate alternative mask, and allowing the policeman to return to full duties.

AUTHOR CONTRIBUTIONS

Sadaf Sanii: Writing – original draft; investigation; formal analysis; validation; project administration. **Pierre Piletta:** Supervision; formal analysis; methodology; conceptualization; writing – review and editing; investigation.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

PATIENT CONSENT STATEMENT

Patient's obtained written consent.

REFERENCES

1. Ancona A, Monroy F, Fernández-Diez J. Occupational dermatitis from IPPD in tires. *Contact Derm.* 1982;8(2):91-94. doi:[10.1111/j.1600-0536.1982.tb04152.x](https://doi.org/10.1111/j.1600-0536.1982.tb04152.x)
2. Mariano-Bourin M, Marzouki-Zerouali A, Poreaux C, Schmutz JL, Bursztajn AC. Allergic contact dermatitis caused by a black rubber hand-brake handle. *Contact Derm.* 2020;82(2):124-125. doi:[10.1111/cod.13407](https://doi.org/10.1111/cod.13407)
3. Navarro-Triviño FJ, Ruiz-Villaverde R. Purpuric contact dermatitis caused by N-isopropyl-N'-phenyl-p-phenylenediamine from a samsung fit strap. *Contact Derm.* 2020;83(1):68-69. doi:[10.1111/cod.13536](https://doi.org/10.1111/cod.13536)
4. Maibach H. Scuba diver facial dermatitis: allergic contact dermatitis to N-isopropyl-N-phenylpara-phenylenediamine. *Contact Derm.* 1975; 1(5):330. doi:[10.1111/j.1600-0536.1975.tb05463.x](https://doi.org/10.1111/j.1600-0536.1975.tb05463.x)
5. Fisher AA. Allergic reactions to nonrubber products by testing with rubber mixes. Part III: The black rubber mix. *Cutis.* 1995;56(5):253-254.
6. Patel K, Nixon R. Allergic contact dermatitis from black rubber in firefighters' masks: a case series. *Contact Derm.* 2022;86(2):136-137. doi:[10.1111/cod.13993](https://doi.org/10.1111/cod.13993)

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Allergic contact dermatitis to accelerators in rubber gloves marketed as accelerator-free

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KEYWORDS: accelerator-free, allergic contact dermatitis, carbamates, case report, hand eczema, rubber glove, thiurams, work-related

Contact allergies to rubber accelerators used in the production of protective gloves, including thiurams, dithiocarbamates, benzothiazoles, and 1,3-diphenylguanidine are frequent in patients with work-related hand eczema, particularly in cleaning personnel, food handlers and healthcare workers.^{1,2} To find suitable protective gloves for these individuals remains a challenge. Accelerator-free rubber gloves might be an alternative.^{2,3}

CASE REPORT

A 58-year-old female cleaner and kitchen help with a history of atopic dermatitis presented with hand eczema which reportedly had lasted already for 6 years. Patch tests were performed and read according to the guidelines of the German Contact Dermatitis Research Group

(DKG)⁴ using the DKG baseline series as well as DKG ointment bases, preservatives, rubber, and disinfectants series as well as a sample of the disposable nitrile glove Purple Nitril-Xtra (Halyard Health) which had been used by the patient both at work and at home. A larger piece of the glove moistened with water was tested semi-open 'as is', covered with a tape without a chamber (Fixomull stretch, BSN Medical).⁵ Patch tests were removed on day (D) 2. At D3, positive reactions were found to potassium dichromate 0.5% pet (+), thiuram mix 1% pet. (+++), tetramethylthiuram monosulfide 0.25% pet. (++), tetraethylthiuram disulfide 0.25% pet. (++), and dipentamethylenethiuram disulfide 0.25% pet. (+) as well as a doubtful reaction (?+) to zinc diethyldithiocarbamate 1% pet. (all from SmartPractice Europe) (Figure 1A) and a marked and long-lasting positive reaction to the tested nitrile glove (+) which contains dithiocarbamates according to the manufacturer's information (Figure 1B). A partially work-related

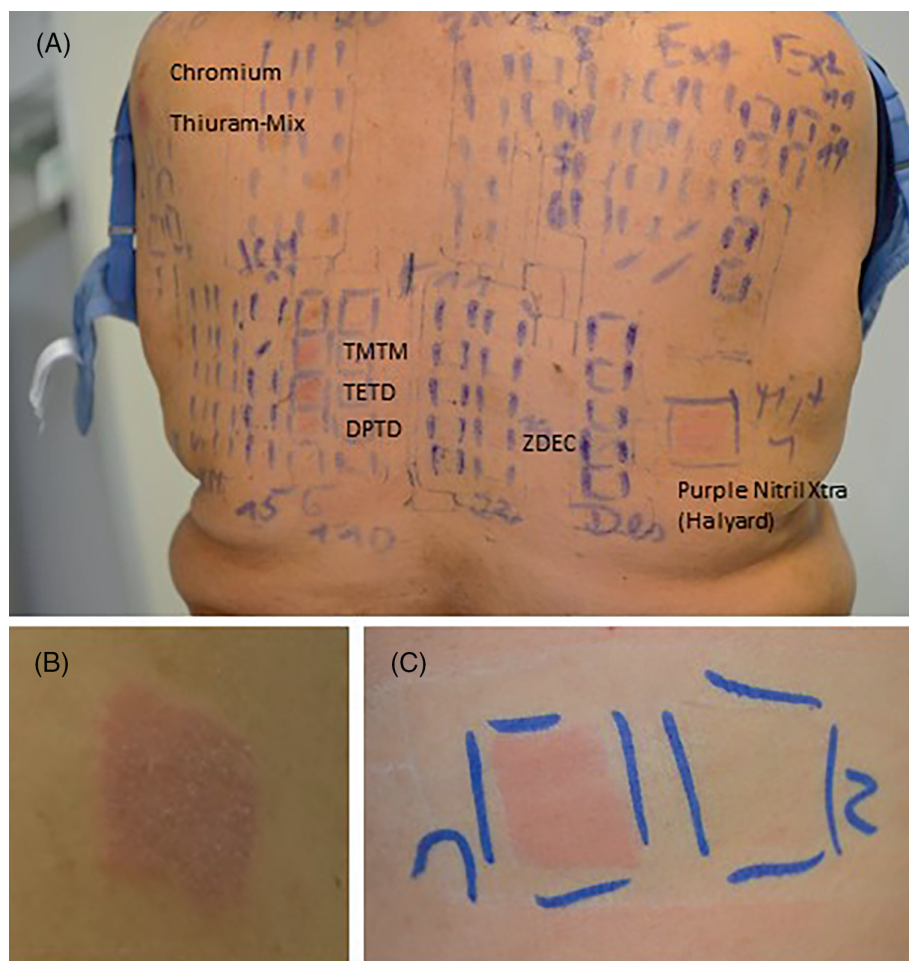


FIGURE 1 Initial patch test at D3 with positive reactions to chromium, thiuram-mix, tetramethylthiuram monosulfide (TMTM), tetraethylthiuram disulfide (TETD), and dipentamethylenethiuram disulfide (DPTD), a doubtful reaction to zinc diethyldithiocarbamate (ZDEC), and a positive reaction to Purple Nitril-Xtra (Halyard Health) (A), positive patch test reaction to Purple Nitril-Xtra (Halyard Health) at D7 (B), positive patch test reaction to SHIELDskin Orange Nitrile 300 (Shield Scientific) and negative patch test reaction to the second selected nitrile glove marketed as accelerator-free at D3 (C).

allergic contact dermatitis of the hands due to sensitization to rubber accelerators was diagnosed. Two disposable nitrile gloves marketed as accelerator-free medical gloves were selected for the patient to be used at home and at work. To our surprise, patch testing the patient with these gloves (as described above) led to a positive reaction (+) to SHIELDskin Orange Nitrile 300 (Shield Scientific) at D3 (Figure 1C).

In a collaboration with the Institution for Statutory Accident Insurance and Prevention in the Healthcare and Welfare Services (BGW) and the Institute for Occupational Safety and Health of the German Social Accident Insurance (IFA), St. Augustin, Germany, a qualitative analysis using methyl tert-butylether extraction and sonication followed by gas chromatography and mass spectrometry (for details see supplement) at the IFA revealed that the analysed two different charges of the glove contained zinc diethyldithiocarbamate, zinc dibutyldithiocarbamate and an unclassified benzothiazole derivate. A selection of six other disposable gloves produced by different manufacturers and all marketed as accelerator-free medical gloves were analysed by the same method. Rubber accelerators (zinc diethyldithiocarbamate and zinc dibutyldithiocarbamate) were only detected in one other glove (SHIELDskin Extreme Orange Nitrile 300) from the same manufacturer. Moreover, we confirmed the manufacturer's information that the glove Purple Nitril-Xtra (Halyard Health) which had been previously used by the patient, contained zinc diethyldithiocarbamate. The patient was finally equipped with a second protective glove made of polyvinyl chloride.

DISCUSSION

Rubber accelerators are widely used in the production of natural and synthetic rubber gloves. Nowadays, thiurams have mostly been replaced by dithiocarbamates for this purpose.^{6,7} However, thiurams and dithiocarbamates constitute a redox pair and are transformed into each other and thiurams are considered a better marker for a thiuram/dithiocarbamate sensitisation when patch tested.⁶ Therefore, individuals with sensitization to thiurams are advised to also avoid dithiocarbamates.³

In response to contact allergies to rubber accelerators, glove manufacturers have developed and marketed accelerator-free gloves.² According to European standard EN 455-3, which is mainly used for medical gloves, the absence of a substance may only be declared by the manufacturer if the substance is not used in any part of the manufacturing process. Despite being marketed as accelerator-free, classified as medical device and labelled with EN 455-3, the analysis revealed that the selected 'accelerator-free' glove SHIELDskin Orange Nitrile 300 contained three accelerators of which two were dithiocarbamates, explaining the positive patch test reaction to the glove in our patient. Reassuringly, common accelerators were undetectable with the same analytic methods in all but one of the other analysed gloves marketed as accelerator-free medical gloves. Notably, the only other accelerator-containing glove was produced by the same manufacturer. Upon request, the manufacturer informed us that the gloves are not supposed to contain any thiurams or

dithiocarbamates, but cross-contamination could not be excluded as the same manufacturing facilities are used for the production of accelerator-free and accelerator-containing gloves.

We here show that protective gloves classified as medical device and marketed as accelerator-free are not necessarily free of accelerators. As a qualitative and not a quantitative analysis was performed, we cannot comment on the amounts of the detected accelerators. Even if the 'accelerator-free' glove contains much smaller amounts of accelerators than conventional rubber gloves, this might still cause allergic contact dermatitis in individuals with strong sensitizations to rubber accelerators. Patch testing these gloves prior to use may help to assess individual tolerability even though this cannot exclude development of allergic contact dermatitis upon wearing. Correct labelling of glove ingredients and tight surveillance of the production process are warranted.

AUTHOR CONTRIBUTIONS

Richard Brans: Conceptualization; investigation; writing – original draft; methodology; writing – review and editing; project administration; data curation. **Silke Werner:** Conceptualization; investigation; writing – original draft; writing – review and editing; methodology; validation; project administration; data curation. **Lara Obermeyer:** Investigation; writing – review and editing. **Andreas Hansen:** Investigation; writing – review and editing. **Christiane Altenburg:** Conceptualization; investigation; funding acquisition; writing – review and editing; methodology; project administration. **Albert Nienhaus:** Conceptualization; writing – review and editing; methodology; funding acquisition; investigation.

CONFLICT OF INTEREST STATEMENT

There are no conflicts of interest.

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REFERENCES

- Brans R, Schroder-Kraft C, Skudlik C, John SM, Geier J. Tertiary prevention of occupational skin diseases: prevalence of allergic contact dermatitis and pattern of patch test results. *Contact Derm.* 2019;80(1):35-44.
- Crepy MN, Lecuen J, Ratour-Bigot C, Stocks J, Bensefa-Colas L. Accelerator-free gloves as alternatives in cases of glove allergy in healthcare workers. *Contact Derm.* 2018;78(1):28-32.
- Hansen A, Brans R, Sonnsman F. Allergic contact dermatitis to rubber accelerators in protective gloves: problems, challenges, and solutions for occupational skin protection. *Allergol Select.* 2021;5:335-344. doi: [10.5414/ALX02265E](https://doi.org/10.5414/ALX02265E)
- Mahler V, Nast A, Bauer A, et al. S3 guidelines: epicutaneous patch testing with contact allergens and drugs—short version, Part 1. *J Dtsch Dermatol Ges.* 2019;17(10):1076-1093. doi: [10.1111/ddg.13956](https://doi.org/10.1111/ddg.13956)
- Aalto-Korte K, Suuronen K, Frosch P. Patch testing with the patients' own products. *Contact Derm.* 6th ed. Springer; 2021. chapter 27: 551-569.
- Hansson C, Ponten A, Svedman C, Bergendorff O. Reaction profile in patch testing with allergens formed during vulcanization of rubber. *Contact Derm.* 2014;70(5):300-308.

7. Geier J, Lessmann H, Mahler V, Pohrt U, Uter W, Schnuch A. Occupational contact allergy caused by rubber gloves—nothing has changed. *Contact Derm*. 2012;67(3):149-156.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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Perception of hand eczema among adolescents in Poland: A cross-sectional study

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KEYWORDS: allergic contact dermatitis, cosmetics, epidemiology

Hand eczema (HE) is a common disease affecting patients of any age.¹ Studies performed in adolescents suggest that self-reported lifetime prevalence of HE in this group of subject is as high as 9.7%–10.4%.^{2,3} The psychosocial burden of HE is vast.⁴ Visible skin lesions affect patients' mental health leading to decreased quality of life and increased level of stigmatization.^{4,5} This study was undertaken to assess HE perception in adolescents.

METHODS

This study was conducted on a group of 258 high school students in Wrocław, Poland. The project was approved by local Ethics Committee (KB-663/2022). Written informed consent was obtained from all adult participants as well as from at least one parent of students under the age of 18 years. Demographic data were collected by investigators during the school classes with specially designed questionnaire, including age and gender of the participants as well as personal history of hand eczema. Self-reported assessment of HE was performed using the question 'Have you ever had hand eczema?' that was used in the previous study.⁶ HE photograph (Figure S1) was shown to all participants and they were asked to give their perception of HE in general and their attitude toward the patient documented on clinical illustration. Four questions were

selected based on the study by Letule et al.⁷ and Chernyshov et al.⁸ The obtained results were statistically analysed with the IBM SPSS Statistics v. 26 (Spss Inc.) software. Quantitative variables were assessed with the Mann–Whitney *U* test; qualitative data were analysed with a chi-squared test; the Bonferroni correction was used for multiple variables. All analyses were performed as two-sided tests with a significance level of 5%.

RESULTS

Out of 258 students who were invited to participate in the project 243 subjects filled the questionnaire (94.2% response rate). Among them, there were 117(48.1%) females and 126 (51.9%) males with mean age of 16.0 ± 1.7 years (age range: 14–18 years). A total of 68 students (28.0%) reported a positive history of having HE. A total of 153 students (63%) declared that they would not shake not hand with a person from the photograph ('No'—23.9% and 'Rather No'—39.1%), while only 15 participants (6.2%) would easily shake hands with such patient. The vast majority of the respondents—204 (84%) did not know if the disease presented on the photograph is contagious, 32 students (13.2%) considered it as not contagious disease and the remaining 7 ones (2.9%) as contagious. Looking at the attached clinical illustration 147 subjects (60.5%) felt disgusted and