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Length matters – use of polyethylene glove liners to prevent allergic contact dermatitis to rubber accelerators

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Conflict of Interest

The authors declare no potential conflict of interests.

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Case Report

A 44-year-old woman with atopic diathesis who worked as a cleaner of hospital beds presented with longstanding hand dermatitis. Patch tests were performed and read according to the guidelines of the German Contact Dermatitis Research Group (DKG)¹ using the DKG baseline series, the DKG series for topical preparations, preservatives, rubber, industrial biocides and disinfectants as well as a selection of the patient's own products, including the disposable nitrile protective glove Micro-Touch® Nitra-Tex™ E.P. (Ansell, Richmond, Australia). Patch tests were removed on day 2. Positive reactions to all four thiurams included in the thiuram mix, zinc diethyldithiocarbamate and the nitrile glove, which according to the manufacturer's information (product data sheet) contains zinc dibutyldithiocarbamate (ZDBC) and zinc diethyldithiocarbamate (ZDEC), were observed (Table 1).

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Hence, allergic contact dermatitis to this glove and irritant contact dermatitis due to wet work were diagnosed.

Table 1: Patch test results

Test substance		Day 2	Day 3	Day 4
Thiuram mix	1% pet.	++	++	++
Tetramethylthiuram disulfide (TMTD)	0.25% pet.	+	++	++
Tetramethylthiuram monosulfide (TMTM)	0.25% pet.	++	+++	+++
Tetraethylthiuram disulfide (TETD)	0.25% pet.	+	++	++
Dipentamethylenethiuram disulfide (DPTD)	0.25% pet.	?	+	+
Zinc diethyldithiocarbamate (ZDEC)	1% pet.	+	+	+
Micro-Touch® Nitra-Tex™ E.P.*	as is, moistened with water	+	++	++

* contains zinc dibutylthiocarbamate (ZDBC) and zinc diethyldithiocarbamate (ZDEC) according to the manufacturer

Selection of an alternative protective glove with appropriate chemical protection was challenging as to the best of our knowledge no adequate thick-walled disposable glove model free of thiurams and dithiocarbamates was available on the market. Therefore, we recommended a thick-walled disposable glove model with a long cuff (length: 28.5 cm, material: nitrile/neoprene rubber) without thiurams but containing dithiocarbamates to be worn in combination with a cotton and a polyethylene (PE) glove liner (length: 37 cm, Figure 1b). The latter was recommended in order to prevent skin contact with the disposable protective glove.²

At follow-up, after several weeks of using the glove combination, only dermatitis on the wrists was observed (Figures 1a and 1b). When the patient was asked to demonstrate the donning and duffing of the gloves, it turned out that she had received a shorter PE glove (length: 29 cm) than previously recommended. The shorter PE glove – despite having almost the same length as the disposable protective glove – tended to slip causing direct skin contact at the wrist to the protective glove containing dithiocarbamates (Figure 1c). The PE glove liner was subsequently substituted by the model with the correct length.



Figure 1: Dermatitis on the wrists (a+b), nitrile/neoprene rubber glove in direct contact with the wrist (c). Additional information: a cotton glove liner was worn underneath the PE glove and the nitrile/neoprene rubber glove (outside colour: green, inside colour: blue) was put on top.

Discussion

Sensitizations to rubber accelerators are frequent and hamper the selection of adequate protective gloves.² In particular, dithiocarbamates are commonly used in rubber gloves.³⁻⁵ Accelerator-free disposable non-sterile medical gloves could be a good alternative for many activities.^{2,3,5} However, there is a lack of thick-walled, long-cuffed disposable gloves free of dithiocarbamates which are required when working for longer periods with e.g. surface disinfectants or cleaning products.² Reusable polyvinyl chloride (PVC) gloves are no suitable alternative as information on their breakthrough times are usually not available. Therefore, it is unknown if these gloves offer a sufficient degree of protection and thus, the user would have to change them frequently.² In these cases, the use of protective gloves containing rubber accelerators could be inevitable. Wearing PE glove liners underneath could prevent direct skin contact to the protective gloves worn on top in those patients who are sensitized to rubber accelerators. As shown in this case, the use of PE glove liners is feasible and effective in preventing allergic contact dermatitis to rubber accelerators in protective gloves.

However, careful selection of the length of glove liners and individual counselling on their use is of great importance.

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