

# Occupational nitrile glove allergy caused by Pigment Blue 15

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## Case Report

A renal transplant nurse, with over 20 years of experience, developed severe incapacitating hand dermatitis when the employer changed its glove policy by replacing latex gloves with blue nitrile gloves (Micron). Although the patient was an atopic individual, he had no prior history of hand dermatitis. Additionally, he reported a severe reaction on his arm where a colleague had touched him briefly with a gloved hand. At that time, there were numerous referrals from the Occupational Health Department with similar, but milder, hand dermatitis caused by blue nitrile gloves. The patient responded well to both oral and topical steroids, potassium permanganate soaks, emollients and soap substitutes as treatment, only to relapse when he wore the gloves again. He resumed the use of latex gloves, and remained symptom-free while awaiting patch testing.

Patch testing was first conducted with the British Society for Cutaneous Allergy baseline series, nurses series, additional rubber allergens, latex glove and blue nitrile glove (Micron) with Chemotechnique Ultra IQ™ chambers and allergens from Trolab, Reinbeck, Germany, and Chemotechnique, Vellinge, Sweden. The exposure time was 2 days, and readings were performed on day (D)2 and D4. The patient had a +++ reaction only to the nitrile glove, appearing on D4 (Fig. 1). A repeat patch test with a 5mm size nitrile glove elicited a reproducible reaction. When the suppliers were contacted, they suggested a trial run with a white nitrile glove while they tried to source and supply individual ingredients for patch testing. Interestingly, the patient was able to use these gloves with no problems, and thus, after comparison of the listed ingredients (Table 1), testing with the equivalent white



**Fig. 1.** Nitrile glove D4.

**Table 1.** Glove ingredients

| Blue glove                              | White glove                             |
|-----------------------------------------|-----------------------------------------|
| Nitrile butadiene rubber                | Nitrile butadiene rubber                |
| Potassium hydroxide                     | Potassium hydroxide                     |
| Aqua wax                                | Aqua wax                                |
| Wingstay-L, sulfur                      | Wingstay-L, sulfur                      |
| Titanium dioxide                        | Titanium dioxide                        |
| Zinc di- <i>N</i> -butyldithiocarbamate | Zinc di- <i>N</i> -butyldithiocarbamate |
| Zinc diethyldithiocarbamate             | Zinc diethyldithiocarbamate             |
| Zinc oxide                              | Zinc oxide                              |
| Pigment Blue 15*                        | White pigment*                          |

\*Only difference.

nitrile glove was performed, and gave a negative result, suggesting the blue dye as a probable allergen. Control testing in 20 patients with the blue glove gave negative results. As the manufacturer was unable to supply individual allergens for testing, the help of the team in Malmö, Sweden was sought to identify the causative chemical in the glove. Further testing was performed with glove extract (1), thin-layer chromatograms (2), and Pigment Blue 15 (PB15) (CAS no. 147-14-8) 1% pet., purchased from Alfa Aesar (MA, USA) under the name copper(II) phthalocyanine; positive results were obtained with the

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Fig. 2. PB15 at D4.

extract and the dye on D4 (Fig. 2). Furthermore, 28 consecutive dermatitis patients were tested with PB15 1% pet., and negative results were obtained with all of them.

Although the other referred patients with nitrile glove problems had negative patch test results, including with the glove 'as is' (although they were not tested with PB15), their symptoms cleared when they changed to using white gloves.

## Discussion

Glove allergy causes a significant work burden in occupational medicine, and various ingredients have been reported as causative. A review of materials and allergens in protective gloves in 2009 (3) investigated different allergens, and found these to be predominantly rubber vulcanizers and accelerators. The review mentioned a single report of a pigment, Irgalite® Orange F2G (Pigment

Orange 34, CI 21115), in rubber gloves. Although pigment allergens are not common, more of them are found in textile gloves. These include Disperse Orange 3, Acid Red 118, Direct Orange 34, Disperse Red 17, Disperse Blue 35, and Disperse Orange (3). One finding of allergic contact dermatitis caused by blue PVC slip dots in a cotton glove was described in 2010 (4). This involved a metalworker with intermittent erythema on the backs of his hands and fingers, and subsequent vesiculation of his fingertips, related to work. A 1+ positive patch test reaction to the blue PVC dots in an unworn glove led to further patch testing with PB15 (VYNAMON® Blue BX FW) 10% and 50% pet., with, again, 1+ positive reactions. Another case report (5), in 1996, mentioned airborne facial contact dermatitis caused by PB15 in an artist's paint. The artist had been making up her own paint mixture by stirring the powdered dye into a cup with white glue, and applying it with a spatula. A positive reaction to PB15 was found on testing of the dye powder.

As PB15 is used to colour medical sutures (Prolene®) (6), our patient was advised to avoid blue sutures. A case report describes a patient who experienced repeated wound breakdown after surgical suturing, as allergic to Acid Blue 158. This was present in the suture material. Additionally, PB15 is used as a cosmetic colorant (CI 74160).

In conclusion, when an allergic reaction to an occupational contact item is suspected, patch testing with the relevant items is indicated, and a positive result should then lead to further identification of the individual allergen. PB15 is, to the best of our knowledge, a new occupational contact allergen in nitrile gloves.

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