STUDY

Allergens Retained in Clothing

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Background: **Some patients state compliance with avoidance of identified allergens, yet have persistent dermatitis in areas under tight-fitting clothing.**

Objective: **To analyze a series of such cases to identify allergens most likely retained in clothing.**

Methods: **Review of contact dermatitis clinic cases and identification of type and formula weight of allergens involved.**

Results: **High-formula-weight allergens and allergens present in medicament ointments are difficult to dissolve in laundry detergent and water and may be retained in clothing.**

Conclusion: **Retention of allergens in clothing, even after washing, may explain recalcitrant dermatitis in a patient who states compliance with avoidance of a seemingly relevant allergen. Dermatologists should consider the possibility of allergen retention in clothing whenever a patient has only partial clearing after at least 1 month of attempted compliance with avoidance of identified allergens. Purchase of new clothing may be required to clear allergic contact dermatitis in this situation.**

IDENTIFICATION OF ALLERGENS by patch testing and subsequent patient avoidance of allergens for several weeks may entirely resolve allergic contact dermatitis. However, some patients have only partial clearance of dermatitis after avoiding allergens for 1 month or longer. If dermatitis persists in areas of tight-fitting clothing, retention of allergens in clothing should be considered.

Retention of allergens in shoes has been previously reported. Mercaptobenzothiazole is a rubber allergen in shoes and may persist in socks even after they have been washed or boiled in water.[1] Corticosteroids may be retained in shoe materials and cause persistent dermatitis even after the steroid-allergic patient discontinues application.[2]

With our contact dermatitis patients, retention of allergens in clothing is often due to topical medicaments. Dermatitis affects areas of tight-fitting clothing, such as the areas under hems, gloves, elastic, or brassieres.

Bacitracin

Patient 1, hospitalized for presumed ''chronic cellulitis,'' had dermatitis limited to his right anterior thigh at a skin graft harvest site. After dermatologic consultation and patch testing with an extended standard series including textile resins, he was diagnosed with allergic contact dermatitis only from bacitracin in an antibiotic ointment that had been prescribed after his surgery. He initially cleared with the application of a topical steroid and the discontinuation of bacitracin but flared shortly after his discharge to home. The dermatitis was always unilateral and had a sharp line of demarcation at the edge of his short pants. He cleared with application of a paste bandage to the affected skin for 2 weeks but again flared when the bandage barrier was removed. He finally remained clear after discarding all of his short pants and purchasing new clothing.

Patient 2, an assembler with severe bilateral hand and forearm dermatitis, had positive patch-test reactions to fragrance, formaldehyde-releasing preservatives, thiuram, chloroxylenol, bacitracin, and neomycin. Her hand dermatitis resolved with the avoidance of rubber gloves and chloroxylenol in the hand soap at her workplace and with the avoidance of fragrance and preservative allergens in personal care products. However, her wrist dermatitis persisted up to her follow-up appointment, scheduled during the summer season. She was wearing short-sleeve shirts at that time, but she recalled that she occasionally donned a jacket that she had worn during the prior months when she applied triple antibiotic ointment to her rash. Her wrist dermatitis resolved after she discarded the jacket (Fig 1).

We unsuccessfully attempted to identify residual bacitracin in the cotton twill short pants of the patient 1 and in the jacket of patient 2. High-pressure liquid

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Figure 1. This patient's hand dermatitis cleared, but persistent wrist dermatitis was exposed by pushing back the sleeves of a jacket contaminated with neomycin and bacitracin.

Figure 2. Persistent dermatitis due to retention of corticosteroids in a brassiere.

chromatography analysis confirmed only the various solvents used for extraction, mass spectrometry analysis following extraction in organic solvents showed no signal for bacitracin, and electron microscopy analysis of the material could not detect any bacitracin. An alternative approach would have been to patch-test pieces of suspect clothing.

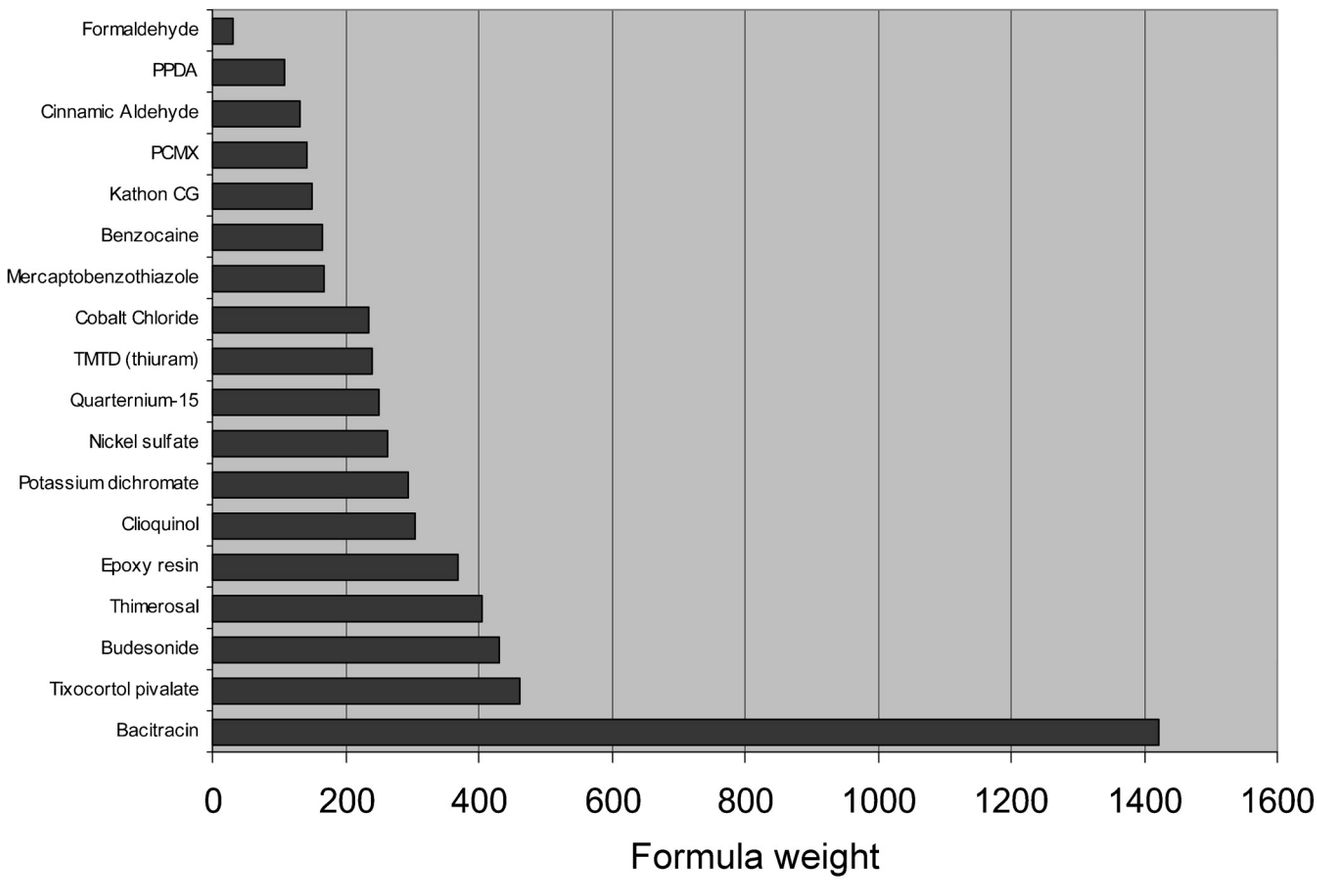

Figure 3. Formula weights of selected allergens Adapted from Niklasson BJ.[3] PCMX = chldroxylenol; PPDA = paraphenylenediamine; TMTD = tetramethylthiuram disulfide.

Corticosteroid and Clioquinol

Two different patients had partial resolution of dermatitis through the avoidance of identified allergens but had persistent dermatitis limited to the breasts. In both cases, the dermatitis resolved only after the patients discarded old brassieres and purchased new ones. One patient was allergic to corticosteroids (positive patch-test reactions to both tixocortol pivalate and budesonide) (Fig 2), and the other was allergic to clioquinol in the bag balm she had been applying.

Discussion

All of our cases of allergens retained in clothing were due to ointment-based medicaments. In each case, the antigen was of a high formula weight (Fig 3),[3] suggesting a complex molecule that may be difficult to dissolve in laundry detergent and water. The ointment vehicle likely also contributed to incomplete removal with routine laundering.

We did not attempt to patch-test with intentionally contaminated and then washed clothing, and this is a limitation of our study. Due to the failure of our laboratory tests to confirm the presence of bacitracin in the clothing, we cannot recommend any confirmatory test. However, in each of our cases, the discarding of potentially contaminated clothing and the purchasing of new clothing resulted in cure.

Conclusion

Persistent dermatitis in areas of tight-fitting clothing may be due to retention of ointment-based medicaments in fabrics. This is especially likely with patients who are allergic to topical antibiotics that are of a very high molecular weight. Recognition of retention in fabric may demonstrate the importance of allergens thought to be only of past relevance, based on the patient's history.

References

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