## About this Section

Each year, *Minnesota Medicine* highlights research and clinical work undertaken by Minnesota medical students, residents and fellows. The goal is to not only showcase the good work these medical trainees are doing but also to inform readers about pertinent topics.

This year, 22 trainees submitted brief papers describing original research or interesting cases. These were evaluated with regard to these and other questions: Did the authors provide an adequate description of the case or the problem? Was their methodology sound? Did they conduct an adequte review of relevant scientific literature? Do the findings or does the case have implications for practice or further research? The reviewers selected five submissions for publication in this issue. Others will be published in future issues.

We thank both those who submitted their work and our reviewers Peter Kernahan, MD, PhD; Barb Elliott, PhD; Barbara Yawn, MD; and Angie Buffington, PhD.

# Allergic Contact Dermatitis to a Hemodialysis Catheter: Epoxy is an Occult Allergen in Medical Devices

BY JAMIE HANSON, KATIE WARD, MD, JENNA VAN BECK AND ERIN WARSHAW MD, MS, UNIVERSITY OF MINNESOTA MEDICAL SCHOOL, UNIVERSITY OF MINNESOTA MEDICAL SCHOOL DEPARTMENT OF DERMATOLOGY, AND MINNEAPOLIS VETERANS AFFAIRS MEDICAL CENTER

Figure 1: Photo of a pink eczematous plaque overlying the patient's fistula site located on his left upper arm.

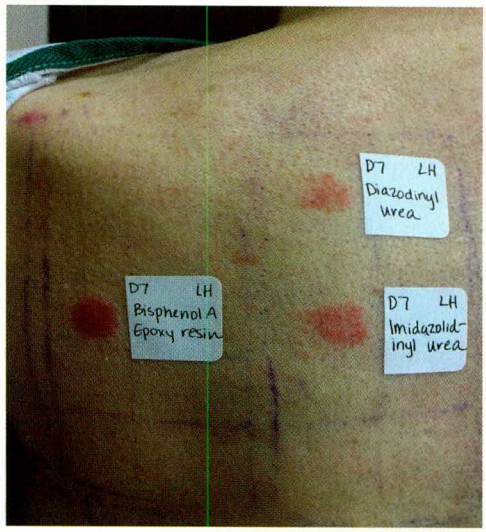


Figure 2: Photo of patch test results on Day 7 depicting a strong (2+) reaction to bisphenol A epoxy resin.

An elderly Caucasian male with hemodialysis-dependent end-stage renal disease since 2008 was referred to dermatology for a chronic eczematous dermatitis overlying his fistula site that was partially responsive to topical triamcinolone ointment 0.1% (Figure 1). Given the likelihood for allergic contact dermatitis (ACD), the patient was patch-tested for allergens using the North American Contact Dermatitis Group standard, auxiliary, corticosteroid and rubber series, as well as for substances (including chlorhexidine and betadine) in his personal care products, alcohol swabs, wound dressings and dialysis equipment. Positive reactions from the final reading are shown in the Table. The patient's reaction to bisphenol A epoxy resin was found to be clinically relevant (Figure 2). A literature search found other case reports of ACD caused by epoxy resins in hemodialysis patients. Authors confirmed that epoxy resins were used in the manufacture of select hemodialysis catheters, including the brand used by the patient (Medisystems—Seattle). A barrier was used to protect the skin until an alternative nonepoxy-containing catheter could be obtained (Togo Medikit—Tokyo).

Given that the patient did not have dermatitis on other parts of his body, clinical relevance for the remaining reactions was doubtful.

TABLE

**Patch Test Results, Day 7**

| STRENGTH OF REACTION | ALLERGEN |
|---|---|
| Strong (2+) | bisphenol A epoxy resin<br>imidazolidinyl urea |
| Mild (1+) | diazolidinyl urea |
| Doubtful (+/-) | ethylhexylglycerin<br>diphenylguanidine |

## Discussion

Epoxy resin systems consist of epoxy monomers, which are cured with the addition of a hardener. The most common epoxy resin is derived from bisphenol A, which also happens to be the most common sensitizer.[1] Contact sensitization to other epoxy resins as well as the diluents, hardeners and accelerators used in epoxy resin systems have also been reported.[1,2] Most ACD caused by epoxy resins develops during the production of plastics. However, up to 25% of epoxy monomers remain unhardened after production and are capable of eliciting a contact allergy.[1]

Our patient developed an allergic reaction to epoxy, which was used to connect the needle to the plastic tubing in his hemodialysis catheter, despite the fact that the glue was "cured." We found four other case reports describing six patients who also developed an allergy to epoxy resins in hemodialysis catheters.[3-6] In all of these patients, the dermatitis resolved after either switching to a catheter that did not contain epoxy or avoiding direct skin contact with the component of the catheter containing the epoxy.

Interestingly, Haussmann et al. detected peripheral eosinophilia in both of their patients, which was later attributed to ACD after negative work-up for other causes.[5] The peripheral eosinophilia resolved in the patient who changed to a catheter that did not contain epoxy but persisted in the patient who implemented a barrier system. The authors hypothesized that direct allergen delivery through the bloodstream was responsible for this finding, although uncharacteristic for ACD. Retrospective analysis showed that our patient had eosinophilia since 2009 and that it has been improving since implementation of a barrier.

There are other case reports of epoxy allergy developing after using various medical devices including hearing aids,[7] ostomy bags[8] and cardiac pacemakers.[9] Our case and these highlight the importance of patch-testing for substances in such products. **MM**

REFERENCES


**1.** Cao LY, Sood A, Taylor JS. Hand/face/neck localized pattern: sticky problems—resins. Dermatol Clin. 2009;27(3):227-49.

**2.** Aalto-Korte K, Suuronen K, Kuuliala O, Henriks-Eckerman ML, Jolanki R. Contact allergy to epoxy hardeners. Contact Dermatitis. 2014;71(3):145-53.

**3.** Mørk NJ. Contact sensitivity from epoxy resin in a hemodialysis set. Contact Dermatitis. 1979;5(5): 331-2.

**4.** Brandao FM, Pinto J. Allergic contact dermatitis to epoxy resin in hemodialysis needles. Contact Dermatitis. 1980 Apr;6(3):218-9.

**5.** Haussmann J, Pratt M, Linett L, Zimmerman D. Allergic contact dermatitis and eosinophilia in association with a hemodialysis cannula. Am J Kidney Dis. 2005;45(2):e23-6.

**6.** Ng PP, Leow YH, Ng SK, Goh CL. Allergic contact dermatitis to epoxy resin in a hemodialysis cannula. Am J Contact Dermat. 1998;9(1):55-6.

**7.** Word AP, Nezafati KA, Cruz PD Jr. Ear dermatitis + epoxy reactivity = hearing aid allergy? Dermatitis. 2011;22(6):350-4.

**8.** Martin JA, Hughes TM, Stone NM. Peristomal allergic contact dermatitis—case report and review of the literature. Contact Dermatitis. 2005;52(5):273-5.

**9.** Honari G, Ellis SG, Wilkoff BL, Aronica MA, Svensson LG, Taylor JS. Hypersensitivity reactions associated with endovascular devices. Contact Dermatitis. 2008;59(1):7-22.

Copyright of Minnesota Medicine is the property of Minnesota Medical Association and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.