



Cobalt content of a convenience sample of leather shoes and gloves in Denmark

Carsten R. Hamann^{1,2} | Dathan Hamann³ | Anne B. Simonsen⁴ | Claus Zachariae^{2,4} | Jeanne D. Johansen^{4,5} | Jacob P. Thyssen^{2,4,5}

¹Section of Dermatology, Dartmouth-Hitchcock Medical Center, Lebanon, New Hampshire

²Copenhagen Research Group for Inflammatory Skin (CORGIS), Hellerup, Denmark

³Contact Dermatitis Institute, Phoenix, Arizona

⁴Department of Dermatology and Allergy, Herlev and Gentofte Hospital, University of Copenhagen, Hellerup, Denmark

⁵National Allergy Research Centre, Herlev and Gentofte Hospital, University of Copenhagen, Hellerup, Denmark

Correspondence

Carsten R. Hamann MD, PhD, Section of Dermatology, Dartmouth-Hitchcock Medical Center, One Medical Center Dr., Lebanon, NH 03766.

Email: hamann511@gmail.com

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Chromium is a well-known allergen in leather products; however, cobalt has not historically been associated with leather exposure. Cobalt allergic contact dermatitis (ACD) caused by leather in furniture upholstery has been reported in Denmark,^{1,2} and leather furniture samples obtained in the United States were also found to contain cobalt.³ However, no clear cases of cobalt ACD caused by leather gloves or shoes have been reported. In this study, we examined cobalt content in a convenience sample of shoes and gloves.

METHODS

A convenience sample of 59 leather shoes and gloves from health-care providers in the Department of Dermatology and Allergy at Herlev and Gentofte Hospital was collected. Items were categorized by type (shoe vs glove), colour (black vs brown vs grey vs other), and sex of the individual (male vs female). A Bruker S-1 Sorter handheld X-ray fluorescence (XRF) unit (Bruker Bioscience Corporation, Billerica, Massachusetts) was set to fundamental parameters mode for elemental analysis, and XRF analysis of each item was undertaken for 10 seconds per sample. Percentages of elemental metal content were recorded for each element that was present at >1% for each sample (anatomical percentage for XRF results, and weight percentage for inductively coupled plasma mass spectrometry [ICPMS] results). Two samples with positive screening results were further analysed by the use of ICPMS with standardized acid extraction methodology at Chemical Solutions (Mechanicsburg, Pennsylvania).⁴

RESULTS

Seven of 43 (16.3%) shoes and 3 of 16 (18.8%) gloves contained >1% cobalt, and 3 of 43 (7.0%) shoes contained >5% cobalt. Both samples analysed with ICPMS contained >400 ppm cobalt. No significant

associations were found between cobalt content and leather colour or sex of the user.

DISCUSSION

We found cobalt in a substantial proportion of leather consumer goods in Denmark. This is comparable to the findings of a recent study showing that 15% of leather used for furniture and upholstery in the United States contained >1% cobalt.³ This adds to the current body of evidence suggesting that leather may be a relevant source of exposure to cobalt. Dermatitis patients with cobalt allergy but without chromate allergy were more likely than controls to report non-occupational leather exposure,⁵ and cobalt sensitization is sometimes reported incidentally in cases of chromate ACD, suggesting possible cosensitization.⁶ Cobalt sensitization has been associated with textile and leather work in women,⁷ and with foot dermatitis in general.⁶ Collectively, these data show that cobalt is present in leather products for personal use, and highlight the fact that this may cause cobalt allergy and dermatitis. Limitations of this study include the following: samples were obtained from hospital staff, who may not be representative of Denmark or other European countries, and data on costs were not available. Although we did not investigate cobalt release, XRF spectrometry has proven to be a reliable screening method for identifying cobalt in leather.³ Clinicians should explore leather consumer products as an exposure source for cobalt-allergic patients.

CONFLICTS OF INTEREST

C. R. Hamann and D. Hamann are the sons of Curt Hamann, CEO of SmartPractice, a company that manufactures and sells patch testing materials. D. Hamann is also an employee of SmartPractice. A. B. Simonsen, C. Zachariae, J. D. Johansen and J. P. Thyssen have no relevant conflicts of interest to declare.

ORCID

Carsten R. Hamann  <https://orcid.org/0000-0003-2011-7380>

Dathan Hamann  <https://orcid.org/0000-0003-2052-3725>

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