

10. Weismann K, Krakauer R, Wanscher B. Prevalence of skin diseases in old age. *Acta Dermato-venereologica* 1980; 60: 352–353.
11. Walton S, Nayagam A T, Keczk K. Age and sex incidence of allergic contact dermatitis. *Contact Dermatitis* 1986; 15: 136–139.
12. Wilkinson J D, Shaw S. Contact dermatitis: allergic. In: Champion R H, Burton J L, Burns A D, Breathnach S M (eds): *Textbook of dermatology*, 6th edition, vol. 1. Oxford: Blackwell Scientific Publications, 1998: 747–748.
13. Sugai T, Takagi T, Yamamoto S, Takahashi Y. Age distribution of the incidence of contact sensitivity to standard allergens. *Contact Dermatitis* 1979; 5: 383–388.
14. Johansen J D, Menné T. The fragrance mix and its constituents: a 14-year material. *Contact Dermatitis* 1995; 32: 18–23.
15. Goh C L. Prevalence of contact allergy by sex, race and age. *Contact Dermatitis* 1986; 14: 237–240.

Occupational IgE-mediated contact urticaria from diphenylmethane-4,4'-diisocyanate (MDI)

LASSE KANERVA, BRITA GRENQUIST-NORDÉN AND PÄIVI PIIRILÄ

Finnish Institute of Occupational Health, Topeliuksenkatu 41 aA, FIN-00250 Helsinki, Finland

Key words: occupational; IgE-mediated; contact urticaria; asthma; carpenter; allergy; diphenylmethane-4,4'-diisocyanate; MDI; cross-reaction; toluene diisocyanate; TDI; respiratory effect. © Munksgaard, 1999.

Case Report

A 28-year-old carpenter, who had had respiratory atopy in childhood, presented with breathing difficulties. He had worked for 1 year glueing wood onto aluminum sheets in the manufacture of panels for ships, using a 2-component polyurethane glue. According to its material safety data sheet, the hardener contained diphenylmethane-4,4'-diisocyanate (MDI: >30%). 2–3 months earlier, the patient had, for the 1st time, noticed work-related breathing problems simultaneously with whealing on his lower arms. On several occasions, symptoms had reappeared when he had been working on the glueing machine.

Patch tests performed with a modified European standard series, a diisocyanate series (Chemotechnique Diagnostics: Malmö, Sweden; Trolab, Hermal: Reinbek, Germany), a plant series, a phenol-formaldehyde resin series, and his own MDI-containing hardener, were all negative.

Prick tests with 20 common environmental allergens (Allergologisk Laboratorium A/S, Denmark) and natural rubber latex were carried out by standard technique (1, 2), histamine hydrochloride (10 mg/ml) being used as positive control. Diisocyanate conjugates with human serum albumin (HSA) were prepared as previously described (3, 4), comprising MDI (Merck 820797, zur Synthese), hexamethylene diisocyanate (HDI: Fluka 52649) and toluene diisocyanate (TDI: Merck 808264, zur Synthese). For prick testing, the hapten-HSA conjugate and control HSA solutions were diluted to 1% (w/v) with Coca solution containing 50% glycerol (3). MDI-HSA induced a histamine-size reaction (diameter 4 mm) and TDI-HSA a 2-mm reaction. All other prick tests, including ones with formaldehyde and exotic woods, were negative. RASTs, performed as previously described (3, 4), with MDI (class 2), TDI (class 2) and HDI (class 2) indicated specific-IgE-mediated sensitization.

It was concluded that the patient had become occupationally sensitized to MDI in the glue, causing both

respiratory (asthma) and skin (contact urticaria) symptoms simultaneously. The positive RASTs to TDI and HDI appeared to indicate cross-sensitivity, as no exposure to TDI and HDI had occurred. The patient was advised to change to a job not involving diisocyanate exposure.

Discussion

Isocyanates are increasingly used in the manufacture of many and various polyurethane products (6). The most common occupational disease from isocyanates is asthma (5, 6). Exposure to diisocyanates and auxiliary chemicals may also result in allergic or irritant contact dermatitis (7–12). Generalized urticaria has been reported on rare occasions (13–15). An IgE-mediated reaction explains less than 1/2 of the immediate reactions in bronchial provocation tests with MDI, TDI and HDI (6). It is not clear whether patients with non-IgE-mediated asthma from diisocyanates may develop contact urticaria, but contact urticaria from diisocyanates is probably much more common than reported.

References

1. Aas K, Belin L. Standardization of diagnostic work in allergy. *Int Arch Allergy Appl Immunol* 1973; 45: 57–60.
2. Kanerva L, Estlander T, Jolanki R. Skin testing for immediate hypersensitivity in occupational allergology. In: Menné T, Maibach H I (eds): *Exogenous dermatoses: environmental dermatitis*. Boca Raton, FL, USA: CRC Press Inc, 1991: 103–126.
3. Kanerva L, Jolanki R, Tupasela O, Halmepuro L, Keskinen H, Estlander T. Immediate and delayed allergy from epoxy resins based on diglycidyl ether of bisphenol. *Scand J Work Environ Health* 1991; 17: 208–215.
4. Belin L, Wass U. Respiratory symptoms and IgE antibodies

- to isocyanates. *Eur J Respir Dis* 1981; 62 (suppl 113): 148–149.
5. Keskinen H, Tupasela O, Tiikkainen U, Nordman H. Experience of specific IgE in asthma due to isocyanates. *Clinical Allergy* 1988; 18: 597–604.
 6. Estlander T, Kanerva L, Jolanki R. Polyurethane resins. In: Kanerva L, Elsner P, Wahlberg J E, Maibach H I (eds): *Occupational Dermatoses Handbook*. Berlin: Springer Verlag, in press.
 7. Malten K E. Occupational dermatoses in the processing of plastics. *Trans St. John's Hosp Dermatol Soc* 1964; 59: 78–113.
 8. Malten K E. Old and new, mainly occupational dermatological problems in the production and processing of plastics. In: Maibach H I, Gellin G A (eds): *Occupational and industrial dermatology*. Chicago: Year Book Medical Publishers Inc, 1982: 237–283.
 9. Rothe A. Zur Frage arbeitsbedingter Hautschädigungen durch polyurethanchemikalien. *Derm Beruf Umwelt* 1976; 24: 7–24.
 10. Kanerva L, Lähdenmäki M-T, Estlander T, Jolanki R, Keskinen H. Allergic contact dermatitis from isocyanates. In: Frosch P J, Dooms-Goossens A, Lachapelle J-M, Rycroft R J G, Scheper R J (eds): *Current topics in contact dermatitis*. Berlin: Springer-Verlag, 1989: 368–373.
 11. Wilkinson S M, Cartwright P H, Armitage J, English J S. Allergic contact dermatitis from 1,6-diisocyanatohexane in an anti-pill finish. *Contact Dermatitis* 1991; 25: 94–96.
 12. Estlander T, Keskinen H, Jolanki R, Kanerva L. Occupational dermatitis from exposure to polyurethane chemicals. *Contact Dermatitis* 1992; 27: 161–165.
 13. Schürmann D. Gesundheitsschäden durch neuartige Lacke und Schaumstoffe. Die DD (Desmodur/ Desmophen -) Lacke und Schaumstoffe als Ursache beruflicher Gesundheitsschädigungen. *Dtsch Med Wochenschr* 1955; 45: 1661–1663.
 14. Israeli R, Smirnov V, Sculsky M. Vergiftungserscheinungen bei Dicyclomethan-4-4'-Diisocyanat-Exposition. *Int Arch Occup Environ Health* 1981; 48: 179–184.
 15. Kanerva L, Estlander T, Jolanki R, Lähdenmäki M-T, Keskinen H. Occupational urticaria from welding polyurethane. *J Am Acad Dermatol* 1991; 24: 825–826.

Airborne allergic contact dermatitis from colophony in a car

HELGE DANIELSEN

Department of Dermatology, Haukeland Hospital, 5021 Bergen, Norway

Key words: airborne; allergic contact dermatitis; colophony; car; motor vehicle; adhesives. © Munksgaard, 1999.

Case Report

A 27-year-old district nurse, with a history of childhood atopic dermatitis, developed a pruritic rash on her face every time she drove her VW GolfTM car to work, particularly if it was well-heated. On examination, there was erythema and slight scaling on her upper eyelids, forehead and cheeks.

Patch testing with the European standard series (Chemotechnique Diagnostics, Malmö, Sweden) showed a ++ reaction to colophony, but a negative prick test.

Discussion

Colophony is a known cause of airborne allergic contact dermatitis (1, 2). The Norwegian importer of the

car confirmed that colophony was present in adhesives in the linings of the roof and doors, and inside the dashboard.

References

1. Watsky K L. Airborne allergic contact dermatitis from pine dust. *Am J Contact Dermat* 1997; 8: 118–120.
2. Karlberg A-T, Gäfvert E, Meding B, Stenberg B. Airborne contact dermatitis from unexpected exposure to rosin (colophony). Rosin sources revealed with chemical analyses. *Contact Dermatitis* 1996; 35: 272–278.