

Short Communication

Bank clerk's occupational allergic nickel and cobalt contact dermatitis from coins

LASSE KANERVA, TUULA ESTLANDER AND RIITTA JOLANKI

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

Key words: bank clerk; occupational; allergic contact dermatitis; nickel; cobalt; coins; dimethylglyoxime test. © Munksgaard, 1998.

Case Report

A 47-year-old non-atopic right-handed bank clerk had worked in a bank since she was 16 years old, in contact with paper documents only. 27 years later (in 1992), she started to work with coins, which took up $\frac{1}{2}$ of her working day. About 1 year later, she developed dermatitis on the palmar aspects of her right-hand fingers. Later, dermatitis spread to the left-hand fingers. The dermatitis was occasionally vesicular, and intermittently dry and itchy. In 1996, she consulted a doctor for the 1st time about her hand dermatitis. Her summer vacation, and alternative work tasks in which she was not exposed to coins, had since resulted in complete healing of her hand dermatitis.

Patch testing was performed and scored according to ICDRG recommendations, with a modified European standard series, a cosmetics series, an antimicrobials series, and papers used in the bank. Nickel sulfate-hexahydrate (Chemotechnique Diagnostics, Malmö, Sweden, 5% pet.) and cobalt (II) chloride-hexahydrate (Chemotechnique, 1% pet.) provoked ++ reactions. A dilution series gave an allergic patch test reaction with nickel sulfate-hexahydrate down to 1% and with cobalt (II) chloride-hexahydrate down to 0.032%. Prick testing with a series of environmental allergens was negative, as was a prick test with nickel sulfate 10 mg/ml (1). A dimethylglyoxime test (2–4) was positive and showed that all Finnish coins, namely the 10 and 50 penny coins, and the 1, 5 and 10 mark coins, contained and released nickel in amounts adequate to induce sensitization (3, 4).

Discussion

It was concluded that the patient had developed allergic contact dermatitis from nickel and cobalt. Furthermore, it was considered evident that this was due to exposure to nickel-releasing coins. She had not worn any nickel-releasing jewellery, had never previously had any dermatitis, and started in 1995 for the 1st time to develop contact dermatitis from contact with metal objects other than coins, namely belt buckles. Her hand dermatitis healed when she was not exposed to coins.

The Finnish 10 penny and 50 penny coins are steel-

coloured and made of copper-nickel alloy, frequently used in coins (5). They contain 25% nickel and 75% copper. The 1 and 5 mark yellow coins are aluminium-bronze alloy coins, containing 2% nickel, 6% aluminium and 92% copper. The 10 mark coin is a bi-metal coin containing both steel-coloured copper-nickel (the same material as the 10 and 50 penny coins) and yellow metal (same material as the 1 and 5 mark coins) in the same coin. The dimethylglyoxime test (2–4) was strongly positive with the steel-coloured copper nickel alloys containing 25% nickel, whereas only a weak reaction was obtained with the yellow metal containing 2% nickel. The metal in Finnish coins is different from the yellow metal, so-called Nordic gold, which is nickel-free and used, e.g., in Sweden. It has previously been shown that nickel-free metal coins and banknotes may become contaminated with nickel from coins (5).

It is widely accepted by occupational dermatologists that the nickel released from coins affects some nickel-sensitive subjects with occupational exposure to coins, such as bank clerks. We believe that this is common, and that scientific data are sparse (6–10), because it is considered self-evident that exposure to the allergen causes allergic contact dermatitis in such sensitized individuals. In our case, it seemed clear that the primary cause of sensitization was nickel in coins, as the patient had never worn inexpensive jewellery nor had dermatitis from contact with metal accessories on her clothing. Nickel allergy is very common among women (11) and therefore also among bank clerks. It is not known why not all nickel-allergic subjects exposed to nickel-releasing coins develop hand dermatitis (9).

Our patient also had strong allergic patch test reactions to cobalt. Cobalt is usually present as an impurity in nickel, and it appears that our patient also developed cobalt allergy from coins. According to the manufacturer, Finnish coins may contain up to 0.7% cobalt as an impurity. The Gollhausen & Ring (9) patient with allergic contact dermatitis from coins also had an allergic patch test reaction to cobalt.

It has recently been debated whether nickel should be used in the new European coinage system (11). We think that low- or no-nickel-release coins should be selected in order both to prevent sensitization to nickel (primary

prevention), and to prevent exacerbation of allergic contact dermatitis in nickel-allergic subjects (secondary prevention). Therefore, the EEC nickel directive (12) based on Danish regulations (13) should be applied to coins in addition to other metal objects in close contact with the skin. The coins need not be nickel-free; e.g., stainless steel contains nickel but rarely causes dermatitis in nickel-allergic patients (4). Copper-nickel alloy has a high nickel release and should not be used for coins. Currently, there are plans in Finland to make coins of Nordic gold, containing 89% copper, 5% aluminium, 5% zinc and 1% tin. Hopefully, this may also apply to the European coinage system.

References

1. Estlander T, Kanerva L, Tupasela O, Keskinen H, Jolanki R. Immediate and delayed allergy to nickel with contact urticaria, rhinitis, asthma, and contact dermatitis. *Clin Exp Allergy* 1993; 23: 306–310.
2. Fleigl F. *Spot testing*. Inorganic application, col 1. New York: Elsevier, 1949: 149.
3. Menné T, Brandrup F, Thestrup-Pedersen K, Veien N K, Andersen J R, Yding F, Valeur G. Patch test reactivity to nickel alloys. *Contact Dermatitis* 1987; 16: 255–259.
4. Kanerva L, Sipiläinen-Malm T, Estlander T, Zitting A, Jolanki R, Tarvainen K. Nickel release from metals, and a case of allergic contact dermatitis from stainless steel. *Contact Dermatitis* 1994; 31: 304–307.
5. Bang Pedersen B, Fregert S, Brodelius P, Gruvberger B. Release of nickel from silver coins. *Acta Dermato-venereologica* 1974; 54: 231–234.
6. Morgan L M, Flint G N. Nickel alloys and coatings: release of nickel. In: Maibach H I, Menné T, (eds): *Nickel and the skin: immunology and toxicology*. Boca Raton, FL, USA: CRC Press Inc, 1989: 45–54.
7. Rothman S. Überempfindlichkeit gegen Hartgelt. *Dermatol Wochenschr* 1930; 90: 98–99.
8. Husain S L. Nickel coin dermatitis. *Br Med J* 1977; 2: 998.
9. Gollhausen R, Ring J. Allergy to coined money. *J Am Acad Dermatol* 1991; 25: 365–369.
10. Räsänen L, Tuomi M-L. Diagnostic value of the lymphocyte proliferation test in nickel contact allergy and provocation in occupational coin dermatitis. *Contact Dermatitis* 1992; 27: 250–254.
11. Kanerva L, Kerosuo H, Kullaa A, Kerosuo E. Allergic patch test reactions to palladium chloride in school children. *Contact Dermatitis* 1996; 34: 39–42.
12. Lidén C. Report: *Nickel allergy and coins. A European provocation study*. 15 January 1997, Stockholm.
13. European Parliament and Council Directive 94/27/EC of 30 June 1994. *Official Journal of the European Communities*, 22 July 1994 (Nickel Directive).
14. Bekendtgørelse om forbud mod salg af visse nikkelholdige produkter. *Miljøministeriets bekendtgørelse nr 472 of 27 June 1989, Denmark* (in Danish).