

ALLERGIES AND OTHER OCCUPATIONAL DISEASES IN THE HAIRDRESSING INDUSTRY

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ABSTRACT

The demand for cosmetic and hairdressing services is high. The hairdressing industry has grown to become an important source of wealth and income internationally, with informal salons and hairdressing being more common in low-income settings. The daily exposure to a wide variety of repetitive practices, substances and chemicals puts hairdressers at an increased health risk for some conditions – particularly on the skin and respiratory and musculoskeletal systems – as the workers are exposed to a diverse range of chemicals (irritants and allergens) and ergonomic risk factors. By means of a case study we illustrate the challenges a medical practitioner faces in trying to identify the causal agent responsible for a health condition at work in a trade where products contain numerous changing chemicals, yet the same chemicals may be ingredients in personal hygiene products, food and medicines to which the worker is non-occupationally exposed. It indicates the necessity of identifying the potentially hazardous chemicals through good detective work, including a detailed workplace visit and report, an exposure and task-directed history of work, hobbies and activities of daily living together with relevant special investigations in order to achieve the best management of the clinical condition.

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ILLUSTRATIVE CASE

A 26-year-old qualified hairdresser presented with a one-year history of an itchy rash on both hands. She experienced recurrent exacerbations of the rash, associated with erythema and vesicles. The rash involved the hands, wrists and forearms but did not involve her palms, face or the rest of her body.

She had been working as a hairdresser in the same formal suburban salon for the past six years. She related the onset of her rash to a colour-master's course she attended, during which she was bleaching (using bleaching pastes) and colouring hair more often than performing tasks such as cutting and styling hair. Although she used latex-black professional hairdresser gloves for tasks such as dyeing and bleaching hair, she did not wear them for mixing the chemicals used for these processes. Furthermore, she could not wear them for cutting and shampooing hair. These gloves were re-usable between clients and their surfaces could easily become contaminated. After the rash started, she changed from latex to nitrile gloves, which she disposed of between clients without any improvement in symptoms. The brands of products used in the workplace or at home before the onset of the rash remained the same. She responded initially to Diprogenta® (betamethasone dipropionate and gentamycin) crème and emollients, but the

rash recurred as soon as she stopped the steroid crème.

On examination of the hands, acute (erythema, vesicles and crusts) and chronic (lichenification, and fissuring) eczematous changes with secondary excoriations were evident over the metacarpal joints extending onto the proximal phalynx of the second and third fingers (see Figure 1A and B). Similar changes were evident over the left medial forearm and left dorsal metacarpal region of the left thumb (see Figure 1C and D). The palms, however, were spared. The rest of her skin was uninvolved and there were no concomitant illnesses.

A patch test with 45 commercially available common allergens (including fragrances, rubber additives, some dyes, formaldehyde and formaldehyde-releasing preservatives and resins) was performed, read and interpreted according to the Contact Dermatitis International Research Group Guidelines.¹ After 72 hours, a 1+ reaction (erythema and induration) to Balsam of Peru and potassium dichromate was noted. All other allergens were non-reactive, including fragrance mix 1 and 2, rubber additives, preservatives and nickel and cobalt. Her workplace was visited and multiple possible causative agents, both irritant and allergic, were identified (see Table I).



Figure 1: The distribution and morphology of the patient's dermatitis. A and B - Patient's hands, showing erythema, red vesico-papules, crusts, excoriations and prominent skin markings predominantly over the knuckles of both hands extending onto the proximal phalanx of the second and third fingers. C and D - The left medial forearm and dorsal metacarpal region of the left thumb showing similar changes.

EPIDEMIOLOGY OF OCCUPATIONAL DISEASE IN HAIRDRESSERS

The hairdressing industry is an important source of income worldwide. According to the European Agency for Safety and Health at Work, more than a million people in Europe work in this industry.² In the United States approximately 400 000 people are employed in the hairdressing industry but this number includes only those in the formal sector.³ Statistics are not available for Africa, but we can assume that the informal hairdressing sector, where backyard and ambulant hairdressers are common, is at least as large as the formal sector. In Ghana, the informal sector encompasses more than 70% of the total workforce and plays an important role in the country's strategy to reduce poverty.⁴

Hairdressers and other workers in the informal sector are routinely exposed to a range of recognised and unrecognised hazards, including physical, chemical,

ergonomic and psychological, that can cause or aggravate several diseases.⁵ Diepgen et al⁵ state that in many countries in Europe and North America data on occupational diseases are scarce and it is recognised worldwide that occupational diseases are usually undiagnosed and under-reported. This under-reporting is even more likely in countries with weak health systems and where informal employment is high, such as in developing countries in Africa.

Dermatological, respiratory and musculoskeletal diseases are regularly reported among hairdressers and hair stylists. Hair products and hairdressing equipment contain numerous chemicals known to cause both irritant and allergic diseases, mostly in hairdressers and, less commonly, in consumers. The concentration of chemicals contained in hairdressing products is regulated to minimise the risk for consumers but not specifically workers in the field. The repeated, often daily exposure of hairdressers

TABLE I: COMMON HAIRDRESSER ALLERGENS IDENTIFIED IN THE PATIENT'S WORKPLACE

HAIR PRODUCT	ALLERGENS
Colour activators	Acrylates, tetrasodium ethylenediaminetetraacetic acid (EDTA), oxyquinoline sulfate, etidronic acid
Bleaching paste and powder	Potassium persulphate, ammonium persulphate, cyamopsis tetragonolobus gum, sodium persulfate, tetrasodium EDTA
Colour (pigment)	Paraphenylenediamines (PPD)
Colour – cream base	Ethanolamine, polyquaternium-6, castor seed oil, glyceryl dihibenate, tribehenin
Conditioner	Fragrance , phenoxyethanol, sodium benzoate, behentrimonium chloride, linalool , limonene , hydrogenated sweet almond oil, prunus domestica fruit extract, disodium EDTA, hexyl cinnamal , propylene glycol, dicaprylate
Nourishing vegetarian conditioner	Fragrance , hydrolysed wheat protein, Simmondsia chinensis (jojoba) seed oil, hydrogenated sweet almond oil, Vitis vinifera (grape) leaf extract, behentrimonium methosulfate, hexyl cinnamal , linalool , limonene
Hair spray	Fragrance , methylisothiazolinone, acrylates, propylene glycol, linalool , limonene
Mask colours	N,n-bis-p-phenylenediamine sulphate, fragrance , propylene glycol, toluene-2,5-diamine sulfate, hydrolysed milk protein, sodium sulfite, methylparaben, propylparaben, 2-amino-4-hydroxyethylaminoanisole sulphate
Shampoo	Fragrance , cocamidopropyl betaine, sodium lauroyl methylisethionate, sodium benzoate , coco-glucoside polyquaternium-7, trisodiummethylenediamine, limonene , linalool

Note: the bold chemicals are fragrances and may be related to balsam of Peru.

puts them at high risk of diseases.⁶ In addition, hairdressing tools can be contaminated by infective agents such as dermatophytes, posing as a source of infection for both consumers and hairdressers.⁷

Increased risk of cancer and reproductive health issues have been variously linked to hairdressing. Formaldehyde (present in hair dyeing and straightening products) is classified by the International Agency for Research in Cancer as a group 1 carcinogen, meaning it has proved to be carcinogenic to human beings. The World Health Organisation has presented evidence of human *in vitro* carcinogenic and mutagenic effects and *in vivo* carcinogenic properties for nitrosamine (present in hair-dye formulations). Cancer and harmful reproductive effects as a result of exposure to such chemicals daily pose additional, rarer occupational health concerns for hairdressers.⁸

Occupational diseases may have negative social and economic consequences for the individual because of temporary or permanent impairment and job loss.⁹ A considerable proportion of hairdressers leave the profession due to occupational diseases. In Denmark, the time from starting training to leaving the profession has been documented as 8.4 years.¹⁰ In a subsequent study of apprentices, 34.5% (49/142) had left the trade after six to seven years and 10.6% (15/141) never completed their training. Unfavourable working hours (37.5%, 18/48), back and joint pain (42%, 20/48) and hand and arm dermatitis (12.5%, 6/48) were the reasons given for leaving the profession.¹¹ A prospective Finnish study evaluated the reasons for leaving the profession over a 15-year period among 3 484 female hairdressers and 3 357 controls selected by proportionate sampling. This study showed that the hairdressers were more likely to leave the industry due to health concerns compared to the controls (RR: 1.33, 95% CI: 1.16–1.52). The same study reported that asthma, hand eczema, and strain injuries of the elbow and wrist (RR: 3.5, 95% CI: 1.8–6.8, RR: 3.5, 95% CI: 2.1–5.7, RR: 2.7, 95% CI: 1.1–6.3, respectively) topped the list of health reasons for leaving the trade. In addition, they reported that hairdressers had a 20% increased risk of leaving the trade if they had had a history of an atopic disease.¹²

SKIN DISEASES

A 1999 review of the epidemiology of occupational contact dermatitis (OCD) from around the world reported that OCD ranked highest as a cause of work-related disability worldwide.⁵ A German study of a labour force of approximately 2.6 million people in different professions over three years (1990 to 1993) reported that the one-year incidence rate for OCD in hairdressers (194 cases of OCD per 10 000 employees per year) was higher than for all other occupations, health-service workers included.¹³ A Danish population-based study in Copenhagen reported a life-time prevalence of 44% (404/1063) for hand eczema

in hairdressers, including hairdresser apprentices.¹⁴ An Australian retrospective review of clinical assessments showed that 96% (157/164) of hairdressers and hairdressers apprentices who attended a dermatology clinic over 17 years (1993–2010) were diagnosed with OCD.¹⁵ In Nigeria, a prevalence of 34% (34/108) for occupational hand dermatitis was reported in hairdressers.¹⁶

A survey of hand dermatitis from five randomly selected salons in the Netherlands showed that 26% of hairdressers (12/45) reported hand dermatitis. In addition, the authors reported that hand dermatitis as a cause of hairdresser absenteeism increased from 21 050 days in 1986 to 54 293 days in 1991.¹⁷ A study of hairdressers in Copenhagen found that 37.6% (1 097/2 918) of those who were still active in the profession at the time of the study gave a history of ever having had hand eczema compared to 48.4% (1 123/2 321) among ex-hairdressers. In addition, the same study evaluated reasons why hairdressers left the profession. Among 2 321 ex-hairdressers, 41.9% left because of musculoskeletal pain and 23.15% because of hand eczema.¹⁰

In a retrospective cohort study from Taiwan, dermatitis was reported in 72% of all hairdressers studied (77/107 43 hairstylists and 64 apprentices). Tasks differed between hairstylists and apprentices. Hairstylists cut, blow-dried and waved hair, whereas apprentices shampooed and waved hair. Evidence of trauma presented as wounds or scars between the index and middle fingers of the non-dominant hand that would hold and guide hair during cutting, dyeing or styling. Scissors-induced trauma prevalence was 37.4% (40/107) for all hairdressers but 81% (39/43) for hairstylists alone.¹⁸

In a cross-sectional survey in Mali, West Africa, to assess anthropophilic dermatophyte (*Trichophyton soudanese* and *Microsporum audouinii*) contamination, 41 samples were collected from hairdressing tools taken from five randomly selected suburban salons in Bamako. Diverse fomite samples, namely, cream pot, braiding needles, hair brushes, cloths, scissors, hair extension, combs, razors, table surfaces, hair clippers and shea-butter were collected and analysed. Contamination was demonstrated in 73.2% (30/41) of the samples, ranging from 43% to 100% dependent on salon and type of fomite sampled.⁷

RESPIRATORY DISEASES

Respiratory symptoms are not rare in hairdressers. A French national survey (1996 to 1999) conducted to assess the incidence of occupational asthma among the working population, showed that hairdressers had the third-highest annual occupational asthma incidence rate, 308 per million (95% CI: 256–359, 138/112 000) following 683 per million for pastry makers and 326 per million for car painters.¹⁹ These results are comparable to those of a Finnish study (330 and 370 per million for men and

women, respectively) but higher than those from Sweden and England (1982 to 1997) (129 per million and 24 per million, respectively).^{19,20} A population-based study from Spain reported that hairdressers are at increased risk of developing asthma (OR: 1.94, 95% CI: 0.86–4.39) compared to a non-hairdresser population.²⁰ Data from a Danish population study among hairdressers, revealed that 7.8% (181/2 321) of them developed adult onset asthma after starting working in the trade and half of them changed profession because of asthma.²¹

In Ghana, 19.5% (23/120) of the participants (beauticians, mechanics, drivers and porters) in a cross-sectional survey reported occupational exposures as trigger events for asthma and 15.6% (18/120) for chronic upper-airways symptoms such as rhinitis and sinusitis.⁴ A South African study reported that hairdressers who work in their own homes were at increased risk of developing asthma (OR: 2.89, 95% CI: 1.46–5.73) compared to the risk in the general population.²² This characteristic of working within their own houses is common in low-resource settings.

MUSCULOSKELETAL DISEASES

The physical and postural demands of the work, and non-ergonomic equipment, are common characteristics of the hairdressing industry and responsible for the high number of hairdressers reporting work-related musculoskeletal disorders. A cross-sectional study in Brazil in which ergonomic analyses were performed, reported a prevalence of 71% of work-related musculoskeletal diseases among 222 hairdressers, with the shoulder, back and neck being the most frequently affected body areas.²³ In a Danish study investigating fragrance-related chemical intolerance symptoms in hairdressers compared to the general population, work-related reasons for leaving the trade were also evaluated. Among those who developed symptoms by inhaling perfume or fragrance, 53% (49/89) left the trade due to musculoskeletal pain compared to 14.2% (317/1 232) without symptoms who left the trade for the same reason. This supported previous reports claiming that musculoskeletal symptoms are features of chemical intolerance.²⁴

CANCER

Epidemiologic studies have reported an increased risk for multiple myeloma and leukaemia in cosmetologists, hairdressers included, exposed to hair-dyeing products.²⁵ A 2009 meta-analysis reported that hairdressers and allied occupations carry higher risk of cancer compared to the risk to the general population. The commonest cancers among these professionals were lung cancer (random effects pooled RR: 1.29, 95% CI: 1.04–1.60), larynx cancer (random effects pooled RR: 1.52, 95% CI: 1.11–2.08), bladder cancer (random effects pooled RR: 1.06, 95% CI: 1.02–1.10) and multiple myeloma (random effects pooled RR: 1.12 95% CI: 1.03–1.23).²⁶

A pooled analysis of ten studies from the InterLymph Consortium assessed the association between occupation and non-Hodgkin lymphoma and its subtypes among 10 046 cases and 12 025 controls. Being a women's hairdresser increased the risk of developing non-Hodgkin lymphoma (OR = 1.34; 95% CI: 1.02–1.74). The subtypes associated with hairdressers were diffuse large B-cell lymphoma (OR = 1.47; 95% CI: 1.08–2.00; 58 cases, 158 controls) and chronic lymphocytic leukaemia, also called 'small lymphocytic lymphoma' (OR = 1.79; 95% CI: 1.06–3.03; 18 cases, 130 controls), whereas no association was found for follicular lymphoma.²⁷

REPRODUCTIVE HEALTH

A Spanish study assessing the relationship between hairdressing and reproductive health compared 310 qualified hairdressers and assistants with 310 office workers. Menstrual disorders in the 12 months preceding the study were higher in hairdressers (prevalence of 9.7%; adjusted OR: 1.87, 95% CI: 0.99–3.91) when compared to office workers (3.9% prevalence). In addition, hairdressers were 2.17 (95% CI: 0.91–5.17) times as likely not to fall pregnant after 12 months of normal unprotected active sexual activity compared to the controls.²⁸ A meta-analysis of reproductive disorder among hairdressers and cosmetologists revealed an increased risk of infertility (OR 1.15, 95% CI: 1.03–1.28), foetal death (OR 1.14, 95% CI: 1.04–1.24), and preterm delivery (OR 1.04, 95% CI: 1.00–1.07) compared to the general population.²⁹

An earlier meta-analysis of 19 studies reported on the risk for five reproductive outcomes (time to pregnancy, preterm birth, small for gestational age, low birth weight and embryonic and foetal loss) among female hairdressers and cosmetologists. The combined risk ratios (RRc) were calculated for the outcomes time to pregnancy RRc 1.11 (95% CI: 1.03–1.19), premature birth RRc 1.05 (95% CI: 0.99–1.11), small for gestational age RRc 1.24 (95% CI: 1.10–1.41), low birth weight RRc 1.21 (95% CI: 1.06–1.39) and embryonic and foetal loss RRc 1.19 (95% CI: 1.03–1.39). Apart from premature birth, the other four outcomes reflected statistically significant, but weak increased risk for reproductive disorders among hairdressers and cosmetologist. The analysis failed to establish a definitive occupational causality because the evidence was weak and aspects such as alcohol consumption, current medication, dietary habits and other non-occupational exposures were not accounted for.³⁰ Regardless of the lack of robustness in some reports, possible reproductive health disorders should be recognised among these professionals and efforts should be made to reduce harmful chemical exposures.

ALLERGENS IN THE HAIRDRESSING INDUSTRY

Among hairdressers, sensitisation to substances used in the hairdressing industry is increasing.^{9,12,31–33} Although

allergic contact dermatitis (ACD) is the most common occupational allergic disease occurring in hairdressers with a prevalence of 58%,³² asthma also poses a health problem.²¹ Immediate IgE-mediated reactions may also occur. A recent case report described a hairdresser sensitised to persulphates in the workplace who developed an anaphylactic reaction when exposed to dental cement containing persulphates during a dental procedure.³⁴

Specific substances and chemicals are clearly identified as occupationally relevant allergens among hairdressers as summarised in Table II. Diverse studies globally reported patch-test results which vary from country to country.³⁵ The North Bavarian study of 662 hairdressers showed sensitisation for glyceryl monothioglycolate (GMT) (54% sensitive, 50% relevant), paraphenylene diamine (PPD) (31% sensitive, 29% relevant), ammonium persulphate (24% sensitive, 23% relevant), toluenylenediamine sulfate (21% sensitive, 19% relevant), o-nitro p-phenylenediamine (9% sensitive, 8% relevant), pyrogallol (6% sensitive, 4% relevant) and fragrances (5% sensitive, 2% relevant).⁵ A retrospective study from 1980 to 1993 of hairdressers

from Madrid found 48.8% had ACD, although 58.8% had positive patch tests. Positive patch-test reactions were seen in more than 10% of the 379 hairdressers tested for paraphenyldiamine (58.8%), nickel (41.4%), disperse orange 3 (32.2%), 4 aminobenzene (31.9%) and thioglycolate (15.3%). The nickel sensitisation rate was higher than in the general population (18.3%) and considered relevant for the hairdressers.³⁵ In a British retrospective review of 725 hairdressers patch-tested over a 26-year period from 1980 to 1993, the allergens giving positive reaction in >10% of the tested group were nickel (32.1%), followed by PPD (19%), GMT (21.4%) and ammonium persulphate (10.6%).³⁶ Guo et al, in a 1994 study among 98 hairdressers selected randomly from hairdressing shops in Taiwan, found that the most common allergens were nickel (22%), Captan (6%), methyl- and chloromethylisothiazolinone (Kathon CG) (5%) and fragrance mix (5%), whereas the sensitivity to hair dyes and permanent-wave components was low (<5%).³⁷

Common sources of allergens are shampoo preservatives, hair dyes and straightening, permanent-waving and

TABLE II: COMMON ALLERGENS IN THE HAIRDRESSING INDUSTRY, (modified from Kanerva)³⁸

HAIR PRODUCTS OR TOOLS	ALLERGENS	ALLERGY REACTION
Reducing/blonding agents or hair bleaching	Glyceryl thioglycolate Ammonium thioglycolate Cysteamine Thiolactic acid Potassium persulfate Ammonium persulfate	Type IV Types I and IV
Hair dyes	Para phenylene diamine 2,5-diaminotoluene sulfate 2-nitro-4-phenylene diamine 5-aminophenol 4-aminophenol 4-aminodiphenylamine Resorcinol Henna	Type IV Types I and IV
Preservatives (antibacterial, antifungal) (*formaldehyde releasers)	Paraben mix Methyldibromoglutaronitrile 2-bromo-2-nitropropane-1,3-diol 2,5-diazolidinyl urea* Imidazolidinyl urea* Methylchlorisothiazolinone Mercaptobenzothiazole Quaternium 15* Formaldehyde	Type IV
Surfactants	Cocamidopropyl betaine	Type IV
Conditioners	Sodium coco hydrolysed animal protein	Types I and IV
Shampoo Hair dyes	3-dimethylaminopropylamine	Type IV
Hair straighteners Hair dyes	Formaldehyde	Type IV
Gloves	Thiuram mix Carba mix Mercaptobenzothiazole Latex	Type IV Types I and IV
Metallic tools/equipment (scissors, pins, clips, hair plates, etc)	Nickel S Cobalt	Type IV
Can be in all products	Fragrance mix	Type IV

bleaching agents.³⁷ However, conditioners, tools and a wide variety of other hair products may also contain allergens.

Table II lists the most common allergens used for patch tests in the hairdressing industry and the type of hypersensitivity reactions they evoke. The majority of the substances cause Type IV delayed hypersensitivity reactions. Prior sensitisation must take place, often at higher exposure concentrations of the substance than are necessary to evoke the subsequent eczematous allergic reaction.³⁸

Valks et al³³ compared sensitisation trends to hairdressing products among 300 Spanish hairdressers from 1994 to 2003 with those found in 379 hairdressers from 1980 to 1993. They report an increased frequency in positive patch-test reactions (73.8% compared to 58.8%) and occupational ACD (58% compared to 48.8%). A significant increase in sensitisation for the majority of the known hairdressing allergens was observed, in particular p-phenylenediamine (45.9% to 54%), 4-aminobenzene (31.9% to 40.7%), ammonium thioglycolate (2.7% to 12.3%), ammonium persulfate (7.9% to 14.3%), p-toluenediamine sulfate (6.8% to 15.3%), p-aminodiphenylamine (2.9% to 7.7%), o-nitro-4-phenylenediamine (2.1% to 7.3%), and aminophenols (0% to 9%). A decrease in reactions and sensitisation was reported for disperse orange (32.7% to 17%) and thioglycolic acid (15.3% to 3%).³³

Some food ingredients such as hydrolysed wheat protein (HWP), castor oil and grape seed oil can cause hairdressers to develop rhinitis, contact urticaria and asthma. These ingredients are used in a diversity of hairdressing products. A hairdresser may become sensitised to these products as a consumer and then, on re-exposure to them at the workplace, develop occupational rhinitis, urticaria or asthma. They are an important group of substances to consider as etiologic agents for occupational health problems in hairdressers.³⁹

Metals such as nickel, cobalt and chromium are known to cause sensitisation and a high prevalence of ACD in the general public. Hairdressers are permanently in contact with tools made of metal alloys which may release these metals such as combs, scissors and hair clips.⁴⁰ Occupational metal sensitisation relevance among hairdressers appears low. Among 662 hairdressers from North Bavaria metal sensitisation was poorly correlated with occupational relevance; nickel (52% sensitive, 6% relevant), cobalt (17% sensitive, 2% relevant) and chromate (5% sensitive, 0% relevant).¹³ Chrome's oxidative proprieties are relevant to the cosmetic industry as it may be mixed into hair-dyeing products to achieve better colour results.⁴¹ Chrome may cross-react with cobalt and nickel, which are frequently present in hairdressing tools/equipment (scissors, clips, combs, etc.) and dyes. Although the North Bavarian hairdressers study showed

possibly delayed-type hypersensitivity for potassium chromate, it also suggested no occupational relevance.⁵

Turčić et al reported that, following nickel, fragrances are the most frequent agents implicated in causing allergic contact dermatitis.⁴² Balsam of Peru, otherwise known as *Myroxylon pereirae*, is a natural complex resin, and only 60–70% of its components have been identified precisely. Owing to the common use of *M pereirae* in the perfume (used as an aromatic and fixative delaying evaporation), food (flavourant), medicine (antiseptic, antifungal and antiparasitic) and cosmetic industry, it is accepted as a marker of fragrance allergy and is included in all standard patch-test series.⁴³ Also, positive patch-test reactions to fragrance (5%, 31/662) suggesting sensitisation and possibly delayed type hypersensitivity have been recorded among North Bavarian hairdressers, but occupational relevance was demonstrated in only 2% (13/662).⁵

CONCLUSION

This hairdresser has been exposed to many chemicals over the past six years. The pattern of improvement of the symptoms when away from work for long periods and recurrence when back at work clearly suggests work-relatedness. However, it does not exclude the possibility of exposure to substances outside the workplace environment, either for initial sensitisation or for triggering ongoing symptoms.

Our patient has been classified as having OCD. She continues to work and remains exposed and her dermatitis persists despite varied and intermittent use of a variety of topical agents and the ongoing use of gloves for specific tasks. It is becoming urgent that the etiologic agent(s) are identified and her skin condition is controlled. With ongoing eczema and a damaged barrier function, she is at daily risk of increased sensitisation to additional chemicals, both at work and elsewhere. This could lead to worsening eczema, which could result in her having to leave her vocation. The active eczema and open skin lesions are also putting her and her clients at risk of infections. In addition, as she is now pregnant, she needs to be advised to limit exposure to potentially dangerous substances in her environment. The scheduled patch-testing with the hairdresser series and substances identified from her workplace has been delayed at her request because of her pregnancy, further delaying definitive treatment.

The clinical distribution of the eczema initially suggested a glove allergy. Changing gloves from latex to nitrile did not improve her skin. This is understandable as similar rubber chemicals may be found in both glove types. The initial gloves used were professional reusable black rubber ones. Glove re-use has its own problems: material degradation, physical damage and gradual contamination with the substances used in the profession and for cleaning. Her current use of nitrile gloves excludes contamination as the

gloves are disposed of between clients. Overall it seems unlikely that gloves were the cause as the rubber glove allergens were negative on patch testing and sources of contamination and glove penetration have been minimised or eliminated. The distribution is more compatible with contact with treated, contaminated hair during styling and cutting.

The positive patch-test reaction to chromium is weak and does not seem to be occupationally relevant. Importantly, none of the products she used listed chrome as an ingredient (see Table I). Contamination of the raw materials used in their manufacture could still explain her exposure. The patient did not react to any of the other metals patch-tested, namely, nickel and cobalt, to explain a cross-reaction. Finally, the occupational relevance of chrome sensitisation has been shown to be low.⁵

The weak reaction to Balsam of Peru is difficult to link

to occupational exposure, considering how widely it is encountered in day-to-day living in the modern world. None of the products she uses list it as an ingredient (see Table I). It is noteworthy that both fragrance mixes tested, which share many similar fragrance chemicals, were negative. This does not exclude an etiologic role for fragrances as several specific ones have been identified from the ingredients list (see Table I) that could be implicated.

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DECLARATION OF CONFLICT OF INTEREST

The author declares no conflict of interest.

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