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Contact sensitization to 34 common contact allergens in university students in Beijing

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Epidemiological studies of contact allergy in the general population provide important evidence for the prevention of contact allergy. In 2010, we reported frequencies of contact allergy to 20 common allergens selected from the European baseline series in university students in Beijing (1). In the present study, we tested 34 common allergens selected from the European baseline series and a cosmetic series to investigate possible changes concerning common contact allergens in the general population in Beijing.

Materials and Methods

Four hundred and eighty-one healthy university student volunteers were tested from 25 April 2014 to 25 May 2014. Students were recruited by sending messages through education departments stating that volunteers were needed to test for the frequency of allergic reactions to common contact allergens. Exclusion criteria comprised severe skin disease, immunosuppressant treatment, or the use of corticosteroids within 4 weeks. Knowledge or suspicion of an existing allergy was neither an inclusion nor an exclusion criterion. All respondents not violating the exclusion criteria were studied. There were 149 males and 332 females, with an average age of 24 ± 3 years (range 18–33 years). All participants were Chinese Hans. The local ethics committee approved this study, and oral consent was obtained from participants. Allergens in IQ Chambers™ (Anhui Rainmix Biotech, Huainan, Anhui Province, China; Table 1) were applied

to the upper back for 2 days, and the results were recorded at day (D)2 and D3 according to international recommendations (2). Data were analysed with SPSS 16.0 (SPSS, Chicago, IL, USA).

Results

One hundred and four volunteers tested positive, i.e. 21.6% (95% confidence interval: 17.7–28.5) (3). Four preservatives, namely methylchlorisothiazolinone (MCI)/methylisothiazolinone (MI), formaldehyde, and methylidibromoglutaronitrile, and quarternium-15 were among the top 10 most common allergens (Table 1). As compared with the 2010 results (1), the positivity rate of MCI/MI increased remarkably from 0% to 2.7%, although the sex and age distributions were different in the two investigations ($p < 0.05$, χ^2 -test), and hence a direct comparison between the positivity rates cannot be performed. Most cosmetic-related allergens yielded some positive reactions, and they replaced the rubber-related allergens and potassium dichromate in the top 10 most common allergens.

Discussion

This study shows that preservatives, especially MCI/MI, have become the most frequent contact allergens in the general population, most likely reflecting the increased use of cosmetics and skin care products by university students in Beijing, owing to the improvement in living conditions. A survey of the use of cosmetics and skin care products in university students should be performed to confirm this. MCI/MI is a mixture of MCI and MI. It is one of the most frequent contact allergens. It has been found that patch testing with 200 ppm MCI/MI can detect more allergic reactions than the 100 ppm we

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Table 1. Prevalence of positive reactions patch testing (%) with 34 allergens in volunteers, and comparison with those reported in 2010 (1)

Allergens, concentration	Volunteers (n = 481)			Reported in 2010 (n = 205)
	Male (n = 149)	Female (n = 332)	Total (n = 481)	
Nickel sulfate, 5.0%	2.0	6.9	5.3 (3.5–7.5)*	8.8
Colophonium, 20.0%	3.4	3.0	3.1 (1.7–4.8)	4.9
Cobalt chloride, 1.0%	0.7	3.6	2.7 (1.2–4.2)	1.5
Sorbitan sesquioleate, 20.0%	2.7	1.5	2.3 (1.0–3.9)	NA
MCI/MI, 100 ppm aq.	0.7	2.7	2.1 (1.0–3.1)	0
Fragrance mix I, 8.0%	0	2.7	1.9 (0.8–3.1)	2.4
<i>p</i> -tert-Butylphenol-formaldehyde resin, 1%	0.7	1.8	1.5 (0.4–2.7)	NA
Formaldehyde, 1% aq.	0.7	1.5	1.2 (0.4–2.3)	1.5
Methyldibromoglutaronitrile, 2%	1.3	0.9	1.0 (0.2–2.1)	NA
Quaternium-15, 2%	0.7	0.9	0.8 (0.2–1.7)	0
Hexamethylenetetramine, 2.0%	0.7	0.6	0.6 (0–1.4)	NA
<i>p</i> -Phenylenediamine, 1.0%	1.3	0.3	0.6 (0–1.0)	0
Carba mix, 3.0%	1.3	0	0.4 (0–1.0)	2.4
Thiuram mix, 1.0%	1.3	0	0.4 (0–1.0)	0
Paraben mix, 16.0%	0.7	0.3	0.4 (0–1.0)	0
Cetyl alcohol, 5.0%	0	0.6	0.4 (0–1.0)	0
4-Hydroxybenzophenone, 10.0%	0	0.6	0.4 (0–1.0)	NA
Potassium dichromate, 0.5%	0.7	0	0.2 (0–0.6)	2.4
Hydroquinone, 1.0%	0.7	0	0.2 (0–0.6)	NA
Iodochlor hydroxyquinoline, 0.2%	0	0.3	0.2 (0–0.6)	NA
DMDM hydantoin, 2.0% aq.	0	0.3	0.2 (0–0.6)	NA
Lanolin alcohol, 30%	0	0.3	0.2 (0–0.6)	NA
<i>p</i> -Aminophenol, 1.0%	0	0.3	0.2 (0–0.6)	NA
2-Phenoxyethanol, 1.0%	0	0.3	0.2 (0–0.6)	NA
Triethanolamine, 2.0%	0	0.3	0.2 (0–0.6)	NA
Bronopol™, 0.5%	0	0	0 (0–0.6)	0
Ethylenediamine dihydrochloride, 1.0%	0	0	0 (0–0.6)	1.5
Mercaptobenzothiazole, 2.0%	0	0	0 (0–0.6)	NA
Tea tree oil, oxidized, 5.0%	0	0	0 (0–0.6)	NA
<i>N</i> -(cyclohexylthio)phthalimide, 1.0%	0	0	0 (0–0.6)	NA
Epoxy resin, 1.0%	0	0	0 (0–0.6)	0.5
Imidazolidinyl urea, 2%	0	0	0 (0–0.6)	0.5
2,6-Di- <i>tert</i> -butyl-4-cresol, 2.0%	0	0	0 (0–0.6)	NA
Sorbic acid, 2.0%	0	0	0 (0–0.6)	NA

MCI, methylchlorisothiazolinone; MI, methylisothiazolinone; NA, not applicable.

Allergens in pet., except where indicated otherwise.

*95% confidence intervals (in parentheses).

used (4); therefore, we may expect that the true prevalence of MCI/MI contact allergy could be even higher. Although this study is based on a self-selected population, and those with a history of allergy might be more likely to

participate, the results indicate that preservatives and cosmetic allergens are becoming increasingly important in the Chinese population.

References

- Li L F. Contact sensitization to European baseline series of allergens in university students in Beijing. *Contact Dermatitis* 2010; **62**: 371–372.
- Wahlberg J E, Lindberg M. Patch testing. In: *Contact Dermatitis*, 4th edition, Frosch P J, Menné T, Lepotévin J-P (eds): Berlin, Heidelberg, Springer-Verlag, 2006: pp. 365–390.
- Gefeller O, Pfahlerberg A B, Uter W. What can be learnt from nothing? – A statistical perspective. *Contact Dermatitis* 2013; **69**: 350–354.
- Bruze M, Isaksson M, Gruvberger B et al. Patch testing with methylchlorisothiazolinone/methylisothiazolinone 200 ppm aq. detects significantly more contact allergy than 100 ppm. A multicentre study within the European Environmental and Contact Dermatitis Research Group. *Contact Dermatitis* 2014; **71**: 31–34.