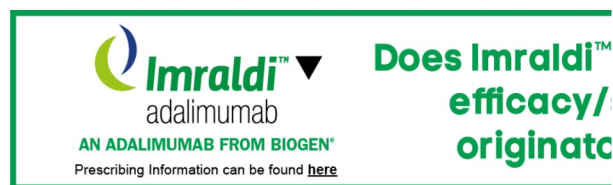


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Australian baseline series allergens in assessment of allergic contact dermatitis in New South Wales

Harriet Sara Cheng , Joseph Konya, Edmund Lobel, Pablo Fernandez-Penas

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Present address: Professor Harriet Sara Cheng, Department of Dermatology, Auckland District Health Board, New Zealand.

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Dear Editor,

INTRODUCTION

The Australian baseline series (ABS) was created by expert consensus and review of relevant allergens in a population from Victoria.¹ In a recent follow-up study, Dear and colleagues reported the performance of the ABS.² Further validation of the ABS is required in populations from other regions in Australia. Subsequently, we report the positivity rates for ABS allergens in a population from Sydney.

METHODS

This was a retrospective observational study of patients patch-tested at The Skin Hospital in the Westmead and Darlinghurst facilities in Sydney from 2007 to 2017. Ethics approval was granted by the University of Sydney ethics committee.

Data from patch testing to allergens in the current ABS (updated February 2021) and local standard series were reviewed.³ These clinics accept referrals from specialists and general practitioners and use a local baseline series with additional series and patients own products tested as indicated (Table [S1](#)).

RESULTS

1,584 patients were included; 579 at the Darlinghurst site and 1,005 at Westmead. Patient characteristics are shown in Table 1. The most frequent positive reactions were nickel sulfate (7.5%), cobalt chloride (3.7%), *Myroxylon pereirae* (3.7%), fragrance mix I (3.5%), p-Phenylenediamine (2.6%) and potassium dichromate (2.5%). Positive reactions to patient's own products were seen in 162 cases (10.2%).

Table 1. Characteristics of patients patch tested in Sydney from 2007 to 2017 (n = 1584)

Characteristic	Frequency (%)
Male	531 (33.5)
Age > 40 years	877 (55.4)
Occupational cause	115 (7.3)
Atopic dermatitis	343 (21.7)
Hand dermatitis	252 (15.9)
Leg ulcer or dermatitis	119 (7.5)
Facial dermatitis	370 (23.4)
Positivity rate	441 (27.8)

Two hundred and fifty-eight patients (58.5%) had all positive reactions detected by ABS allergens, 127 (28.8%) were partially evaluated (i.e. had at least one allergen detected but not all) and 56 (12.7%) had no allergens detected by the ABS. Overall, ABS allergens detected 71.5% of positive reactions and 72.9% of relevant positive reactions. Positive and relevant reactions to ABS allergens are shown in Table 2.

Table 2. Positive and relevant reactions to Australian baseline series allergens in patients patch-tested in New South Wales from 2007 to 2017 (n = 1584)

Allergen	Tested	Positive	Relevant	Positive/tested %	Positive/total %	Relevant/tes %
Nickel sulphate	1559	119	18	7.6	7.5	1.2
Cobalt chloride	1559	59	7	3.8	3.7	0.4
Myroxylon pereirae	886	58	16	6.5	3.7	1.8

Allergen	Tested	Positive	Relevant	Positive/tested %	Positive/total %	Relevant/tes %
Fragrance mix I	1559	55	21	3.5	3.5	1.3
p-Phenylenediamine	1564	41	28	2.6	2.6	1.8
Potassium dichromate	1557	39	8	2.5	2.5	0.5
MI/MCI	886	31	20	3.5	2	2.3
Colophonium	1561	27	9	1.7	1.7	0.6
Thiuram mix	1561	22	12	1.4	1.4	0.8
MI	155	21	16	13.5	1.3	10.3
Quaternium 15	1561	17	7	1.1	1.1	0.4
Carba mix	1559	15	4	1	0.9	0.3

MI = methylisothiazolinone, MCI = methylchloroisothiazolinone, NT = not tested

Table 3 shows non-ABS allergens positive 0.5% or more of those tested. The most frequent relevant reactions missed by the ABS were dodecyl gallate (11), cinnamic alcohol (7), methyl dibromo glutaronitrile (5), toluenesulfonamide formaldehyde resin (5), 4-tert-butylphenol formaldehyde resin (5), basic red 46 (5), oakmoss absolute (4), cinnamic aldehyde (4) and 2-nitro-4-phenylenediamine (4).

Table 3. Non-Australian Baseline Series allergens positive in 0.5% or more of patients patch-tested from 2007 to 2017 (n = 1584)

Allergen	Number of positives (%)	Comments
Dodecyl gallate	31 (2.0)	Reported low relevance, relevance 35% in present study
Thiomersal	21 (1.3)	Low relevance
Methyl dibromo glutaronitrile	14 (0.9)	Low relevance
Toluene sulfonamide formaldehyde resin	11 (0.7)	Rates decreasing worldwide, 45% relevance in present study
Cinnamyl alcohol	9 (0.6)	Present in fragrance mix I

Allergen	Number of positives (%)	Comments
Octyl gallate	9 (0.6)	Low relevance
Oakmoss absolute	8 (0.5)	Present in fragrance mix I

DISCUSSION

The ABS identified nearly three quarters of relevant allergens and causes of allergic contact dermatitis. Generally, a baseline series should identify 70%–80% of allergens⁴; however, varying figures are reported. A North American study found that 50% of positive reactions were to baseline series allergens (series size 20 allergens).⁵ Patel and Belsito found, using a screening series of 28 allergens, that 27.6% had all allergens identified and 49.9% had some but not all allergens identified.⁶

Testing with a larger number of allergens improves accuracy of patch testing and testing with a standard series alone is seldom adequate.⁷ Our findings support this; supplementation with special series' depending on the clinical scenario is required. As found in the Victorian study, fragrance allergens were frequently missed relevant reactions.² Fragrance allergy is not reliably detected by testing with the fragrance mixes.⁸

Toluenesulfonamide formaldehyde resin, a cause of contact allergy to nail polish, was recently removed from the ABS. We found that overall 0.7% of patients were positive to this allergen with a relevance rate of 45%. However, internationally positivity rates are decreasing; falling from 0.78% from 1980 to 2009 to just 0.03% from 2010 to 2018 at a tertiary patch test centre in the United Kingdom.⁹

We found 31 positive and eleven relevant reactions to dodecyl gallate. Dodecyl gallate, the ester of dodecanol and gallic acid, is an antioxidant and preservative in foods and cosmetics. In our patients, reactions were caused by cosmetics, handling cooking oils and margarine and ingested food. Gallates are often excluded from baseline series because of difficulty ascertaining relevance. However, gallate reactions may be rising and our results suggest that ongoing surveillance is needed and future consideration of inclusion in the ABS if local data confirm increased positivity and relevance rates.¹⁰

Several ABS allergens are not included in our local baseline series. This is a limitation of our study as they were not tested in consecutive patients as the local standard series used over the study period differ from the ABS. For example, methylisothiazolinone was positive in 13.5% of patients tested, but only 1.3% of all patients presenting for patch testing overall because only 155 patients were tested to MI.

In conclusion, we report the performance of ABS allergens in detecting positive and relevant reactions in a population undergoing patch testing in Sydney. The ABS detected 72.9% of relevant reactions. Missed allergens included fragrances and dodecyl gallate. The two clinics at Darlinghurst and Westmead have since adopted the ABS and unified their supplementary allergen series.

Supporting Information



Filename	Description
ajd13745-sup-0001-TableS1.docx Word document, 13.2 KB	Table S1. Local baseline series used at testing sites in Sydney during the study period.

Please note: The publisher is not responsible for the content or functionality of any supporting information supplied by the authors. Any queries (other than missing content) should be directed to the corresponding author for the article.

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Supplementary table 1. Local baseline series used at testing sites in Sydney during the study period

Allergen	Darlinghurst Concentration and vehicle	Westmead Concentration and vehicle
Potassium dichromate	0.25% pet	0.5% pet
Nickel sulfate	5% pet	5% pet
p-Phenylenediamine	1% pet	1% pet
<i>Myroxylon perei</i>	25% pet	25% pet
Neomycin sulfate	20% pet	20% pet
Paraben mix	12% pet	12% pet
Colophonium	20% pet	20% pet
Lanolin alcohol	30% pet	30% pet
Epoxy resin	1% pet	1% pet
Mercapto mix	2% pet	2% pet
Thiuram mix	1% pet	1% pet
Fragrance mix I	8% pet	8% pet
Quaternium 15	1% pet	1% pet
Formaldehyde	1% aq	1% aq
Chlorocresol	1% pet	1% pet
2-Mercaptobenzothiazole	2% pet	2% pet
Imidazolidinyl urea	2% pet	2% pet
Methylisothiazolinone	0.2% aq	0.2% aq
MCI/MI	0.02% aq	0.02% aq
Toluenesulfonamide formaldehyde resin	10% pet	10% pet
Carba Mix	3 % pet	3 % pet
Cobalt chloride	1% pet	1% pet
4-tert-butylphenol formaldehyde resin	1% pet	1% pet
Sesquiterpene lactone mix	0.1% pet	Not included
Budesonide	0.1% pet	Not included
Tixocortol-21-pivalate	1% pet	Not included
Black rubber mix	0.6% pet	Not included
Disperse blue mix (124/106)	1% pet	Not included
Propylene glycol	20% aq	Not included
Benzyl alcohol	1% pet	Not included
Tea tree oil	10% pet	Not included
Fragrance mix II	14% pet	Not included
Diazolidinyl Urea	2% pet	Not included
Primin	Not included	0.01% pet
N-Isopropyl-N-phenyl-4-phenylenediamine	Not included	0.1% pet
Ethylenediamine dihydrochloride	Not included	1% pet

Castor oil	Not included	1 drop
Epoxy acrylate	Not included	0.5 pet
Benzocaine	Not included	5% pet
Methyl dibromoglutaronitrile	Not included	0.5% pet