

Sensitization to *Malassezia* in infants and children with atopic dermatitis: prevalence and clinical characteristics

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Key words: atopic dermatitis; children; *Malassezia*; sensitization.

There is increasing evidence that sensitization to *Malassezia* plays an important role as a trigger factor in atopic dermatitis (AD; 1, 2). Sensitization is reported to occur in adults with head and neck dermatitis and in older children mainly after puberty (2, 3). In infants and toddlers-specific immunoglobulin E (IgE) antibodies to *Malassezia* have rarely been found (2–4). Most studies analyzed sensitization rates specific to only one *Malassezia* species.

The aim of this study was to investigate the rate of sensitization to three different *Malassezia* species in a cohort of children suffering from AD of all age groups and severity degrees. In order to be able to decide which AD patients are to be screened for *Malassezia* sensitization, we analyzed clinical characteristics in different age groups.

Children attending the allergy department at the Children's Hospital, Univer-

sity of Cologne, because of AD between March 2003 and July 2007 were included in the study. Clinical picture with distributional pattern of lesions and overall severity was assessed with the SCORAD index on the day of the blood sampling. In order to find age-related differences in the clinical picture, we separately analyzed the data for infants below and above 12 months of age.

Total and specific IgE to food and microbial antigens were tested with the ImmunoCAP™ system (Phadia, Freiburg, Germany). Specific IgE to *Malassezia* was measured using the ImmunoCAP m227 to *Malassezia* species, which is a mixture of *M. sympodialis*, *M. globosa*, and *M. restricta*.

One hundred and forty-one children aged between 3 and 196 months (mean 35.8, SD 38.4) with AD were included in the study. Fifty-eight children were 12 months of age or younger, 83 older than 12 months. Mean value of the SCORAD index was 36 (range: 0–91, SD 20).

Twenty-four of the 141 sera (17%) were tested positive for specific IgE to *Malassezia* species (range: 0.36–44.2 kU/l). Nine of 58 patients (15.2%) aged 12 months or younger were positive compared to 15 of 83 (18.1%) in the older age group. The youngest sensitized patient was 4 months old. The risk for sensitization to *Malassezia* correlated significantly with total IgE value ($r = 0.510$, $P < 0.0001$) and weakly with the SCORAD index ($r = 0.24$, $P > 0.005$).

There was no significant correlation between sensitization to *Malassezia* species and age ($r = 0.102$, $P = 0.087$),

duration ($r = 0.094$, $P = 0.11$), or period of onset of the disease ($r = 0.09$, $P = 0.15$). Data on association of clinical items and sensitization is presented in Table 1.

Malassezia colonization takes place immediately after birth and shows a great variation in presence and density on human skin over different age groups (2, 3). Considering this variability it has been suggested to analyze more than one *Malassezia* species when screening for sensitization in patients suffering from AD (2, 5). Using a combined ImmunoCAP to three species we could demonstrate higher sensitization rates than previously reported especially in young infants.

Analyzing the associated clinical picture, we could clearly show that patients with high IgE values and a severe clinical course are at higher risk for being sensitized to *Malassezia*. Clinical items associated with sensitization were age dependent. In infants, repeated episodes of oozing lesions were predictive for sensitization. Higher pH in these lesions may lead to a more pronounced allergen release (6) and subsequently a higher risk for sensitization. In the older age group, head, face and neck distribution as well as lesions on hands and feet were significantly associated with *Malassezia* sensitization.

In conclusion, sensitization to *Malassezia* does occur even in young infants. In patients at risk, testing should be considered in order to initiate antifungal treatment. Future studies should address the effectiveness of antifungal treatment in *Malassezia*-sensitized infants and children with AD.

Table 1. Odds ratio for patients sensitized to *Malassezia* species compared to patients without sensitization

	All patients ($n = 141$)		Infants 12 months or younger ($n = 58$)		Children older than 12 months ($n = 83$)	
	Odds ratio (95% CI)	P-value	Odds ratio (95% CI)	P-value	Odds ratio (95% CI)	P-value
Chronic active disease	4.42 (1.6–11.4)	0.003	5.54 (1.2–25.43)	0.011	3.87 (1.21–12.35)	0.015
Lesions on hands and feet	4.2 (1.6–11.4)	0.001	2.35 (0.56–9.9)	ns	7.31 (1.53–34.9)	0.005
Repeated oozing lesions	3.49 (1.34–9.06)	0.007	10.67 (1.2–91.9)	0.018	2.28 (0.72–7.13)	ns
Lesions on the neck	3.32 (1.31–8.39)	0.009	3.44 (0.77–15.48)	ns	3.23 (0.99–10.51)	0.044
Lesions on the face	3.28 (1.14–9.31)	0.022	2.59 (0.29–22.9)	ns	4.44 (1.28–15.4)	0.013
Sensitization to food allergens	11.19 (2.51–49.75)	<0.0001	0.77 (0.65–0.91)	0.023	9.29 (1.94–44.4)	0.001
Sensitization to aeroallergens	2.79 (1.06–7.35)	0.034	2.46 (0.48–12.68)	ns	2.97 (0.77–11.5)	ns
Sensitization to <i>Candida albicans</i>	15.42 (4.29–55.36)	<0.0001	13.42 (1.07–168.3)	0.013	22.13 (4.38–111.86)	<0.0001

The authors would like to thank Dr Burow (Phadia) for fruitful discussion and performance of the ImmunoCAP assay.

The authors declare that they have no conflict of interest.

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Accepted for publication 21 November 2007
Allergy 2008; 63:486–487
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Munksgaard
DOI: 10.1111/j.1398-9995.2007.01623.x

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