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Clinical significance of molds newly available for radioallergosorbent testing

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Three years of weekly Rotorod airborne allergen reports from Corpus Christi, Texas, were reviewed. Five of 10 newly available airborne molds for radioallergosorbent testing (RAST) were present in significant numbers. Three hundred seventy-five mold RAST evaluations were expanded to include the five old and these five new molds. Except for *Alternaria*, the frequency of and allergenic response to the new molds were generally greater than those for the five old molds. The usual *Alternaria-Cladosporium* mold screen proved less satisfactory when these five new molds were added to the mold battery; however, the addition of *Helminthosporium* to the screen corrected this deficiency. Cross-reactivity production of false-positive responses seems unlikely because of frequent significant variance in RAST scores from mold to mold in the same patient.

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Until April 25, 1986, only five airborne molds were commercially available for radioallergosorbent testing (RAST) (Table 1).¹ Many practitioners believed that testing and treatment for these five molds generally sufficed for mold allergy control. Others, however, believed that skin testing of additional molds was a necessary supplement. An additional 10 airborne molds are now available for RAST testing (Table 1).

Corpus Christi is a city in southwest Texas, on the Gulf of Mexico, in which there is a high prevalence of mold allergy. Appropriate care of patients

Table 1. Airborne molds available for RAST testing

Old	New
<i>Alternaria alternata</i>	<i>Aureobasidium pullulans</i>
<i>Aspergillus fumigatus</i>	<i>Botrytis cinerea</i>
<i>Cladosporium herbarum</i>	<i>Curvularia lunata</i> *
<i>Mucor racemosus</i>	<i>Epicoccum purpurascens</i> *
<i>Penicillium notatum</i>	<i>Fusarium moniliforme</i> *
	<i>Helminthosporium halodes</i> *
	<i>Phoma betae</i>
	<i>Rhizopus nigricans</i>
	<i>Stemphylium botryosum</i> *
	<i>Trichoderma viride</i>

*New molds commonly airborne in Corpus Christi, Tex.

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residing in this area required investigating the clinical importance of these 10 newly available airborne molds. In this locale, a previous study designed to test the efficacy of a screening RAST revealed 237 of 670 patients (35%) were positive to one or more of the (then

Table 2. RAST class responses in the 83 patients with a positive response

	Class I	Class II	Class III	Class IV	Class V	Total positive	
						No.	%
<i>Alternaria</i>	17	18	18	10	1	64	77
<i>Helmintho- sporium</i>	15	13	15	12	4	59	71
<i>Fusarium</i>	22	8	11	9	1	51	61
<i>Stemphylium</i>	13	7	19	10	1	50	60
<i>Curvularia</i>	13	16	12	8	1	50	60
<i>Mucor</i>	24	15	4	1	0	44	50
<i>Cladosporium</i>	19	16	4	1	0	40	48
<i>Epicoccum</i>	15	10	7	6	0	38	46
<i>Penicillium</i>	20	12	3	0	1	35	41
<i>Aspergillus</i>	14	8	1	1	0	24	29

Table 3. Ten patients with positive responses to the new molds missed by the *Alternaria-Cladosporium* screen

Patient no.	<i>Helminthosporium</i>	<i>Fusarium</i>	<i>Stemphylium</i>	<i>Curvularia</i>	<i>Epicoccum</i>
1	4	4	0	3	0
2	3	1	2	2	0
3	3	1	0	0	0
4	2	1	2	2	0
5	2	1	1	1	0
6	1	1	0	0	0
7	1	0	0	0	0
8	1	0	0	0	0
9	0	1	0	0	0
10	0	1	0	0	0

available) five molds.² In that study an *Alternaria-Cladosporium* mold screen proved to be 96.9% efficient and 91.5% sensitive. When only class 2 or higher responses were considered, the efficiency was 99.7% and sensitivity was 94.2%. The former percentages were designated the "exact" responses and the latter were called the "definite" responses. The standard formulas³ used to derive these percentages were:

$$\text{Test efficiency} = \frac{\text{True Positives} + \text{True Negatives}}{\text{Grand Total}} \times 100$$

$$\text{Test sensitivity} = \frac{\text{True Positive}}{\text{True Positives} + \text{False Negatives}} \times 100$$

METHODS AND MATERIALS

Study objectives. The primary objective of this study was to evaluate the prevalence and allergenicity in the Corpus Christi area of the 10 newly available molds for RAST testing. A second objective was to

reexamine the efficacy of the *Alternaria-Cladosporium* screen if it appeared advisable to add any of the newly available molds to the old mold battery.

Materials. An *Aeroallergen* model Rotorod Sampler (Sampling Technologies, Inc., of Los Altos Hills, Calif.) was used for air sampling. Collected samples were read by Pollen Research Associates, Inc. (Wenham, Mass.). Disks and reagents for the five old molds were obtained from Ventrex Laboratories, Inc. (Portland, Maine). Disks and reagents for the 10 new molds were obtained from Pharmacia Diagnostics Division of Electro-Nucleonics, Inc. (Newark, N.J.).

Study procedure. Three years of weekly Rotorod airborne allergy reports from Corpus Christi, Texas, were reviewed. Five of the 10 newly available molds were present in significant numbers (Table 1).

Three hundred seventy-five RAST patient evaluations were expanded to include all five old molds plus these five newly found molds. Approximately 75% of the tests was performed on frozen serum samples remaining from RAST tests performed during the previous year.

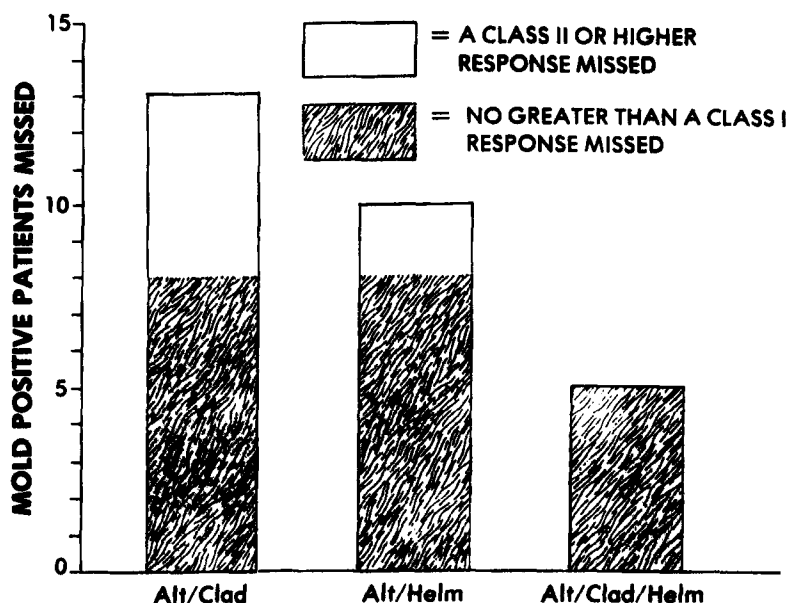


Fig. 1. Mold-screen comparisons for the 83 patients with positive responses. Alt, *Alternaria*; Helm, *Helminthosporium*; Clad, *Cladosporium*.

Table 4. Efficiency and sensitivity comparisons

Screens	Efficiency (%)		Sensitivity (%)	
	Exact*	Definit†	Exact*	Definit†
<i>Alternaria-Cladosporium</i>	96.5	98.7	84.3	94.0
<i>Alternaria-Helminthosporium</i>	97.3	99.5	88.0	97.6
<i>Alternaria-Cladosporium-Helminthosporium</i>	98.7	100.0	94.0	100.0

*Includes classes I to V RAST responses.

†Includes classes II to V RAST responses.

The rest of the tests were accomplished on current patients' serum samples.

RESULTS

Of the 375 patients, 83 (22%) had a positive response to at least one of the 10 molds in the new battery. These 83 patients responded positively to the old molds 207 times and to the new molds 248 times (Table 2). Cross-reactivity production of false-positive responses seems unlikely because of frequent significant variances in RAST scores from mold to mold in the same patient.

On review of the current data, if the *Alternaria-Cladosporium* screen had been used for this newly structured (five old plus five new) mold battery, 10 patients (12%) with positive responses to the five new molds would have been missed (Table 3). Of these 10 patients, the first five are most noteworthy.

As seen in Table 2, *Helminthosporium* was the most allergenic of the five new molds. Retrospec-

tively, the efficiency and sensitivity of the *Alternaria-Cladosporium* mold screen for this expanded 10-mold battery was compared with those of an *Alternaria-Helminthosporium* screen and an *Alternaria-Cladosporium-Helminthosporium* screen. These results are presented in Fig. 1 and Table 4.

DISCUSSION

Five of the 10 newly available molds for RAST were commonly airborne in the Corpus Christi area. On RAST, *Helminthosporium* was the most allergenic, followed in order by *Fusarium*, *Stemphylium Curvalaria*, and *Epicoccum*. All but *Epicoccum* appeared more allergenic than the previously available molds except *Alternaria*. Retrospectively, the most efficient screen for mold sensitivity in this location was a combination of *Alternaria*, *Cladosporium*, and *Helminthosporium*.

The fewer patients with positive responses to mold observed in this study (22%) than in an earlier study²

(35%) may be due to a lack of remaining sera from some previously tested patients who were more allergenic. Such an influence would bias the study negatively.

These data substantiate the potential importance of the 10 newly available molds for RAST. The need to use these new molds will differ from one geographic location to another. Air sampling over at least a full year needs to be accomplished to determine which, if any, of these molds will have a significant role in a given area. Additional sources of information might be obtained from local government agencies or state universities.

CONCLUSION

Depending on the practitioner's geographic location, some or all of these newly available molds for RAST may be very important for inclusion in the RAST ar-

mamentarium. In this study, *Helminthosporium* was the most allergenic. Specific significance must be determined by air sampling over a full year, supplemented with information (when available) from local governmental or university sources.

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REFERENCES

1. Nalebuff DJ, Fadal RG, Ali M. An enthusiastic view of the use of RAST in clinical allergy. *Immunol Allergy Pract* 1981;3:18-29.
2. King WP. Efficiency of a screening radioallergosorbent test. *Arch Otolaryngol* 1982;108:781-6.
3. Galen RS, Gambino SR. Beyond normality: the predicted value and efficiency of medical diagnosis. New York: John Wiley & Sons, 1975:10-4, 33.