

# Frequency of allergy to *Alternaria* and *Cladosporium* in a specialist clinic

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In the literature there is considerable variation in the frequency of allergy to the moulds *Alternaria iridis* and *Cladosporium herbarum*. In 1985 a 6-month frequency study was performed in a specialist clinic with a patient population similar to the average specialist and out-patient clinics in Denmark as regards sex, age, and diagnoses. Allergy was confirmed by use of a purified and standardized extract, and SPT, CPT and RAST were performed. Among the 292 first referrals nine had allergy to *Alternaria*, and two to *Cladosporium*, corresponding to a frequency of 3.1 (1.0-6.5)% and 0.7 (0.1-3.6)%, respectively, with 99% confidence limits. Most of the patients were multi-allergics suffering from rhinoconjunctivitis as well as asthma.

*Key words:* *Alternaria iridis*; *Cladosporium herbarum*; frequency; mould allergy

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The airborne spores of *Alternaria* and *Cladosporium* are found in sufficient amounts to cause allergy, although there is considerable variation in the frequencies (9, 10, 11, 13). Diagnosis is difficult partly due to imprecise anamnestic information and partly to technical problems in the production of the extracts (1, 3, 5, 6).

In the present study purified and biologically standardized extracts of *Alternaria iridis* and *Cladosporium herbarum* (2) are used for diagnosing general practice patients.

## MATERIAL AND METHOD

The study includes all first-referred patients in a 6-month period from June 1 to November 30, 1985. Population characteristics are shown in Table 1. The clinic receives only patients with suspected allergy referred from general practitioners.

An obligatory inclusion criterion is rhinitis and/or asthma in the period from early spring to end of autumn. Patients were asked to record symptoms on a diary card. Because of multi-allergy this information was not of quantitative value. The anamnestic record is evaluated as a

whole in terms of possible and probable in relation to mould allergy (Table 2).

Allergen extracts are delivered freeze-dried in vials by Pharmacia for reconstitution in various diluents. For skin prick test (SPT) 10,000 BU and 100,000 BU, diluted in Pharmalgen glycerol-diluent (50% glycerol) and for conjunctival provocation (CPT) 1,000 BU, 10,000 BU and 100,000 BU, diluted in Pharmalgen albumin-diluent (0.3 mg serum albumin, 0.4% fenol).

Fresh material was not prepared every day but as often as recommended by the manufacturer.

Phadebas®, Pharmacia Diagnostics was used for RAST analysis and the results indicated in RAST-class.

The experimental design is shown in Fig. 1. The inclusion criterion was positive anamnesis (e.g. not incompatible with mould fungi allergy) in connection with a cutaneous reaction to the extract strength 100,000 BU > the negative reference (glycerol diluent).

### *Skin prick test*

Prick test, using a DHS-disposable lancet (12), was performed on the volar side of the forearm

Table 1  
Distribution by age groups and sex

| Age   | Number | %    |
|-------|--------|------|
| 1-14  | 73     | 25   |
| 15-20 | 39     | 13.4 |
| 21-40 | 125    | 42.8 |
| 41-   | 55     | 18.8 |
|       | 292    | 100  |
| Men   | 123    | 42   |
| Women | 169    | 58   |

Table 2  
Point system for graduation of the investigation result

| Point                    | 1        | 2                                   | 3                  |
|--------------------------|----------|-------------------------------------|--------------------|
| Anamnesis                | possible | probable                            | -                  |
| Skin prick test          | 1/4 HEP  | 1/2 HEP                             | 1 HEP              |
| Conjunctival provocation | -        | 10 <sup>4</sup> -10 <sup>5</sup> BU | 10 <sup>3</sup> BU |
| RAST-class               | 1        | 2                                   | 3-4                |

SPT: Allergen extract 10,000 BU, histamine chloride reference 10 mg/ml. Allergy is ruled out: 0-3, doubtful: 4-5, probable: 6-8, and certain: 9-11.

and read after 15 min. The wheal size was marked and transferred by tape to a result sheet. Wheal mean diameters were calculated, and histamine chloride 10 mg/ml used as reference. The prick test was used as single determination during the screening phase (100,000 BU), whereas a four-fold test was performed in the follow-up examination with 10,000 BU corresponding to the strength of the histamine reference.

#### Conjunctival provocation

Provocation was performed at the follow-up examination in the mould fungi off-season from January 1 to March 31, 1986. The provocation test was performed during a period of non-medication and according to the method described by Møller et al. (8). Only the combination of rhinitis and ciliary blush-up was accepted as positive.

#### Score system

The value of positive results from the tests used was graded as stated in Table 2. The ranking of

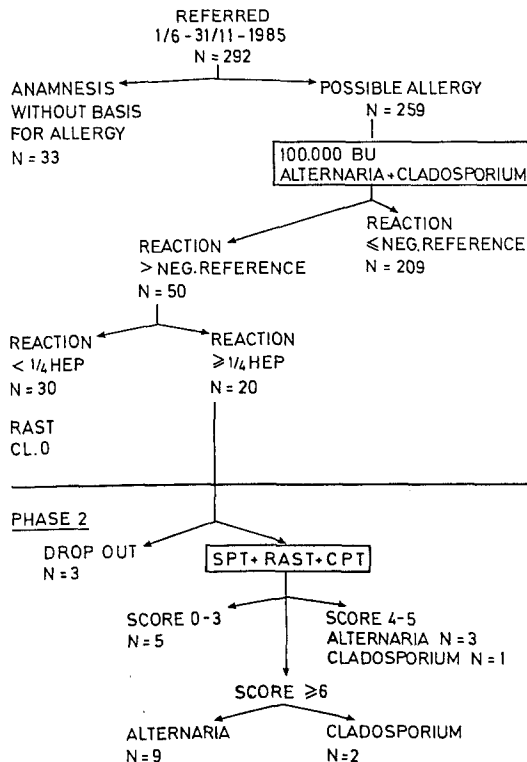


Fig. 1. Flow-chart illustrating the course of the investigation. For details in phase 2 see Table 3.

the results follows the guide lines used in similar studies (7, 13). A total of points < 4 excludes allergy, while the diagnosis is regarded as doubtful at the interval 4-5, probable at 6-8, and certain at 9-11 points.

#### Drop-outs

Absence from follow-up resulted in exclusion. Refusal of blood tests (RAST analysis) was not considered as decisive and was only of practical importance to the children examined.

#### RESULTS

259 patients of 292 had an anamnesis which was not incompatible with allergic disease. 50 reacted to the cutaneous test of 100,000 BU, > the negative reference (doubtful cases were

Table 3

An outline of patients investigated in phase 2. Patients 10 and 13 had no positive reactions to SPT in the mould off-season

|                     | Patient No. | Skin prick test HEP | RAST class | Provocation BU  | Anamnesis point | Total score | Probable or certain |
|---------------------|-------------|---------------------|------------|-----------------|-----------------|-------------|---------------------|
| <i>Alternaria</i>   | 1           | 1/2                 | 3          | 10 <sup>5</sup> | 1               | 8           | yes                 |
|                     | 2           | 1                   | -          | 10 <sup>4</sup> | 1               | 6           | yes                 |
|                     | 3           | 1/4                 | 3          | 10 <sup>4</sup> | 1               | 7           | yes                 |
|                     | 4           | 1/2                 | 2          | 10 <sup>4</sup> | 1               | 7           | yes                 |
|                     | 5           | 1/4                 | 2          | 10 <sup>4</sup> | 1               | 6           | yes                 |
|                     | 6           | 1/2                 | -          | 10 <sup>5</sup> | 2               | 6           | yes                 |
|                     | 7           | 1/2                 | 3          | 10 <sup>3</sup> | 2               | 10          | yes                 |
|                     | 8           | 1/2                 | 2          | 10 <sup>3</sup> | 2               | 9           | yes                 |
|                     | 9           | 1/4                 | -          | 10 <sup>5</sup> | 1               | 4           | no                  |
|                     | 10          | 0                   | 3          | 10 <sup>5</sup> | 2               | 7           | yes                 |
|                     | 11          | 1/4                 | -          | 10 <sup>5</sup> | 2               | 5           | no                  |
|                     | 13          | 0                   | 0          | 10 <sup>5</sup> | 1               | 3           | no                  |
|                     | 14          | 1/2                 | 0          | negative        | 1               | 3           | no                  |
|                     | 15          | 1/4                 | 0          | negative        | 2               | 3           | no                  |
|                     | 16          | 0                   | 2          | negative        | 2               | 4           | no                  |
| <i>Cladosporium</i> | 3           | 1/4                 | 0          | 10 <sup>5</sup> | 2               | 5           | no                  |
|                     | 4           | 1/4                 | 0          | -               | 1               | 2           | no                  |
|                     | 12          | 1                   | 3          | 10 <sup>5</sup> | 2               | 10          | yes                 |
|                     | 16          | 1/2                 | 2          | negative        | 2               | 6           | yes                 |
|                     | 17          | 1/2                 | -          | negative        | 1               | 3           | no                  |

Table 4

Allergies and diagnoses for all patients in phase 2

| Rhinitis |     |       |       |                           |        |                    |
|----------|-----|-------|-------|---------------------------|--------|--------------------|
| No.      | Age | Birch | Grass | House dust mite + animals | Asthma | Dermatitis atopica |
| 1        | 20  | +     | +     | +                         | +      |                    |
| 2        | 4   |       | +     |                           |        |                    |
| 3        | 17  |       | +     | +                         | +      |                    |
| 4        | 19  | +     |       |                           | +      |                    |
| 5        | 16  |       |       | +                         |        |                    |
| 6        | 10  | +     | +     | +                         |        |                    |
| 7        | 18  |       | +     | +                         | +      |                    |
| 8        | 15  | +     | +     | +                         |        |                    |
| 9        | 13  | +     | +     | +                         | +      |                    |
| 10       | 13  | +     | +     | +                         | +      |                    |
| 11       | 10  |       |       | +                         | +      |                    |
| 12       | 18  |       |       | +                         | +      |                    |
| 13       | 18  |       |       | +                         |        |                    |
| 14       | 14  | +     |       |                           |        |                    |
| 15       | 16  |       | +     | +                         |        | +                  |
| 16       | 47  |       |       | +                         | +      | +                  |
| 17       | 11  |       |       |                           | +      | +                  |

also included). 30 patients with a cutaneous reaction  $< 1/4$  HEP underwent RAST-analyses during the screening phase. All these patients were of allergy class 0 for *Alternaria* and *Cladosporium*.

Twenty patients proceeded to the follow-up examination. Three patients did not attend and were excluded. Thus, 17 patients were evaluated. Probable or positive allergy to *Alternaria* was confirmed in nine patients and to *Cladosporium* in two. With 99% confidence limits the incidence of *Alternaria* allergy was 3.1% (1.0–6.5) and of *Cladosporium* 0.7% (0.1–3.6).

Characteristics regarding the re-examined group are shown in Table 4. More than half of the patients had both rhinitis and asthma, and the majority was multi-allergic.

## DISCUSSION

Mould allergy was primarily seen among multi-allergics with both rhinitis and asthma. This loaded subgroup will presumably appear more frequently in the hospital/out-patient clinics. The frequencies of mould fungi allergy mentioned in the literature reflect a prevalence in hospital patients, of whom 25–50% have an allergic reaction (10). In an earlier population study Nilsby (9) reported a frequency of 10%. The amount of irritants in the extracts are certainly responsible for the high prevalence in earlier studies.

In the Danish multi-centre study (14) 3% had positive SPT to *Alternaria* and 3% to *Cladosporium*, corresponding to levels in the present study. The patient groups in both studies were similar as regards age and sex distribution, and SPT was performed in most cases with Soluprick®, which is a purified extract.

The relation between *Cladosporium* and *Alternaria* depends on climatic factors. In western Europe *Cladosporium* is the most common (4, 5, 10), but this is not reflected in the classification of allergies shown.

As stated, 50 patients reacted to SPT 100,000 BU. This produced no more information than when patients were tested with 10,000 BU at the second examination.

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