

Case report

Extrinsic allergic alveolitis after exposure to the yeast *Rhodotorula rubra*

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A case of extrinsic allergic alveolitis following exposure to the red yeast *Rhodotorula rubra* is reported – to our knowledge, for the first time. Extensive growth of the yeast in the patient's environment was demonstrated, explaining an elevated titer of *Rhodotorula*-specific precipitating antibodies in his serum. A bronchial provocation test confirmed the diagnosis.

Key words: bronchial provocation tests; counterimmunoelectrophoresis; extrinsic allergic alveolitis; fungal antibodies; humidity, adverse effects; *Rhodotorula*.

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Evidence of connection between dampness in buildings, microfungal growth, and adverse respiratory health effects has accumulated (1, 2, 7, 8). The effects may be allergic or nonallergic manifestations such as toxic or irritative symptoms (3).

We report a case of extrinsic allergic alveolitis (EAA) after long-term exposure to *Rhodotorula rubra*, a shiny red yeast which is often present in water-damaged constructions and material (4, 5). To our knowledge, this common yeast has not formerly been shown to cause EAA.

Case report

We studied a 55-year-old, nonsmoking man, an undertaker by profession, who had been living for 14 years in the same house. He had noticed his first symptoms 7 years before the diagnosis was made. During this period he became increasingly tired, and his physical abilities decreased. He suffered from recurring nightly attacks of fever (38–40°C) and dyspnea, accompanied by malaise, shivering, headache, and muscle and joint pains, followed by sweating and normalization of temperature around 0500, after which the patient slept heavily until morning.

The symptoms started when he moved his bedroom from the second floor to the ground floor near the bathroom. Major attacks occurred monthly or weekly and could be triggered by visiting the cellar, which he consequently avoided. A slight, obstructive reduction in ventilation capacity, reduced transfer factor, and radiologic signs of pulmonary fibrosis were demonstrated. Standard skin prick test was positive for birch pollen. Total serum-IgE and eosinophils showed normal values. Examination of the house, which contained several rooms suffering from dampness, revealed visible mold and yeast spots, especially in the bathroom and the cellar, where the walls were heavily contaminated with the red yeast.

Material and methods

Airborne dust was collected on agar plates by passive precipitation for 20 min. Scrapings and imprints from visible mold spots were collected and cultivated on agar plates.

Specific precipitating antibodies were demonstrated by means of counter-current immunoelectrophoresis (CCIE) (6) using a 1:10 w/v saline dilution of a partially purified (dialyzed) and freeze-dried

Rhodotorula rubra antigen extract (ALK, lot no. 066/523355).

Bronchial provocation was performed with the same antigen extract as used for CCIE, administered in 10-fold increasing doses every 12 h. Three milliliters of saline extract was inhaled by tidal breathing through a Wright nebulizer at 0.14 ml/min, the starting dilution being $1/10^6$ w/v.

Results

Cultivation of air samples, scrapings, and agar imprints showed extensive growth by the molds *Cladosporium herbarum* and *Penicillium* spp. and especially by the yeast *Rhodotorula rubra*. CCIE showed titer 0 for *Cladosporium herbarum* and *Penicillium* spp. and titer 4 for *Rhodotorula rubra*.

Bronchial provocation

Ten hours after the second dose, the patient experienced slight prodromal symptoms (cold hands and malaise). At 2–6 h after the third dose, his temperature rose from 37.4°C to 39.0°C. The peak expiratory flow rate was reduced from 660 to 450 l/min, and the patient complained of pains in the knees and severe headache. During the provocation the leukocyte count rose from 5.5 to $8.9 \times 10^9/l$, and the fraction of neutrophils from 77% to 84%. A chest radiograph taken about 12 h after the acute reaction showed fresh but sparse diffuse nodular infiltration in the basal part of both lungs, in addition to the slight fibrotic changes on the prechallenge radiograph taken 2 d earlier.

The patient refused anti-inflammatory treatment, and recovered spontaneously within 12 h.

Discussion

For 6 years this patient had consulted a variety of clinicians and undergone standard investigations for "fever of unknown cause" without significant pathologic findings. Eventually, the diagnosis of extrinsic

allergic alveolitis was suggested by a thorough anamnesis in combination with environmental investigations and demonstration of an immunologically relevant exposure. As pointed out earlier (6), these initial investigations are only tentative, and the diagnosis should be confirmed by antigen-specific bronchial challenge. In our patient, a challenge with the suspected yeast antigen reproduced his symptoms and gave rise to acute fever, neutrophilocytosis in the blood, decreasing lung function, and radiologic changes compatible with the diagnosis. After he had moved to dry premises, his attacks almost ceased and his general condition improved markedly.

Without intervention, the condition may cause severe lung fibrosis and may even be fatal. Initially, however, the symptoms are completely reversible upon ending exposure to the offending allergen. This report suggests that the common yeast *Rhodotorula rubra* should be regarded as a possible cause of extrinsic allergic alveolitis.

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