

Allergic alveolitis and late asthmatic reaction due to molds in the tobacco industry

F. LANDER, J. R. JEPSEN & S. GRAVESEN

Dept. of Pulmonary Medicine, University of Odense, Dept. of Occupational Medicine, Esbjerg Hospital, and ALK, Environmental Department, Copenhagen, Denmark

Key words: tobacco industry; mold allergy.

Accepted for publication 13 July 1987

Occupational mold allergy in industry and agriculture is common (4). The most frequent reason is unwanted growth of microfungi on stored organic material. The handling of contaminated material can liberate large numbers of spores and individual sensitization is possible. Various species and amounts of microfungi and bacteria are seen, depending on the temperature and humidity of the stored organic material. Growth of microfungi has also been registered in the tobacco industry. In a Finnish investigation (3) growth of several fungal species was found on tobacco, and large amounts of spores were registered in the area of moistened tobacco. Three cases of allergic alveolitis were found among the tobacco workers, probably caused by *Aspergillus fumigatus*. In a Macedonian study (2) various microfungi were found on tobacco, including *Scopulariopsis brevicaulis*.

From Denmark a case of late asthmatic reaction, presumably mediated by *Scopulariopsis brevicaulis*, is presented and illustrates the often difficult diagnostic procedures connected with occupational allergy.

CASE

A previously healthy 46-year-old non-smoking female tobacco worker without atopic pre-

disposition was employed in a tobacco factory for 15 years. In the last 4 years she had worked at a semi-automatic cheroot machine. Large amounts of humid dust were liberated into the air and on to the machine and surrounding floor. There was no local ventilation and no respiratory protection was used. After 2 years' employment at the machine, she began to have symptoms with a dry cough and attacks of dyspnoea after working for some hours. The attacks gradually increased in frequency and were followed by attacks during the night. Broncholytic treatment had no effect. In addition, the patient had recurrent flue-like symptoms with fever often accompanied by dyspnoea. Towards the end of her employment the patient complained of constant dyspnoea, even during light exercise. Due to these symptoms she was finally fired in 1980. Since she was no longer exposed, the asthmatic attacks gradually decreased and after a short treatment with prednisolone, the patient was almost asymptomatic. Her condition was primarily regarded as occupational asthma. Skin prick test and RAST showed a doubtful positive reaction to *Dermatophagoides pteronyssinus*. Microbial investigations in the factory revealed high colony counts and growth of different microorganisms. The concentrations of specific precipitating antibodies against *Aspergillus fumigatus*, *Micropol-*

spora faeni and *Thermoactinomyces vulgaris* were low.

A claim for worker's compensation was initially rejected. However, some years later the previously mentioned study on the sensitization of Macedonian tobacco workers to the microfungus *Scopulariopsis brevicaulis* (2) led to renewed examination of the patient's case as the sampling of microorganisms had demonstrated a massive growth of *S. brevicaulis* from the dust and air of the factory. A higher titer concentration of precipitating antibodies to *S. brevicaulis* were found in the patient's serum in spite of her 4 years' absence from work. Bronchial provocation test (BPT) with *S. brevicaulis* resulted in a significant drop in lung function.

Results of environmental and clinical investigations

Cultivation of microfungi in the factory by use of a Slit Sampler revealed several molds (Table 1). Titers of specific precipitating antibodies from the patient's serum against the microorganisms are shown in the same table. Results from routine allergy tests are shown in Table 2. Bronchial provocation was performed with one

Table 1

Presence of microfungi in the tobacco factory and specific antibody in serum

Molds	Spec. IgG-titer
<i>Scopulariopsis brevicaulis</i>	32
<i>Penicillium</i> sp.	2
<i>Cladosporium</i> sp.	—
<i>Aspergillus</i> sp.	4
<i>Rhizopus nigricans</i>	8

Table 2

Results of clinical tests

Total IgE	normal
Eosinophilic leucocytes	normal
Standard prick test	neg.
Standard prick test (mold panel)	neg.
Intracutan-test <i>S. b.</i> (1:100)	neg. (immediate, late)
RAST <i>S. b.</i>	doubtful pos.
Hist. lib. from basoph. leucoc. against <i>S. b.</i>	neg.
X-ray of thorax	normal

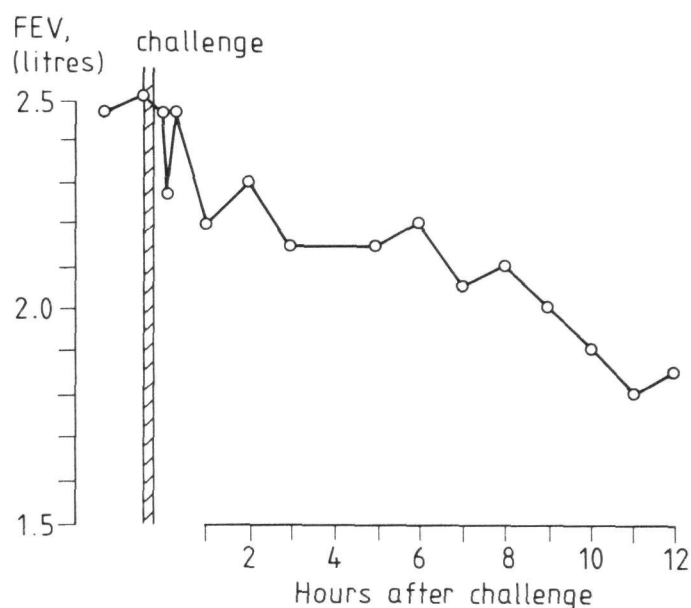


Fig. 1. Non-immediate (late) reaction to inhalation challenge with *Scopulariopsis brevicaulis* (dilution 1:20).

challenge each day under hourly spirometry measurement. Fungal extract of *S. brevicaulis* was used in serial dilutions: 1:2000, 1:200, 1:20. The patient reacted to extract 1:200 and 1:20 with a 20–25 % drop in FEV₁ after 10–11 h (Fig. 1).

No symptoms, such as malaise, elevated temperature or leucocytosis were demonstrated during testing. The clinical findings of cough, increasing dyspnoea, recurrent symptoms of influenza with episodes of elevated temperature, specific IgG antibodies against *S. brevicaulis*, and significant late asthmatic reaction on bronchial provocation, suggest a Type III allergy: extrinsic allergic alveolitis caused by antigens from *Scopulariopsis brevicaulis* and probably influenced by other microorganisms.

DISCUSSION

Asthmatic late reactions can be both IgE- and IgG-mediated (1). The late reaction is caused by immune-complexes, cell mediation, or the alternative pathway. Clinically, no basis was found for the diagnosis of Type I allergy in this patient. The coincidence of growth of *S. brevicaulis* in the work environment, specific precipitating antibodies in a high concentration, and bronchoconstriction following bronchial

provocation, point to a Type III allergy involving antigens from *S. brevicaulis*. The symptom course: cough, increasing dyspnoea, and symptoms of influenza including attacks of fever, exhibit an almost classical Type III allergy. The case has proven that environmental investigation of occupational exposure is an essential prerequisite in allergological investigations.

Precautions must be aimed at preventing growth of microfungi in the tobacco, assisted by adequate ventilation or, if necessary, respiratory protection for the personnel.

REFERENCES

1. Butcher, B. T. & Salvaggio, J. E.: Occupational asthma. *J. Allergy Clin. Immunol.* 78, 547-556, 1986.
2. Cvetanov, V., Ežcove, N. & Leškov, S.: A chronic form of allergic alveolitis in the tobacco industry. In: Fifth Yugoslavian-Swedish Symposium on occupational health, 1979. *Arbete och Hälsa*, 19, 13-24, Stockholm, 1982.
3. Huuskonen, H. S., Husman, K. R., Järvisalo, J., et al.: Extrinsic allergic alveolitis in tobacco industry. *Br. J. Ind. Med.* 41, 77-83, 1984.
4. Parkes, R. W.: Occupational lung disorders. London, Butterworths, 1982.

Address:

Flemming Lander

Dept. of Pulmonary Medicine

Odense Sygehus

5000 Odense C

Denmark

This document is a scanned copy of a printed document. No warranty is given about the accuracy of the copy. Users should refer to the original published version of the material.