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- Leiomyoma of the intrathoracic trachea. *J Thorac Cardiovasc Surg* 1969; 57:126-33
- 6 Sansone S, Belsey R. Severe hemorrhage complicating endoscopic biopsy of bronchial adenoma. *Dis Chest* 1967; 51:208-10
- 7 Joyner LR, Maran AG, Sarana R, Yakaboski A. Neodymium YAG laser treatment of intrabronchial lesions: a new mapping technique via the flexible fiberoptic bronchoscope. *Chest* 1985; 87:418-26
- 8 Hooper RG, Jackson FN. Endobronchial electrocautery. *Chest* 1985; 87:712-14

Allergic Bronchopulmonary Aspergillosis due to *Aspergillus oryzae**

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A 19-year-old female student with allergic bronchopulmonary aspergillosis (ABPA) due to *Aspergillus oryzae* is reported. This organism was used for fermentation starter to make soybean paste in her father's workshop adjacent to the home where she lived. ABPA might be considered an occupational disease in certain situations.

Soybean products such as soy sauce and soybean paste are one of the most important and popular materials for cooking in Japan. There are more than 2,500 small soybean workshops and more than 10,000 persons are related to this

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type of occupation in our country. *Aspergillus oryzae* is an important organism for fermentation starter to make soybean paste. We present a case of ABPA caused by *Aspergillus oryzae* in the daughter of a soybean paste maker. This organism may become one of the important offending allergens to cause ABPA as an occupational disease in Japan.

CASE REPORT

A 19-year-old female student was admitted to our hospital for evaluation of an abnormal pulmonary shadow appearing repeatedly in her right lung field every spring since her childhood. Although she had no symptom at the time of admission in May 1984, she had experienced cough and dyspnea with slight wheeze every spring since she was 13 years of age. Her father managed his own soybean paste workshop adjacent to his home where she lived. Every spring, raw materials were mixed together in a huge barrel to make soybean paste and then *Aspergillus oryzae* was added for fermentation. Innumerable spores of *Aspergillus oryzae* were scattered into the air that made the surrounding atmosphere, including that of her room, thick yellow. Although she rarely entered his workshop, she was exposed to a high concentration of conidia of *Aspergillus oryzae* in season.

On admission, her chest roentgenogram disclosed a massive consolidation at the right basal segments (Fig 1A). Fiberoptic bronchoscopy disclosed mucus plugs obstructing the lumen of the lower bronchi. Culture of the mucus plug on potato-dextrose agar in plates grew colonies of *Aspergillus* species and these were identified as *Aspergillus oryzae* by incubation in Czapek and Sabouraud agar in flasks as selective media. Bronchogram of her right lower bronchi revealed marked cystic bronchiectasis as shown in Figure 1B. Laboratory data on admission included a white blood cell count of 9,300/cu mm (3 percent band forms, 80 percent segmented neutrophils, 8 percent eosinophils, 1 percent monocytes and 8 percent lymphocytes), an erythrocyte sedimentation rate of 9 mm/hr, and normal blood chemistry results. She had mild peripheral eosinophilia at the range of 8 to 14 percent during her hospitalization. Her lung function was 2,410 ml of vital capacity, 1,960 ml of forced expiratory volume in one second (FEV₁ 81.2 percent; DLco 24.9 ml/min/mm Hg. Her serum IgE level was 2,600 IU/ml by RIST,

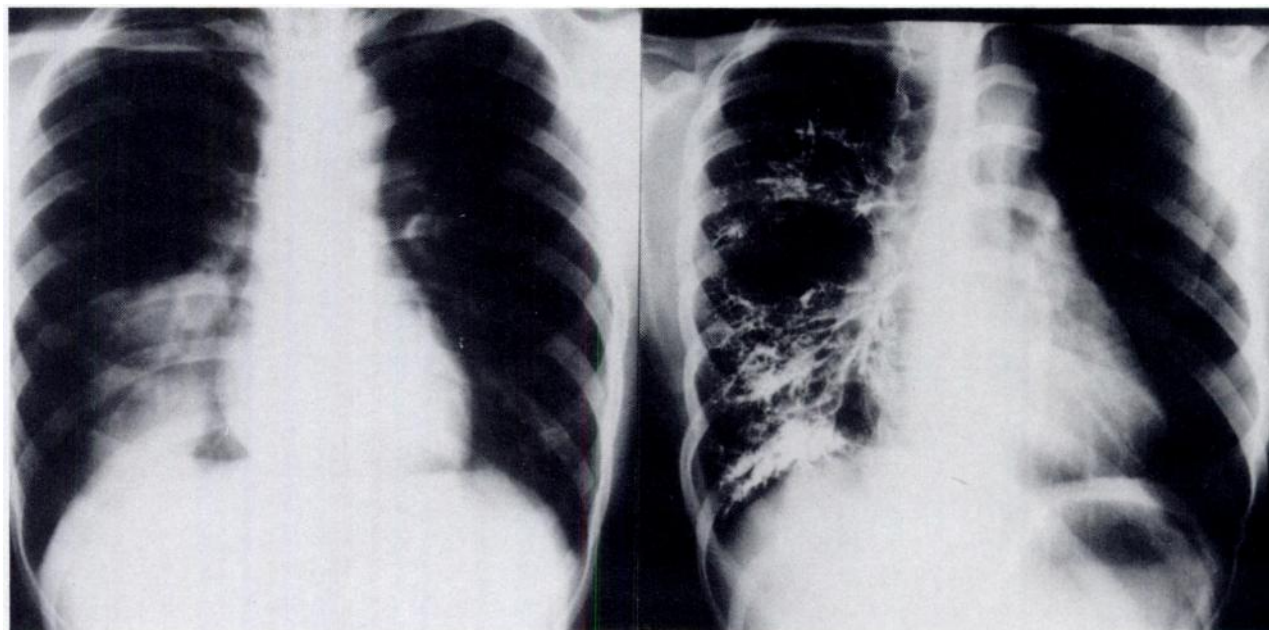


FIGURE 1A (left). PA chest roentgenogram shows a massive consolidation at the right basal segments. B (right). Bronchogram of her right lower bronchi shows marked cystic bronchiectasis.

Table 1—Results of Histamine Release from Leukocytes of Patient and Healthy Control Stimulated with *Aspergillus oryzae* antigens

		Patient % release	Healthy control % release
Spontaneous release		5.4	5.9
anti-IgE		51.0	43.0
medium control			
(Czapeck)	10^{-3}	3.3	7.4
	10^{-4}	2.9	7.7
	10^{-5}	2.8	4.4
	10^{-6}	2.9	7.6
<i>Aspergillus oryzae</i>			
(CM)	10^{-3}	29.0	8.3
	10^{-4}	3.9	5.9
	10^{-5}	2.8	5.4
	10^{-6}	2.8	5.7
<i>Aspergillus oryzae</i>			
(WB)	10^{-3}	50.0	6.6
	10^{-4}	5.6	8.8
	10^{-5}	3.9	7.9
	10^{-6}	1.4	9.2

and IgG, IgA, IgM contents were 1,440, 192, 197 mg/dl respectively by single immunodiffusion. Allergenic extracts were obtained from the culture medium (CM) and the mycelial extract (ME) of *Aspergillus oryzae* cultured from the mucus plug and further immunologic examinations were done. Intradermal skin test showed an immediate wheal and flare reaction, but no late reaction. Precipitating antibodies against both extracts, but not to *Aspergillus fumigatus* antigen, were demonstrated in her serum by Ouchterlony double immunodiffusion technique. Using the RAST technique, serum IgE antibodies against both extracts (CM and ME) of *Aspergillus oryzae* were also detected. Leukocytes (2×10^6 /ml) of her blood were incubated with serial dilutions of *Aspergillus oryzae* antigen and medium control. As shown in Table 1, both CM and ME released histamine from her leukocytes at 10^{-3} concentration. Medium itself did not release histamine at the concentrations of *Aspergillus oryzae* antigens tested. A diagnosis of ABPA caused by *Aspergillus oryzae* was made because this patient fulfilled all the primary criteria and two of the secondary criteria for the diagnosis of ABPA by Rosenberg et al.¹

DISCUSSION

Aspergillus species are the only mold used as a fermenta-

tion starter to make soybean products. More than 100 cases of ABPA have been reported in Japan since 1972, mostly caused by *Aspergillus fumigatus*. We found five reports of ABPA including this case due to *Aspergillus oryzae*.²⁻⁵ Employing *Aspergillus oryzae* antigens, positive skin reaction and precipitating antibodies were shown in all cases. Positive RAST results have been described in three cases. Further, positive histamine release from the patient's peripheral blood leukocytes has been shown. All cases were related to the production of soybean products. Four of the five patients were family members of soybean paste and/or soy sauce maker whose workshops were on the premises of their homes. The other patient was a neighbor of a soybean workshop. Exposure to high concentrations of conidia of *Aspergillus oryzae* would be necessary to cause the disease. It is estimated that more than 30,000 persons, including family members such as this patient, are exposed to this type of situation. ABPA might be an occupational disease in these situations.

This patient was treated with inhalations of amphotericin B and bronchial toiletting via bronchofiberscope several times. Prednisolone was not used. The abnormal shadow on her chest roentgenogram lessened, but still remained.

REFERENCES

- 1 Rosenberg M, Patterson R, Mintzer R, Cooper BJ, Roberts M, Harris KE. Clinical and immunological criteria for the diagnosis of allergic bronchopulmonary aspergillosis. *Ann Intern Med* 1977; 86:405
- 2 Tanizaki K, Takahashi K, Hosokawa M, Nakamura K, Sasaki Y, Akagi K, et al. Immunological investigation of ABPA. *Jap J Thorac Dis* 1979; 17:686
- 3 Kino T, Chihara J, Mitsuyasu K, Kitaichi M, Honda K, Kado M, et al. A case of ABPA caused by *Aspergillus oryzae* which is used for brewing bean paste (Miso) and soy sauce (Shoyu). *Jap J Thorac Dis* 1982; 20:467
- 4 Tochigi T, Isa H, Kashida Y, Sugihara Y, Yoshikawa K, Kino T. A case of ABPA caused by *Aspergillus fumigatus* and *Aspergillus oryzae*. *Jap J Thorac Dis* 1984; 22:446 (abstract)
- 5 Kobayashi O, Narita M, Kouchi H, Asano R, Toyama J, Nagai A, et al. A case of ABPA due to *Aspergillus oryzae* and its subtype. *Jap J Thorac Dis* 1984; 22:925.

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