

Dear Editor

Is *Bjerkandera* Allergy Affected by the Arrival of Yellow Sand Dust?

Yellow sand dust ("Asian dust") is a meteorological phenomenon involving the long-range transport of atmospheric pollutants originating from the Taklamakan and Gobi deserts and the Loess plateau. Over one million tons of Asian dust particles are estimated to fall on Japan each year, 3000-5000 km away from their source regions. Yellow sand dust particles reach not only Asia but also the North American continent and Europe. Chemical analysis of these storms and microbiological studies of Asian dust have suggested that humans in the affected regions are exposed to communities of microorganisms that may cause various adverse health effects.¹

Recently, Kobayashi *et al.*² reported that Asian sand dust directly sampled with a bioaerosol sampler at a height of 400 m using a tethered balloon over Noto Peninsula, Suzu City, Ishikawa Prefecture, contained *Nocardiosis* spp., *Bacillus* spp., *Streptomyces* spp., and *Bjerkandera* spp. Ichinose *et al.*³ reported the aggravating effects of Asian sand dust on lung eosinophilia in mice, and found marked eosinophil accumulation in the bronchial lavage fluid in mice stimulated with *Bjerkandera* spp. among these isolated strains in samples provided by Kobayashi (personal communication).

Bjerkandera adusta is a wood decay basidiomycetous (BM) fungus, which has attracted attention because of its potential role in enhancing the severity of allergic fungal cough (AFC) by sensitization to this fungus.⁴ Further studies demonstrated growth of filamentous *B. adusta* at 4°C-37°C on Sabouraud dextrose agar and showed that abundant asexual spores (arthroconidia) were produced from the hyphae of this fungus.⁵ The ability to colonize the human bronchi has been gradually clarified as a peculiar characteristic of this fungus, among the approximately 30000 species in the BM phylum. Studies focusing on the role of fungal colonization in sensitization of AFC patients demonstrated that colonization by *B. adusta* is necessary in the process of sensitization to this fungus. Therefore, antifungal drugs have provided a new treatment strategy for chronic intractable cough in reducing or eradicating the colonizing antigen. Our recent study demonstrated the possibility of predicting positive results for sensitization to *B. adusta* in the efficacy of antifungal therapy in chronic idiopathic cough patients.⁶ A frequency of detection of this fungus in outdoor samples in France was reported previously,⁷ suggesting that AFC may be recognized outside Japan in the near future. As *B. adusta*, a mushroom spore with a worldwide distribution, may have

potential to enhance the clinical manifestations of chronic cough, asthma, and allergic rhinitis, such natural phenomena may influence human health on a worldwide scale.

Here, we discuss the problems encountered in attempting to clarify whether the arrival of yellow sand actually influences *Bjerkandera* allergy. First, although *B. adusta* was detected directly from samples collected at Suzu City,² it was not present in the profile of the microbial community structure of yellow sand obtained from the source area.⁸ Second, the results of a retrospective study indicated that the cough symptoms of chronic cough patients sensitized to *B. adusta* were not always aggravated concomitant with the arrival of yellow sand (unpublished data).

To evaluate the unexpected results of these studies, we postulated that the enhancement of clinical manifestations of allergic diseases caused by *B. adusta* collected by sand fall would be influenced by the atmospheric concentration of this fungus just before arrival of the sand near the ground surface in the downwind area.

To test our hypothesis, we planned the following three sets of experiments.

1) To evaluate the heterogeneous distribution of *B. adusta*, multiple medical institutions should be selected among the areas where yellow sand has been observed for several years.

2) It should be evaluated whether *B. adusta* exacerbates the cough symptoms of chronic cough patients. Fungal culture of pharyngeal swabs, intradermal skin test using an antigenic solution of *B. adusta*, capsaicin cough inhalation test, and the Leicester Cough Questionnaire⁹ or cough-related laryngeal sensation questionnaire¹⁰ should be performed in chronic cough patients before and after the arrival of yellow sand.

3) It should be determined whether *B. adusta* is present in the atmosphere of the study area. It is important to investigate whether *B. adusta* was transported from far away or was collected by sand fall in the nearby downwind area. For this, air samples should be collected at both 400 m and 1.2 m above the ground, and *B. adusta* should be assayed quantitatively before and after the arrival of yellow sand.

Integrated research to validate this hypothesis may clarify the possible impact of yellow sand on *Bjerkandera* allergy.

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