

## Malt can cause both occupational asthma and allergic alveolitis

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**Key words:** allergic alveolitis; malt; occupational asthma; specific inhalation challenge.

Malting is a process in which grains are made to germinate by soaking in water, this process being stopped by heating and drying the cereal. Malting grains develop the enzymes that are required to modify the grain's starches into sugars. We here report for the first time a case of occupational asthma (OA) to malt and a case of allergic alveolitis (AA) in a subject who was initially referred for possible OA.

Subject number 1 (S1), a 40-year-old man started working as a machine operator for a malt manufacturing company 12 years ago. He noted increasing dyspnoea and a productive cough that were worse on working days and towards the end of the working week.

Subject number 2 (S2), a 40-year-old man started working as longshoreman 10 years ago. He was a nonsmoker with a history of seasonal rhinitis who developed conjunctivitis symptoms, dyspnoea and a dry cough when unloading malt from ships.

The lung function of S1 showed moderate obstruction, air-trapping and bronchial hyperresponsiveness to methacholine (BHRMethacholine;  $PC_{20} = 0.06$  mg/ml). Skin prick tests (SPT) for common allergens and cereals (including barley) were negative whereas

malt induced a 3 mm induration. After stabilization of his asthma, he underwent specific inhalation challenge (SIC). After exposure with the control substance, lactose, via particle generator for 30 min, the forced expiratory volume in 1 s ( $FEV_1$ ) remained stable during the 8 h of observation afterwards. The next day, after exposure to malt for 20 min, he showed a biphasic reaction with a  $FEV_1$  drop of 39% after 2 h with improvement and again a drop in  $FEV_1$  to -31% 7 h postexposure. Sputum eosinophils remained within normal limits.

S2 had entirely normal lung function tests. Skin prick test to cereals and malt were negative. Specific inhalation challenge was performed. On exposure to lactose on a control day, there was no significant change in spirometry. The next

day, he was exposed to malt dust for 30 min via particle generator. Forced expiratory volume in 1 s did not change significantly during the day. The oral temperature rose from 35.4° in the morning to 36.8° at the end of the day. The following day, he was again exposed to malt for 30 min. He developed nasal congestion, cough and phlegm. Forced expiratory volume in 1 s did not change significantly and BHRMethacholine was normal. The next day he was exposed for 120 min to malt dust when he developed nasal congestion, cough, chest tightness, shivering and hyperthermia (oral temperature of 38.5°), leucocytosis (15 800 cells/mm<sup>2</sup>) with neutrophilia (93%), a drop in vital capacity of 13% and in carbon monoxide diffusion capacity of 9% occurred together with hypoxemia ( $paO_2$  of 56 mmHg). Post-SIC chest radiograph

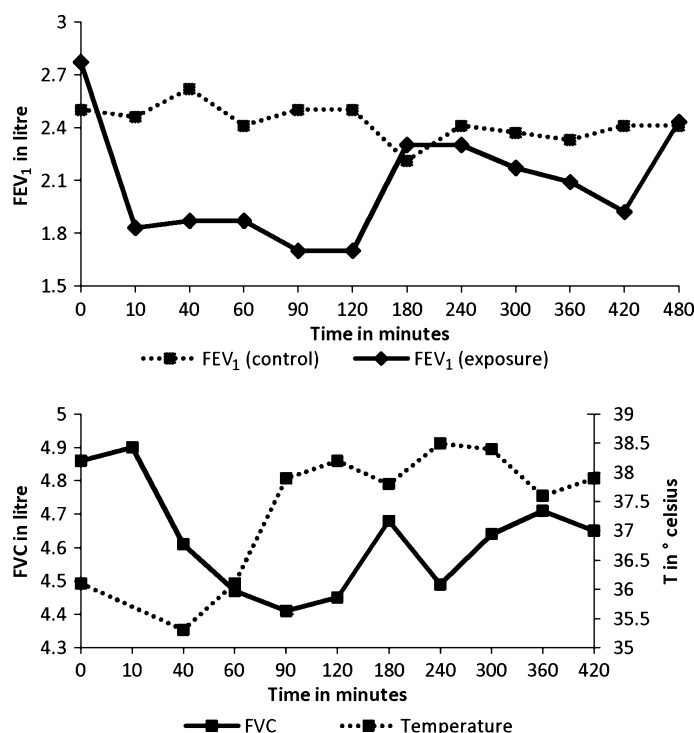


Figure 1. Serial  $FEV_1$  measurements on the control and intervention day for subject number 1 (S1) (top) and of FVC and oral temperature (°C) for subject number 2 (S2) (bottom).

was normal and examination of induced sputum yielded a salivary sample.

Occupational asthma and immunological sensitization caused by barley flour has been reported in the past (1). Among brewery workers, a high rate of acute and chronic respiratory symptoms, increased rate of sensitization to barley and lung function changes were reported (2). In S1, the diagnosis of OA to barley was excluded by a negative SPT while the diagnosis of OA to malt was confirmed by a positive SPT and a positive SIC to malt.

The prevalence of AA in Scottish malt workers has been estimated to be 5.2% (3). S2 had negative skin prick tests to common allergens (including moulds and cereals) and a normal total IgE count. Allergic alveolitis was diagnosed because of a rise in oral temperature, a decrease in vital capacity and diffusion capacity after SIC with malt. An increase in oral temperature ( $>37.2^{\circ}\text{C}$ ) and/or neutrophilia ( $>7500$  neutrophils/ $\text{mm}^3$ ) was

present in  $>90\%$  of positive SIC, as reported by Hendrick et al. (4). In workers with respiratory symptoms who are exposed to malt, OA as well as AA must be considered (Fig. 1).

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## Reference

1. Vidal C, Gonzalez-Quintela A. Food-induced and occupational asthma due to barley flour. *Ann Allergy Asthma Immunol* 1995;**75**:121–124.
2. Godnic-Cvar J, Zuskin E, Mustajbegovic J, Schachter EN, Kanceljak B, Macan J et al. Respiratory and immunological findings in brewery workers. *Am J Ind Med* 1999;**35**:68–75.
3. Grant IW, Blackadder ES, Greenberg M, Blyth W. Extrinsic allergic alveolitis in Scottish maltworkers. *Br Med J* 1976;**1**:490–493.
4. Hendrick DJ, Marshall R, Faux JA, Krall JM. Positive “alveolar” responses to antigen inhalation provocation tests: their validity and recognition. *Thorax* 1980;**35**:415–427.