

EDITORIAL

Measurement of airborne protein allergens in occupational asthma

The United Kingdom (UK) scheme for the Surveillance of Work-Related and Occupational Respiratory Disease (SWORD) [1] has demonstrated the importance of occupational asthma as a major cause of occupational morbidity and also the importance of protein allergens in the causation of asthma in the food production and processing industries. Occupational asthma caused by exposure to protein allergens deserves attention for a number of reasons. Occupational asthma is essentially preventable and asthma caused by protein allergens in the workplace provides a useful model for studying asthma caused by non-occupational exposures, whether in the home or wider environment. However, prevention depends upon an understanding of the factors associated with sensitization and more particularly exposure/response relationships. Experience with isocyanate asthma has long suggested that it is the occasional high peaks of exposure associated with spills and other incidents that are responsible for sensitization [2]. Little is known though of the patterns of exposure responsible for sensitization to protein allergens nor the associated environmental and personal factors modifying this response.

In this issue, Sandiford *et al.* [3] report the measurement of airborne flour allergens in flour mills and bakeries using a combination of personal air sampling and immunoassay techniques. Similar techniques have been used in other studies involving indoor allergenic proteins, e.g. from dust mites, cats and cockroaches [4], urinary proteins from laboratory animals [5] and airborne shellfish proteins in the seafood industry [6]. Sandiford *et al.* have now demonstrated that personal sampling is possible on a scale large enough for clinico-epidemiological studies; over 500 samples were analysed in their study [3].

Control of exposure to other toxic substances in the workplace is managed by measurement of exposure and comparing the results with agreed national or international standards. Standard setting is a complex exercise but depends heavily on comparing exposure data collected from working populations with appropriate clinical endpoints. Now the technology is available for the measurement of personal exposure to protein allergens there are a number of questions to be answered. Setting standards for environmental control will need knowledge of the concentration of the airborne allergen below which the majority of those exposed will not become sensitized. For some toxic chemicals, regulatory authorities set both short-term (10 min) and full-shift (8 h) exposure limits. If

sensitization is related to the number and height of short peaks of exposure, both types of standard may be needed. Sandiford *et al.* [3], used 8-h sampling and although it may be difficult, this technology needs to be adapted to measure exposure over much shorter periods.

Standard setting does, however, depend on existence of methods that are reproducible and transportable from laboratory to laboratory. It is clearly important to select a representative allergen that is associated with the majority of the cases of sensitization in that industry and has minimal crossreactivity with other common allergens encountered either in that industry or outside the working environment. Although Sandiford *et al.* have used a polyclonal serum in their study, the development of assays based on monoclonal sera will be important in establishing inter-laboratory comparisons as will be the production and availability of standard allergens.

The ability to monitor a number of individuals both through the working day and prospectively will enable research workers to address the role of concurrent exposure to irritant gases and smoking in the development of sensitization to airborne proteins. A key question for occupational physicians is the extent to which atopy will modify any exposure/response relationships and this has implications for all standard setting exercises involving respiratory sensitizers. Current practice is to reduce exposure to airborne material as far as possible in the hope that the sensitization problems in a specific workplace can be minimized. This empirical approach is not entirely satisfactory and agreed standards for airborne material will at least give some guidance to the occupational physician and hygienist [5].

Even in the absence of agreed standards, quantitative assays of airborne allergens can play a useful role in the local control of exposure. These assays can be used to identify the processes, places and operations that give rise to significant exposure and thus allow exposure control procedures to be directed with maximum effectiveness and economy. The investigation of cage design and animal husbandry practices on measured rat urinary aeroallergen [5] is an example of an assessment and control exercise guided by the measurement of airborne allergens in the workplace.

References

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