

Report on Exposure to Animal Allergens in the Biomedical Research Facility – March 21, 2003

Background

On March 6, 2003, Environmental Health and Safety (EH&S) was advised that an incident had occurred in the Biomedical Research Facility (BRF) building, wherein a researcher had become sick after possible exposure to rodent allergens. On the day that the researcher became ill, rats were brought into a room adjacent to the one where the affected individual worked, for procedures to be performed under the fume hood. EH&S was advised that the researcher who became ill had been experiencing allergic symptoms related to rodent exposures for some time, and that the Principal Investigator (PI) had typically excluded rodents from the laboratory by requiring his researchers who handled rodents to perform all animal procedures in the Laboratory Animal Research (LAR) facilities on the first floor of BRF.

EH&S was asked to evaluate this incident and to make recommendations to protect the health of the allergic individual and to investigate the potential adverse health consequences of rodent exposure to other employees and students working in the BRF building. EH&S was further advised that the allergic individual may have been sickened by animal exposures when animals were brought to laboratories elsewhere on the second floor of BRF, and not simply to the room adjacent to the one in which the allergic individual normally works.

Background on allergies to research animals

Allergies to research animal proteins shed in urine, saliva and skin are a significant occupational risk for laboratory workers, potentially affecting one third of animal researchers.¹ “An estimated 10% of laboratory workers eventually develop occupation-related asthma.”² Sensitivities to research animal allergens generally develop over months or years of occupational exposure, predominantly through inhalation of airborne allergens.

For individuals in whom a Laboratory Animal Allergy (LAA) is suspected, diagnostic tests (medical examinations, skin tests or in vitro tests for specific antibodies, and lung function tests) may be performed to assess the potential for and severity of LAA.³

Once the presence of LAA is established, treatment should be directed toward removing the worker from continued exposure. Individuals who remain in the workplace

¹ Harrison, Controlling Exposure to Animal Allergens, ILAR, Volume 42, Number 1, pages 17-36, 2001.

² Occupation Health and Safety in the Care and Use of Research Animals, National Research Council, National Academy Press, Washington D.C., 1997.

³ Robert Bush, Laboratory Animal Allergy, Assessment and Treatment of Laboratory Animal Allergy, ILAR Journal, Vol. 42:1, 2001.

with continued exposure for long durations after developing LAA are at risk of developing chronic, persistent asthma.⁴

It has been established that chronic exposure to relatively high and moderate concentrations of allergen greatly increases the rate of development of LAA. “Epidemiological studies have shown that the greater the exposure to animal allergens, the more likely one will become sensitized and have symptoms related to work.”⁵ Thus, allergen exposure reduction is the primary goal for all employees at risk.

A number of pharmacological treatments aimed at preventing or ameliorating allergic reactions in animal workers are available, however continued exposure of an allergic individual to animal allergens may result in deterioration of lung function. Therefore, pharmacological intervention may be useful for intermittently exposed individuals, but is not considered a viable option for chronically exposed laboratory workers or animal care handlers.

Immunotherapy, which “consists of administration of allergenic extracts to sensitive individuals to reduce their sensitivity”, has been shown to produce some demonstrated improvement against LAA in uncontrolled studies, but the use of immunotherapy for chronically exposed laboratory workers has not been established as a method for protecting exposed workers from deterioration of lung function.⁶

Prevention of the development or progression of LAA is an important goal in animal research facilities. Steps taken to address this issue are directed at minimizing exposure to animal allergens by workers, and include pre-employment and periodic medical surveillance to identify at-risk workers; facility design directed toward reductions in animal allergen loads; education of workers regarding the risks of exposure and alerting them to work practices which may limit exposure; judicious use of personal protective equipment (PPE); and evaluation and treatment of affected individuals.⁷

Evaluation of BRF ventilation

Tom Jacobson, the EH&S Assistant Director, examined the fume hood exhaust system in the BRF building, and determined that the fume hoods were adequately exhausting from the building, and exhausted air was sufficiently removed from air intake ducts, so that no exhausted air reentered the building ducting system. Mr. Jacobson consulted with Mark Sawicki, an FSU engineer knowledgeable about ventilation design regarding the ventilation in the BRF building. They determined that ambient air from all laboratories in BRF was exhausted directly to the outside, and that no re-circulation of air takes place.

⁴ Robert Bush, Laboratory Animal Allergy, Assessment and Treatment of Laboratory Animal Allergy, ILAR Journal, Vol. 42:1, 2001.

⁵ Robert Wood, Laboratory Animal Allergy, Laboratory Animal Allergens, ILAR Journal, Vol. 42:1, 2001.

⁶ Robert Bush, Laboratory Animal Allergy, Assessment and Treatment of Laboratory Animal Allergy, ILAR Journal, Vol. 42:1, 2001.

⁷ Occupational Health and Safety in the Care and Use of Research Animals, National Research Council, National Academy Press, Washington, D.C. 1997

Discussion of Findings

Reduction of animal allergen exposure to employees and students is an important goal for animal research facilities, and is accomplished primarily through isolation of animals from employees, to the extent possible, and minimizing exposures through appropriate ventilation, by implementing work practices that reduce animal allergen levels, by the use of appropriate personal protective equipment (PPE), and through identification of individuals at risk of developing LAA.

Because there is no known “safe” level of animal allergens,⁸ steps must be taken to generally reduce allergen levels to the extent possible. Further, because animal proteins are considered potent allergens, a significant reduction of exposure is advisable to reduce the rate of development of LAA.⁹

An evaluation of the ventilation in the BRF building indicates that the currently engineered Heating, Ventilation, & Air Conditioning (HVAC) system should adequately evacuate air contaminated with animal allergens, with no re-circulation from one laboratory to another. Thus, if animals are transported from the animal care facility on the first floor to research laboratories on the second floor in covered cages, animal allergens should not be shed in significant quantities in the hallways or laboratory areas other than those where animal procedures are carried out.

Various work practices should be implemented to reduce allergen levels to employee or student working with animals. In addition to the assorted work practices, researchers should be encouraged to protect the general environment by isolating animal work areas, using cage filter tops, working under fume hoods when possible, wearing gloves, wearing laboratory coats or scrubs that are designated for working with animals (not be used for general laboratory work), and becoming mindful of the risks associated with animal allergen exposure and additional work practices that can be applied to reduce animal allergen exposures to themselves and colleagues.

Increased efforts to train researchers regarding the risks associated with animal contact seem warranted. Researchers should be made aware that increased exposure may result in illness, and that they are responsible for minimizing allergen exposure to themselves and others. They should be advised what steps they can take to reduce allergen levels.

The medical surveillance program should be re-evaluated to determine if further measures are warranted to protect researchers who may have symptoms indicative of LAA.

⁸ NIOSH Alert: Preventing Asthma in Animal Handlers, Publication No. 97-116, 1998

⁹ Susan Gordon, Laboratory Animal Allergy, A British Perspective on a Global Problem, ILAR Journal 42:1, 2001.

Recommendations

In keeping with the National Research Council (NRC) and the National Institute of Occupational Safety and Health (NIOSH) recommendations for minimizing animal allergen exposure to research animal workers, EH&S recommends that reasonable efforts to minimize animal allergen exposure be taken. In particular, the following modifications and practices are recommended to reduce allergen concentrations to the BRF workers:

Researchers:

- The use of filter-top animal cages for animals taken to the second floor of BRF is recommended. Filter tops should be removed in the laboratories only when necessary and under a fume hood, if possible.
- A low animal density should be promoted – transport of the fewest number of animals needed at one time.
- Because animal proteins excreted in urine are often potent allergens, animals to be taken to the second floor of BRF should be transferred to clean cages, if warranted, before moving them.
- Researchers working with animals in the animal housing facilities should wear laboratory coats, scrubs, disposable gloves, and other PPE as needed during animal handling work, but remove those before leaving the first floor.
- Researchers who will be working with animals on the second floor of BRF should close laboratory doors when working on animals in the laboratory.
- Workers who continue to experience symptoms should avoid allergen exposure altogether – this might require relocation to a building where no animal work is performed.

EH&S:

- EH&S, in conjunction with LAR, will undertake a training program for researchers and animal handlers in BRF and the Kellogg Research Building (KRB) regarding the risks of animal allergies and steps for risk reduction of exposure to themselves and their coworkers.
- EH&S will periodically remind animal researchers and animal care workers of the potential for developing LAA “to promote an early diagnosis of allergy so that appropriate interventions can be made with individual workers to prevent the development of serious disease.”¹⁰
- EH&S will provide guidance to affected individuals by evaluating work practices and, if warranted, providing information toward medical intervention. For the BRF researcher whose illness prompted this evaluation, the researcher will be notified by memorandum regarding avoidance of exposure animal allergens, and addressing the potential for medical intervention.

¹⁰ James Seward, Laboratory Animal Allergy, Medical Surveillance of Allergy in Laboratory Animal Handlers, ILAR Journal 42:1, 2001.

LAR:

- Because animal handlers are likely to have a relative high level of animal allergen exposure, diligence must be taken regarding surveillance of this population for development of allergic symptoms. Animal care workers who have noted new allergic symptoms when handling animals should be alerted to the potential need for medical intervention by LAR supervisors, and advised to contact EH&S.
- When reasonable, measures should be undertaken to reduce allergen load, including lowering the animal density, use of ventilated filter-topped cages, and the encouraging the use of appropriate PPE, possibly including the use of a particulate mask and working with proper ventilation controls.
- Workers who are required to wear respirators for protection, including particulate filtering masks, must participate in a formal respiratory protection program. Workers should be directed by their supervisors to contact EH&S for information regarding the respiratory program.

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