Focus: Research

Hair and Dander and Urine, OH MY!

Challenging allergens in the workplace

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Case Study: Renström et al. (1995)
Thirty-eight students were examined during their first year of training as laboratory animal technicians. They were all re-examined after an average of 18 months working with various laboratory animals, primarily mice, rats and rabbits. Nine of the students (24%) developed allergic symptoms such as nasal and eye irritation and skin rashes. Eight out of the affected nine showed asthma-like reactions during lung testing.

This case study reflects similar findings in over fifty years of research data related to occupational allergies in animal related professions. Statistics among animal care workers show that 10-44% will develop allergies to animals and up to 22% may develop occupation-related asthma. These allergens can stimulate the production of an antibody and are called antigens. Sources of animal antigens include animal hair, dander, feces, urine, saliva and albumin, and can be transmitted by inhaling, rubbing eyes or skin contact. Sensitized workers may exhibit mild reactions such as sneezing and nasal symptoms to severe asthma symptoms such as cough, chest tightness, wheezing or shortness of breath. Occupational asthma can limit the ability to work and may lead to permanent disability.

An ounce of prevention is worth a pound of cure.

The NIH cites that manifestations from laboratory animal allergy cause more than one third of animal care workers to lose time from work. This poses an enormous cost to employers due to lost productivity and health care expenses. High-risk tasks include disposal of waste bedding, changing of filters (HVAC/ LEV Systems), washing cages, box changing, shaving fur, injections and other invasive procedures [Gordon S. et al. 2003]. The good news is that symptoms from animal-related allergies are often alleviated or cured when exposure to the allergen ceases.

Case Study: Fisher et al. (1998)
159 employees at a pharmaceutical research laboratory were enrolled in a program to reduce the incidence of laboratory animal allergy symptoms. Over the course of five years, the annual incidence of laboratory animal allergy was reduced from 10% to 0% through the implementation of an education and training program and modification of work practices. Education and training programs emphasized allergic diseases, symptoms, exposure control, proper techniques for working with animals and waste disposal. Animal stack density, shaving practices and engineering controls were modified. The latter included the implementation of filter-top cages,

HEPA-filtered room ventilation, increased room air exchange, and dust-free bedding. Personal protective equipment supplemented engineering controls and included mandatory use of respiratory protection.

Engineering controls are the first line of defense against potential allergen exposure. An evaluation of the current operation of the HVAC system of any animal facility should be a priority in minimizing the potential for allergic responses among facility staff.

The control of airflow in animal facilities has two purposes:

1. To provide a comfortable environment for animals and to protect them from possible contamination
2. To protect personnel both within the animal facility and outside of the facility from potential exposure to animal allergens

(Keene 2004)

Inadequate HVAC systems can be difficult and costly to upgrade, especially in antiquated facilities. This should not be a factor preventing the protection and comfort of animals and personnel. Elevated allergen levels in animal facilities due to inadequate HVAC can be controlled with room level systems that provide HEPA filtration and elevate the airflow levels without changing the room air balance.

Personnel regularly performing high-risk tasks should always wear appropriate PPE in addition to using equipment that protects the operator from allergenic dust and airborne particulate matter.

Waste bedding disposal systems with a high rate of inward airflow draw air away from the operator and HEPA filters capture airborne contaminants and dessiccate damp particles to reduce odor.

Box changing, small animal shaving and procedural work performed in a changing hood or biosafety cabinet increases operator protection with an inward airflow and HEPA filtration. Larger animals can be damp shaved with an attachment to an accessory on a HEPA vacuum to immediately capture hair and dander and to prevent it from becoming airborne.

Separation of cage wash areas through physical and air barriers prevents cross-contamination of clean and dirty materials. Increased HEPA filtration in each zone reduces dust from bedding disposal and filling procedures, minimizing inhalation hazards. SOP's for gowning, material handling, and personnel traffic should be strictly enforced to prevent the spread of allergenic material into the greater facility.

Following the Fisher et al. model, it is not a stretch to think that any facility currently battling allergen challenges could be allergen-free by implementing relevant education and training programs and modifying work practices promoting allergen control. While engineering control solutions can be quite costly, there are technologies available that achieve the necessary results without great expense. bioBUBBLE consultants can provide valuable information on an array of cost-effective solutions for air quality improvement in laboratory animal facilities. It is key to remember that any investment promoting the health and well-being of personnel and animals will provide exponential returns through increased

productivity, reduced health care expenses and a world-class animal research program.

Resources:
Fisher R, Saunders W, Murray S, Stave G. 1998. Prevention of Laboratory Animal Allergy. J Occup Environ Med 40:609-613.

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Keene, John H. 2002. Special Feature- Ask the Experts, Laboratory Animal Dander Allergy. Applied Biosafety Journal Vol 7, No 4:233-234

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Renström A, Maimberg P, Larsson K, Sundblad B-M. 1995. Allergic sensitization is associated with increased bronchial responsiveness: a prospective studyof allergy to laboratory animals. European Respiratoy Journal 8:1514-1519

Vanderbilt University. http://healthandwellness.vanderbilt.edu/news/2011/09/animal-allergies/

Wald P and Stave G. 2003. Occupational Health and Safety in Biomedical Research in the Laboratory. ILAR Journal Online, Vol 44, No 1:57-71

AAALAC FAQ's

INSTITUTIONAL RESPONSIBILITIES: Allergy prevention

Question:

The occupational health and safety department at our institution has recently required the use of additional equipment in the animal facility to minimize exposure of personnel to animal allergens (biosafety cabinets, cage changing stations and bedding dump stations). They cite language in the 2011 *Guide* that prioritizes engineering controls for allergy prevention over personal protective equipment (PPE). What is the AAALAC position regarding engineering controls for allergy prevention?

Answer:

The *Guide for the Care and Use of Laboratory Animals* (NRC 2011) does emphasize the use of "engineering or process controls" for allergy prevention. It also states that "PPE should be used to supplement, not replace, engineering or process controls...." This guidance is made in the context of allergy prevention and early identification of personnel with emerging allergic symptoms. The *Guide* also cites the extensive literature indicating that laboratory animal allergy has become a significant issue for those in contact with laboratory animals. AAALAC International considers allergy prevention to be an important topic and a key component of the occupational health and safety program. The use of engineering controls to prevent exposure to allergens is preferred as the primary means to minimize personnel exposure. PPE should be used as an adjunct to engineering controls, rather than the foremost means of protection. Keeping in mind that the activities most associated with allergen exposure are handling animals and cages with bedding, cage changing and dumping soiled bedding in the cage wash area, appropriate engineering controls may include: proper animal facility design and function with separation of functional spaces; a well designed and functional HVAC system with appropriate airflow patterns; consideration of newer cage designs which minimize personnel exposure; and the use of containment equipment such as biosafety cabinets, cage changing stations and bedding dump stations. AAALAC International site visitors will continue to evaluate occupational health and safety programs and the methods used to prevent laboratory animal allergy through evaluation of personnel training, risk assessment by qualified occupational health

and safety personnel, preventive medicine, periodic health evaluations, engineering controls, and the appropriate use of PPE.