



SENSOR

Occupational Lung Disease Bulletin

Massachusetts Department of Public Health
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Dear Healthcare Provider:

Laboratory workers, maintenance workers in animal facilities, veterinarians and others who work with animals on a regular basis may be at risk for developing allergies and work-related asthma. Massachusetts has a large number of research laboratories that handle animals and the number of workers exposed may be increasing. Of the top 11 bio/pharma states, Massachusetts was one of four states that added jobs this decade. Employment in Massachusetts bio/pharma industries grew 60%, from 29,046 in 2000 to 46,553 in 2009, outpacing the Massachusetts economy overall. Many universities and companies with animal facilities have programs to protect employees who work with animals. This *Occupational Lung Disease Bulletin* summarizes research on laboratory animal allergies and asthma and includes prevention recommendations developed by the National Institutes of Health to protect their laboratory workers.

REMINDER: To receive your Bulletin by e-mail, please send a message to occupational.asthma@state.ma.us.

Sincerely,
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Work-Related Asthma among Laboratory Animal Workers

Case Report: An occupational medicine physician reported that a 29 year-old female pharmaceutical company employee developed new onset work-related asthma. In a telephone interview, the employee described onset of symptoms after working as a research technician with responsibilities for oral dosing and surgery on rodents. She reported exposure to animal products (dander, fur, feces) as well as animal bedding. She described wheezing, coughing, chest tightness and shortness of breath. Her symptoms worsened during the work day and over the course of the work week. Her physician advised job change and transfer to another area of the company. The employer reassigned her, but she feared being terminated.

Animals or animal products such as dander, hair, fur, saliva and body wastes contain allergens that can cause respiratory and skin disorders. The National Institute for Occupational Safety and Health (NIOSH) has estimated that 33% of animal handlers develop allergy symptoms. This estimate may be conservative, because many who develop allergies early leave laboratory work, and are not included. The most common symptoms are runny or stuffy nose, watery or itchy eyes, sneezing and skin rashes. About 10% of animal handlers develop work-related asthma. Those who develop laboratory animal allergies are at greatest risk of developing asthma (Portengen 2003, Gordon 2003, Bush 2003).

Clinical features of laboratory animal allergies

When animal allergens become airborne during animal handling, dosing or surgical procedures, and cleaning of cages, laboratory employees may be exposed by inhalation and dermal contact. The most common symptom reported among those who develop allergies is work-related rhinoconjunctivitis, which occurs in 50 to 100% of those who report allergies. Less common are skin rashes and breathing problems. Most workers who develop laboratory animal allergies do so within the first 3 years of exposure, with nasal symptoms being the first to develop.

Atopic individuals are nearly 11 times more likely to become sensitized. Atopy may decrease the exposure time to become sensitized. About 60% of those with laboratory animal allergies will have specific IgE to animal allergens, detectable by skin prick or serological test. However, atopy is not considered an adequate predictor of laboratory animal allergies to be used to identify workers at higher risk of developing allergies or asthma. Laboratory animal allergy is unrelated to smoking (Nicholson 2010).

Work-related asthma

Work-related asthma (WRA) is the most severe outcome, and considered to be the end state of laboratory animal allergy. Once sensitized, some individuals develop lower respiratory symptoms. Asthma symptoms, including wheezing, coughing, shortness of breath or difficulty breathing, may occur immediately, or be delayed 8 hours or more. In a study of 319 laboratory animal workers,

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those workers with less than 4 years experience, who were sensitized and continued to be exposed to laboratory animals, showed significant declines in lung function (Portengen 2003).

Sources of exposure

Animal allergens are found in the urine, fur, saliva and serum of laboratory animals such as rats, mice, guinea pigs, and rabbits. Studies have documented that sensitization to laboratory animals and the development of allergies increases with increasing airborne concentration, and with longer duration exposures. Contact with allergens on clothing and other surfaces also contributes. Peak exposure of short duration may be more important than average exposures. Increasing the number of animals or the number of species handled also increases the risk of symptom development. In one study, animal care specialists had the highest rates of allergy symptoms, associated with tasks involving work with cages or many animals at the same time. Other animal handlers in academic, farming and research facilities, including, veterinarians and animal technicians, livestock workers, custodians and cleaning crew, may be at risk (Pacheco 2006, Nicholson 2010).

In addition to the animal protein allergens, there are other exposures that may lead to the development of WRA in laboratory workers. Endotoxins from gram negative bacteria have been associated with both allergy symptoms and asthma, and exposure was documented during mouse experiments on the bench, rather than in a hood with controlled ventilation. Mouse allergen exposures, on the other hand, were more likely to occur in the dirty cage wash area and during cage changing (Pacheco 2006, Elliot 2005).

Dust from bedding, as well as formaldehyde and quaternary disinfectants used in cage cleaning and laboratory care should also be considered as potential causal factors in treating laboratory workers with WRA.

Prevention

There is currently no specific OSHA occupational exposure standard for laboratory animal allergens. However, recognition of the risks has prompted development and implementation of control measures in many laboratories, and an apparent decline in prevalence of laboratory animal WRA as reflected in the literature (Folletti 2008).

The most important prevention step is to implement engineering controls designed to reduce dust and draw allergen-containing air away from personnel, providing filtration to remove particles. Oversight of work practices is crucial as are education and training of personnel.

We remind Massachusetts healthcare providers to report cases of WRA associated with laboratory animal exposure to the Occupational Health Surveillance Program (OHSP).

We are also interested in learning more about successful approaches that are being implemented to reduce the incidence of laboratory animal allergies and asthma among workers in Massachusetts laboratories.

Recommendations (Summarized) National Institutes of Health Laboratory Animal Allergy Prevention Program (LAAPP)

1. Local exhaust ventilation, engineering controls
Provide ventilation that is appropriate for the task, e.g. biological safety cabinets and tables equipped with ventilation. Use filter top cages and ventilated animal racks. Corncob bedding and recycled wood products are preferred by NIH. Cage dumping and cleaning requires special attention, including wetting or a special station with High Efficiency Particulate Air (HEPA) filtration.
2. Administrative controls
Design of the facility should minimize animal transfers and maintain appropriate animal density for the facility. Ensure housekeeping on a regular schedule with wet methods, not sweeping. Training and education regarding personal hygiene, proper use of equipment and protective gear, and awareness of allergy symptoms is important.
3. Personal protective equipment (PPE)
Recommended equipment includes nitrile gloves, and disposable lab coats or scrubs. The use of dust masks is recommended whenever animals and/or soiled bedding are handled. Street clothes should be kept separate from laboratory wear. Allergic employees need N-95 respirators.
4. Medical evaluation and management
Employees should be provided regular medical evaluation. Employees should be urged to report signs and symptoms of allergy promptly.
5. Program evaluation
The program should be evaluated regularly to assess effectiveness in preventing allergies and WRA among employees handling animals.

<http://dohs.ors.od.nih.gov/pdf/LAAPP.pdf>

References available on request.

Please report work-related asthma cases to SENSOR by phone, fax, or mail!