

III-12. LABORATORY ANIMAL ALLERGIES

I. Purpose

- A. To determine whether or not symptoms suggestive of an allergic reaction are related to work exposures to laboratory animals.
- B. To prevent the development of occupational asthma with timely and appropriate intervention.

II. Relevant OMS Procedure Manual Sections

- A. Occupational Injury and Illness. Chapter III, Section 18
- B. Preplacement Medical Evaluation. Chapter III, Section 22
- C. Animal Exposure Program. Chapter IV, Section 1

III. Attachments

- A. Laboratory Animal Allergy Handout. [Attachment I](#)

IV. Background

- A. Allergens
 - 1. Most laboratory animal allergens are small acidic extracellular glycoproteins called lipocalins. They are carried on small particles that are capable of remaining airborne for extended periods and penetrating exposed employees' lower airways.
 - 2. The proteins most frequently associated with allergic reactions are found in animals' urine, saliva, and dander.
- B. Probabilities and risk factors for developing an allergic reaction to laboratory animal allergens
 - 1. Contact with animals, their secretions, excretions, bedding, and feed place workers at risk for developing an allergic reaction to laboratory animal allergens.
 - 2. Twenty to 30 percent of individuals working with laboratory animals will develop an allergic reaction to animal proteins.
 - 3. Five to ten percent of individuals will develop asthma as a result of working with laboratory animals. Asthmatic reactions are more likely to occur among individuals who have hyper-reactive airways.
 - 4. Risk factors for developing an allergic reaction include:
 - a. An allergic reaction to another animal species. This is likely due to physical similarities in the animals' proteins.
 - b. The intensity of the exposure. However, although exposure to small concentrations of allergens can provoke an allergic reaction.
 - c. The duration of the exposure.
 - d. The route of exposure. The most effective route is via the respiratory tract.

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- C. Signs and symptoms
1. Most allergic signs and symptoms involve the upper airway (e.g., rhinorrhea and nasal congestion) and eyes (e.g., conjunctivitis, tearing and itching). Skin manifestations include a maculopapular rash and urticaria. Less frequently, the lower airway may be involved (e.g., coughing, wheezing and shortness of breath).
 2. Nasal symptoms almost always develop first. The mean time to onset of nasal symptoms is seven months from the first exposure. Occupational asthma without nasal symptoms is very uncommon.
 3. Allergic symptoms most frequently appear in the first 6 to 36 months of starting work with animals. However, they may not present for years.
 4. When symptoms do occur, they typically begin within 15 minutes of the exposure. Half of the allergic employees will also develop additional symptoms three to four hours following the exposure. That second reaction will peak four to eight hours following the exposure and resolve in 12 to 14 hours.
 5. The longer the exposure continues before the employee develops symptoms and the longer the employee's symptoms are present before the exposure is discontinued, the less likely they will recover permanently. This is especially problematic for individuals with lower respiratory reactions. If the exposure is not eliminated promptly, the worker may require life-long treatment for asthma.
- D. Testing
1. Neither a history of prior allergic disease nor elevated IgE levels reliably helps predict individuals who will become sensitized to laboratory animal proteins.
 2. A negative skin test may be useful in excluding the diagnosis of an allergic reaction to animal proteins. In a review of seven published studies, Bush reported that the concordance between skin tests and symptoms was 81% (790 of 971). However, 13% (124) had a positive skin test but were asymptomatic and another 6% (57) had symptoms suggestive of allergic reactions to animal proteins but did not have a positive skin test. The significant variation in the findings in the articles may be the result of inadequate standardization of the allergens and the testing methodology.
 3. Enzyme-linked immunosorbent assays and radioallergosorbent (RAST) testing has also been used to evaluate possible allergic reactions to animal proteins; however, RAST results do not correlate with clinical findings as well as skin test results.
 4. There is no practical value in routinely screening employees (e.g., skin prick testing, in-vitro assays or pulmonary function testing) for increased susceptibility to laboratory animal proteins prior to entering the work area or during employment, unless the employee has symptoms suggestive of a laboratory animal allergy.

V. Employee Education

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- A. Workers who report that they will work with laboratory animals during a preplacement medical evaluation will receive:
 - 1. Counseling concerning the risk of developing an allergic reaction to animal proteins;
 - 2. An explanation of symptoms that may represent an allergic reaction and how to seek medical attention in OMS; and
 - 3. A copy of the Laboratory Animal Allergy Handout ([Attachment I](#)).
 - B. Allergic reactions to laboratory animal proteins are also addressed in the Division of Occupational Health and Safety (DOHS) Laboratory Safety Training course and in periodic Animal Care and Use training courses offered by the Office of Animal Care and Use (OACU).
 - C. Supervisors in animal care areas receive the same training and are provided copies of the NIH Laboratory Animal Allergy Prevention Program.
 - D. OMS provides workers enrolled in the Animal Exposure Program (AEP) with an annual reminder of the health risks, including allergies to animal proteins, associated with animal contact. See the AEP for additional details.
- VI. Identification of Employees with Allergic Symptoms
- A. Employees with symptoms suggestive of an allergic reaction related to a workplace allergen should report their concerns to OMS for evaluation.
 - B. Alternatively, employees may be referred to OMS for evaluation by co-workers, supervisors or their safety specialist.
- VII. Medical Evaluation
- A. The medical history is critical in the diagnosis of an allergy to laboratory animal proteins. Issues addressed include:
 - 1. The animals contacted, work practices and personal protective equipment utilized.
 - 2. The nature, severity and pattern of symptoms (e.g., runny or stuffy nose, sinus problems, watery or itchy eyes, sneezing spells, eczema, hives, coughing and wheezing or chest tightness).
 - 3. The temporal relationship of symptoms to work activities and their duration. Encourage employee to create a log documenting time, duration and location of when symptoms begin and subside.
 - 4. The possible presence of potential risk factors such as:
 - a. Prior personal history of allergies or asthma,
 - b. Presence of indoor pets, and
 - c. Family history for allergies or asthma.
 - 5. Medications used to help control symptoms.
 - B. A targeted physical exam is performed. The clinician examines the employee's nose, eyes and skin for evidence of allergies and auscultates the chest for wheezing on forced expiration.
 - C. Confirmation of the diagnosis of an allergy to laboratory animal proteins requires appropriate diagnostic testing. The employee will be referred to an allergist in the

community for further evaluation and treatment if the medical history suggests the presence of an occupational allergy.

1. Pulmonary function testing
 - a. Pulmonary function testing is useful both for employees with upper airway symptoms and lower airway symptoms related to exposures to laboratory animals. Testing employees who have only upper airway symptoms may detect evidence of sub-clinical asthma.
 - b. Spirometry measures the forced expiratory volume at one second (FEV 1), forced vital capacity (FVC), and maximum midexpiratory flow rate (FEF 25-75). A decline of at least 20% of the FEV 1 or 25% of the FEF 25-75 is considered significant.
 - c. Pulmonary function testing is performed before the beginning of the workweek and towards the end of the employee's work shift.
 - d. Additionally, a symptomatic employee may be given a disposable peak flow meter and instructed to measure and record peak expiratory flow measurements every three hours while awake. Abnormal findings are confirmed by repeating the testing in OMS with both the disposable meter and the clinic spirometer.

D. Treatment

1. Eliminating exposure to allergens is the treatment of choice for laboratory animal allergies. OMS clinicians recommend that employees with suspected allergies to laboratory animals be assigned alternate duties and be fitted for an N-95 respirator while the employees' symptoms are evaluated. If enhanced safety procedures and equipment do not control the employee's symptoms, an OMS medical provider recommends that the worker permanently be assigned duties that do not involve contact with laboratory animals.
2. There are several treatment options for workers who have allergies to animal proteins.
 - a. Antihistamines may control or decrease symptoms, if administered prior to exposure.
 - b. Mast cell stabilizers, such as cromolyn and nedrocimil, can also be used to prevent or reduce symptoms, if used prior to allergen exposure.
 - c. Employees who have daily lower respiratory symptoms may require short- and long-acting beta-receptor agonist bronchodilator therapy and possibly inhaled corticosteroids. Such employees are strongly encouraged to discontinue further contact with the animals that provoke their symptoms.
 - d. Desensitization injections may reduce the employee's sensitivity to allergens. They are most effective for employees with intermittent exposure. Although desensitization injections may reduce some of the symptoms, they are not curative. Evaluation for possible desensitization can be accomplished by an allergist in the community.

E. Workplace investigation. When an occupational allergy is suspected, the OMS

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clinician may request an inspection by the appropriate safety specialist to determine the extent of the exposure and approaches that could eliminate or reduce further exposures, as indicated.

- F. Documentation. In addition to documenting the employee's concerns in the employee's clinical record, the OMS clinician reports the occurrence in the Clinical Access Manager (see the OMS Occupational Injury and Illness procedure for additional details).

VIII. Bibliography

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Allergies to Laboratory Animals A Significant Health Risk

What is an allergy?

An allergy is an exaggerated reaction by the body's immune system to proteins. In the case of allergies to laboratory animals, the proteins most frequently associated with the allergic reaction are found in the animal's urine, saliva and dander.

What are the symptoms of allergic reactions to laboratory animals and when do they occur?

The earliest symptoms include nasal stuffiness, a "runny" nose, sneezing, red irritated eyes and hives. Symptoms that are particularly troubling are those that suggest the worker is developing asthma. These symptoms include coughing, wheezing and shortness of breath. Asthma resulting from allergic reactions to laboratory animals can result in severe and occasionally disabling breathing problems. Rarely, an employee with allergic symptoms will develop a potentially life-threatening reaction following an animal bite.

Most workers who develop allergic reactions to laboratory animals will do so within the first twelve months of working with them. Infrequently, reactions only occur after working with animals for several years. Initially the symptoms are present within minutes of the worker's exposure to the animals. Approximately half of allergic workers will have their initial symptoms subside and then recur three or four hours following the exposure.

What laboratory animals are associated with allergic reactions?

Most animals used in research have been identified as the source of workers' allergic symptoms. Because mice and rats are the animals most frequently used in research studies, there are more reports of allergies to rodents than other laboratory animals.

What are the chances that a worker will develop an allergic reaction to laboratory animals?

It has been reported that one out of every three to five individuals who works with laboratory animals will develop allergic symptoms. Further, one in twenty workers with allergies to animal proteins will develop asthma as a result of their contact with laboratory animals.

Are there factors that are associated with an increased risk for developing an allergic reaction to laboratory animals?

Yes, a history of allergy to other animals (typically cats and dogs) is the best predictor for who will develop an allergy to animals found in research laboratories. Other factors associated with allergic reactions to laboratory animals include the individual's intensity, frequency and route of the exposure to the animals. Activities such as handling animals and cleaning their cages may

be associated with an increased risk of exposure to the animal proteins and thereby place the worker at greater risk of developing an allergic reaction. Although workers who have a personal or family history for asthma, seasonal allergies, and dermatitis are also at increased risk, individuals with no prior history of allergies and only brief work exposures can also develop allergic reactions to laboratory animals.

What can be done to reduce the chance that a worker will develop an allergic reaction to laboratory animals?

The best approach for reducing the likelihood that a worker will develop an allergic reaction is to eliminate or minimize their exposure to the proteins found in animal urine, saliva and dander. Ideally, this is accomplished by limiting the chances that workers will inhale or have skin contact with animal proteins. In addition to using well-designed air handling and waste management systems in research areas, workers can reduce their risk of exposure by routinely using dust/mist masks, gloves and gowns. If additional respiratory protection is required, the worker should contact the Technical Assistance Section, Division of Occupational Health and Safety (301-496-3353).

What should you do if you are concerned that you may have some of the symptoms that suggest an allergic to laboratory animals?

Notify your supervisor of your concern and call the OMS to schedule an appointment for evaluation. A clinician will review your medical and work history and perform a targeted physical exam. Based upon the clinical findings, additional testing may be performed. With early identification of allergic reactions to animals and appropriate treatment, most people can avoid further injury or the development of asthma.

OMS Health Units:

Building 10, Room 6C306
7:30 am – 5:00 pm M – F
301-496-4411

IRF Fort Detrick, Room 1B116
8:00 am – 4:30 pm M– F
301-631-7233

Baltimore Bayview, Room 01B210
8:00 am – 4:30 pm M– F
443-740-2309

Rocky Mountain Laboratories, Room 5202
7:30 am – 5:00 pm MST M– F
406-375-9755