American Latex Allergy Association

FAQs on Latex-Related Occupational Asthma

Asthma affects 5 to 10 percent of people worldwide. The proportion of newly diagnosed cases of asthma in the United States due to exposure at work is estimated to be between 2 and 15 percent.

What types of asthma can occur at the workplace?

There are two categories of asthma in the workplace:

1. Occupational asthma. This is defined as variable airway obstruction (partial or intermittent narrowing of the small airways of the lungs) or bronchial hyperresponsiveness (airway twitchiness) caused by agents or conditions in the workplace. This can be further classified into two subtypes:
    - Occupational asthma with latency. This is the most common type. The symptoms develop after a period of exposure varying from a few weeks to several years. The occupational agent sensitizes the immune system leading to airway inflammation. Latex-induced occupational asthma is an example of this type.
    - Occupational asthma without latency. This is also called irritant-induced asthma. The symptoms occur immediately after exposure to high concentrations of irritant gases, fumes, or chemicals. The mechanism is unknown but unlikely to be an immune response.
2. Work-aggravated asthma. This is when preexisting asthma is worsened by irritants such as perfumes, odors, or cleaning agents in the workplace. A worker with previously diagnosed asthma can still become sensitized to an occupational agent, leading to occupational asthma. Likewise, a patient with occupational asthma due to latex can develop symptoms after exposure to irritants in a latex-safe job.

Reference:
Chan-Yeung M, Malo J. Occupational asthma. NEJM 1995; 333: 107-112.
Chan-Yeung M, Malo J. Aetiological agents in occupational asthma. Eur Resp J 1994; 7:346-371.

What kind of asthmatic reaction can happen in the workplace?

Occupational asthma is bronchial hyperresponsiveness (twitchy airways). This can be confirmed in the Pulmonary Function Laboratory by inhaling either methacholine or histamine. After inhalation, isolated early reactions may occur within a few minutes after exposure, and peak after 30 minutes, and resolves within 60 to 90 minutes. Late

reactions can occur 4-6 hours after allergen challenge, with maximal symptoms between 8 to 10 hours, and resolve after 24 hours. A biphasic reaction has both an early and late phase. A continuous reaction has no remission between early and late phase reactions. Atypical reactions start about two hours after an exposure and last for a few hours. This is important because identifying the trigger frequently depends on the timing of the allergen exposure.

Reference:
Chan-Yeung M, Malo J. Occupational asthma. NEJM 1995; 333: 107-112.

What are the risk factors for occupational asthma?

The main risk factors for occupational asthma with latency are atopy (the predisposition to develop allergy) and smoking. Atopy predisposes to occupational asthma caused by high molecular weight proteins such as latex. In contrast, smokers are at higher risk for occupational asthma caused by low-molecular weight compounds such as platinum salts, and anhydrides used in the paint and plastic industries.

Reference:
Avila PC, Shusterman DJ. Work-related asthma and latex allergy. Postgraduate Med 1999; 105: 39-46.

What is the mechanism behind latex-related occupational asthma?

Natural rubber latex causes asthma through an immune process leading to the production of IgE (the allergic antibody). The repeated deposition of latex allergen-bearing airborne particles onto mucosal surfaces of the lung causes sensitization. After sensitization, when reexposure occurs, the release of inflammatory mediators and production of allergic antibodies results in allergic asthma. Airborne latex depends on the use of powdered rubber gloves. Use of cornstarch-powdered latex gloves is associated with a high risk of occupational disease in glove-wearers. Airborne cornstarch particles carry latex allergens into the air.

Reference:
Fish JE. Occupational Asthma and rhinoconjunctivitis indced by natural rubber latex exposure. JACI 2002: 110: S75-81.
Tomazic VJ, Shampaine EL, Lamanna et al. Cornstarch powder on latex products is an allergen carrier. JACI 1994: 93: 751-758.

Who is at high risk for latex-related occupational asthma?

Natural rubber latex (NRL) is used in many and varied occupations and for non-occupational purposes. These include workers at factories who make rubber gloves and tires. It also affects individuals who wear and use dipped latex products (gloves) such as doctors, dentists, nurses, technicians, and food service personnel. The prevalence

of NRL-allergic sensitization in the general population is low. After occupational exposure, rates of sensitization and NRL-induced asthma rise dramatically. Specifically, NRL allergy has become an important health problem in health care workers. Inhaling NRL from gloves protein resulted in occupational asthma with high-protein powdered latex gloves. These gloves were introduced into the marketplace in the 1980s following recommendations for universal precautions due to HIV disease. NRL may be one of the leading causes of occupational asthma in healthcare workers.

Reference:
Vandenplas O, Delwiche G, et al. Prevalence of occupational asthma due to latex among hospital personnel. Am J Resp Crit care Med 1995; 151: 54-60.
Delclos G, Gimeno D, et al. Occupational risk factors and asthma among health care professionals. Am J Respir Crit Care Med 2007; 175: 667-675.

How is the diagnosis of latex-induced occupational asthma made?

Several criteria are required to make the diagnosis of occupational asthma caused by NRL protein allergens. First, you must have asthma, and second, the asthma occurred as a result of exposure to latex at the workplace. The asthma symptoms typically increase at work and improve at home or on vacation. To confirm asthma requires breathing tests that can show an improvement of > 12% after taking a medication such as albuterol. Alternatively, the methacholine challenge test can be done in the pulmonary function laboratory of the hospital. This entails inhaling methacholine, performing a pulmonary function test, and documenting constriction of the airways after the methacholine was given. Third, sensitization to NRL allergens can be confirmed by a blood test known as a serum-specific IgE (ELISA or RAST) or skin testing to an NRL antigen. Fourth, demonstration of decreased lung function associated with exposure to latex. Good peak expiratory flow monitoring can aid in diagnosis. An employee can blow into this device 4 times a day for 4 weeks before, during, and after work shifts and record the values. A pattern of decreased peak flows while at work or after leaving work is evidence for occupational asthma. Unfortunately, an approved commercial skin test preparation for latex is not available. Furthermore, the blood tests may not identify all the patients who truly have latex allergy. Blood tests for latex IgE shows relatively low sensitivity, and false negative results are occur in up to 25%.

Reference:
Kelly KJ, Kurup V, Zacharisen M, et al. Skin and serologic testing in the diagnosis of latex allergy. JACI 1993; 91: 1140-5.

What is the treatment for latex-related occupational asthma?

The treatment for latex-related asthma in the workplace is to decrease exposure to airborne latex. This includes substituting synthetic latex or other non-latex gloves for latex (NRL) gloves. Powder-free sterile NRL gloves are preferred if latex gloves must be used. Otherwise, non-natural rubber latex gloves should be used. Personal protective equipment, such as a well-fitted respirator, may help temporarily if complete removal is not feasible.

The medications used to treat occupational asthma are the same as those used in non-occupational asthma.

Latex-specific immunotherapy or allergy injections has been reported but resulted in severe allergic reactions in a high proportion of patients and is not available for treatment. Further standardization of latex extracts and clinical trials with large numbers of latex allergic persons will be required.

Reference:
Kelly, KJ, Sussman G, Fink JN, et al. Stop the sensitization. JACI 1996; 98:851-858.
Charous BL, Blanco C, et al. Natural rubber latex after 12 years: Recommendations and perspectives. JACI 2002; 109: 31-4.

What is the prognosis for patients with occupational asthma?

The majority of patients with occupational asthma with latency have permanent impairment, despite removing the patient from the causative agent for several years. The patients may experience asthma symptoms with exposure to other triggers and irritants. Patients may have persistent bronchial hyperresponsiveness, with or without symptoms of asthma. The longer the duration of symptoms before removal from latex exposure correlates with the severity of the asthma. The early diagnosis and immediate avoidance of latex increases the possibility of recovery.

Reference:
Brugnami G, Marabini A, Siracusa A. Work-related late asthmatic response induced by latex. JACI 1995; 96: 457-64.
Vandeplas O. Occupational asthma caused by natural rubber latex. Eur Respir J 1995; 8: 1957-1965.

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