

Medical Education Systems, Inc.



Course 905

LATEX ALLERGY



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Latex Allergy

Learning Objectives

Upon completion of this course, you will be able to:

- Define and discuss what is meant by “latex”
- Identify the various items containing latex that may be found in the healthcare setting
- List and discuss the types of allergic reactions to latex that can be seen in the workplace
- Identify and discuss the steps that can be taken to minimize those allergic reactions

Introduction

This course is intended to alert healthcare personnel to the potential for allergic reactions in some individuals using natural rubber latex (NRL) products, particularly gloves, in the workplace setting. Natural rubber is utilized in a variety of products including gloves, airways, airway masks, medication vial tops, anesthesia bags, various catheters, supplies for intravenous use, dental dams, balloons, and other products. NRL glove use in the health care setting has risen dramatically since about 1987, due to the increased threat of contracting HIV, hepatitis B, and other infectious agents in the course of delivering health care to patients and the need for barrier protection. Thus, the frequency of exposure to NRL among health care and other workers has increased.

NRL products are also used to provide barrier protection from some chemicals and other agents in health care and other environments. (NOTE: While NRL gloves are useful for certain purposes, they are not universally suitable. The properties of a glove material for a specific use must be determined in advance of use. Gloves appropriate for protection from the particular chemical or agent must be used.) NRL gloves are also used to prevent contamination of products in some workplaces (e.g., electronics and drug manufacturing). Natural rubber articles are manufactured in some workplaces (e.g., manufacturers of medical gloves, industrial gloves, balloons, rubber bands, boots and shoes, and many other products).

With more widespread use of NRL gloves, there has been an increase in reported NRL allergies, among patients as well as among workers, notably health care workers. Rarely, these allergies can be fatal. In addition to reports from the dermatology, allergy, and pulmonary literature of severe skin and respiratory symptoms, life-threatening reactions to NRL products have been noted in pediatric patients with spina bifida who had undergone numerous surgical procedures, resulting in repeated NRL exposure. In addition, the US Food and Drug Administration (FDA) received reports of numerous severe allergic reactions, including several deaths, associated with exposure to NRL enema cuffs in providing care to sensitized patients.

NRL is manufactured from a variety of plants, but mainly the rubber tree, **Hevea brasiliensis**. The milky fluid from the tree contains variable amounts of proteins which may be absorbed through the skin or inhaled and cause allergic reaction in susceptible workers. NRL contains many proteins. A number of these proteins, such as heveamine, hevein, and rubber elongation factor (REF), may initiate allergic reaction to NRL. Studies have indicated that corn starch powder, added to gloves to facilitate donning and removal, can serve as a carrier for the allergenic proteins from the NRL.

In addition, gloves, including those made from NRL as well as some other materials, may contain chemical accelerators such as thiuram, carbamates, and benzothiazoles to which a worker may also develop sensitization, resulting in allergic contact dermatitis. Antioxidants, biocides, soaps, and other chemicals used in the processing of NRL products may contribute to sensitization as well.

In 1987 the Centers for Disease Control and Prevention (CDC) recommended universal precautions, the concept that blood and certain body fluids from all individuals should be approached as if potentially infectious. The use of barrier protection was subsequently required by OSHA's bloodborne pathogens standard. The increased use of latex gloves in a variety of settings greatly increased the exposure of health care workers to NRL.

The two major routes of exposure include dermal exposure and inhalational exposure. NRL protein absorption has been reported to be enhanced when perspiration collects under latex clothing articles. Exposure may also occur by the respiratory route, particularly when glove powder acts as a carrier for NRL protein which becomes airborne when the gloves are donned or removed. Some investigations have indicated that powder free gloves with reduced protein content reduce risk of development of NRL allergy. Some questions regarding powder free glove shelf life and ease of use have arisen and are being addressed. Importantly, only non-NRL gloves must be used by those workers who are allergic to NRL.

The majority of health care workers are able to use NRL products to care for most patients. Variations exist in the reported prevalence of NRL allergy. This variation is probably due to different levels of exposure and methods of estimating latex sensitization or allergy. Nevertheless, prevalence studies indicate that from around 6% to 17% of the exposed health care workforce is allergic to NRL. In a survey of active duty dental officers in the U.S. Army, the prevalence of allergic symptoms correlated with NRL use was reported to be 13.7%. An investigation of dental workers using NRL skin prick testing at two consecutive American Dental Association meetings revealed allergic responses in 9.1-9.7% of dental hygienists and assistants, although dentists showed a lower rate of 5.1-6.7%. The general population exhibits a lower rate of NRL sensitization (approximately 1 to 6%). These prevalence statistics are based on seroprevalence as well as skin test positivity and/or allergic manifestations and do not refer to the more serious anaphylactic response, which is rare but potentially life threatening in some individuals.

In addition to dentists, health care workers reported to have especially high risks include operating room personnel consistently exposed to NRL (i.e., operating room nurses, physicians, and technicians). NRL allergy has also been reported in greenhouse workers, hairdressers, doll

manufacturing workers, and workers in a glove manufacturing plant, and may pose a risk to others as well.

Use of natural rubber products may result in several varieties of reactions (see table). These reactions include irritant and several types of allergic reactions. They can vary from localized redness and rash to nasal, sinus, and eye symptoms to asthmatic manifestations including cough, wheeze, shortness of breath, and chest tightness; and rarely, systemic reactions with swelling of the face, lips, and airways that may progress rapidly to shock and, potentially, death.

When gloves are associated with skin lesions, the most common reaction is irritant contact dermatitis. Irritant contact dermatitis may be due to direct irritation from gloves or glove powder, but may also be due to other causes, such as irritation from soaps or detergents, other chemicals, or incomplete hand drying. Irritant contact dermatitis presents as dried, cracked, split skin. Although irritant contact dermatitis is not in itself an allergic reaction, the breaking of the intact skin barrier due to these lesions may afford a pathway for latex proteins to gain access, and thus promote development of allergy.

The second type of reaction that may be associated with glove use is allergic contact dermatitis (also known as type IV delayed hypersensitivity or allergic contact sensitivity). When glove use has been associated with this reaction, it appears to be due to the chemicals used in processing NRL or other glove materials. The allergic contact dermatitis has an appearance similar to the typical poison ivy reaction, with blistering, itching, crusting, oozing lesions. Also, like poison ivy, this dermatitis may appear a day or two after the use of gloves or exposure to other sources of chemical sensitizers.

The third and potentially most serious type of reaction sometimes associated with glove use is a true IgE/histamine-mediated allergy (also called immediate or type I hypersensitivity) to glove protein [in the case of NRL allergy, to NRL protein(s)]. This type of reaction can involve local or systemic symptoms. Localized symptoms include contact urticaria (hives) which appear in the area where contact occurred (in the case of gloves, the hands), but which can spread beyond that area and become generalized. More generalized reactions include allergic rhinoconjunctivitis and asthma. The presence of allergic manifestations to NRL indicates an increased risk for anaphylaxis, a rare but serious reaction experienced by some individuals who have developed an allergy to certain proteins (e.g., insect stings, natural rubber, penicillin).

This type I reaction can occur within seconds to minutes of exposure to the allergen (in the case of NRL, to natural rubber proteins) either by touching a product with the allergen (e.g., gloves) or by inhaling the allergen (e.g., powder to which natural rubber proteins from gloves have adsorbed). When such a reaction occurs, it can progress rapidly from swelling of the lips and airways to shortness of breath, and may progress to shock and death, sometimes within minutes. While any of these signs and symptoms may be the first indication of allergy, in many workers with continued exposure to the allergen (in the case of NRL allergy, to natural rubber proteins), there is progression from skin (contact urticaria) to respiratory symptoms over a period of months to years. Some studies indicate that individuals with latex allergy are more likely than latex non-allergic persons to be atopic (have an increased immune response to some common allergens, with symptoms such as asthma or eczema. Once NRL allergy occurs, allergic

individuals continue to experience symptoms, which have included life-threatening reactions, not only on exposure to NRL in the workplace but also upon receiving or accompanying a family member receiving health care services at inpatient as well as office-based settings. In addition, such reactions have occurred on exposure to consumer goods such as balloons, condoms, and other products. Moreover, some affected individuals continue to experience asthmatic symptoms even without contact with NRL. Therefore, development of allergy to NRL in an individual has lifestyle implications beyond the workplace.

Types of Reactions

Type Reaction	Symptoms/Signs	Cause	Prevention / Management
Irritant Contact Dermatitis	scaling, drying, cracking of skin	direct skin irritation by gloves, powder, soaps/detergents, incomplete hand drying	Obtain medical diagnosis, avoid irritant product, consider use of cotton glove liners , consider alternative gloves/products
Allergic Contact Dermatitis (Type IV delayed hypersensitivity or allergic contact sensitivity)	blistering, itching, crusting (similar to poison ivy reaction)	accelerators (e.g., thiurams, carbamates, benzothiazoles) processing chemicals (e.g., biocides, antioxidants) Consider penetration of glove barrier by chemicals	Obtain medical diagnosis, identify chemical. Consider use of glove liners such as cotton Use alternative glove material without chemical Assure glove material is suitable for intended use (proper barrier)
NRL Allergy - IgE/histamine mediated (Type I immediate hypersensitivity) ----- -----	----- Hives in area of contact with NRL	NRL proteins: direct contact with or breathing NRL proteins, including glove powder containing proteins, from powdered gloves or the environment	Obtain medical diagnosis, allergy consultation, substitute non-NRL gloves for affected worker and other non-NRL products Eliminate

<p>A) Localized contact urticaria</p> <p>which may be associated with or progress to:</p> <p>B) Generalized Reaction</p>	<p>-----</p> <p>Include: generalized urticaria, rhinitis, wheezing, swelling of mouth, shortness of breath. Can progress to anaphylactic shock</p>		<p>exposure to glove powder - use of reduced protein, powder free gloves for coworkers</p> <p>Clean NRL-containing powder from environment</p> <p>Consider NRL safe environment</p>
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Recommended Strategies - Risk Reduction

It is of primary importance that barrier protection be used when hands would otherwise contact infectious materials or hazardous chemicals. OSHA's bloodborne pathogens standard requires that gloves be worn when it is reasonably anticipated that hand contact may occur with blood, other potentially infectious materials, mucous membranes, non-intact skin, or contaminated items or surfaces, as well as when performing most vascular access procedures [29 CFR 1910.1030, paragraph (d)(3)(ix)]. NRL is a glove material that has been used in the health care environment for barrier protection for a number of years. In response to reported NRL allergy in some patients and health care workers, measures have been recommended to reduce the risk of NRL allergy in workers.

Primary prevention involves reducing potential development of allergy by reducing unnecessary exposure to NRL proteins for all workers. Food service workers or gardeners, for example, do not need to use NRL gloves for food handling or gardening purposes. Gloves made of NRL as well as synthetic materials have been cleared for marketing as medical gloves by the FDA and can be used effectively for barrier protection against bloodborne pathogens. General administrative procedures that an institution can follow to reduce worker exposure to NRL proteins include:

- (1) If selecting NRL gloves for worker use, designating NRL as a choice only in those situations requiring protection from infectious agents;
- (2) When selecting NRL gloves, choosing those that have lower protein content. Selecting powder free gloves offers the additional benefit of reducing systemic allergic responses; and
- (3) Providing alternative suitable non-NRL gloves as choices for worker use (and as required by OSHA's bloodborne pathogens standard [29 CFR 1910.1030, paragraph (d)(3)(iii)] for workers who are allergic to NRL gloves).

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Use of powder free gloves has been shown to reduce the dissemination of NRL proteins into the environment and decrease the likelihood of reactions by both the inhalation and dermal routes. Appropriate work practices when wearing hand protective equipment, including NRL gloves, include avoidance of contact with other body areas such as the eyes or face. Handwashing after glove removal is required by OSHA's Bloodborne Pathogens Standard [paragraph (d)(2)(v)] and helps to minimize powder and/or NRL remaining in contact with the skin. Thorough clean-up of any residual powder in the workplace with appropriate vacuum filters will decrease employees' exposure as well.

Since the reason for wearing gloves is to provide barrier protection from hazardous substances, substitute materials must maintain an adequate barrier protection and be appropriate for the hazard. At a minimum, gloves made from NRL or other materials and used for a medical purpose should be labeled as medical gloves. Such gloves must meet the FDA criteria for marketing, manufacturing, and testing of medical gloves. The Health Industry Manufacturers Association (HIMA), in conjunction with the FDA, has proposed general guidelines for use of medical gloves with some recommendations for those individuals who are allergic to natural rubber.

One institution has reported that a coordinated effort to identify NRL sensitive individuals and reduce the use of "high allergenic" natural rubber latex gloves substantially reduced aeroallergen levels and costs.⁴ Other investigators have reported that some NRL allergic workers have been able to work wearing nonlatex gloves when their coworkers wore powder free latex gloves.

Effective September 30, 1998, the FDA requires labeling statements for medical devices which contain natural rubber and prohibits the use of the word "hypoallergenic" to describe such products.⁸ NRL gloves with a reduced level of chemical accelerators must be labeled to eliminate confusion associated with the "hypoallergenic" claim and to provide more specific information to the user. Some NRL gloves and other devices produced before the effective date of the FDA regulation may not carry the NRL labeling or may be labeled "hypoallergenic". Such products may still be in use in some facilities. It should be noted that such products should not be presumed to be NRL free. The hypoallergenic claim referred to the chemical additives, and such gloves may be powder free; however, they contain the NRL proteins to which NRL allergic workers react.³ The FDA is currently exploring options for reducing exposure to NRL proteins and powder. It is important to note that these FDA regulations do not apply to non-medical devices, including utility gloves.

Recommended Worker Evaluation and Management

The administrative procedures outlined above may not be sufficient to protect all individuals who have already developed NRL allergy. The American College of Allergy, Asthma, and Immunology has suggested that "safe zones" (areas in which non-NRL products are used and NRL proteins have been thoroughly removed from the environment) may be needed to protect those workers who are already sensitized to NRL. Health care facilities should develop policies

and procedures for reducing the risk of NRL allergies in the workplace. Prudent risk reduction strategy involves an initial survey and assessment, with a coordinated effort to identify and catalogue all NRL products used in the workplace. An ongoing program, involving close coordination with resource and materials management staff, should be established to monitor the NRL content of incoming products so that management staff can be prepared to choose appropriate products for offering non-NRL alternatives to control NRL exposure as well as for creating NRL safe zones. Mechanisms for reporting and managing cases should be in place.

It is not possible, at present, to determine which workers will become allergic to NRL proteins, the extent of an individual worker's reaction, or the length of time required for such allergic reactions to develop. It is also not possible, at present, to predict who will progress from local contact urticaria to the more dangerous allergic reactions, nor when this may occur.

Laboratory and clinical evidence indicates that an association exists between allergy to natural rubber proteins and allergy to certain foods and plants (e.g., avocado, banana, kiwi, chestnut) and some aeroallergens (e.g., pollens, grasses). A history of multiple surgeries has also been reported to be a risk factor for NRL allergy. In some institutions, periodic screening questionnaires for symptoms of NRL allergy in workers with current or past history of significant NRL exposure (e.g., surgical personnel) have been useful for ascertaining reaction rates and managing those individuals experiencing reactions. A medical evaluation of hand dermatitis, by a physician experienced in dermatologic diagnoses, is essential for taking preventive steps and assuring effective therapeutic measures. Evaluation of signs/symptoms associated with latex allergy should be accomplished under the direction of a physician with expertise in NRL allergy, with additional medical testing and treatment made available if indicated.

Provision of latex-free procedure trays and crash carts for treatment of natural rubber allergic individuals has been recommended. Although the fundamentals of emergency response

(i.e., assuring airway, breathing, and circulation) remain of primary importance should a worker develop symptoms (including those caused by NRL allergy) requiring resuscitation, these situations should be anticipated in the workplace and provision of immediate access to non-natural rubber containing equipment considered.

Information Availability

Investigation continues into various aspects of NRL allergy; our understanding of some issues continues to evolve. Meanwhile, workers and workplaces need to be aware of the present state of knowledge regarding NRL allergy and methods of protection. Workers should be advised of symptoms of NRL allergy as well as primary and secondary preventive measures for decreasing the risk of NRL allergy development and NRL allergic reactions in workers who are allergic.

The National Institute for Occupational Safety and Health (NIOSH) has published an Alert titled Preventing Allergic Reactions to Natural Rubber Latex in the Workplace **which is presented below:**

The National Institute for Occupational Safety and Health (NIOSH) requests assistance in preventing allergic reactions to natural rubber latex* among workers who use gloves and other products containing latex. Latex gloves have proved effective in preventing transmission of many infectious diseases to health care workers. But for some workers, exposures to latex may result in skin rashes; hives; flushing; itching; nasal, eye, or sinus symptoms; asthma; and (rarely) shock. Reports of such allergic reactions to latex have increased in recent years --especially among health care workers.

At present, scientific data are incomplete regarding the natural history of latex allergy. Also, improvements are needed in methods used to measure proteins causing latex allergy. This Alert presents the existing data and describes six case reports of workers who developed latex allergy. The document also presents NIOSH recommendations for minimizing latex-related health problems in workers while protecting them from infectious materials. These recommendations include reducing exposures, using appropriate work practices, training and educating workers, monitoring symptoms, and substituting nonlatex products when appropriate.

In this document, the term "latex" refers to natural rubber latex and includes products made from dry natural rubber. Natural rubber latex is the product manufactured from a milky fluid derived mainly from the rubber tree, *Hevea brasiliensis

BACKGROUND

Composition of Latex

Latex products are manufactured from a milky fluid derived from the rubber tree, *Hevea brasiliensis*. Several chemicals are added to this fluid during the processing and manufacture of commercial latex. Some proteins in latex can cause a range of mild to severe allergic reactions. Currently available methods of measurement do not provide easy or consistent identification of allergy-causing proteins (antigens) and their concentrations. Until well accepted standardized tests are available, total protein serves as a useful indicator of the exposure of concern. The chemicals added during processing may also cause skin rashes. Several types of synthetic rubber are also referred to as "latex," but these do not release the proteins that cause allergic reactions.

Products Containing Latex

A wide variety of products contain latex: medical supplies, personal protective equipment, and numerous household objects. Most people who encounter latex products only through their general use in society have no health problems from the use of these products. Workers who repeatedly use latex products are the focus of this Alert. The following are examples of products that may contain latex:

Emergency Equipment

Blood pressure cuffs

Stethoscopes
Disposable gloves
Oral and nasal airways
Endotracheal tubes
Tourniquets
Intravenous tubing
Syringes
Electrode pads

Personal Protective Equipment

Gloves
Surgical masks
Goggles
Respirators
Rubber aprons

Office Supplies

Rubber bands
Erasers

Hospital Supplies

Anesthesia masks
Catheters
Wound drains
Injection ports
Rubber tops of multidose vials
Dental dams

Household Objects

Automobile tires
Motorcycle and bicycle handgrips
Carpeting
Swimming goggles
Racquet handles
Shoe soles
Expandable fabric (waistbands)
Dishwashing gloves
Hot water bottles
Condoms
Diaphragms
Balloons
Pacifiers
Baby bottle nipples

Individuals who already have latex allergy should be aware of latex-containing products that may trigger an allergic reaction. Some of the listed products are available in latex-free forms.

Latex in the Workplace

Workers in the health care industry (physicians, nurses, dentists, technicians, etc.) are at risk for developing latex allergy because they use latex gloves frequently. Also at risk are workers with less frequent glove use (hairdressers, housekeepers, food service workers, etc.) and workers in industries that manufacture latex products.

TYPES OF REACTIONS TO LATEX

Three types of reactions can occur in persons using latex products:

- Irritant contact dermatitis
- Allergic contact dermatitis (delayed hypersensitivity)
- Latex allergy

Irritant Contact Dermatitis

The most common reaction to latex products is *irritant contact dermatitis* -- the development of dry, itchy, irritated areas on the skin, usually the hands. This reaction is caused by skin irritation from using gloves and possibly by exposure to other workplace products and chemicals. The reaction can also result from repeated hand washing and drying, incomplete hand drying, use of cleaners and sanitizers, and exposure to powders added to the gloves. Irritant contact dermatitis is not a true allergy.

Chemical Sensitivity Dermatitis

Allergic contact dermatitis (delayed hypersensitivity, also sometimes called chemical sensitivity dermatitis) results from exposure to chemicals added to latex during harvesting, processing, or manufacturing. These chemicals can cause skin reactions similar to those caused by poison ivy. As with poison ivy, the rash usually begins 24 to 48 hours after contact and may progress to oozing skin blisters or spread away from the area of skin touched by the latex.

Latex Allergy

Latex allergy (*immediate hypersensitivity*) can be a more serious reaction to latex than irritant contact dermatitis or allergic contact dermatitis. Certain proteins in latex may cause sensitization (positive blood or skin test, with or without symptoms). Although the amount of exposure needed to cause sensitization or symptoms is not known, exposures at even very low levels can trigger allergic reactions in some sensitized individuals.

Reactions usually begin within minutes of exposure to latex, but they can occur hours later and can produce various symptoms. Mild reactions to latex involve skin redness, hives, or itching. More severe reactions may involve respiratory symptoms such as runny nose, sneezing, itchy eyes, scratchy throat, and asthma (difficult breathing, coughing spells, and wheezing). Rarely,

shock may occur; but a life-threatening reaction is seldom the first sign of latex allergy. Such reactions are similar to those seen in some allergic persons after a bee sting.

LEVELS AND ROUTES OF EXPOSURE

Studies of other allergy-causing substances provide evidence that the higher the overall exposure in a population, the greater the likelihood that more individuals will become sensitized. The amount of latex exposure needed to produce sensitization or an allergic reaction is unknown; however, reductions in exposure to latex proteins have been reported to be associated with decreased sensitization and symptoms.



Figure 1. Dust produced by removing a latex glove containing powder.

The proteins responsible for latex allergies have been shown to fasten to powder that is used on some latex gloves. When powdered gloves are worn, more latex protein reaches the skin. Also, when gloves are changed, latex protein/powder particles get into the air, where they can be inhaled and contact body membranes (see Figure 1). In contrast, work areas where only powder-free gloves are used show low levels or undetectable amounts of the allergy-causing proteins.

Wearing latex gloves during episodes of hand dermatitis may increase skin exposure and the risk of developing latex allergy. The risk of progression from skin rash to more serious reactions is unknown. However, a skin rash may be the first sign that a worker has become allergic to latex and that more serious reactions could occur with continuing exposure .

WHO IS AT RISK?

Workers with ongoing latex exposure are at risk for developing latex allergy. Such workers include health care workers (physicians, nurses, aides, dentists, dental hygienists, operating room employees, laboratory technicians, and hospital housekeeping personnel) who frequently use latex gloves and other latex-containing medical supplies. Workers who use latex gloves less frequently (law enforcement personnel, ambulance attendants, funeral-home workers, fire fighters, painters, gardeners, food service workers, and housekeeping personnel) may also

develop latex allergy. Workers in factories where latex products are manufactured or used can also be affected.

Atopic individuals (persons with a tendency to have multiple allergic conditions) are at increased risk for developing latex allergy. Latex allergy is also associated with allergies to certain foods especially avocado, potato, banana, tomato, chestnuts, kiwi fruit, and papaya. People with spina bifida are also at increased risk for latex allergy.

DIAGNOSING LATEX ALLERGY

Latex allergy should be suspected in anyone who develops certain symptoms after latex exposure, including nasal, eye, or sinus irritation; hives; shortness of breath; coughing; wheezing; or unexplained shock. Any exposed worker who experiences these symptoms should be evaluated by a physician, since further exposure could result in a serious allergic reaction. A diagnosis is made by using the results of a medical history, physical examination, and tests.

Taking a complete medical history is the first step in diagnosing latex allergy. In addition, blood tests approved by the Food and Drug Administration (FDA) are available to detect latex antibodies. Other diagnostic tools include a standardized glove-use test or skin tests that involve scratching or pricking the skin through a drop of liquid containing latex proteins. A positive reaction is shown by itching, swelling or redness at the test site. However, no FDA-approved materials are yet available to use in skin testing for latex allergy. Skin testing and glove-use tests should be performed only at medical centers with staff who are experienced and equipped to handle severe reactions.

Testing is also available to diagnose allergic contact dermatitis. In this FDA-approved test, a special patch containing latex additives is applied to the skin and checked over several days. A positive reaction is shown by itching, redness, swelling, or blistering where the patch covered the skin.

Occasionally, tests may fail to confirm a worker who has a true allergy to latex, or tests may suggest latex allergy in a worker with no clinical symptoms. Therefore, test results must be evaluated by a knowledgeable physician.

TREATING LATEX ALLERGY

Once a worker becomes allergic to latex, special precautions are needed to prevent exposures during work as well as during medical or dental care. Certain medications may reduce the allergy symptoms, but complete latex avoidance (though quite difficult) is the most effective approach. Many facilities maintain latex-safe areas for affected patients and workers.

HOW COMMON IS LATEX ALLERGY?

The prevalence of latex allergy has been studied by several methods:

- Questionnaires to assess reactions to latex gloves

- Medical histories of reactions to latex-containing products
- Skin tests
- Tests for latex antibodies in a worker's blood

Reports about the prevalence of latex allergy vary greatly. This variation is probably due to different levels of exposure and methods for estimating latex sensitization or allergy. Recent reports in the scientific literature indicate that from about 1% to 6% of the general population and about 8% to 12% of regularly exposed health care workers are sensitized to latex. Among sensitized workers, a variable proportion have symptoms or signs of latex allergy. For example, one study of exposed hospital workers found that 54% of those sensitized had latex asthma, with an overall prevalence of latex asthma of 2.5%. Prevalence rates up to 11% are reported for non-health care workers exposed to latex at work.

Several reasons may exist for the large numbers of latex allergies recently reported in workers

1. Workers rely increasingly on latex gloves to prevent the transmission of human immunodeficiency virus (HIV), hepatitis B virus, and other infectious agents as outlined in *Recommendations for Prevention of HIV Transmission in Health-Care Settings* [CDC 1987] and in *Guidelines for Prevention of Transmission of Human Immunodeficiency Virus and Hepatitis B Virus to Health-Care and Public-Safety Workers* [CDC 1989].
2. Since 1992, the Occupational Safety and Health Administration (OSHA) has required employers to provide gloves and other protective measures for their employees [29 CFR*1910.1030, Bloodborne pathogens].

*Code of Federal Regulations. See CFR in references.

3. Some manufacturers may have produced more allergenic gloves because of changes in raw materials, processing, or manufacturing procedures to meet the increased demand for latex gloves. These production changes may account partly for the varied concentrations of extractable latex proteins reported for latex gloves (up to a 3,000-fold difference in gloves from various manufacturers). Variations may also exist between lots produced by the same manufacturer.
4. Physicians are more familiar with latex allergy and have improved methods for diagnosing it.

CASE REPORTS

The following case reports briefly describe the experiences of six workers who developed latex allergy after occupational exposures. These cases are not representative of all reactions to latex but are examples of the most serious types of reactions. They illustrate what has occurred in some individuals.

Case No. 1

A laboratory technician developed asthma symptoms after wearing latex gloves while performing blood tests. Initially, the symptoms occurred only on contact with the gloves; but later, symptoms occurred when the technician was exposed only to latex particles in the air.

Case No. 2

A 33-year-old woman sought medical treatment for occupational asthma after 6 months of periodic cough, shortness of breath, chest tightness, and occasional wheezing. She had worked for 7 years as an inspector at a medical supply company, where her job included inflating latex gloves coated with cornstarch. Her symptoms began within 10 minutes of starting work and worsened later in the day (90 minutes after leaving work). Symptoms disappeared completely while she was on a 12-day vacation, but they returned on her first day back at work.

Case No. 3

A nurse developed hives in 1987, nasal congestion in 1989, and asthma in 1992. Eventually she developed severe respiratory symptoms in the health care environment even when she had no direct contact with latex. The nurse was forced to leave her occupation because of these health effects.

Case No. 4

A midwife initially suffered hives, nasal congestion, and conjunctivitis. Within a year, she developed asthma, and 2 years later she went into shock after a routine gynecological examination during which latex gloves were used. The midwife also suffered respiratory distress in latex-containing environments when she had no direct contact with latex products. She was unable to continue working.

Case No. 5

A physician with a history of seasonal allergies, runny nose, and eczema on his hands suffered severe runny nose, shortness of breath, and collapse minutes after putting on a pair of latex gloves. He was successfully resuscitated by a cardiac arrest team.

Case No. 6

An intensive care nurse with a history of runny nose, itchy eyes, asthma, eczema, and contact dermatitis experienced four severe allergic reactions to latex. The first reaction began with asthma severe enough to require treatment in an emergency room. The second and third reactions were similar to the first. The fourth and most severe reaction occurred when she put on latex gloves at work. She went into severe shock and was successfully treated in an emergency room..

CONCLUSIONS

Latex allergy in the workplace can result in potentially serious health problems for workers, who are often unaware of the risk of latex exposure. Such health problems can be minimized or prevented by following the recommendations outlined in this Alert.

RECOMMENDATIONS

The following recommendations for preventing latex allergy in the workplace are based on current knowledge and a common-sense approach to minimizing latex-related health problems. Evolving manufacturing technology and improvements in measurement methods may lead to changes in these recommendations in the future. For now, adoption of the recommendations wherever feasible will contribute to the reduction of exposure and risk for the development of latex allergy.

Employers

Latex allergy can be prevented only if employers adopt policies to protect workers from undue latex exposures. NIOSH recommends that employers take the following steps to protect workers from latex exposure and allergy in the workplace:

1. Provide workers with nonlatex gloves to use when there is little potential for contact with infectious materials (for example, in the food service industry).
2. Appropriate barrier protection is necessary when handling infectious materials [CDC 1987]. If latex gloves are chosen, provide reduced protein, powder-free gloves to protect workers from infectious materials.

The goal of this recommendation is to reduce exposure to allergy-causing proteins (antigens). Until well accepted standardized tests are available, total protein serves as a useful indicator of the exposure of concern.

3. Ensure that workers use good housekeeping practices to remove latex-containing dust from the workplace:
 - Identify areas contaminated with latex dust for frequent cleaning (upholstery, carpets, ventilation ducts, and plenums).
 - Make sure that workers change ventilation filters and vacuum bags frequently in latex-contaminated areas.
4. Provide workers with education programs and training materials about latex allergy.
5. Periodically screen high-risk workers for latex allergy symptoms. Detecting symptoms early and removing symptomatic workers from latex exposure are essential for preventing long-term health effects.

6. Evaluate current prevention strategies whenever a worker is diagnosed with latex allergy.

Workers

Workers should take the following steps to protect themselves from latex exposure and allergy in the workplace:

1. Use *nonlatex* gloves for activities that are not likely to involve contact with infectious materials (food preparation, routine housekeeping, maintenance, etc.).

2. Appropriate barrier protection is necessary when handling infectious materials [CDC 1987]. If you choose latex gloves, use powder-free gloves with reduced protein content:

- Such gloves reduce exposures to latex protein and thus reduce the risk of latex allergy (though symptoms may still occur in some workers).
- So-called hypoallergenic latex gloves do not reduce the risk of latex allergy. However, they may reduce reactions to chemical additives in the latex (allergic contact dermatitis).

3. Use appropriate work practices to reduce the chance of reactions to latex:

- When wearing latex gloves, do not use oil-based hand creams or lotions (which can cause glove deterioration) unless they have been shown to reduce latex-related problems and maintain glove barrier protection.
- After removing latex gloves, wash hands with a mild soap and dry thoroughly.
- Use good housekeeping practices to remove latex-containing dust from the workplace:
 - Frequently clean areas contaminated with latex dust (upholstery, carpets, ventilation ducts, and plenums).
 - Frequently change ventilation filters and vacuum bags used in latex-contaminated areas.

4. Take advantage of all latex allergy education and training provided by your employer:

- Become familiar with procedures for preventing latex allergy.
- Learn to recognize the symptoms of latex allergy: skin rashes; hives; flushing; itching; nasal, eye, or sinus symptoms; asthma; and shock.

5. If you develop symptoms of latex allergy, avoid direct contact with latex gloves and other latex-containing products until you can see a physician experienced in treating latex allergy.

6. If you have latex allergy, consult your physician regarding the following precautions:

- Avoid contact with latex gloves and other latex-containing products.

- Avoid areas where you might inhale the powder from latex gloves worn by other workers.
- Tell your employer and your health care providers (physicians, nurses, dentists, etc.) that you have latex allergy.
- Wear a medical alert bracelet.

7. Carefully follow your physician's instructions for dealing with allergic reactions to latex.

ADDITIONAL INFORMATION

For additional information about latex allergy, call 1-800-35-NIOSH (1-800-356-4674); or visit the NIOSH Home Page on the World Wide Web at <http://www.cdc.gov/niosh/homepage.html>

You may access the following latex allergy website directly or by selecting *Latex Allergy* through the NIOSH Home Page:

- http://www.familyvillage.wisc.edu/lib_latx.htm

Examination

Select the *best* answer to each of the following items. Mark your responses on the Answer Form.

1. Natural rubber latex (NRL) products, particularly gloves, in the workplace setting have been the source of many allergic reactions. Natural rubber is utilized in a variety of products including gloves, _____.

- a. airway masks
- b. medication vial tops
- c. anesthesia bags
- d. All of the above

2. Rarely, these allergies can be fatal. In addition to reports from the dermatology, allergy, and pulmonary literature of severe skin and respiratory symptoms, life-threatening reactions to NRL products have been noted in pediatric patients with _____ who had undergone numerous surgical procedures, resulting in repeated NRL exposure.

- a. asthma
- b. low birth weight
- c. spina bifida
- d. All of the above

3. NRL is manufactured from a variety of plants, but mainly the _____, **Hevea brasiliensis**.

- a. hibiscus tree
- b. rubber tree
- c. olive tree
- d. cacao plant

4. NRL contains many proteins. A number of these proteins, such as, _____ which may initiate allergic reaction to NRL

- a. hevamine
- b. hevein
- c. rubber elongation factor (REF)
- d. All of the above

5. NRL protein absorption has been reported to be enhanced when _____ collects under latex clothing articles.

- a. hair follicles
- b. powder
- c. perspiration
- d. All of the above

6. Prevalence studies indicate that from around of the exposed health care workforce is allergic to NRL.

- a. 2% to 10%
- b. 6% to 17%
- c. 15% to 30%
- d. 28% to 46%

7. When gloves are associated with _____, the most common reaction is irritant contact dermatitis.

- a. severe itching
- b. sweat glands
- c. skin lesions
- d. powder burns

8. When glove use has been associated with this reaction, it appears to be due to the _____ NRL or other glove materials.

- a. chemicals used in processing
- b. powders
- c. irritants
- d. None of the above

9. The potentially most serious type of reaction sometimes associated with glove use is a true _____ allergy (also called immediate or type I hypersensitivity) to glove protein [in the case of NRL allergy, to NRL protein(s)]. This type of reaction can involve local or systemic symptoms.

- a. genetic-based
- b. IgE/histamine-mediated
- c. protein-mediated
- d. None of the above

10. General administrative procedures that an institution can follow to reduce worker exposure to NRL proteins include:

- a. If selecting NRL gloves for worker use, designating NRL as a choice only in those situations requiring protection from infectious agents
- b. When selecting NRL gloves, choosing those that have lower protein content. Selecting powder free gloves offers the additional benefit of reducing systemic allergic responses; and
- c. Providing alternative suitable non-NRL gloves as choices for worker use (and as required by OSHA's bloodborne pathogens standard for workers who are allergic to NRL gloves).
- d. All of the above

11. When gloves are associated with skin lesions, the most common reaction is irritant contact dermatitis.

- a. True
- b. False

12. The allergic contact dermatitis has an appearance similar to the typical poison ivy reaction, with blistering, itching, crusting, oozing lesions.

- a. True
- b. False

13. Use of powder free gloves has been shown to reduce the dissemination of NRL proteins into the environment and decrease the likelihood of reactions by both the inhalation and dermal routes

- a. True
- b. False

14. It is not possible, at present, to determine which workers will become allergic to NRL proteins, the extent of an individual worker's reaction, or the length of time required for such allergic reactions to develop.

- a. True
- b. False

15. Latex allergy should be suspected in anyone who develops certain symptoms after latex exposure, including nasal, eye, or sinus irritation; hives; shortness of breath; coughing; wheezing; or unexplained shock.

- a. True
- b. False

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