



[Home »](#)

## Latex Allergy Diagnosis and Management

Updated: September 2016

Originally Posted: July 2004

Updated by:

Sandra M. Gawchik, DO

Asthma & Allergy Associates

West Chester, Pennsylvania, USA



Original Author: Professor Connie Katelaris, MD, PhD  
Clinical Associate Professor, Dept. of Clinical Immunology and Allergy  
Westmead Medical Centre  
Westmead, Australia

Select One ▼

### INTRODUCTION

Allergy to natural rubber latex is an important clinical condition that occurred after the institution of universal precautions. There was a rapid rise in the production of latex gloves with the institution of universal precautions meet the needs of health care workers. This resulted in an epidemic of latex allergy in health care workers in both medical and dental environments as well as individuals with specific health problems such as spina bifida, myelodysplasia, urogenital abnormalities, multiple surgical interventions, and food allergies (bananas, kiwi, avocado, and chestnuts).

Allergies to natural latex gloves were identified as a serious health care problem in the late 1980s and 1990s. It is estimated that there are currently greater than 13 million people worldwide with over 1.5 million residing in the United States who have latex allergy. Over the past decade, the incidence has decreased due to the recommendation of avoiding powder latex gloves. However, the problem still has not gone away and remains high in third world countries where powder latex gloves continue to be used as they are cheaper than the non-latex alternatives.

Ninety-nine percent of all commercial latex (NRL) comes from commercially grown *Hevea brasiliensis* in a number of tropical countries including Malaysia, Thailand, and India. Smaller plants are located in Central and South America. The rubber tree is one of the 2000 lactiferous plants that are unique in its ability to secrete a milky sap that can produce forms of latex. NRL contains highly cross-linked polymers with the structure of cis-1, 4 polyisoprene. In addition, the cytoplasm contains a variety of enzymes and structural proteins that are involved in biosynthesis of polyisoprene, coagulation of latex and plant defense against microbes. A number of these proteins are potent allergens. Harvested latex is treated with ammonia. The elasticity and strength of latex is due to the added chemicals phenylenediamine, thiuram, and carbamates.

## **HEVEA LATEX ALLERGENS**

Approximately 250 different latex polypeptides have been identified of which 60 have been able to bind to human Ig E. Only 15 of the **Hevea**-allergens have been given official numbers. The most highly sensitizing of the allergens are Hev b 1.2, 3, 4, 5, 6.02, 7.01, and 13. Hev b 1 (rubber elongation factor) and Hev b 3 (phenyltransferase) require direct mucosal contact as during surgery for sensitization. Hev b 5 acidic protein and Hev b 6.01/6.02 are the major allergens involved in sensitizing health care workers. These proteins are released from dipped products primarily latex gloves that have been coated with powder. Donning and removing the gloves aerosolizes the powder to which the latex is adherent into the environment. In occupations requiring protective gloves sensitization occurs through contact and inhalation.

## **PREVALENCE**

In the 1990s the incidence of sensitization was 3-9.6% in the general population. In countries where avoidance of latex is practiced sensitization has decreased to <1%. However, latex allergy has continued as a result of inadvertent exposure to latex from less obvious sources, e.g., balloons and hair extensions. In third world as well as Asian countries, latex continues to be used and sensitization is a problem for both health care workers and patients.

## **RISK FACTORS**

The main risk factors are occupational exposure and atopy. Individuals allergic to other allergens, e.g., fruits, or vegetables, or with eczema have a higher rate of latex allergy.

## **OCCUPATIONS WHERE LATEX GLOVES ARE USED**

- Physicians and other health care professionals
- Food handlers/restaurant workers
- Domestic workers
- Hairdressers
- Rubber industry workers
- Security personnel
- Condom users
- Atopic individuals
- Construction workers
- Painter
- Funeral home workers
- Police officer, firefighters
- Ambulance attendants
- Florist

## **MEDICAL CONDITIONS ASSOCIATED WITH INCREASED LATEX SENSITIZATION**

- Spina Bifida
- Urogenital abnormalities
- Imperforate anus
- Tracheo-esophageal fistula
- Multiple congenital anomalies
- Ventriculo-peritoneal shunt
- Cerebral palsy
- Quadriplegia
- Pre-term infants

## **DEVELOPMENT OF LATEX PROTEIN ALLERGENS**

Latex proteins can sensitize in the following manner:

- Inhalation of latex adherent to powder particles as gloves are donned and removed.
- Absorption through the skin when the barrier integrity is disrupted by trauma, irritation, contact dermatitis or eczema.
- Absorption through mucous membranes when latex protein becomes solubilized by body secretions with condoms, internal exams or intraoperative or dental procedures with latex gloves.
- Direct entry into the body when latex protein is present in intravenous injection ports, surgical procedures or when latex gloves are used by a health care professional

## **ALLERGIC AND NONALLERGIC HYPERSENSITIVITY REACTIONS TO LATEX**

- Irritant Contact Dermatitis
- Allergic Contact Dermatitis
- Rhinitis, Conjunctivitis, and Asthma
- Anaphylaxis

### **IRRITANT CONTACT DERMATITIS**

Irritant dermatitis is a non-allergic reaction to latex gloves. It is a non-IgE mediated reaction due to heat and friction under the gloves. A direct injury to epidermal cells or destruction or removal of the protective intracellular lipids occurs. Symptoms develop within minutes to hours of putting on the gloves and are due to repeated hand washing, use of detergents and sanitizers that are improperly rinsed off or due to cornstarch powder inside the gloves. Synthetic, as well as latex gloves, can cause this irritation. If exposure continues, the skin becomes thickened and dry. Symptoms are confined to the gloved area. Cotton-liner gloves may help to prevent this problem as well as appropriate washing rinsing and drying of the hands.

### **ALLERGIC CONTACT URTICARIA**

60-80% of health care workers who are allergic to latex report contact urticaria. This is the most common early manifestation of latex allergy. Symptoms occur within 10-15 minutes after gloves are donned. Sites remote to the hand that have been touched by the hand that has been in contact with the latex protein can develop urticaria. It is a type I immune-mediated reaction caused by NRL. These symptoms can predate more serious reactions.

### **RHINITIS CONJUNCTIVITIS AND ASTHMA**

Rhinitis, conjunctivitis, and asthma can occur in latex sensitive individuals on exposure to aerosolized latex protein adherent to cornstarch powder when gloves are re-donned and removed. Symptoms such as ocular tearing and itching, nasal congestion, itching, sneezing and rhinorrhea may frequently be confused with seasonal pollen

allergies. It becomes important to correlate these to latex aeroallergen exposure. Asthma can occur as an isolated exposure to latex in patients not previously diagnosed with asthma.

These individuals will experience chest tightness, wheeze, shortness of breath, dyspnea and or cough. They should be removed from the work environment unless exposure can be eliminated.

## **ANAPHYLAXIS**

This most serious type 1 IgE-mediated reaction can occur in both medical and non- medical settings. This life-threatening allergic reaction can occur intraoperatively during surgical, obstetrical, gynecologic, dental and other medical procedures. In addition, exposure to toy balloons, condoms, diaphragms, rubber handled sports equipment, pacifiers, and hair extensions can precipitate an anaphylactic reaction.

## **DIAGNOSIS**

### **Diagnosing latex allergy can be challenging.**

The most important part of the evaluation is the history and the temporal relationship of clinical symptoms on exposure to latex. This holds true throughout the world. One questionnaire regarding latex allergy, for example, available from the American Latex Allergy Association and this form is helpful in evaluating patients. In the United States, there are no FDA extracts available for latex skin testing but in vitro testing is available. Thus in the United States, the first step in the evaluation of latex allergy is the clinical history followed by in vitro immunological tests if the history is supportive of an IgE mediated reaction.

## **TESTING PROCEDURES**

Latex skin testing materials are available from three commercial sources in Canada and Europe. When skin test materials are standardized in terms of their allergen content and stability they are a safe and effective diagnostic procedure and is the testing method of choice when available. Skin prick or puncture test are done first. At times when the skin testing is inconsistent with the history, IgE antibody serology testing may also be needed. Provocation testing is not recommended due to the inherent risk.

### **Skin Testing**

In Europe and Canada, the three commercially available glycerinated *H.brasiliensis* extracts are prepared from Hevea B and C serum proteins from sterile ammoniated or non-ammoniated latex. The non-ammoniated C serum extract is felt to be comprehensive in its allergen composition.

### **Serological testing**

The two serological tests that are currently available throughout the world are the ThermoFisher Scientific/Phadia ImmunoCAP and the Siemens Immulonite assay. Currently, an ImmunoCAP ISAC that contains recombinant Hev1, 3, 5, 6, and 8 is under investigation. The strength of this test is in identifying sensitized but asymptomatic individuals with cross-reactive latex profilin (Hev b 8). In the United States, the serological testing is used as the choice method to confirm the clinical history as skin testing materials are not commercially available.

Patients with a clinical history of latex allergy can have negative results on skin testing and serological testing. This can be due to an inadequate number or quality of testing materials. Therefore clinical judgment is an important component in the diagnosis.

## **CROSS -REACTIVITY OF LATEX ALLERGENS**

Approximately 30-50% of individuals have the latex allergy syndrome reacting to a number of fruits and vegetables. This is referred to as the oral allergy syndrome. The foods that contain cross-reactive allergens are banana, kiwi, avocado, chestnut white potato and tomato. The major pan-allergen involved in the reaction is a

class I chitinase a plant defense protein. A patient who demonstrates a reaction to one of these foods should be screened for risk for latex allergy.

## **MANAGEMENT**

There are four major approaches to treating and managing latex allergy.

- Avoidance
- Pharmacotherapy
- Immunotherapy
- Anti-IgE Therapy

The most cost effective treatment is avoidance. Pharmacotherapy is not helpful in pretreating to prevent reactions. Immunotherapy has not proven to be effective as there is a high rate of serious allergic reactions. Anti-IgE therapy is under investigation but is currently off-label and costly.

## **Potential Sources of Latex**

### **Home Environment**

- Balloons
- Condoms, diaphragms
- Baby bath toys
- Pacifiers, baby bottle nipples, teething rings
- Spandex (can be contaminated with latex)
- Erasers
- Racquet handles and grips
- Rubber bands
- Rubber Shoes
- Rubber cement
- Foam pillows and mattresses
- Rubber boots and shoes
- Sports shoes
- Thong sandals
- Household rubber gloves

### **Medical Setting**

- Gloves
- Blood Pressure cuffs
- Tourniquets
- Catheters
- Equipment previously handled with latex
- Oral and nasal airways
- Face masks and straps
- Oxygen Masks
- Latex sealed medication vials
- Rubber in syringe stoppers

- Stethoscope tubing
- Electrode pads
- Bandages
- Injection ports

### **Dental offices**

- Guetta Balota
- Dental dams
- Orthodontic Rubber bands
- Adhesives and dressing

### **INDIVIDUAL MANAGEMENT**

The individual who is latex allergic should inform all of his medical professionals, including general physicians, surgeons, gynecologist, dentist, employers, co-workers, and family members and friends of this medical problem. The following should be done:

1. A medical alert bracelet indicating the words “latex allergy” should be worn
2. Self -injectable epinephrine should be carried by individuals with systemic reactions
3. Non latex gloves should be carried
4. The patient should request a latex safe environment for medical, surgical, gynecological and dental procedures.

### **INSTITUTIONAL AVOIDANCE**

A completely latex free environment is not achievable. However, a latex safe environment can be established in institutions for the latex allergic individual. This can be achieved through education of personnel and by establishing a latex committee and protocols in the medical setting to provide a latex-safe environment. The protocols should be reviewed and updated at appropriate intervals.

### **Latex Allergy Questionnaire**

### **REFERENCES**

The following references are provided for additional information

Gatchis, Sandra Latex Allergy Mount Sinai Journal of Medicine 78:759-772, 2011

Sussman,G ,Gold,M Guidelines for the Management of latex allergies and safe latex use in health care facilities Am College of Allergy Asthma and Immunology 1996.

[www.acaai.org/public/physicians/latexhtm](http://www.acaai.org/public/physicians/latexhtm)

American Latex Allergy Association [www.allergyresources.org](http://www.allergyresources.org)



This site complies with the HONcode standard for trustworthy health informa