

The Latex Allergy and Associated Reactions



Background

Latex exposure continues to be an occupational concern as more people report allergic reactions due to contact with latex products. In the United States of America it is estimated between 2 to 6 percent of the population and 10 to 17 percent of health care workers (up to 20% in one South African hospital) have established latex sensitivity. Greater than 2 percent of health workers have occupational asthma as a result of latex exposure. Allergic reactions may occur in both the users of latex products and third parties exposed to latex use.

Latex (or natural rubber) is the milky sap obtained by tapping the rubber tree (*Hevea brasiliensis*). The raw material is mixed with a preservative (e.g. ammonia) then concentrated and shipped as a latex concentrate. The fluid contains variable amounts of proteins that can be absorbed through the skin or inhaled and can cause allergic reactions in susceptible workers. More than 50 different proteins have been implicated in the allergic response (up to 240 different proteins are found in latex).

During manufacturing, chemicals are added to render latex elastic and stable to heat by vulcanisation (heating in the presence of sulfur). Further chemicals are added for strength and durability, including mercaptobenzothiazole, thiurams and carbamates. After the addition of preservatives and stabilisers, the solution is placed in a mould, heated and dried.

Sometimes a dry powder lubricant (usually corn-starch) is added to the surface of the latex to prevent the rubber surfaces from sticking together and to assist in making the product feel 'smooth' to the user. Allergic reactions can occur to latex protein as well as the chemicals added to it, but *not* to cornstarch (which is not known to be an allergen). However, when gloves are worn, latex proteins can be leached from the glove and stick to the cornstarch particles. When gloves are changed, these particles can become airborne and spread latex allergen into the local environment.

Latex continues to be a hazard in many workplaces and needs to be carefully considered during risk management.



Workplace Hazards

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The Risk Groups

The following industries may be more likely to be impacted: health care; emergency services; veterinary care; hospitality; food handlers; sanitation and cleaning; funeral; law enforcement; sex; body piercing, beauty and hairdressing; latex manufacturing; and latex toy manufacturing. However, third parties to these industries (e.g. patients and customers) and other roles utilising latex gloves (e.g. employees utilising latex gloves in first aid kits or when cleaning) may also be impacted.

Sources of Exposure

People who are sensitive to latex may have an allergic reaction if they come into contact with latex products, such as: medical gloves; surgical masks; goggles; rubber aprons; respirators; elastic bandages; adhesive tape, balloons, industrial gloves; dishwashing gloves; baby bottle teats; baby dummies; rubber bands; erasers; dental bite blocks; dental dams; clothing elastic; rubber toys; mouse pads; hoses; rubber grips, shoes, boots and a wide range of medical equipment. Allergic reactions usually occur after exposure to dipped products like gloves, balloons and condoms.

Synthetic rubber is produced from petrochemicals and does not contain allergenic latex proteins. Products containing synthetic rubber (like most latex paints and shoe soles) do not cause allergic reactions.

Gloves made from nitrile, a favoured substitute to latex gloves, are produced with the same accelerator mercaptobenzothiazole, as some latex gloves. (Persons with suspected irritant or allergic contact dermatitis to latex gloves may also react to nitrile).

Many fruits and foods have similar proteins to latex and can also cause allergic reactions. These foods include banana, avocado, chestnut, passionfruit, kiwi fruit, potatoes, tomatoes, strawberries, figs, apples, celery, melons, pineapples, milk, papaya, grapes and pitted fruit (cherries and peaches).

Exposure Routes

There are various routes of exposure to latex:

- **Skin**

Skin exposure can occur when handling latex products. Examples include: handling and exposure to medical devices such as medical gloves, tourniquets and electrocardiogram electrodes, adhesive tapes, condom catheters and ileostomy bags; Hairdressers using latex gloves while applying hair colouring; Technicians wearing gloves while cleaning joints; Food handlers wearing latex gloves or customers eating food prepared with latex gloves.

- **Mucous membranes**

Latex proteins contacting mucous membranes of the mouth, vagina, urethra or rectum may result in severe reactions. Contact may occur during physical examinations; touching the mouth with unwashed hands after wearing latex gloves; or eating food prepared with latex gloves.

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- **Inhalation**

Cornstarch powder is applied to latex gloves during the manufacturing process to give the gloves a smooth feel and make them non-sticky. The latex protein can adhere to the surface of the cornstarch particles. When the person removes the glove, the cornstarch powder is easily aerosolized and can cause asthmatic reactions if inhaled.

- **Intravascular**

Exposure through intravascular administration of latex proteins can result from disposable syringe plungers, medications stored in vials with rubber stoppers and intravenous tubing with latex injection ports.

Types of reactions

There are three main types of latex sensitivity reactions:

1. Immediate hypersensitivity or Type 1-IgE mediated reaction

Immediate allergic reactions (also known as Type 1 or IgE antibody mediated) are the least common but the most serious adverse reactions (may lead to death) to latex. These reactions are considered 'true' latex allergies.

The reactions may occur within minutes but rarely lasts longer than 2 hours. It can have a sudden onset although the sufferer may have been using latex for years without problems.

In people who have developed sensitivity to natural latex proteins, contact with latex releases the histamine into the tissues.

The result is itching, redness and hives (urticaria) with direct contact (e.g. after wearing rubber gloves) or itchy swollen lips, face or tongue (e.g. after blowing up balloons). Some people will develop irritation after wearing a condom, inserting a diaphragm for contraceptive purposes or after visiting the dentist or hairdresser and coming into contact with latex.

Reactions can also occur when latex is inhaled, resulting in allergic rhinitis (hay fever) or asthma like symptoms (more common in hospitals). Latex proteins can leach out of the gloves with sweaty hands and attach to the powdered lubricant. Where gloves are being changed frequently, latex on these fine particles can become suspended in the air (similar to pollen).

Anaphylaxis is the most dangerous allergic reaction to latex and typically occurs in very sensitive patients where the latex protein is absorbed rapidly by moist surfaces (e.g. mouth, nose, throat, vagina or rectum) or internally (e.g. during a surgical operation). Severe difficulty in breathing, a drop in blood pressure and anaphylactic shock may occur.

2. Allergic Contact Dermatitis or Type 4 (Delayed hypersensitivity)

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Allergic Contact Dermatitis (sometimes called type IV or delayed hypersensitivity Reaction; T-cell mediated reaction; rubber allergy; or chemical sensitivity dermatitis) is the most common immune reaction to latex. The symptoms look similar to irritant dermatitis symptoms, but the cause is different. The rash is rough, dry and scaly, sometimes with weeping sores. It typically occurs 6-48 hours after contact with latex rubber.

Contact Allergic Dermatitis is usually due to an inflammatory reaction to the chemicals (including thiurams and carbamates) added to rubber during manufacture; although there is now evidence that delayed contact dermatitis may also result from contact with latex protein as well.

Contact Allergic Dermatitis is annoying but is generally not considered dangerous. As with irritant dermatitis, treatment is recommended to reduce the risk of developing more serious immediate allergic reactions to latex.

3. Irritant Contact Dermatitis

The most common adverse reaction to latex is Irritant Contact Dermatitis. The reaction (a skin rash; generally rough, dry and scaly skin; and may include weeping sores) is not an immediate (true) allergic reaction and does not involve the immune system.

Irritant Contact Dermatitis has a gradual onset, sometimes taking a number of days. The reaction is most often caused by the accelerators and chemicals used in the latex glove manufacturing.

Irritant Contact Dermatitis may be caused by moisture accumulation from incomplete hand drying and sweating during prolonged glove use; detergents, soaps and antiseptics which are not completely rinsed off the skin after hand washing and which become trapped under the glove; skin irritation from the cornstarch which is present in powdered gloves; or incorrect selection of latex gloves for use with chemicals that can permeate through the glove material.

Even though irritant dermatitis is not an allergic reaction and is reversible, the absorption of latex through damaged skin may increase the risk of developing a true latex allergy with ongoing exposure.

Managing the Risk

Prevention and Minimisation

Employers should undertake a risk management process to determine the most appropriate way to prevent or minimise the latex allergy and associated reactions in the workplace.

Some ways by which this could be achieved include:

(1) Elimination

- Remove latex products from the workplace.
- Stopping the use of latex gloves for tasks that do not involve an infection risk for example catering, maintenance and routine housekeeping.

(2) Substitution

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- Replace powdered latex gloves with powder-free latex gloves, as these significantly increase the risk of latex allergy.
- Replace oil-based hand care products with water-based products, as oil-based products can cause latex deterioration and leaching of latex proteins.

(3) Engineering

- Redesign tasks so that latex gloves are not required to be worn for prolonged periods.
- Position hand washing amenities close to where latex gloves to enable prompt hand hygiene after glove removal.
- Wear large sized gloves to increase air circulation between the glove and skin.

(4) Administration

- Develop and implement latex policy and procedures: aim to reduce the risk of latex allergy occurring in the workplace, as well as provide a safe workplace for sensitised individuals.
- In healthcare settings, identify all patients who have a latex sensitivity and ensure that they can be treated in a latex-safe environment with access to latex-free emergency equipment.
- Identify all products at the workplace which contain latex.
- When choosing gloves as barriers against chemicals, check the Material Safety Data Sheet (MSDS) for the substance and use chemical compatibility charts available from glove suppliers.
- Provide instruction and training to workers, including information about: the latex allergy and how to protect against it; what procedures require latex products; what products contain latex; importance of avoiding the use of lotions or cream barriers under latex gloves; hand washing and skin care; recognizing and reporting signs and symptoms of latex allergy; and the importance of communicating co-workers if a latex allergy is suspected.
- Actively monitor the health of employees how are required to utilize latex products.

(5) PPE

- Prevent sweat contributing to latex allergies by provide cotton or nylon glove liners to wear under the latex glove. The finger tips of the glove liners may be removed where greater dexterity is required. Gloves liners should be washed in a mild detergent after use and rinsed well to prevent residual detergent accumulating under the glove.

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