



Allergic reactions to glove materials

Gloves are common in research laboratories. The selection of the glove material and type of glove is generally depended on the intended control of a hazard. For a small percentage of researchers, exposure to certain glove materials can itself pose a hazard. The use of gloves can cause irritant contact dermatitis - a non-allergic reaction. Irritant contact dermatitis is a non-immune reaction affecting the skin, and should not be confused with an allergy.

Exposure to glove materials can also cause an immune reaction - an allergic reaction. Allergic reactions can be triggered by exposure to natural rubber latex proteins and/or synthetic chemicals in the glove material.

Latex allergy is an IgE-mediated, immediate-type hypersensitivity reaction to one or more proteins present in natural rubber latex. The immune response is activated whenever the body comes into contact with an antigen, which is most commonly a protein. Latex products can cause Type I allergy as well as Type IV allergy.

Type I allergy to latex gloves may present as a localized contact urticaria – an allergic reaction of the skin with eruption of smooth, itchy patches, wheals or hives - that can mimic an allergic contact dermatitis. Latex protein can also be inhaled and cause widespread urticaria. The spectrum of clinical signs ranges from contact urticaria, generalized urticaria, allergic rhinitis, allergic conjunctivitis, angioedema, and asthma. In rare cases, in allergic individuals, systemic effects may progress to anaphylactic reactions.

Studies have shown that the chemical accelerators and other additives commonly used in the production of nitrile and latex and non-latex gloves can cause Type IV allergy. The Type IV response begins when the antigens (such as residual chemicals leached from the glove) penetrate the skin, triggering the formation of T cells sensitized to the specific antigens. Patients often present with a chronic dermatitis on their wrists and the back of their hands. Residues from chemical accelerators such as mercaptobenzothiazole and other mercapto compounds, thiuram, thioureas and carbamates in the glove material can trigger such allergic reaction. Currently, carbamates are the most common accelerators used in the manufacturing of latex and nitrile gloves. Thiurams are most commonly regarded as a cause of Type IV delayed contact dermatitis. Thiurams decompose during vulcanisation, liberating the sulfur and carbamates. Thiourea and naphthyl compounds are also rubber accelerators but are less common cause of allergy.

Correctly identifying the underlying mechanism of a glove-related reaction can be difficult because in some individuals' symptoms of both Type IV and Type I allergic reactions may be present. Patients who demonstrate hand dermatitis and use rubber gloves should be evaluated by a dermatologist and patch testing will be performed to determine the cause of the glove dermatitis. Patch testing causes an allergic reaction at the site of chemical application. The chemicals are applied on one day and removed 48 hours later when the skin is examined for possible allergic reactions. The patch test sites on the skin are again checked for a final read at 72 to 96 hours later. All of the rubber accelerators are tested by patch testing. Latex allergies which present as hives are best tested by prick or scratch testing and this is performed by an allergist. Once the offending chemical is identified, the patient will be instructed as to what gloves she can wear.

If natural rubber latex allergy or chemical sensitivity is present, avoidance and substitution is imperative. Most cases of adverse response to glove material can be controlled once the offending irritant or allergen is identified and eliminated. In response to the growing interest in allergic contact dermatitis, several glove manufacturers have introduced accelerator-free products. Some glove brands carry the claim Low Dermatitis Potential, which is regulated by the Food and Drug Administration.

Selected Synthetic Glove Materials and Brands

| Glove Material | Brand Names | Accelerators |
|--|---|--|
| Polyisoprene | Dermapreen, Isotouch (Ansell); Biogel (Biogel / Molnlycke Health Care); Esteem (Cardinal Health); Sensicare (Medline Industries) | Carbamates or Thiurams/Thiazoles |
| Vinyl (polyvinyl chloride) | Duratouch/Trutouch (Ansell, Maxxim), Triflex (Allegiance) | No accelerators, Allergic contact dermatitis has rarely been reported from vinyl glove additives |
| Nitrile (butadiene copolymer) | Safeskin (Safeskin Corp.) ; Sensicare (Maxxim Medical); Tillotson Pure Advantage and Dual Advantage (Tillotson); SmartCare (SmartCare, Inc.) Allegiance Flexam Nitrile Examination Glove (Allegiance); Adenna NPF Nitrile Powder Free Exam Gloves (Adenna Inc.) | Carbamates, thiazoles |
| Nitrile (butadiene copolymer) accelerator free | True Advantage (Tillotson) , N-Dex (Ansell, Best Glove), Aspen2100 (Hourglass Indust.), SemperSure (Sempermed) | No accelerators |
| Neoprene (polychloroprene polymer) | Dermaprene (Ansell); Biogel Neoprene; Duraprene (Allegiance); Neolon (Maxxim) | Thiourea, diphenyl guanidine, carbamates |
| Polyurethane | Sensicare (Maxxim Medical) | No accelerators |

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| Styrene butadiene block polymer | Elastyren (ECI Medical Technologies), Allergard (Allergard) | No accelerators |

The American Latex Allergy Association, the National Institute for Occupational Safety and Health and ORS recommend:

- Latex gloves should be used only as mandated by accepted Universal Precautions standards. The routine use of latex gloves in low risk situations should be discouraged.
- Only low-allergen latex gloves should be purchased and used.
- Only powder-free latex gloves should be purchased and used.
- If you have or suspect allergic reactions to a glove material, consult your physician and notify ORS.

Sources:

Patterson's Allergic Diseases 7th ed, 2009

American Latex Allergy Association, Dermatitis: Is It Irritation Or Allergy?, 2006

Nick Gardner, Accelerator-Free Fact or Fiction, Health and Safety International, Oct. 2008 http://www.hsimagazine.com/article.php?article_id=37

FDA Guidance Document Submissions for Testing for Skin Sensitization To Chemicals In Natural Rubber Products, Jan

1999 <http://www.fda.gov/MedicalDevices/DeviceRegulationandGuidance/GuidanceDocuments/ucm073792.htm>