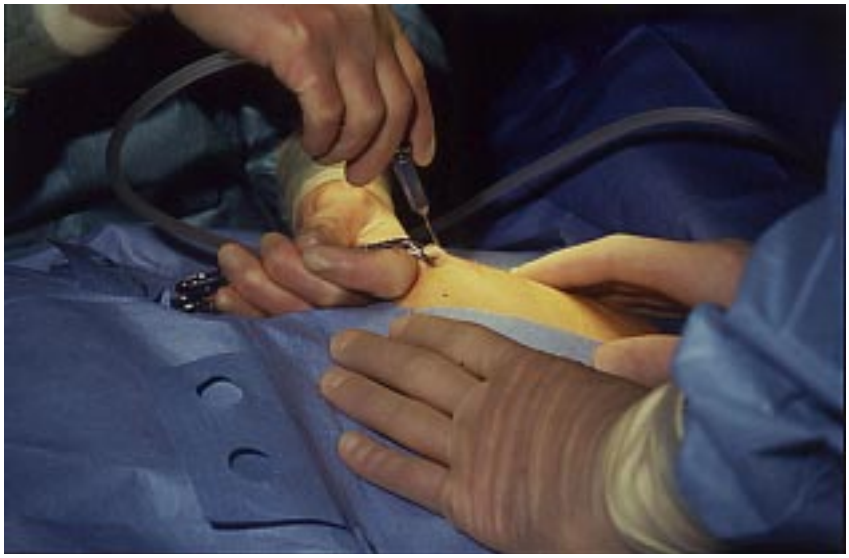
Latex Allergy

Bodil B. Knudsen, MD
Department of Dermatology, Gentofte Hospital, DK-2900 Hellerup, Denmark
BOKN@gentoftehosp.kbhamt.dk.



The dexterity of latex gloves is superior to gloves made from most other materials.

Introduction

The term "Latex allergy " is not well defined. "Latex" usually refers in the medical literature to materials made from natural rubber, although in the chemical literature "latex" is defined as a suspension of polymeric particles. "Latex allergy" usually means allergic reactions related to proteins ("latex proteins") from the rubber tree, *Hevea Brasiliensis* (1), and does not include allergy to rubber chemicals.

Latex proteins are present especially in natural rubber products such as gloves, condoms and balloons, which are made by a dipping process. The raw material used for this process is the sap from the rubber tree ("natural rubber latex") where coagulation has been prevented by adding ammonia. During manufacture, chemicals such as thiurams, carbamates and mercaptobenzothiazoles are added. Surpluses of these chemicals as well as latex proteins are partly removed by water leaching during manufacture. Thin, elastic latex products are finally powdered with cornstarch or surface treated by chlorination or with a polymer, to facilitate donning or prevent sticking (2).

Most other rubber items are manufactured from dry rubber, where the raw coagulated rubber is ground and mixed with chemicals. This process usually reduces considerably the allergenicity caused by latex proteins.

Allergy from rubber products

Rubber chemicals such as thiurams, carbamates, mercaptobenzothiazoles, and various antioxidants are well known contact sensitizers, causing allergic contact dermatitis in sensitized patients. This very important aspect of allergy to rubber is not treated in this paper, which deals only with "latex allergy".

In 1979, Nutter (3) described allergy to latex proteins and specific IgE antibodies were demonstrated (4). Several of the allergens have now been characterized and synthesized. The molecular weight of the allergens ranges from 4.7 kD up to more than 50 kD. No single major allergen has been identified, although Hevein (Hev b6.0, 4.7 kD) in latex gloves appears to be a very important allergen. Other important allergens are Hev b1 (Rubber Elongation factor) and Hev b3 (Spina bifida protein) (5, 6).

Tapping of latex sap from the Hevea Brasiliensis tree.

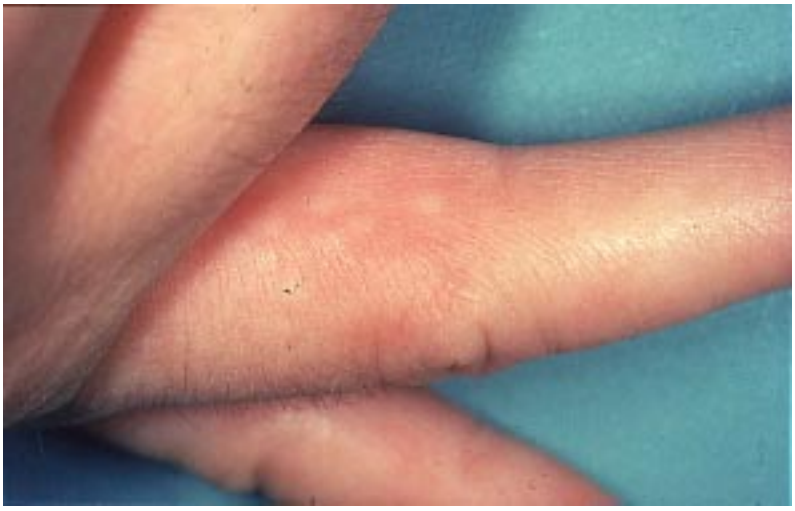
Clinical features

The symptoms attributed to latex allergy are most often a localized contact urticaria following skin contact with rubber (1), but protein contact dermatitis resembling allergic contact dermatitis also seems to be frequent (7, 8) as also are rhino-conjunctivitis and asthma (1). Being an immediate-type allergy, local contact urticaria can proceed in some individuals to generalized symptoms with generalized urticaria, edema, asthma and eventually anaphylaxis. Generalized symptoms are mainly described following contact with mucosal surfaces and during surgical operations (9). Also described are asymptomatic cases, where sensitization is confirmed by a positive prick test, but without overt allergic symptoms from contact with rubber products (10).

The cornstarch powder, often added to the final products, absorbs the latex proteins which then become airborne with powder particles. Such airborne allergens can provoke asthma and allergic rhino-conjunctivitis in sensitized individuals, without direct contact with natural rubber latex products.

Crossreactivity

Crossreactivity to proteins in kiwi fruit, bananas, avocado pear and other fruits is well described and proven by inhibition assays. Other proteins that may be present in a variety of plants, including latex, can cause symptoms. Not all latex-allergic patients with a positive prick test to these fruits develop symptoms when exposed to the fruits (11, 12).



Contact urticaria due to latex gloves.

Frequencies

The frequency of sensitization to latex proteins varies considerably according to the population studied and the test methods used. Most studies find frequencies in the general population of less than 1%, while among health care workers regularly using latex gloves, frequencies ranging from 2.8 to 16.9% have been reported (1). Frequencies up to 73% have been reported among Spina Bifida patients (13). 50-75% of latex-allergic patients are atopics (1). Besides atopics, patients with allergic or irritant hand eczema are at risk (1).

Diagnosis

The consequences of having latex allergy are serious, and this should be reflected in efforts made in the diagnostic procedure for each patient. Concomitant occurrence of immediate-type allergy to latex proteins and contact dermatitis due to rubber chemicals seems to be common (8, 14), and all patients suffering from symptoms related to the wearing of natural rubber latex gloves should always be tested for both type IV and type I allergy.

The strategy for testing has to be adapted to the patient's clinical history. Prick-testing is the cornerstone in the diagnosis but, unfortunately, existing diagnostic reagents are not all standardized and not directly available on the market (1,15). In Denmark, some specialists use reagents from ALK (Hoersholm, Denmark) and/or Stallergènes SA (Fresnes, France). Diluted reagents may be used initially in suspected cases of extreme sensitivity. Extracts of own rubber material (5 wvol% in saline (1)) may be used in individual cases, but extracts from a random latex glove cannot be used for screening, as the antigen level in such a glove may be too low. Unspecific reactions, or reactions due to contamination with housedust mites or other allergens, should be taken into account when extracts of own rubber material is used.

The sensitivity and specificity for measurement of specific IgE when using CAP-RAST (Pharmacia, Uppsala, Sweden) is 80–90% and lower specificity and sensitivity has been reported concerning other test systems measuring specific IgE (1). Thus a negative outcome of a routine test for latex-specific antibodies does not exclude latex allergy.

Where results from skin prick-testing, clinical history and specific IgE are conflicting, skin provocation tests can be carried out as use-tests with the patient's own gloves. Lung provocation tests with non-standardized materials seem to imply a risk of severe allergic reactions (16). The diagnosis should always be based on more than one of the above-mentioned parameters.

Treatment of the sensitized patient

Immunotherapy is not available. Consequent reduction of latex exposure has been shown to be followed by a decrease in specific IgE (17), and elimination of exposure seems to be the only rational therapy.

Individuals diagnosed as latex allergic should avoid all direct contact with products manufactured from natural rubber latex. As alternative materials, all synthetic materials can be used, whether they are called synthetic rubbers or plastic or vinyl. Both occupational and private aspects should be taken into account in the comprehensive instructions given to sensitized patients. Most sensitized individuals are employed in the health care services or other workplaces where such gloves are used regularly, and appropriate substitutes for latex gloves should be suggested. Very frequently, powder-free latex gloves are mistaken for latex-free gloves. Misunderstanding between type-IV allergy to chemicals and latex allergy is common. Patients should be warned of contact with balloons and latex condoms and possibly also natural latex mattresses, but latex on products such as carpets and solid latex products without direct skin contact have generally not been reported as causing symptoms (18). Elastic waist bands in clothing may possibly cause symptoms.

The critical situations seem to occur when latex-sensitized individuals come in contact with medical products when undergoing surgery, dental work, gynaecological examinations, etc., where latex gloves, urinary catheters and other latex products may be used directly on mucosal surfaces or for invasive procedures (9). Many items used in the hospital are made at least partly of natural rubber latex, but items such as plunge stoppers, vials, ports in infusion sets and suchlike have only in a very few cases been reported as having caused allergic reactions (18). Most of these kinds of products are now made of synthetic materials. Some products such as balloons on invasive catheters cannot be replaced by alternative materials without impairing quality. The risk of using a possibly inferior product has to be balanced against the slight risk of an allergic reaction in such cases. In many cases, a waterproof barrier as plastic or i.e. Tegaderm® between the rubber material and the patient can solve the problem.

Indirect exposure to powder-borne latex allergens in situations where powdered gloves are used, also causes problems. Low-latex workplaces where the content of latex allergens in the air is below elicitation thresholds (19) can be achieved provided all powdered natural rubber latex gloves are replaced by either non-powdered natural rubber latex gloves or gloves made of synthetic materials, whether powdered or non-powdered. In the very few cases where a change of workplace has been necessitated because of latex allergy, the reason has been difficulty in obtaining working conditions with a sufficiently low latex antigen concentration. In emergency rooms and operating theatres, low-latex facilities should be available for latex-sensitized patients coming to hospital. Latex-free emergency trays should be available in such units. With the current switch in most hospitals to powder-free gloves, the problem of indirect latex exposure seems generally to have been avoided.

Cornstarch powder itself has only rarely been described as an allergen; the allergenicity of glove powder is almost exclusively attributed to latex allergens. Patients with concomitant irritant contact dermatitis may however occasionally benefit from powder-free gloves, irrespective of their allergies.

One of the greatest problems for patients – and health care workers who come in contact with latex-allergic patients – is to obtain information about the possible presence of latex

in various products, as synthetic materials and natural rubber latex are so similar in appearance. Single use medical gloves, CE-labelled, must have their latex content declared (20).

In the health care sector, but also in private use of natural rubber latex products, efforts should be concentrated on primary prevention of sensitization. Use of low-allergenic gloves (powdered or powder-free) seems to reduce sensitization rates considerably (21,22). The content of total leachable proteins can be measured using standardized methods, and can be used as a substitute measure for latex allergens (20). Hopefully, a standardized method for measuring latex allergens will be available within a few years. The content of proteins in gloves can vary from below 50 mg/g glove to more than 1000 µg/g. Most gloves used in hospitals today have a protein content below 100–150 µg/g. Powder-free gloves generally (but not always) have a low protein content. The significance of powder for primary sensitization has still not been clarified (23), but use of powder-free natural rubber latex gloves is currently the simplest way to achieve low-latex working conditions, beneficial for patients already sensitized.

Most latex-allergic patients can continue their work once a few precautions have been taken, and suffer no symptoms in daily life. Very few need to change their workplace. Education, information and labelling of products are prerequisites in order to avoid unnecessary worry and restrictions in lifestyle, creating "latex cripples" (24).

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