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## Latex Allergy: Are You Risking Your Life for Your Job?

### 2.5 Contact Hours

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#### OBJECTIVES

After reading the **Latex Allergy** course, the learner will be able to:

- List the occupations and populations at risk for latex allergy.
- Identify why latex allergy has grown more prevalent since 1987.
- Describe the three types of reactions associated with latex allergy, along with common symptoms of each.
- Identify methods used to diagnose latex allergy.
- List ten products (medical and household) that contain latex.
- List foods that can cause cross-reactions in people allergic to latex.
- Describe why allergy shots are not approved as a treatment option.

#### INTRODUCTION

Julie is a nurse in a busy ICU. Over the past year, she has noticed an itchy rash on her hands after working, along with occasional wheezing and shortness of breath. She had attributed the difficulty breathing to being out of shape, but after just being on vacation for two weeks, she is surprised to find all of her symptoms gone. Is Julie allergic to work?

Julie does have an allergy, not to her job, but as a result of it. Her work environment has put her at risk for developing a latex allergy; it looks like she has succumbed, along with many others.



## WHAT IS LATEX?

Natural rubber latex comes from the milky sap produced by a variety of plants; however, the latex used in manufacturing comes primarily from the Malaysian rubber tree *Hevea brasiliensis*. Natural rubber latex should be differentiated from synthetic (man-made) rubber, as well as from the technical term “latex,” which refers to a combination of different kinds of particles, but which does not necessarily indicate the presence of natural rubber latex. (An example of this is latex paint). Allergic reactions are only caused by natural rubber latex from rubber tree sap.

## Who is at Risk?

In the 1990s, latex allergy reached epidemic levels among healthcare workers. It was estimated that 8-12% of healthcare workers developed a latex sensitivity due to frequent exposure to powdered latex gloves (SGNA, 2007). The increased incidence is dramatically shown by the growing number of Medic Alert bracelets listing latex allergy. In 1986, there were just 12, but by 2005, there were over 16,000. (ENA position statement, 2005). Much progress has been made in latex allergy research and awareness, and the number of healthcare workers who are newly diagnosed has now greatly diminished due to decreased use of powdered latex gloves in healthcare facilities. However, because the development of latex allergy is directly related to frequent exposure, any healthcare workers who are still regularly exposed to powdered latex gloves remain at high risk for developing the allergy.



This is also true for other workers who are frequently exposed to powdered latex gloves on the job or at home. These include firefighters, police, food service workers, environmental services workers, beauticians, auto mechanics, greenhouse workers, day care workers, painters, and people working in latex manufacturing. Latex gloves are sold in most stores and many people wear them for routine household chores such as cleaning and washing dishes. The continued use of latex gloves in everyday life combined with an unawareness of the allergy has now made the general population the group at highest risk. There is even a report of a horse farmer who developed a latex allergy.

Certain patient populations are also highly prone to developing latex allergy. Children born with spina bifida often have frequent surgeries and urogenital procedures, which used to mean frequent contact with latex gloves and catheters. In fact, the first fatalities related to latex allergy resulted from the use of latex catheters used for barium enemas. In industrialized countries, the prevalence of latex allergy in children with spina bifida is about 50% (Rolland & O’Hehir, 2008); therefore, these children are now simply treated as though they are allergic to latex from birth and strict latex precautions are used. Patients with preexisting asthma, or a history of atopy are also likely to develop latex allergies. Atopy is defined as a genetic predisposition to allergic conditions, such as asthma, eczema, or hay fever. The presence of coexisting allergies is strongly correlated with the development of latex allergy.

## FREQUENCY

### Why Has Incidence Increased?

The first published article relating allergic reactions to latex gloves appeared in 1933 in the New England Journal of Medicine. In the article, Dr. John Downing stated that he had seen two surgeons during the previous six months who had dermatitis on their hands corresponding with rubber glove use. He also described seven men who worked for a public utility company who wore rubber gloves eight hours every day. They all had redness, swelling and fine vesicles where the gloves touched their bare hands. The same reaction occurred in two control subjects who had rubber gloves applied to their bare arms. Dr. Downing cited a letter he had received from the chief chemist of a rubber company that stated that the company had received approximately 20 reports of dermatitis caused by rubber gloves in the last 20 years (taking documented occurrence back to 1913), and that he believed there were many more unreported incidences. The chemist also mentioned there were about the same number of reactions reported from other rubber goods in which the rubber touched bare skin.

It's apparent that latex allergy is nothing new, so why is it exploding into an epidemic now?

The HIV scare changed how healthcare workers thought about the use of gloves. With the recommendation of "Universal Precautions" in 1987 (treating blood and body fluids from all individuals as potentially infectious), gloves literally became a barrier between life and possible death. Latex gloves are considered the barrier of choice against blood-borne diseases, and the high demand for the gloves led to a change in the manufacturing process that allowed faster production. Previously, the latex was poured into a mold. Now, the gloves are dipped, permitting more of the latex proteins to remain in the gloves. The exact process differs between manufacturers, thus levels of latex proteins may vary among brands of gloves. The new manufacturing process provides a large supply of gloves for a low cost, which makes it easy for employers to choose latex gloves even for their employees who are not at risk for blood contact.

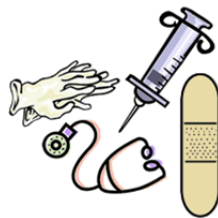


## LATEX SUBSTITUTES

### Which Products Contain Latex?

Over 40,000 products contain latex! Many of these are medical supplies. The dipping process is also used to make balloons and condoms, so there tends to be a high incidence of reaction from these. The following is a partial list of examples with latex-free alternatives. Any of these latex products can cause a reaction in a person who is sensitized.

Product Containing Latex	Latex-Free Alternative
Latex exam gloves	Nitrile, neoprene or other approved material exam gloves
Stethoscope tubing	Latex free stethoscope
Urinary catheters	Silicone catheters
Medication vial stoppers	Remove stopper before drawing up med
IV tubing ports	IV tubing without latex port or use stopcock to inject meds
Tape	Plastic tape
Erasers	Vinyl erasers
Latex balloons	Mylar balloons
Non-skid backing on rugs	100% cotton rugs
Band-Aids	Latex free Band-Aids or gauze with latex-free tape
Elastic in clothing	Don't let elastic touch skin
Rubber balls	Vinyl/PVC balls
Rubber kitchen gloves	Nitrile, neoprene, vinyl or other synthetic gloves
Foam earphones	Plastic earphones without foam
Computer mouse pads	Plastic/vinyl mouse pad
Anything with a rubber handle	Vinyl, leather or cover handle with latex-free tape



## FOOD ALLERGIES

There are some foods that can cause cross reactions because the proteins in the food are similar to one or more of the proteins found in latex. These primarily include bananas, kiwi, avocados, chestnuts and mangos, although some studies are showing that there may be others. If a person is already allergic to one or more of these foods, the chance of developing a latex allergy increases. However, not everyone with a latex allergy has food allergies. Natural rubber latex contains over 200 proteins, of which 50 to 60 are known to cause reactions (Rolland & O’Hehir, 2008). Different people can be sensitized to different combinations of proteins. Studies have also shown that people allergic to latex may react to foods prepared by someone wearing latex gloves (Ameratunga, Ameratunga, Crooks, & Simmons, 2008).

## SYMPTOMS OF LATEX ALLERGY

General symptoms of latex allergy:

- Skin rash
- Hives
- Eye tearing and irritation
- Nasal symptoms such as sneezing, drainage, or congestion
- Wheezing or chest constriction

There are three general types of reactions associated with latex allergy, although they won’t manifest the same way in everyone since people may not react to the same proteins.

1. Contact dermatitis is irritation at the site of contact caused by the powder added to gloves.

Powdered gloves have an irritating alkaline pH, whereas powder-free gloves have a lower pH that is closer to that of skin. Studies have shown that an alkaline skin surface lasts long after the removal of powdered gloves. Dermatitis can also be caused by sweat on the hands while they’re covered by gloves, and “mechanical” irritation from the powder rubbing on the skin. Usual symptoms include redness, scaling and itching that disappear when the source is removed. This is not a latex allergy since it is not an immunological reaction and is not related to the latex proteins.

2. Type IV hypersensitivity is a cell-mediated allergic reaction to the chemicals (mostly accelerators) used in processing, but not to the latex itself. These chemicals can be airborne by the powder used in gloves. Thiurams have been identified as the main source of reaction, but as this chemical is no longer used by most manufacturers, the incidence of this type of reaction may start to decrease. The reaction is delayed for 24 to 48 hours after exposure and includes redness itching, localized swelling, hives, red and itchy eyes, runny nose and coughing. Repeated exposure causes the symptoms to arise faster and persist longer. Often, symptoms occur at work and disappear at home. While this is not a reaction to latex either, it does predispose the person to progressing to a true latex allergy.

3. Type I hypersensitivity is an immediate IgE-mediated response that can be life threatening. This is a true latex allergy, caused by histamine release upon exposure to latex. Latex proteins bind to glove powder and become aeroallergens when the powder is released, thus inducing respiratory symptoms

as well as skin reactions. Glove powder has been found in the air for up to 12 hours after release, so a sensitized person can react hours after the actual gloves were used. The latex proteins are also water-soluble and are easily absorbed through the skin. It's estimated that 16.9% of all anaphylactic reactions during surgery are related to latex allergy (Reisacher, 2008). These reactions are frequently termed "anesthesia accidents." The risk of anaphylaxis caused by latex allergy is even higher in children with spina bifida. Symptoms of a Type I reaction include difficulty breathing (from bronchospasm or airway swelling), increased heart rate, hypotension, hives, nausea or abdominal cramping, dizziness, or respiratory and/or cardiac arrest. Chronic asthma is also a frequent result of Type I hypersensitivity.

Symptoms of Latex Allergy Reactions		
Contact Dermatitis	Type IV Hypersensitivity	Type I Hypersensitivity
<ul style="list-style-type: none"> <li>• Itching</li> <li>• Redness</li> </ul>	<ul style="list-style-type: none"> <li>• Hives</li> <li>• Runny nose</li> </ul>	<ul style="list-style-type: none"> <li>• Anaphylaxis</li> <li>• Difficulty breathing</li> </ul>

## DIAGNOSING LATEX ALLERGY

History and physical are crucial to diagnosis. A blood test (RAST test) may be done to detect antibodies but it is often unreliable since a person with a positive history may have a negative RAST test. Often, a scratch test is done. The skin on the forearm is pricked and a solution containing latex is dropped on the area. If the area becomes red, swollen and itchy within 15 minutes, the test is positive. However, there is no commercially available testing solution. This leads to variance in the amount of latex in the solution used by different physicians, since they make their own. A patch test is similar in that a piece of latex glove is applied to the arm for up to 15 minutes. Hives with itching or redness indicates a positive response. The physician may not even do the scratch or patch tests on a person with a strong history, as the tests themselves have caused some people to experience anaphylaxis.

## TREATMENT

Patients with a confirmed latex allergy should wear a medic alert bracelet at all times. Currently, there is no cure for latex allergy, prevention and avoidance are the best treatment options. Allergy shots (desensitization or immunotherapy) are not approved for use in the United States because they have caused Type I reactions. The other bad news is that this is a progressive allergy; each exposure increases sensitization and the chance of an anaphylactic reaction.

Researchers in Europe have conducted clinical trials on immunotherapy for latex allergy. In one study, administering oral and subcutaneous natural rubber latex allergens significantly lowered the incidence of rhinitis, conjunctivitis, and skin reactions; however, it did not significantly affect asthma associated with latex allergy. In another study, there were a large number of systemic reactions to the latex injection during both the initial therapy and the monthly maintenance injections (Rolland & O'Hehir, 2008). Despite these

results, immunotherapy is more commonly used in other countries than in the United States. Since people may react to different combinations of the latex proteins, it will be difficult to find a common treatment for all latex allergy sufferers. Therefore, immunotherapy is considered an experimental treatment, and avoidance of exposure is the primary treatment and means of prevention.

There have been many advances in latex allergy research. For example, the specific proteins that are the major allergens for people with spina bifida have been isolated, and it's been discovered that they are not the same proteins that are the primary allergens in healthcare workers (Peixinho, Tavares-Ratado, Tomás, Taborda-Barata, & Tomaz, 2008). This may be explained by a difference in the routes of exposure between the two groups, and different means of subsequent sensitization. The allergens that affect children with congenital malformations (such as spina bifida) are particle-bound proteins that are less soluble than other latex proteins. Sensitization to these proteins may be caused by repeated mucosal contact. Healthcare workers tend to be exposed primarily through topical and respiratory contact since they wear latex gloves for long periods of time, and constantly inhale the powder that is all around them. It's been theorized that neonates who develop latex allergy are sensitized by inhaling the powder from latex gloves worn in the delivery room. Studies done with mice show that the mice develop IgE antibodies to specific combinations of latex proteins based on the type of exposure they've had (injected vs. topical vs. inhaled). There's still a lot of research to be done, but isolating the specific allergens to each population and method of exposure gives hope that there may be effective treatments developed in the future.

## PREVENTION

First, notice if you have any of the above symptoms. Healthcare workers are so good at taking care of others that we tend to overlook ourselves. If you do have symptoms, (especially at work but not at home), keep a journal to find a pattern. Ask your doctor or allergist to be tested for latex allergy and remind them that you are at high risk because of your occupation, and even more so if you have other allergies. There is also a hereditary component to latex allergy, so find out if anyone in your family has symptoms. Finally, avoid latex gloves as much as possible.

## SURGICAL AND EXAM GLOVES

While there are several latex alternatives for disposable gloves, the advantages and disadvantages of each mean it is important to choose the right glove for the situation. Gloves are classed as Exam Grade or General Purpose. Exam gloves are regulated by the FDA, general purpose gloves are not. Exam gloves are regulated by the U.S. Food and Drug Administration's (FDA) Center for Devices and Radiological Health and tested using standards provided by ASTM International ([www.astm.org](http://www.astm.org)) in the United States and in Europe by the Personal Protective Equipment Directive for the European Community ([ec.europa.eu](http://ec.europa.eu)).



The following considerations should be taken into account when selecting medical gloves:

1. Allergies: will the gloves cause an allergic reaction in staff or patients.
2. Blood borne pathogen barrier protection: medical gloves should provide protection in compliance with ASTM F 1671 (ASTM F1671 - 07 Standard Test Method for Resistance of Materials Used in Protective Clothing to Penetration by Blood-Borne Pathogens Using Phi-X174 Bacteriophage Penetration as a Test System, information provided with glove manufacturer.) Additionally, it is recommended that gloves comply with ASTM F1671-97a (Resistance of Materials to Penetration by Blood-Borne Pathogens) to ensure barrier protection against certain viral elements.
3. Chemical barrier protection: medical gloves should provide protection against chemicals including, but not limited to, chemotherapy drugs, and sterilants. This protection is measured using ASTM F 739 (Standard Test Method for Resistance of Protective Clothing Materials to Permeation by Liquids or Gases Under Conditions of Continuous Contact) and ASTM F 1383-96 (Standard Test Method for Resistance of Protective Clothing Materials to Permeation by Liquids or Gases Under Conditions of Intermittent Contact).
4. Elasticity and tensile strength: how far will a glove stretch without breaking and how much force it takes.
5. Cut resistance
6. Abrasion resistance
7. Tear resistance
8. Puncture resistance
9. Dexterity
10. Contamination: powdered gloves can lead to complications in surgical patients and increase allergy risk. Airborne powder can carry high levels of both latex and bacteria, increasing risk for infection and latex allergy reactions. Other contaminants, like silicone, can leave residue behind, either airborne or through direct contact.



Denise M. Korniewicz, PhD, RN, FAAN, Professor and Senior Associate Dean for Research at the University of Miami School of Nursing and Health Studies and School of Medicine, Department of Epidemiology has published the following guidelines for comparative medical gloves (Dr. Denise M. Korniewicz. Advantages and Disadvantages of Non-latex Surgical Gloves.):

*Table 1: Selection Guide for Gloves Used in Healthcare Settings*

	<b>Barrier Protection</b>	<b>Strength &amp; Durability</b>	<b>Puncture Resistance</b>	<b>Fit &amp; Comfort</b>	<b>Elasticity</b>	<b>Allergenicity</b>
<i>Latex</i>	<i>Long-standing barrier qualities</i>	<i>Strong, natural rubber is durable</i>	<i>Has re-seal qualities</i>	<i>Provides comfortable fit</i>	<i>Natural ability due to elastic quality rubber</i>	<i>Contains protein &amp; chemical allergens low powder is preferred</i>
<i>Neoprene (Chloroprene)</i>	<i>Good but tear resistance is marginal</i>	<i>Strong</i>	<i>Has some puncture resistant qualities</i>	<i>Provides a good fit, has some elastic ability that enhances fit</i>	<i>Close to latex and allows for flexibility</i>	<i>Contains no latex proteins but has some accelerator chemicals</i>
<i>Nitrile</i>	<i>Resistant to punctures &amp; tears, flexes and does not develop holes</i>	<i>Strong has puncture resistant qualities</i>	<i>Has puncture resistant qualities</i>	<i>Slightly tighter fit</i>	<i>Less than latex over time tends to shape to wearer's hand</i>	<i>Contains no proteins but contains some accelerator chemicals</i>
<i>Vinyl</i>	<i>Easily breaks during use, baggy</i>	<i>Weak, breaks easily &amp; punctures easily in use</i>	<i>Punctures with sharps</i>	<i>Fit limited baggy</i>	<i>Dexterity compromised</i>	<i>Contains no proteins but chemical accelerators</i>
<i>Polyurethane</i>	<i>Durable and high puncture resistance</i>	<i>Excellent tear puncture and abrasion resistance</i>	<i>Superior to latex for puncture resistance; mimics nitrile in performance</i>	<i>Good comfort and fit; has latex-like qualities</i>	<i>Elasticity is apparent</i>	<i>Contains no latex proteins &amp; no chemical accelerators</i>
<i>Copolymer (block polymers)</i>	<i>Good resistance to tears</i>	<i>Stronger than vinyl; puncture resistance is fair</i>	<i>Easy to puncture</i>	<i>Latex like fit and comfortable</i>	<i>Elasticity superior to vinyl but below latex</i>	<i>Contains no latex proteins but some chemical accelerators</i>

## SUMMARY

Julie asked her doctor about her symptoms and he referred her to an allergist. The allergist suspected latex allergy based on her history and did a scratch test. Within minutes of the latex solution application, her arm became swollen, red and itchy. Spirometry indicated that Julie has asthma, and since it had not been previously documented in her medical record, the allergist diagnosed latex-allergy-induced asthma. Julie can no longer work in the ICU, so the employee health nurse is helping her find another job within the hospital that will be safe for her.



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## RESOURCES

American Academy of Allergy, Asthma & Immunology - [www.aaaai.org](http://www.aaaai.org)

American College of Allergy, Asthma & Immunology - [www.acaai.org](http://www.acaai.org)

Medline Plus Health Information - [www.nlm.nih.gov/medlineplus/latexallergy.html](http://www.nlm.nih.gov/medlineplus/latexallergy.html)

Spina Bifida Association - [www.sbaa.org](http://www.sbaa.org)



## CE Exam

Latex Allergy

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**Directions:** Circle the best answer to each question.

1. Why has the incidence of latex allergy decreased among healthcare workers?
  - A. Not as many people are choosing a career in healthcare.
  - B. The statistics are no longer being recorded.
  - C. The use of powdered latex gloves has decreased in many healthcare facilities.
  - D. Latex is completely banned in all healthcare facilities.
  
2. Which patient population is at highest risk for developing a latex allergy?
  - A. Elderly patients with diabetes
  - B. Women with multiple sclerosis
  - C. Elderly patients with COPD
  - D. Children with spina bifida
  
3. A skeptical coworker asks you why latex allergy is so prevalent among healthcare workers now. Your best response would be:
  - A. The fact that more people are wearing latex gloves more often combined with new manufacturing methods that cause retention of the latex proteins.
  - B. It's always been this bad but most people didn't know about it.
  - C. More people have other allergies now, which increases the incidence of latex allergy too.
  - D. Environmental pollution has increased the incidence of latex allergy.
  
4. A patient tells you that he used to have delayed rashes, itchy eyes, and a runny nose after he was exposed to latex. However, after the last exposure, he felt his heart race, he was dizzy, and he had a hard time breathing. You tell the patient that his reactions may have progressed from:
  - A. Type I to Type IV
  - B. Type I to contact dermatitis
  - C. Contact dermatitis to Type I
  - D. Type IV to Type I
  
5. Type I reactions include all of the following except:
  - A. Difficulty breathing
  - B. Increased heart rate
  - C. Rash
  - D. Hives

6. Which test for latex allergy may be negative even when the patient has positive symptoms?

- A. RAST test
- B. Patch test
- C. Skin prick test
- D. Latex assay test

7. Your patient has a latex allergy. You need to listen to her lungs, but you don't want the stethoscope tubing to touch her skin. You decide to:

- A. Ask each of your coworkers if their stethoscope is latex-free .
- B. Skip that part of your respiratory assessment.
- C. Cover the stethoscope tubing with foam rubber.
- D. Cover the stethoscope tubing with a stockinette.

8. You were diagnosed with a latex allergy two weeks ago. You're now in the cafeteria at lunchtime and you just remembered that some foods can cause cross reactions in people who are allergic to latex. Which of the following will you avoid?

- A. Chicken salad
- B. Banana
- C. Bread
- D. Coffee

9. A friend asks "Why don't you just get allergy shots like other people with allergies?" You reply:

- A. There is currently a shortage of the serum.
- B. Allergy shots aren't approved in the U.S. because they've caused Type I reactions.
- C. Insurance doesn't cover allergy shots and they're very expensive.
- D. No studies have been done on the effectiveness of allergy shots for latex allergy.

10. Another nurse asks you how she can decrease her risk of developing a latex allergy. You reply:

- A. Stop chewing gum.
- B. Don't take care of patients with latex allergy.
- C. Avoid powdered latex gloves as much as possible.
- D. Stop eating bananas.



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Your opinion is important to us. Please answer the following questions by circling the response that best represents your experience.		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
<b>COURSE OBJECTIVES &amp; CONTENT</b>						
1.	The activity was valuable in helping me achieve the stated learning objectives.	5	4	3	2	1
2.	The content was up to date.	5	4	3	2	1
2.	The number of credit hours was appropriate for the content.	5	4	3	2	1
<b>TEACHING/LEARNING METHODS</b>						
4.	The teaching/learning methods, strategies, and slides were effective in helping me learn.	5	4	3	2	1
5.	The material was clearly explained.	5	4	3	2	1
6.	The answers to the post-test questions were appropriately covered in the activity.	5	4	3	2	1
<b>OVERALL ACTIVITY</b>						
7.	The online course/download supported the achievement of the stated learning objectives.	5	4	3	2	1
8.	The material was relevant to my professional development.	5	4	3	2	1
9.	Overall, I am pleased with this activity and would recommend it to others.	Yes	No			
10.	The content was presented free of commercial bias. *	Yes	No			
11.	Did the material presented increase your knowledge and/or understanding of this topic? *	Yes	No	NA		

Continued on Next Page

\* If you responded "No" to question 10, please explain why:

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\* If you answered "Yes" to question 11, what change do you intend to make?

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What barrier, if any, may prevent you from implementing what you learned?

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Cite one new piece of information you learned from this activity:

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Additional comments/suggestions:

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With my signature I confirm that I am the person who completed this independent educational activity by reading the material and completing this self evaluation.

Signature \_\_\_\_\_ Date: \_\_\_\_\_





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## HOW TO GET YOUR CONTINUING EDUCATION CREDIT

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Have you registered with us before?  Yes  No

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CX0050	Latex Allergy		19.00
	Shipping & Handling		8.95
			Total: \$27.95

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