Latex allergy: what has the epidemic taught us?

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History of Latex Allergy

• First described in housewife with contact urticaria (Nutter, 1979)
• Intra-operative anaphylaxis (Turjanmaa, 1984)
• Spina bifida children (Slater, 1989)
• 15 deaths from latex barium enema balloons (Ownby, 1991)
Latex Glove Manufacture

1. Rubber tapping
2. Non ammoniated latex (NAL)
3. Ammonia 0.7%
4. Low ammoniated latex (LAL)
5. Stabilisation (Thiurams, antioxidants); these chemicals cause Type IV hypersensitivity
6. Washing/Leeching, +/- $\gamma$ irradiation, +/- powdering
7. Heating, Dipping (glove moulds dipped into liquid latex)

CRC for Asthma
Epidemiology

- A disorder dependent on exposure to latex proteins
- Wider community - < 1% (Liss, 1999)
- Health care workers sensitisation historically between 4 and 22% (now much less)
- Overt allergy less than half of sensitised group
The Alfred Hospital nurses latex allergy study

- 140 nurses from ICU and theatre
- 22% of group positive skin test to one of 5 latex glove eluates (sensitisation)
- Symptoms of local hand irritation were equally frequent in skin-prick negative group

### TABLE 3
Symptoms Associated with Latex Glove Usage

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Latex skin prick test positive</th>
<th>Latex skin prick test negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skin dryness</td>
<td>26 (84%)</td>
<td>80 (73%)</td>
</tr>
<tr>
<td>Itch</td>
<td>18 (58%)</td>
<td>52 (48%)</td>
</tr>
<tr>
<td>Skin erythema</td>
<td>17 (55%)</td>
<td>48 (44%)</td>
</tr>
<tr>
<td>Urticaria</td>
<td>4 (13%)*</td>
<td>4 (4%)*</td>
</tr>
<tr>
<td>Eczema</td>
<td>10 (32%)</td>
<td>29 (27%)</td>
</tr>
<tr>
<td>Eye symptoms</td>
<td>4 (13%)</td>
<td>6 (6%)</td>
</tr>
<tr>
<td>Nasal symptoms</td>
<td>5 (16%)</td>
<td>10 (9%)</td>
</tr>
<tr>
<td>Dyspnoea</td>
<td>1 (3%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Asthma</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Rapid onset†</td>
<td>23</td>
<td>65</td>
</tr>
<tr>
<td>Delayed onset†</td>
<td>7</td>
<td>5</td>
</tr>
</tbody>
</table>

The nurses were asked to estimate the time delay between putting on gloves and onset of each symptom. If the first symptom began less than one hour after putting on the gloves, the subject has been classified as a rapid responder.

*p<0.05 (comparing latex skin prick test positive and negative nurses for this symptom).

†The delay of onset of symptoms was answered by 30 of the nurses who were latex skin prick test positive and 70 nurses who were skin prick test negative.
Diagnosis of Latex allergy

• Symptoms of immediate type allergy (hand itching alone not predictive) on latex exposure
• Associations – risk group (spina bifida, HCW), fruit allergy, existing hand dermatitis, atopy
• Demonstration of latex specific IgE by skin prick test, RAST test or challenge testing
Latex allergens have a high capacity to cross-link effector-cell bound IgE
Prevalence of self reported symptoms on latex exposure among latex allergic subjects

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Latex allergic (n=32)</th>
<th>Latex non-allergic (n=19)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local skin itching and erythema</td>
<td>90.6</td>
<td>20.3</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Local skin hives</td>
<td>87.5</td>
<td>0</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Generalised erythema</td>
<td>43.8</td>
<td>5.3</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Sneezing</td>
<td>62.5</td>
<td>0</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Facial swelling</td>
<td>68.8</td>
<td>0</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Throat swelling</td>
<td>43.8</td>
<td>0</td>
<td>0.01</td>
</tr>
<tr>
<td>Asthma, shortness of breath or wheezing</td>
<td>71.9</td>
<td>5.3</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Anaphylaxis</td>
<td>40.6</td>
<td>0</td>
<td>0.01</td>
</tr>
</tbody>
</table>

Sutherland, 2003
Skin testing in latex allergy may be associated with anaphylaxis

- Commonest skin test reagent causing anaphylaxis (228/100,000) (Valvasevi et al, Ann Allergy Asthma Immunol 1999: 132-6.)
- 9/118 consecutive patients tested with glove extract had systemic reactions (4 anaphylaxis) (Kelly et al, J Allergy Clin Immunol 1994: 813-6.)
Stallergenes latex extract

- 93% sensitivity (43/46 latex allergics diagnosed), 100% specificity at 1:200 dilution (100 IR) 22ug/ml. Low ammoniated latex preparation (RRIM clone 600)
  - Turjanmaa et al, Latex allergy diagnosis: in vitro and in vivo standardization of a natural rubber latex, Allergy 1997 50: 41-50

- Alfred Hospital Experience – over 200 skin tests performed. Five systemic reactions. None in RAST negative subjects.
  - Sr Sue McLellan personal communication – SAS records.
Different latex allergens are clinically important in different risk groups.
## Reported Prevalences of IgE reactivity to individual latex allergens

<table>
<thead>
<tr>
<th>Allergen</th>
<th>Spina bifida</th>
<th>HCW</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hev b 1</td>
<td>81 54</td>
<td>52.3 13</td>
<td>(Chen et al., 1997) (Kurup et al., 2000)</td>
</tr>
<tr>
<td>Hev b 2</td>
<td>38</td>
<td>48</td>
<td>(Kurup et al., 2000)</td>
</tr>
<tr>
<td>Hev b 3</td>
<td>100 85</td>
<td>0 19</td>
<td>(Yeang et al., 1996) (Kurup et al., 2000)</td>
</tr>
<tr>
<td>Hev b 4</td>
<td>46</td>
<td>61</td>
<td>(Kurup et al., 2000)</td>
</tr>
<tr>
<td>Hev b 5</td>
<td>56</td>
<td>92</td>
<td>(Slater et al., 1996)</td>
</tr>
<tr>
<td>Hev b 6.01</td>
<td>38</td>
<td>45 69</td>
<td>(Kurup et al., 2000) (Alenius et al., 1996)</td>
</tr>
<tr>
<td>Hev b 6.02</td>
<td></td>
<td>48</td>
<td>(Alenius et al., 1996)</td>
</tr>
<tr>
<td>Hev b 6.03</td>
<td></td>
<td>21</td>
<td>(Alenius et al., 1996)</td>
</tr>
<tr>
<td>Hev b 7</td>
<td>23 3 39.5</td>
<td>23 49</td>
<td>(Kurup et al., 2000) (Seppala et al., 2000) (Wagner et al., 2001)</td>
</tr>
<tr>
<td>Hev b 8</td>
<td></td>
<td>35</td>
<td>(Fuchs et al., 1997)</td>
</tr>
<tr>
<td>Hev b 9</td>
<td></td>
<td>14.5</td>
<td>(Wagner et al., 2000)</td>
</tr>
<tr>
<td>Hev b 10</td>
<td></td>
<td>33</td>
<td>(Wagner et al., 2001)</td>
</tr>
<tr>
<td>Hev b 11w</td>
<td></td>
<td>23</td>
<td>(O’Riordain et al., 2001)</td>
</tr>
</tbody>
</table>
Hev b 5, 6 and 7 are important among HCW

- Combination of rHev b 5,6,7 has 93% sensitivity, 100% specificity for diagnosis of latex allergy by SPT. Yip et al. Skin prick test reactivity to recombinant latex allergens. *Int Arch Allergy Immunol* 2000:121(4): 292-9

- There is significant monosensitisation to each Hev b 5 (17%), Hev b 6 (10%) and Hev b 7 (10%).
Some latex allergens share significant homology with food allergens
Food allergy in latex allergy

• 50% of subjects with latex allergy have food allergy
• Commonest fruits are banana, avocado, kiwi fruit
• Major allergens of banana and avocado are chitinases that share significant homology with hevein (Hev b 6.02)
Current *in vitro* IgE assays are non ammoniated latex (NAL)
RAST testing for latex allergy

- No approved skin testing reagent in Australia or US – therefore **RAST testing critical**
- Pharmacia Cap system is most widely used and validated
- Fully automated system where allergen bound to an activated cellulose matrix
- Serum added undiluted, washed and detected with monoclonal anti-IgE (flourescent substrate)
CRC for Asthma
# Performance of CAP assay

<table>
<thead>
<tr>
<th>Study</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>N=allergic</th>
<th>N=non allergic</th>
<th>Gold Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hamilton*</td>
<td>76.3%</td>
<td>96.7%</td>
<td>117</td>
<td>195</td>
<td>History and positive Skin test</td>
</tr>
<tr>
<td>Ownby#</td>
<td>79.5%</td>
<td>90.2%</td>
<td>83</td>
<td>60</td>
<td>History and positive Skin test</td>
</tr>
</tbody>
</table>

*Diagnostic Performance of FDA cleared serologic assays for latex allergy, Hamilton et al, JACI 1999; 103: 925-30

#A blinded multicenter comparison of two commercial in vitro tests for latex-specific IgE antibodies, Ownby et al, Ann Allergy Asthma Immunol 2000; 84: 193-196
Potential limitations of current IgE assays

- CAP system is Non Ammoniated Latex (NAL)
- Source of allergen exposures is latex gloves
- Some proteins may be under-represented or their IgE epitopes altered in current NAL diagnostic assays
Difference in protein profile between NAL and latex glove extract

Mr (kDa)  
25 →

NAL  
Glove Extract

Processing
Heat

16% SDS-PAGE Coomassie Stain

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Hev b 5 in latex allergy

• Hev b 5 is an important allergen recognised on skin testing by 18/29 (62%) of latex allergic health care workers (HCWs). In 5/29 (17%) it was the sole sensitiser. Yip et al, Skin Prick Testing to recombinant latex allergens, (Int Arch Allergy Immunol 2000; 121: 292-299)

• Hev b 5 is in low abundance in commercially available capture assays Chen, Z. et al, The absence of Hev b 5 in capture antigen may cause false negative results in serologic assays for latex specific IgE antibodies(Abstract), J Allergy Clin Immunol 105; S 83.

• “k82 plus” – (NAL CAP spiked with rHev b 5/MBP) results in greater diagnostic sensitivity (an additional 16/222 or 7% of serum samples became positive) Lundberg et al, Recombinant spiked allergen extract, Allergy 2001, 56: 794-795.
rHev b 5 increases sensitivity of CAP

Lundberg, Allergy 2001 56: 794-795
The human immune response to Hev b 5

- Hev b 5 cloned and expressed simultaneously in 1996
- Reacted with IgE of 92% of HCW, 56% spina bifida patients
- Highly charged, proline rich
- Uncertainties – no specific mAbs expressed as fusion protein with MBP.
Frequency of skin prick test reactivity to latex allergens for latex glove sensitised health care workers

Bernstein et al., JACI 111:610, 2003

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Monoclonal Antibody Production

• Useful to act as probes to determine relative abundance of Hev b 5 in latex extracts.
• Use in aero-allergen assays
Western of rHev b 5

C – Coomassie stain
S – Silver stain
1 – latex allergic HCW IgE
2 – non latex allergic HCW IgE
3 – 1 inhibited with Hev b 5
4 – no serum control
5 – mAb 6F6
6 – mAb 6A10
7 – isotype control

B Inhibition Immunoblot of Glove extract

Western of glove extract

Sutherland et al, Clin Exp Allergy, 2002
<table>
<thead>
<tr>
<th>Latex extract</th>
<th>Hev b 5 content % total protein *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Powdered non-sterile latex gloves</td>
<td></td>
</tr>
<tr>
<td>• laboratory utility glove</td>
<td>3.0</td>
</tr>
<tr>
<td>• household glove</td>
<td>1.6</td>
</tr>
<tr>
<td>Sterile surgical gloves</td>
<td>nd</td>
</tr>
<tr>
<td>• powdered</td>
<td>nd</td>
</tr>
<tr>
<td>• non-powdered</td>
<td>nd</td>
</tr>
<tr>
<td>Latex sap</td>
<td>1.8</td>
</tr>
</tbody>
</table>

* detected by mAb inhibition ELISA
nd = not detectable
Sutherland et al, Clin Exp Allergy 2002
CRC for Asthma
**Major latex allergens in latex glove sensitised patients**

**rHev b 5**

<table>
<thead>
<tr>
<th>IgE (OD 490 nm)</th>
<th>Latex non-allergic (n=20)</th>
<th>Latex allergic (n=29) 55%</th>
</tr>
</thead>
</table>

**rHev b 6.01**

<table>
<thead>
<tr>
<th>IgE (OD 490 nm)</th>
<th>Latex non-allergic (n=21)</th>
<th>Latex allergic (n=29) 70%</th>
</tr>
</thead>
</table>

94% IgE reactive to Hev b 5 and/or Hev b 6.01
Livingstone powdered latex glove (Hev b 5 staining)

Halogen® assay (courtesy of Dr Teresa Mitakakis)
Hev b 5 : summary

• Hev b 5 is a major latex allergen and important aero-allergen
• Most high quality surgical gloves and powder free examination gloves have low or undetectable allergen levels
• May be under-represented in commercial capture assays
Latex is an excellent model for novel immunotherapeutic strategies
Specific immunotherapy for latex allergy - trials using current unfractionated extracts

- 17 patients, randomised DBPC, rush sc IT then maintenance – clinical benefit, but high adverse events (Leynadier et al., JACI 2000)

- 24 patients, DBPC cluster sc IT – clinical efficacy mainly on cutaneous symptoms, high adverse events (Sastre et al., JACI 2003)

- 26 patients, rush sublingual IT – improved glove-use test, high adverse events (Bahima et al., J Invest Allergol Clin Immunol 2004)
Developing high dose allergen T cell targeted immunotherapy
B and T cell epitopes of allergens

Allergen

tertiary structure

B cell epitope

primary structure

T cell epitopes

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Hypoallergenic allergy vaccine strategy

1. Identify allergenic proteins
2. Identify T cell epitopes
3. Prepare mutant protein or peptide vaccines
4. Test in vivo

- IgE
- Overlapping peptides
- Allergen source
- Proliferation
- IL-5
- Allergen peptides
- Th2 (allergic) response
- Control
- Vaccine
- Allergen

**Control**

**Vaccine**

**Allergen**

**Th2 (allergic) response**

**Proliferation**

**IL-5**

**Allergen peptides**

**CRC for Asthma**
Mapping T cell epitopes of latex allergens
Dominance of T cell response to Hev b 5 p(1-20) and p(46-65) in latex allergic subjects (n=14)

De Silva et al., JACI 105:1017, 2000

CRC for Asthma
Identification of Hev b 5 p(46-65) core T cell epitope

Core epitope: EPTAAPAEPE
Hev b 5 p(51-60)

$^{3}$H-Thymidine incorporation (CPM)
Structure of Hev b 6.01

Prohevein (Hev b 6.01)

Processing

Hevein (Hev b 6.02)  C-terminal fragment (Hev b 6.03)

IgE reactivity: 80 % positive  20 % positive

Hevein 30 times as abundant as C-terminal fragment in rubber latex
(Soedjanaatmadja et al., 1995)

Rozynek et al., Clin Exp Allergy 28:1418, 1998

CRC for Asthma
Dominance of T cell response to Hev b 6.01 p(10-29) and p(19-38) in latex allergic subjects (n=10)

Hevein

Hev b 6.01

% responders


SI \geq 2.5

De Silva et al., Clin Exp Allergy 34:1, 2004
Identification of core T cell epitope of hevein

Core epitope Hev b 6 p(20-29)
Production of T cell stimulatory hypoallergenic mutants
Hev b 6.01 mutant recombinant and synthetic peptide molecules

rHev b 6.01 proteins

Wildtype

Mutant 1

Mutant 2

Mutant 3

Mutant 4

Hev b 6.02 peptides

Wildtype

Mutant 1

Mutant 2

Mutant 3

Mutant 4

Drew et al., J Immunol 173: 5872, 2004
rHev b 6.0 mutants and peptide variants have reduced IgE binding - inhibition ELISA

Drew et al., J Immunol 173: 5872, 2004

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Functional assays for hypoallergenic mutants

- Basophil activation assay by flow cytometry
- Allergen-specific T cell proliferation assay
CD63 is a surface marker for activated basophils

Unstimulated basophil

Activated basophil

(Adapted from Valenta & Kraft, 2001)
**Hev b 6.01 variants are poor activators of basophils**

- no activation by Hev b 6.02 peptide variant 2

Drew et al., *J Immunol* 173: 5872, 2004
T cells proliferate to variants of Hev b 6.01

Drew et al., J Immunol 173: 5872, 2004

WT, Wildtype
M1, Mutant 1
M2, Mutant 2
V1, Variant 1
V2, Variant 2
Hypoallergenic preparations

Native allergen

Mutant allergen vaccine

IgE epitope removal
No IgE binding

T-cell peptide vaccine
No IgE cross-linking

(Adapted from Valenta & Kraft, 2001)
<table>
<thead>
<tr>
<th>Latex allergen</th>
<th>IgE reactive glycan moiety</th>
<th>Allergen Status</th>
<th>CD4⁺ T-cell epitopes mapped</th>
<th>Hypoallergenic recombinant variants produced</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hev b 1</td>
<td></td>
<td>Minor</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Hev b 2</td>
<td>Yes</td>
<td>Minor/Major</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hev b 3</td>
<td></td>
<td>Minor</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Hev b 4</td>
<td>Yes</td>
<td>Minor/Major</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hev b 5</td>
<td></td>
<td>Major</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Hev b 6.01</td>
<td></td>
<td>Major</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Hev b 6.02</td>
<td></td>
<td>Major</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Hev b 6.03</td>
<td></td>
<td>Minor</td>
<td>Yes</td>
<td></td>
</tr>
<tr>
<td>Hev b 7</td>
<td></td>
<td>Minor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hev b 8</td>
<td></td>
<td>Minor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hev b 9</td>
<td></td>
<td>Minor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hev b 10</td>
<td></td>
<td>Minor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hev b 11</td>
<td></td>
<td>Minor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hev b 12</td>
<td></td>
<td>Minor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hev b 13</td>
<td>Yes</td>
<td>Minor</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Summary

• T cell epitope based Hev b 5 and Hev b 6.02 peptide combination - potential latex immunotherapy

• Role of Hev b 2 and Hev b 13 needs clarification

• Hypoallergenic preparations for safe administration of higher doses with greater efficacy: down-regulation of Th2-polarised response and expansion of Tregs

• Need to identify most effective and safe method for vaccine administration (route, adjuvant, regimen)
Allergen avoidance in Latex allergy

• Primary prevention works: “substitution of powdered latex gloves with low-protein powder-free NRL gloves greatly reduces NRL allergens, NRL sensitization, and NRL asthma in healthcare workers” Lamontagne et al, 2006

• Secondary Prevention – most latex allergic individuals can safely continue to work in low latex protein and powder free environment (Turjanmaa 2002)
Prevalence and characterization of latex allergy in nursing staff at a major Australian hospital

- Questionnaires mailed to 1373 nurses.
- 920 returned (67%). 5 invalid.
- 230 nurses symptomatic (25%)
- 685 asymptomatic (75%)
- 100 from each group underwent skin testing and RAST

Drew et al, submitted
Table 2 Immunological Testing

<table>
<thead>
<tr>
<th>Test</th>
<th>Percent Of Initial Questionnaire Grouped Subjects Positive On Testing (positive/tested)</th>
<th>Percent Of All Subjects Symptomatic &amp; Testing Positive</th>
<th>Percent Of All Subjects Non-Symptomatic &amp; Testing Positive</th>
<th>Percent Of All Subjects Testing Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stallergene Latex SPT</td>
<td>3.2 (3/93)</td>
<td>0.8</td>
<td>0</td>
<td>0.8</td>
</tr>
<tr>
<td>Latex Glove Extract SPT</td>
<td>0 (0/93)</td>
<td>0</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>Latex EAST</td>
<td>7.0 (7/100)</td>
<td>1.8</td>
<td>3.0</td>
<td>4.8</td>
</tr>
<tr>
<td>rHev b 5 ELISA</td>
<td>0 (0/100)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>rHev b 6.01 ELISA</td>
<td>0 (0/100)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

1 Percent of Symptomatic Group Positive*Number of Symptomatic Questionnaires/Total Questionnaires Returned Correct
2 Percent of Non-Symptomatic Group Positive*Number of Non-Symptomatic Questionnaires/Total Questionnaires Returned Correct

Drew et al, submitted
Table 4 Hev b 6.02 Content Of Latex Gloves In Use At The Alfred Hospital

| Glove Brand Name         | Manufacturer      | Country  | Material | Powdered | Protein content (mg/g glove)
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Uniglove*</td>
<td>Uniglove</td>
<td>Malaysia</td>
<td>Latex</td>
<td>Yes</td>
<td>514</td>
</tr>
<tr>
<td>SafeSkin Satin Plus</td>
<td>Kimberly-Clark</td>
<td>Thailand</td>
<td>Latex</td>
<td>No</td>
<td>&lt;47</td>
</tr>
<tr>
<td>Labtex Plus</td>
<td>Ansell Medical</td>
<td>Malaysia</td>
<td>Latex</td>
<td>No</td>
<td>&lt;47</td>
</tr>
<tr>
<td>Gammex PF</td>
<td>Ansell Medical</td>
<td>Malaysia</td>
<td>Latex</td>
<td>No</td>
<td>173</td>
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<tr>
<td>Conform</td>
<td>Ansell Medical</td>
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<td>Latex</td>
<td>Yes</td>
<td>150</td>
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<tr>
<td>Gammex</td>
<td>Ansell Medical</td>
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<td>Latex</td>
<td>Yes</td>
<td>705</td>
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<tr>
<td>No Powder SensiClean</td>
<td>Ansell Medical</td>
<td>Sri Lanka</td>
<td>Latex</td>
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* high allergen latex glove no longer used at the Alfred Hospital

underline indicates gloves used to produce SPT reagents used in study

1 limit of protein detection 47 ug/g glove. Assessed using Pierce BCA protein detection kit

2 limit of mAb reactive Hev b 6.02 content 137 ng/g glove

3 limit of IgE reactive Hev b 6.02 content 1 ng/g glove

Drew et al, submitted
Conclusions

• It appears rates of sensitization to latex are reduced compared with a decade earlier likely due to the introduction of high quality, powder free latex gloves.

• Levels of IgE-reactive Hev b 5 and 6 are either undetectable or extremely low in high quality medical grade gloves

• Molecular characterisation of latex allergens has enhanced diagnosis and offers hope of immunotherapy in latex allergy