

# Dental surgeons with natural rubber latex allergy: a report of 20 cases

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Latex allergy is becoming a major occupational health issue and dental surgeons are at risk from becoming sensitized to natural rubber latex. A study was conducted to investigate risk factors and glove-related symptoms reported by dentists with natural rubber latex allergy. Twenty dentists, who had undergone serological or dermatological testing for a Type I allergy to latex, were identified from a questionnaire survey. Risk factors investigated were: gender, years in clinical practice, exposure to latex gloves, atopic history and food allergy. The majority of dentists (75%) gave an atopic history. Glove-related adverse reactions ranged from cutaneous to systemic manifestations. All twenty dentists reported itching of the hands in response to latex gloves. One respondent was unable to continue in dental practice because of her glove-related allergies; nineteen dentists were able to continue by using synthetic, non-latex gloves.

*Key words:* Atopy; dentist; latex allergy; natural rubber; occupational; rubber gloves; skin complaints.

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## INTRODUCTION

Natural rubber latex (NRL) is now recognized as a major occupational hazard among healthcare workers who wear gloves.<sup>1</sup> Dental practitioners are required to wear gloves for the treatment of all patients and the majority wear NRL gloves.<sup>2</sup> Dentists are, therefore, at risk of being sensitized to NRL as well as developing an irritant or allergic contact dermatitis on their hands.<sup>3,4</sup> A Canadian study has shown that 10 per cent of dental personnel tested had positive skin prick tests (SPT) to NRL, which is similar to the percentages reported in operating theatre personnel and other hospital workers.<sup>4</sup> Atopy is a known risk factor for developing latex sensitization and health care workers with atopic allergy have been reported to have a 24% prevalence of positive results for latex SPTs.<sup>5</sup>

The aim of the present study was to investigate adverse reactions and risk factors reported by dental surgeons who had been confirmed as having NRL allergy by serological and/or dermatological testing.

## MATERIALS AND METHODS

Dentists suffering from NRL allergy were identified from respondents who had completed a questionnaire survey concerning adverse reactions to gloves, which was circulated to members of the British Dental Association. Twenty dentists had been confirmed as having NRL allergy either by a positive SPT and/or the prevalence of measurable latex serum IgE antibodies. Dental surgeons included in the study were asked questions concerning gender, length of time in clinical dental practice, number of years wearing NRL gloves and personal history of atopy and food allergy. An atopic history included asthma, hay fever or hand eczema in childhood (< 15 years of age) and eczema elsewhere on the body. Respondents who reported a confirmed NRL allergy were also asked if they had tested positive to other glove allergens, (*e.g.*, thiurams) by patch testing. Dentists were

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asked to report adverse reactions which they had attributed to wearing NRL gloves, prior to being confirmed as having NRL allergy. Signs and symptoms included: chapping or cracking of hands, itching, rash, hives (urticaria), itchy or watery eyes, sneezing, shortness of breath, facial swelling and anaphylaxis. Dentists were asked if they had been unable to continue working in dental practice and, if they had been able to continue in their current workplace, what changes had been necessary as a result of their NRL allergy.

## RESULTS

Of the twenty dentists with confirmed NRL allergy, nine were female. The number of years in clinical practice and routine wearing of NRL gloves is shown in Table 1, together with reported atopic conditions and food allergies. The majority (75%) of dentists with NRL gave an atopic history. Three dentists reported that they had also been diagnosed as having a Type IV, delayed allergic reaction to thiurams (accelerators found in some NRL gloves). Table 2 shows the glove-related signs and symptoms reported by the 20 dentists with a confirmed NRL allergy. Ten individuals also reported an adverse reaction to NRL products other than latex gloves. Of these, one female dentist had suffered anaphylaxis after a party balloon deflated in her face; this had required emergency treatment with adrenaline.

Of the twenty dentists reported in this study, one female dentist (No. 1) had been unable to continue in dental practice because of her NRL allergy. She reported being allergic to NRL and thiurams but, despite trying a large number of different synthetic gloves, had been un-

able to find a glove that her hands could tolerate. Twelve of the respondents were able to continue dental practice using a synthetic (non-NRL) glove and were free from symptoms. Dentist No. 2 had changed to non-latex gloves immediately after having been diagnosed as having NRL allergy. Despite this she noticed that her eyes were still symptomatic and the 'wheezing' of her chest continued to necessitate the use of a steroid inhaler. The other clinical personnel in her practice carried on wearing powdered NRL gloves and she felt this practice was causing her problems. Dentist No 2 eventually changed to another practice in which the principal was willing to provide non-NRL, powder-free gloves to all staff. Since changing dental practices, this practitioner reported that her adverse reactions ceased and she has not needed to use steroid inhalers. Interestingly, six dentists reported being able to continue wearing NRL gloves which were powder-free.

## DISCUSSION

The prevalence of NRL allergy in European healthcare workers screened with SPT, has been reported at a rate of 2.8% to 10.7%.<sup>1</sup> Studies among dental healthcare workers suggest a similar prevalence of NRL allergy to that reported in operating theatre personnel.<sup>4,6</sup> Dental practitioners are clearly at risk from becoming sensitized to NRL because of their frequent and prolonged exposure to latex gloves throughout their working life. The present study has investigated possible risk factors and glove-related signs and symptoms reported by a group of dentists who had been confirmed as allergic to NRL.

**Table 1.** Dentists with confirmed type 1 allergy to NRL: reported risk factors

Dentist no.	Gender	Glove allergen	Years in clinical practice	Latex glove use (yrs)	Atopic history	Atopic conditions				Food allergy
						Asthma	Hayfever	Eczema	Hand eczema	
1	F	NRL + Thiuram	2-5	>5	Yes	No	Yes	Yes	No	No
2	F	NRL	2-5	3-5	Yes	No	Yes	No	Yes	No
3	F	NRL	>10	>5	No	No	No	No	No	No
4	M	NRL	>10	3-5	No	No	No	No	No	No
5	F	NRL	>10	>5	Yes	No	Yes	Yes	Yes	No
6	M	NRL	6-10	>5	Yes	No	No	Yes	No	No
7	M	NRL	6-10	>5	Yes	No	No	No	Yes	No
8	M	NRL	>10	3-5	Yes	No	Yes	Yes	No	No
9	M	NRL + Thiuram	>10	3-5	Yes	No	Yes	Yes	No	No
10	M	NRL	>10	3-5	No	No	No	No	No	No
11	F	NRL + Thiuram	2-5	3-5	Yes	No	No	Yes	Yes	Yes — kiwi fruit
12	M	NRL	6-10	>5	No	No	No	No	No	No
13	F	NRL	>10	>5	No	No	No	No	No	No
14	F	NRL	6-10	>5	Yes	No	Yes	No	No	No
15	M	NRL	6-10	3-5	Yes	Yes	Yes	Yes	No	No
16	M	NRL	>10	>5	Yes	No	No	Yes	No	Yes — shellfish
17	F	NRL	>10	>5	Yes	Yes	Yes	Yes	No	Yes — bananas, almonds, chestnuts, (avocado?)
18	M	NRL	>10	>5	Yes	No	Yes	Yes	Yes	No
19	M	NRL	6-10	>5	Yes	No	Yes	No	No	No
20	F	NRL	>10	>5	Yes	No	Yes	No	No	No

NRL = Natural rubber latex.

**Table 2.** Reported by dentists with a confirmed type 1, allergy to NRL: glove related signs and symptoms

Dentist no.	Cracking of hands	Rash	Itching	Hives on skin	Runny nose	Itchy eyes	Facial swelling	Shortness of breath
1	Yes	Yes	Yes	Yes	Yes	Yes	No	No
2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3 <sup>a</sup>	No	No	Yes	No	No	Yes	No	No <sup>b</sup>
4 <sup>a</sup>	Yes	Yes	Yes	Yes	No	No	Yes	No
5	Yes	Yes	Yes	No	No	No	Yes	No
6	Yes	Yes	Yes	Yes	No	No	No	No
7	Yes	Yes	Yes	Yes	No	No	No	No
8 <sup>a</sup>	Yes	Yes	Yes	Yes	Yes	Yes	No	No
9 <sup>a</sup>	Yes	Yes	Yes	Yes	Yes	Yes	No	No
10 <sup>a</sup>	Yes	Yes	Yes	Yes	No	No	Yes	No
11 <sup>a</sup>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
12 <sup>a</sup>	No	No	Yes	Yes (body)	No	Yes	No	No
13	Yes	Yes	Yes	Yes	No	No	No	No
14	No	No	Yes	Yes	No	No	No	No
15	Yes	Yes	Yes	No	No	No	No	No
16 <sup>a</sup>	Yes	Yes	Yes	No	No	No	No	No
17 <sup>a</sup>	No	Yes	Yes	Yes	Yes	Yes	No	Yes
18	Yes	Yes	Yes	Yes	No	Yes	No	Yes
19 <sup>a</sup>	No	No	Yes	Yes	Yes	Yes	No	Yes
20	Yes	Yes	Yes	Yes	Yes	Yes	No	No

<sup>a</sup> Reaction to other NRL products.<sup>b</sup> Anaphylaxis after balloon deflated in face.

All dentists who reported NRL allergy had routinely been wearing NRL gloves for at least 3 years, with 13 reporting more than 5 years of exposure. In addition to repeated exposure to gloves, atopy seems to be the principal determinant for the development of NRL sensitization and the results of this present study support this. Five dentists reported a history of hand eczema in childhood and three reported suffering from asthma. A recent study by Field investigated risk factors for dental surgeons reporting an adverse reaction to NRL gloves.<sup>7</sup> Dentists with a history of eczema and hand eczema were most likely to report an adverse reaction to NRL gloves. No attempt was made, in Field's study, to differentiate between irritant and allergic (Type I or Type IV) reactions suffered by dental surgeons, as the majority had not undergone specialist testing.

A number of reports have suggested allergen cross-reactivity between NRL and bananas, as well as other foods such as avocados, chestnuts, tomatoes, kiwis and papayas.<sup>8-10</sup> It is of note, therefore, that one of the dentists in the present study reported an allergy to kiwi fruit and another to bananas, a number of nuts and, possibly, avocados. At the present time, it is not known whether a pre-existing asthma may be a risk factor for NRL allergy.<sup>11</sup>

In the reported study, there was a wide range of glove-related sensitization signs and symptoms reported by dentists and these ranged from cutaneous manifestations to systemic reactions. The majority of dentists (75%) reported signs and symptoms of hand dermatitis (*i.e.*, cracking and rash) which they attributed to wearing NRL gloves. Studies have shown that glove-wearing, NRL-allergic patients can present with persistent hand eczema as well as immediate cutaneous symptoms, *i.e.*, contact urticaria.<sup>1,12</sup> Turjanmaa found hand eczema in 67% of hospital employees with NRL allergy and this

disappeared after withdrawal of the NRL gloves, although the patients did not have a Type IV contact allergy to rubber chemicals.<sup>12</sup>

Glove-related skin complaints are complex and well-documented problems in occupational dermatology, but the results of published studies appear to support the assumption that the majority of skin complaints reported in association with glove use, are caused by skin irritation, rather than Type I or Type IV contact allergy.<sup>6</sup> It is significant, however, that all 20 dentists in the present study reported itching of the hands in response to wearing latex gloves. Itching and 'hives' have been statistically correlated to positive SPTs to NRL in two previous studies<sup>4,13</sup> but other investigators have shown that reported, glove-related skin symptoms are not specific signs of IgE-mediated NRL allergy.<sup>14-16</sup> The combination of immediate cutaneous (*i.e.*, itching and hives) and upper respiratory symptoms (runny nose and itchy or watery eyes) has been shown to be suggestive but not diagnostic of NRL allergy.<sup>13</sup> Delayed cutaneous reactions (Type IV) to thiurams were diagnosed following patch testing, in three of the dentists with NRL allergy. Chemicals in the thiuram group are used as accelerators in the manufacturing process of latex gloves and are implicated in the majority of occupationally-acquired glove allergies.<sup>17</sup>

All but one of the dentists identified in this survey as having NRL allergy were able to continue working in routine dental practice. The majority changed to using synthetic, non-NRL gloves, but six dentists were able to continue using a non-powdered NRL glove. Researchers have demonstrated that there is a great deal of variation in the allergen content of different NRL gloves and one study demonstrated more than 3,000-fold differences among 71 glove brands tested.<sup>18</sup> Dental practitioners

may, therefore, react to one glove type with a high level of NRL allergens, while remaining unaffected by another with a lower level of allergens. Most authorities appear to agree, however, that continued exposure to NRL gloves, in a healthcare worker with a proven allergy, is unwise and is likely to increase their level of sensitization. A recent study has focused attention on the frequent occurrence of NRL-induced asthma among healthcare workers<sup>19</sup> and others have highlighted the risks of the widespread use of powdered NRL gloves.<sup>1</sup> It is well-established that corn-starch glove powder can absorb NRL allergens from gloves and air-sampling studies have shown that NRL aeroallergen concentrations are high in areas where powdered NRL gloves are frequently used.<sup>1</sup> Dentist No. 2 continued to exhibit signs of occupationally-induced asthma whilst she was working in an environment in which other dental personnel continued to wear powdered NRL gloves. Changing practices to a powder-free environment solved the dentist's problem, although it was probably unnecessary for her colleagues to use synthetic gloves; unpowdered NRL gloves would have sufficed. Non-latex examination gloves made of synthetic rubbers (*e.g.*, nitrile) are now available which can be used in dental practice. Synthetic gloves made of plastic or vinyl materials are not suitable for operative dentistry because they fit badly and are uncomfortable to wear for long periods of time. Studies have shown that vinyl gloves are generally more blood- and water-permeable than latex gloves.<sup>20</sup>

Latex allergy is becoming a major occupational health issue and dental surgeons are clearly at risk from becoming sensitized to NRL.<sup>21</sup> Occupational health physicians in the health service must be aware that latex sensitization is a potentially serious working condition and that appropriate precautions need to be employed in the management of affected individuals.<sup>22</sup>

## CONCLUSIONS

Natural rubber latex allergy is acknowledged as a significant occupational problem among healthcare workers who routinely wear NRL gloves. Dental surgeons, particularly those with an atopic history, are clearly at risk. The cutaneous symptoms of NRL allergy may remain unrecognized, or attributed to skin irritation caused by the occlusive effects of gloves, glove powder or hand-washing agents. Dental surgeons who report glove-related immediate cutaneous symptoms, *i.e.*, contact urticaria, rhinoconjunctivitis or occupational asthma should be referred for clinical evaluation and diagnostic testing for NRL allergy by an appropriate specialist. The results of this study indicate that dentists diagnosed as having NRL allergy can, in most cases, continue to work in routine dental practice, provided they are given appropriate occupational advice concerning latex avoidance and the use of synthetic gloves. Other members of the dental team working within the same clinical environment should wear powder-free NRL gloves, as latex aeroallergens pose a significant risk to a sensitized dentist. Dental healthcare workers should be encouraged to

choose a latex glove that is powder-free and low in extractable latex proteins if they wish to minimize their chances of becoming sensitized to NRL.<sup>21</sup>

Occupational health and safety issues concerning latex allergy need to be addressed for individual health workers and the institutions which employ them.

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## REFERENCES

1. Turjanmaa K, Alenius H, Mäkinen-Kiljunen S, *et al.* Natural rubber latex allergy. *Allergy* 1996; 51: 593–602.
2. Burke FJT, Wilson NHF, Cheung SW. Factors associated with skin irritation of the hand experienced by dental practitioners. *Contact Dermatitis* 1995; 32: 5–38.
3. Tarlo SM, Sussman GL, Holness DL. Latex sensitivity in dental students and staff: a cross-sectional study. *J Allergy Clin Immunol* 1997; 99: 396–401.
4. Field EA, King CM. Skin problems associated with routine wearing of protective gloves in dental practice. *Br Dent J* 1990; 169: 281–285.
5. Arellano R, Bradley J, Sussman G. Prevalence of latex sensitisation among hospital physicians occupationally exposed to latex gloves. *Anaesthesiology* 1992; 77: 905–908.
6. Wrangsjö K, Osterman K, van Hage-Hamsten M. Glove-related skin symptoms among operating theatre and dental care unit personnel. *Contact Dermatitis* 1994; 30: 102–107.
7. Field EA. Atopy and other risk factors for UK dentists reporting an adverse reaction to latex gloves. *Contact Dermatitis* 1998; 30: 132–136.
8. Blanco C, Carrillo T, Castillo R, Quirarte J, Cuevas M. Avocado hypersensitivity. *Allergy* 1994; 49: 454–459.
9. Mäkinen-Kiljunen S. Banana allergy in patients with immediate-type hypersensitivity to natural rubber latex: characterization of cross-reacting antibodies and allergens. *J Allergy Clin Immunol* 1994; 93: 990–996.
10. Lavaud F, Prevost A, Cossart C, Guerin L, Bernard J, Kochman S. Allergy to latex, avocado, pear and banana — evidence for a 30 kd antigen in immunoblotting. *J Allergy Clin Immunol* 1995; 95: 557–564.
11. Vandenplas O. Occupational asthma caused by natural rubber latex [Review]. *Eur Respir J* 1995; 8: 1957–1965.
12. Turjanmaa K. Latex glove contact urticaria. Thesis, University of Tampere, 1988. *Acta Universitatis Tampereensis series A* 254: 1–86.
13. Yassin MS, Lieri M, Fisher T, O'Brien K, Cross J, Steinmetz C. Latex allergy in hospital employees. *Ann Allergy* 1994; 72: 245–249.
14. Wrangsjö K, Mellström G, Axelsson G. Discomfort from rubber gloves indicating contact urticaria. *Contact Dermatitis* 1985; 15: 79–84.
15. Turjanmaa K. Incidence of immediate allergy to latex gloves in hospital personnel. *Contact Dermatitis* 1987; 17: 270–275.

16. Lagier F, Vervloet D, Lhermet I, Poyen D. Prevalence of latex allergy in operating room nurses. *J Allergy Clin Immunol* 1992; 89: 319–322.
17. Heese A, von Hintzenstern J, Peters K-P, Koch HU, Hornstein OP. Allergic and irritant reactions to rubber gloves in medical health services. *J Am Acad Dermatol* 1991; 25: 831–839.
18. Yunginger J, Jones R, Fransway A. Extractable latex allergens and proteins in disposable medical gloves and other rubber products. *J Allergy Clin Immunol* 1994; 93: 836.
19. Vandenplas O, Delwiche JP, Evrard G. Prevalence of occupational asthma due to latex among hospital personnel. *Am J Respir Crit Care Med* 1995; 151: 54–60.
20. Korniewicz D, Laughan B, Cry W, Lytle D, Larson E. Leakage of virus through used vinyl and latex examination gloves. *J Clin Microbiol* 1990; 28: 787–788.
21. Field EA, Fay FM. Issues of latex safety in dentistry. *Br Dent J* 1995; 179: 247–253.
22. White IR. Setting standards for product selection: allergy prevention. *Eur J Surg* 1997; 579(Suppl): 27–28.

