



**HAL**  
open science

## Occupational contact urticaria: lessons from the French National Network for Occupational Disease Vigilance and Prevention (RNV3P)

L. Bensefa-Colas, M. Telle-Lamberton, S. Faye, J.-L. Bourrain, M.-N. Crépy, Gérard Lasfargues, D. Choudat, I. Momas

### ► To cite this version:

L. Bensefa-Colas, M. Telle-Lamberton, S. Faye, J.-L. Bourrain, M.-N. Crépy, et al.. Occupational contact urticaria: lessons from the French National Network for Occupational Disease Vigilance and Prevention (RNV3P). *British Journal of Dermatology*, 2015, 173 (6), pp.1453-1461. 10.1111/bjd.14050 . hal-01392378

**HAL Id: hal-01392378**

**<https://hal.science/hal-01392378>**

Submitted on 11 May 2022

**HAL** is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution - NonCommercial 4.0 International License

# Occupational contact urticaria: lessons from the French National Network for Occupational Disease Vigilance and Prevention (RNV3P)

L. Bensefa-Colas,<sup>1,2</sup> M. Telle-Lamberton,<sup>3</sup> S. Faye,<sup>4</sup> J.-L. Bourrain,<sup>5</sup> M.-N. Crépy,<sup>1</sup> G. Lasfargues,<sup>4,6</sup> D. Choudat,<sup>1</sup> RNV3P members<sup>†</sup> and I. Momas<sup>2</sup>

<sup>1</sup>Occupational Diseases Department, University Hospital of Centre of Paris-Cochin, AP-HP, 27 Rue du Faubourg Saint Jacques, 75014 Paris, France

<sup>2</sup>Laboratoire Santé Publique et Environnement, Paris Descartes University, Sorbonne Paris Cité, EA 4064, Paris, France

<sup>3</sup>Observatoire Régional de Santé (ORS), Ile-de-France, Paris, France

<sup>4</sup>French Agency for Food, Environmental and Occupational Health & Safety (ANSES), Maisons-Alfort, France

<sup>5</sup>Exploration des Allergies, University Hospital of Montpellier, Montpellier, France

<sup>6</sup>Paris-Est University, Créteil, France

## Correspondence

Lynda Bensefa-Colas.

E-mail: lynda.bensefa@gmail.com

## Funding sources

The study network was funded by the French Agency for Food, Environmental and Occupational Health and Safety (ANSES), the National Health Insurance System for Employees (CNAM-TS) and the National Health Insurance System for Agricultural Workers (CCMSA). Any opinions and conclusions expressed herein are solely those of the authors.

## Conflicts of interest

None declared.

<sup>†</sup>The members of the RNV3P collaboration group are listed in the Appendix.

## Summary

**Background** Occupational contact urticaria (OCU) is an occupational contact dermatitis that can cause serious health consequences and disability at work.

**Objectives** To describe OCU and its temporal trends by the main causal agents and activity sectors in a nationwide scheme in France.

**Methods** Using data from the French National Network for Occupational Disease Vigilance and Prevention (RNV3P), we described OCU reported during the period 2001–10 and analysed the temporal trends of OCU and OCU attributed to the most frequent agents over the study period. Trends analyses were supported by reporting odds ratios using a logistic regression model with reference to 2001, or with time as a continuous variable.

**Results** During the study period, 251 cases of OCU were reported in RNV3P, half of which were due to natural rubber latex, in particular in the health and social work activity sector (HSW). The number of these cases declined significantly over the study period (19% per year), and particularly after 2006. Conversely, the other causes of OCU did not decrease.

**Conclusions** Using surveillance data from a French national network, this study has found that there was a significant decline in OCU due to natural rubber latex, particularly in the HSW, when powdered latex gloves were banned from French hospitals. Our results show the effectiveness of this preventive measure, and suggest that this practice should be extended to other sectors.

## What's already known about this topic?

- Contact urticaria is known to be a frequent cause of occupational dermatosis, but statistics on occupational contact urticaria (OCU) are scarce.

## What does this study add?

- For the first time, temporal trends in OCU were studied over a 10-year period using data from the French RNV3P network.
- The results show the effectiveness of latex exposure prevention measures for healthcare workers and the need for these measures to be extended to other sectors to reduce OCU in the workplace.

Occupational skin diseases (OSDs) are the second most common occupational health problem in Europe, after musculoskeletal disorders.<sup>1</sup> They represent 10–40% of all recognized occupational illnesses and are one of the most important emerging risks related to exposure to chemical, physical and biological risk factors.<sup>1,2</sup> Occupational contact dermatitis (OCD) is the most frequently reported work-related skin disease in many countries. While less frequent than OCD, occupational contact urticaria (OCU) accounts for 1–8% of reported cases of occupational skin diseases.<sup>3</sup>

OCU can be defined as a type of urticaria for which the causal agents or exposure can be found partly or wholly in the work environment.<sup>2</sup> It comprises physical urticaria, which can be made worse by occupational activities, and contact urticaria due to causative agents, proteins or chemicals, with an immunological or nonimmunological mechanism.<sup>4</sup> Because symptoms can be severe in certain circumstances, the problem of OCU needs to be addressed. However, while the causes of immunological contact urticaria are known,<sup>5–7</sup> only some of these causes have been identified as being related to workplace exposure.<sup>4</sup> Most publications on OCU are case reports or short series, and there have been only a few epidemiological studies.<sup>4,8–13</sup>

Data concerning OSD in French workers are very limited.<sup>14</sup> In France the only national statistics available come from Public Insurance Compensation. Even then, only OCU caused by latex proteins is compensated for and recorded. Furthermore, these data have certain biases: they do not take into account nonsalaried workers, and compensation criteria are based more on administrative criteria than on clinical diagnosis.

The most comprehensive information on OSD and OCU in France is issued from the French Occupational and Environmental Disease Consultation Centres, situated at 32 university hospitals: these make up the French National Network for Occupational Disease Vigilance and Prevention (RNV3P, Réseau National de Vigilance et de Prévention des Pathologies Professionnelles). It was set up in 2000 and continuously monitors occupational diseases, including skin allergies.<sup>14,15</sup> Patients with suspected work-related diseases are referred to these centres, mainly by occupational physicians, general practitioners or specialists, such as dermatologists, in order either to obtain expert advice on the link between exposure and disease, or to obtain technical support. RNV3P is an occupational health surveillance scheme at the national level.<sup>15</sup> In this context, the aim of this study based on RNV3P was to describe general features and to study temporal trends in notified OCU by activity sectors and main causal agents in France over the period 2001–10.

## Material and methods

### Data collection and study database

Data collection from RNV3P has been described previously.<sup>14</sup> The experienced occupational physicians based in the 32 centres systematically complete standardized forms for each

new referred patient and report all new cases of occupational diseases. Only the final diagnosis was used for data collection.<sup>14,15</sup> Data included diagnosed diseases (among them OSD and OCU), exposures and occupations and/or activity sectors. All data are coded using the standardized International Classification of Diseases 10th revision (ICD-10).<sup>15</sup> The medical experts rated imputability, which is the evidence of association between the occupational exposure and the disease on a four-level scale including null, possible, probable and certain. The quality of data was optimized using computerized tools for coding and monitoring data consistency, regular quality training and centralized quality controls.<sup>14,15</sup>

The study database consisted of 69 779 work-related disease events recorded in the RNV3P between 2001 and 2010, with completed data on occupational exposure (substances and occupation) and the potential association between occupational exposure and disease.<sup>14</sup> The present analysis deals with 7146 cases of OSD (neoplasia excepted) considered as being probably or certainly associated with exposure (ICD-10 codes L00–L99) (Fig. 1).

The RNV3P network received approval for this study from the national board enforcing data protection legislation.

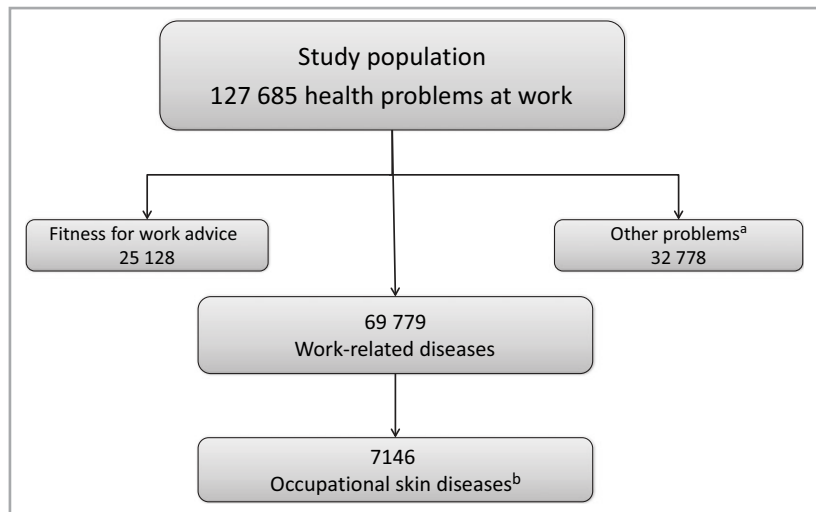
### Case definition

Diagnosis of OCU was based on clinical investigation, mainly skin prick tests with commercially available suspected standardized allergens, or prick by prick (with fresh materials such as food). For a few allergens on determination of specific IgE, including latex and its recombinant allergens (Hev b1, Hev b3, Hev b5 and Hev b6-02), diagnosis was made by several different commercial methods, including radioallergosorbent tests and, currently, enzyme-linked immunosorbent assay (ImmunoCAP 100; Phadia AB, Uppsala, Sweden).<sup>4</sup> Patients were assessed by experienced occupational medical experts, mostly dermatologists or allergists. The physicians took skin-test results and their occupational relevance into consideration when determining the causal relationship by providing a semi-quantitative scale of work relatedness.

Cases were defined as all new OCU (ICD-10 codes L50 and L50-0–L50-9) notified from 2001 to 2010 that were considered to be probably or certainly associated with occupational exposure by the medical expert of each centre.

### Data analysis

Descriptive analyses were performed on occupations, industrial activities and agents related to the OCU cases reported in RNV3P during the study period. Trend analyses were carried out when the numbers of cases were adequate ( $n \geq 50$ ) and were based on previously used methods.<sup>14,16,17</sup> Analysed data consisted of the number of new notified cases in the national database for a given year. The odds (called reporting odds) of OCU or OCU related to specific occupational exposure (namely a causal agent, an industrial sector or both) for a given year were defined by the ratio between the number of



**Fig 1.** Flow chart of the study population: occupational skin diseases recorded in the French National Network for Occupational Disease Vigilance and Prevention, 2001–10. <sup>a</sup>Environmental diseases without any opinions on association with exposure on clinical file. <sup>b</sup>Occupational skin diseases probably or certainly work related.

OCU cases or OCU cases associated with this exposure and the number of all other cases of OSD in this year. The reporting odds ratio (ROR)<sup>18</sup> for each year was calculated with reference to the year 2001 using a logistic regression model that controlled for age and sex; the dependent variable was OCU cases vs. other dermatitis, or OCU related to a specific exposure vs. other cases of dermatitis. The main predictor – calendar time – was treated here as a categorical variable, with each category parameter leading to an estimate of the corresponding year's ROR. Temporal trends were tested by the nonparametric Kendall rank correlation test between years, and the ROR was calculated for each year.

An alternative method considering calendar time as a continuous variable with a scale of years in the logistic model was also used. It led to an estimate of the annual change in ROR, the underlying hypothesis being that the trend would be a regular increase (or a regular decrease) in the ROR by a constant multiplicative factor.

Statistical analyses were performed using R software (<https://www.r-project.org/>). Statistical significance was defined as  $P < 0.05$ .

## Results

### Sociodemographic data

During the study period 2001–10, 251 cases of OCU were recorded in the RNV3P network, with a clear predominance of women (176, 70.1%). The link between disease and exposure was considered as certain in 163 cases (64.9%). The mean age was  $36.3 \pm 10.6$  years, with women significantly younger than men ( $P = 0.005$ ) (Fig. 2).

The most frequently reported industrial activities were health and social work activities (HSW), including 94 cases of OCU (41%), which were almost exclusively among women (85 cases). The second most frequently reported activity was manufacturing (41 cases, 18%), with a predominance of men (28 cases) (Table 1). The most frequently involved

occupations were personal and protective service work (mainly personal care workers and to a lesser extent hairdressers), life science and health associate professionals (mainly nursing and midwifery professionals) and sales and services occupations, which were represented largely by helpers and cleaners (Table 1).

### Causal agents

Physical factors were involved in 21 cases, including pressure ( $n = 9$ ), cold ( $n = 3$ ) and vibration ( $n = 1$ ). Vegetal proteins were the most common cause of OCU ( $n = 143$ , 62%, physical OCU excepted) (Fig. 3). Among them, natural rubber latex (NRL) was predominant ( $n = 124$ ), followed by plants, grains and vegetables ( $n = 15$ ), wood ( $n = 3$ ) and enzyme ( $n = 1$ ). Animal proteins cases ( $n = 8$ , 3.5%) were attributed to fish and seafood, meat, and insects. Hair bleaching products represented the most frequent nonprotein substance related to OCU ( $n = 9$ ).

Among cases due to NRL, HSW was by far the most commonly involved activity sector (65%), followed by real estate, renting and business activities (9.7%). However, there were no predominant occupations. Conversely, non-NRL cases came from a wide variety of activity sectors (Fig. 4).

### Temporal trends

During the 2001–10 study period, the overall number of cases of OSD decreased significantly relative to all other occupational diseases in the RNV3P network, by an average of 6% per year ( $P < 0.001$ , data not shown). Among OSD (Table 2), cases of OCU decreased significantly relative to all other cases of dermatitis (by an average of 9% per year,  $P < 0.001$ ). However, the trend results differed according to causal agents and sectors. We observed a significant decrease in reported cases of OCU related to NRL in the whole workforce (by an average of 15% per year,  $P < 0.001$ ), and the downward trend was significantly greater for cases restricted to NRL in the HSW

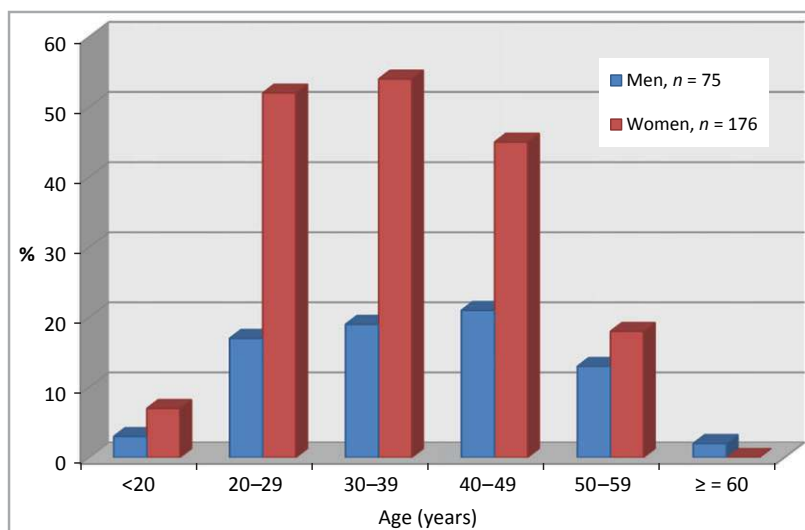


Fig 2. Distribution of work-related cases of urticaria reported in the French National Network for Occupational Disease Vigilance and Prevention, 2001–10, by age group and sex (n = 251).

sector (by an average of 19% per year,  $P < 0.001$ ). With reference to 2001, the odds of OCU due to NRL became significantly lower in the second part of the period (Fig. 5). Conversely, causes other than NRL did not show any significant trend.

## Discussion

For the first time, we describe trends in cases of OCU for the main involved agents and industrial activities in a national occupational disease surveillance scheme. The present study covers a 10-year period. Half of the cases were due to NRL, in particular in the HSW sector, and the number of new cases decreased significantly over the 2001–10 study period. During this period other causes of OCU did not decrease. Before discussing these results, strengths and limitations of our data need to be addressed.

Firstly, under-reporting is a known bias in population-based registry studies, and under-reporting of true cases of OCU cannot be excluded in our reporting network. However, hospital-based occupational disease centres serve as a reference for physicians and specialists for the diagnosis of OCD including OCU, and we can suppose that capture of cases of OSD and OCU in these centres is far higher than the capture of work-related diseases as a whole.<sup>14</sup>

The main strength of our study is thus based on the occupational and medical expertise. Standardized diagnostic procedures for determining OCU are performed by trained occupational medical experts, who have the expertise to look for and highlight specific work-related allergens.<sup>14</sup> Diagnosis is based on the patient's full medical history and assessment of exposure risks in the workplace, in combination with testing results in accordance with guidelines.<sup>19,20</sup> The causal relationship between disease and agent was coded, which allows identification of contact urticaria that is probably or certainly work related. One strength of our

study is that the RNV3P data are taken from multiple centres spread throughout France, thus reducing the potential bias that could result from region-specific industries. Furthermore, this network probably provides the only reliable statistics on OCU at a national level.

One limiting factor in our study is that it is based not on the entire French occupational population, but on a specific subpopulation captured by the centres.<sup>14,15</sup> In order to address this bias, we used the subgroup of all OSDs reported in our network as the reference population, with these data being supplied by the physicians who made the same clinical investigations for the diagnosis of contact dermatitis and urticaria. The study design allows measurement of the disproportionality of the occurrence of a specific OCU (case) relative to all other occurrences of all other OSDs in the network (not cases), thus enabling oversignals in the reporting database to be detected over a period of 1 year.<sup>18</sup> These data can thus provide valid information on time trends in subgroups without direct reference to the whole population.<sup>21</sup>

Regarding temporal trends during the 2001–10 period, changes in disease recognition or in the strength of relationship between OCU and allergens could introduce a bias and compromise the consistency of diagnosis over time, an important criterion for valid estimation.<sup>14,17,22</sup> However, no significant change in the diagnostic method has occurred during the study decade and we feel confident that there was no risk of bias due to under-reporting over the years due to reporter fatigue.<sup>16,17</sup> Indeed, inclusions in RNV3P were not based on voluntary reporting, and all diseases were systematically and mandatorily reported on the basis of financial contracts.<sup>14,15</sup> In addition, during the same period the total number of reported diseases in the network increased significantly.

Lastly, most of the national schemes have studied OSD without making any distinction between OCU and other OSDs (such as OCD), and information on the actual cause is not

**Table 1** Industrial sectors and occupations of patients with occupational contact urticaria reported in the French National Network for Occupational Disease Vigilance and Prevention by sex, 2001–10 (n = 251)

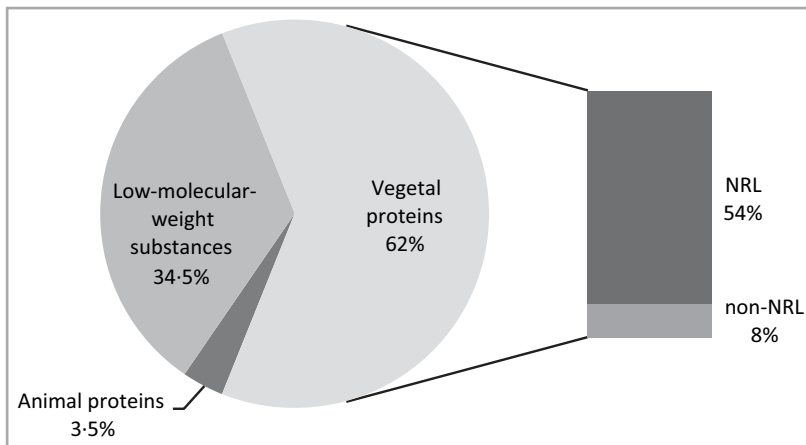
	Men	Women	Total
Activity sectors <sup>a,b</sup>			
A. Agriculture, hunting and forestry	3 (4)	4 (2.6)	7 (3.1)
B. Fishing, aquiculture	0	0	0
C. Mining and quarrying	1 (1)	0	1 (0.4)
D. Manufacturing	28 (39)	13 (8.3)	41 (18.1)
E. Electricity, gas and water supply	0	0	0
F. Construction	7 (10)	1 (0.6)	8 (3.5)
G. Wholesale and retail trade; repair of motor vehicles, motorcycles and personal and household goods	6 (8)	10 (6.4)	16 (7)
H. Hotels and restaurants	2 (3)	5 (3.2)	7 (3.1)
I. Transport, storage and communication	0	2 (1.3)	2 (0.9)
J. Financial activities	0	0	0
K. Real estate, renting and business activities	7 (10)	7 (4.5)	14 (6.2)
L. Public administration and defence; compulsory social activities	4 (6)	11 (7.1)	15 (6.6)
M. Education	1 (1)	6 (3.8)	7 (3.1)
N. Health and social work activities	9 (13)	85 (54.5)	94 (41.4)
O. Community, social and personal service activities	2 (3)	12 (7.7)	14 (6.2)
P. Private households employing staff and undifferentiated production activities of households for own use	0	0	0
Q. Extraterritorial organizations and bodies	1 (1)	0	1 (0.4)
Total	71 (100)	156 (100)	227 (100)
Occupations <sup>b</sup>			
13 General managers	0	1 (0.6)	1 (0.4)
21 Physical, mathematical and engineering science professionals	1 (1)	0	1 (0.4)
22 Life science and health professionals	2 (3)	12 (6.8)	14 (5.6)
23 Teaching professionals	1 (1)	0	1 (0.4)
31 Physical and engineering science associate professionals	3 (4)	3 (1.7)	6 (2.4)
32 Life science and health associate professionals	3 (4)	47 (26.7)	50 (19.9)
33 Teaching associate professionals	1 (1)	0	1 (0.4)
34 Other associate professionals	0	2 (1.1)	2 (0.8)
41 Office clerks	2 (3)	1 (0.6)	3 (1.2)
42 Customer services clerks	0	1 (0.6)	1 (0.4)
51 Personal and protective services workers	9 (12)	57 (32.4)	66 (26.3)
52 Models, salespersons and demonstrators	3 (4)	7 (4.0)	10 (4.0)
61 Market-oriented skilled agricultural and fishery workers	3 (4)	6 (3.4)	9 (3.6)
71 Extraction and building trades workers	15 (20)	0	15 (6.0)
72 Metal, machinery and related trades workers	6 (8)	1 (0.6)	7 (2.8)
73 Precision, handicraft, printing and related trades workers	1 (1)	3 (1.7)	4 (1.6)
74 Other craft and related trades workers	7 (9)	3 (1.7)	10 (4.0)
81 Stationary-plant and related operators	3 (4)	1 (0.6)	4 (1.6)
82 Machine operators and assemblers	11 (15)	5 (2.8)	16 (6.4)
83 Drivers and mobile-plant operators	2 (3)	0	2 (0.8)
91 Sales and services elementary occupations	2 (3)	21 (11.9)	23 (9.2)
92 Agricultural, fishery and related labourers	0	1 (0.6)	1 (0.4)
93 Labourers in mining, construction, manufacturing and transport	0	4 (2.3)	4 (1.6)
Total	75 (100)	176 (100)	251 (100)

Values are n (%). <sup>a</sup>Missing data, n = 24. <sup>b</sup>P < 0.001 for comparison of activity sectors per sex, or occupations per sex, using a  $\chi^2$ -test.

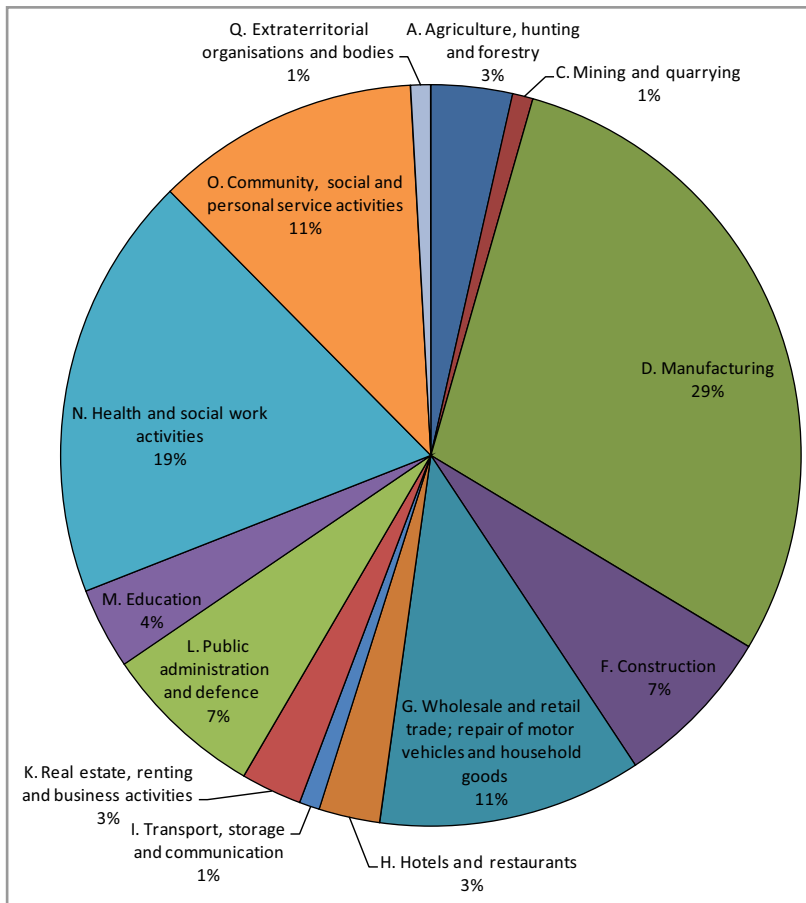
often reported.<sup>23</sup> Even when it is reported, the link with occupational exposure is most often unknown or unclear. The strength of our surveillance scheme is the availability of data on the sources of exposure, occupations, and activity sectors that are actually involved.

This study describes the OCU case features, including time trends, in an occupational disease surveillance network for a

disease that has been poorly documented in the literature.<sup>8–13</sup> Comparisons with data in other countries are very difficult: national occupational skin registries are scarce, and, as mentioned above, they mostly combine all subtypes of OSD and provide in the best cases an estimate of the incidence of occupational dermatosis.<sup>12</sup> Apart from OCU due to NRL, studies based on time series are very rare.



**Fig 3.** Causes of occupational contact urticaria (OCU) reported in the French National Network for Occupational Disease Vigilance and Prevention, 2001–10, by causal agents, except physical OCU (n = 230). NRL, natural rubber latex.



**Fig 4.** Cases of occupational contact urticaria due to agents other than natural rubber latex reported in the French National Network for Occupational Disease Vigilance and Prevention, 2001–10, by industry sector (n = 114, missing data, n = 13).

In our data, contact urticaria most frequently affected young women. Similar patterns have been shown in the U.K.,<sup>10,11</sup> and more recently in a retrospective study in Australia.<sup>13</sup>

In the RNV3P, the predominant sector involved in OCU was HSW, consisting mostly of healthcare workers, with a large proportion of women as previously described in the U.K.<sup>11,12,24</sup> and Australia.<sup>13</sup> Conversely, according to statistics from Finland, the highest numbers of cases of OCU concerned farmers and domestic animal attendants.<sup>9</sup>

In our study, at-risk occupations other than HSW were hairdressers, cleaners or machine operators. This differed slightly from other studies, with the differences being dependent on the socioeconomic fabric of the country.<sup>25</sup> The workers most commonly reported as being at risk of OCU in these studies include, in addition to HSW occupations, bakers, farmers and those in food preparation occupations, as well as veterinarians and domestic animal attendants, and hairdressers.<sup>3–5,20</sup>

NRL was the predominant cause of OCU reported in the RNV3P network, followed by other vegetal proteins and by hair

**Table 2** Annual distribution and trends of occupational contact urticaria (OCU) reported in the French National Network for Occupational Disease Vigilance and Prevention by selected causal agents and/or activity sectors,<sup>a</sup> 2001–10

OCU group	All cases	Natural rubber latex (NRL)	Other than health and social work: NRL		
			Health and social work: NRL	Other than health and social work: NRL	Other than NRL
Total	251	124	74	50	127
2001	29	19	17	2	10
2002	34	17	11	6	17
2003	37	15	10	5	22
2004	32	19	9	10	13
2005	29	20	9	11	9
2006	21	11	4	7	10
2007	15	8	6	2	7
2008	28	7	4	3	21
2009	18	6	3	3	12
2010	8	2	1	1	6
Kendall tau on annual RORs <sup>b</sup>					
Kendall tau <sup>c</sup>	-0.60	-0.76	-0.89	-0.20	-0.20
P-value	0.016	0.002	< 0.001	0.42	0.42
ROR (years) <sup>b,d</sup>					
ROR	0.91	0.85	0.81	0.92	0.98
CI	0.87–0.96	0.80–0.91	0.74–0.88	0.83–1.01	0.92–1.04
P-value	< 0.001	< 0.001	< 0.001	0.098	0.54

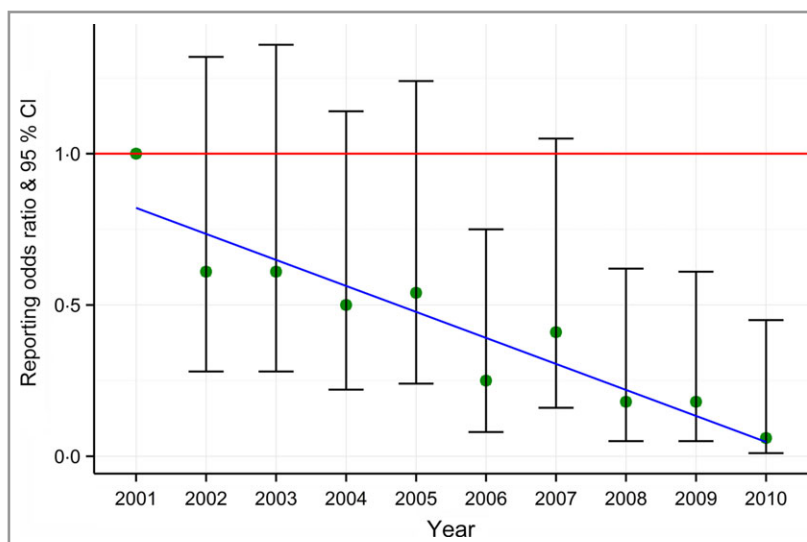
ROR, reporting odds ratio; CI, confidence interval. <sup>a</sup>Relative to all other occupational skin diseases (neoplasia excepted). <sup>b</sup>Annual RORs were defined as the ratio between the number of cases of OCU in each group and the number of all other occupational skin diseases for a given year, with reference to 2001 using a logistic regression model (controlled for age and sex). <sup>c</sup>Nonparametric Kendall rank correlation tau between years and the annual RORs. <sup>d</sup>Annual change in ROR for a year ( $x$ ) vs. year ( $x - 1$ ).

bleaching products. Allergy to NRL is actually a sensitization to *Hevea brasiliensis* proteins, and NRL is known to be the most common cause of OCU.<sup>5,6,25</sup> Vegetal or animal proteins are the most commonly reported causes of OCU,<sup>3</sup> with a less frequently reported cause being chemicals that involve an immunological or nonimmunological mechanism.<sup>3,4</sup> Causal agents other than NRL reported in the literature are cow dander, food and animal products, and flours and grains.<sup>3,8,9,11–13</sup> However, it is surprising that animal proteins are involved in only a few cases in our network, one of the hypotheses being

that OCU due to animal proteins was classified as protein contact dermatitis (PCD), for which the most frequent clinical presentation is a chronic or recurrent eczema, sometimes associated with exacerbation of urticarial reaction immediately after contact with the causal protein.<sup>6</sup> All of these factors could explain a probable misclassification of animal protein OCU as PCD to animal proteins, particularly for people handling foods.<sup>6</sup>

Our data reveal that ammonium persulfates and other persulfates were probably the hair bleaching urticant causing

**Fig 5.** Annual reporting odds ratios for occupational contact urticaria due to natural rubber latex in the health and social work sector reported in the French National Network for Occupational Disease Vigilance and Prevention, 2001–10 ( $n = 124$ ), with 2001 as the reference year. CI, confidence interval.





OCU in hairdressers.<sup>4,26</sup> They were the third most common cause of OCU in the Australia study.<sup>13</sup>

Physical exposure is associated with cases referred to as physical contact urticaria, which is considered a subgroup of contact urticaria.<sup>4,25</sup> In these cases the origin is not purely occupational, and exacerbations can be triggered by direct contact with the physical agent during workplace activities. This can result in deep oedema or shock, for example after exposure to a cold environment. Although it is conventionally classified separately, this specific syndrome is an important issue, particularly because of occupational consequences and the risk of professional exclusion.<sup>4,5</sup> In our network, the wearing of gloves, materials handling and repeated contacts in some cases caused delayed-pressure urticaria in the workplace. Such clinical settings have been rarely described in the literature.

Over the course of the study period, the sector most commonly involved in OCU related to NRL was the HSW sector. In other studies, sensitization and clinical allergy to NRL have also been reported more frequently in the HSW sector, the most common clinical manifestation being contact urticaria.<sup>6,25,27,28</sup> NRL is known to have been a serious occupational health hazard for healthcare workers during the 1990s and 2000s,<sup>29</sup> especially for those with a high exposure to latex gloves highly powdered with protein.<sup>30</sup> Indeed, use of NRL medical gloves in France increased 10-fold in the years 1980–90 following the emergence of the HIV infection epidemic.<sup>31</sup> At that time, prevalence studies showed that 2–17% of exposed healthcare workers were sensitized to NRL, while the rate was < 1% in the general population.<sup>7,20,25,27,28,32–34</sup>

Regarding time-trend analysis, during the 2001–2010 study period we observed a significant decrease in the overall number of cases of OCU reported in the RNV3P network, with an annual decline of 9%. Cases due to NRL among HSW decreased significantly at a rate of 19% per year, and since 2006 the difference from 2001 has been statistically significant. This decrease occurred concomitantly with the French recommendations since approximately 2004 to use low-protein, nonpowdered latex gloves and latex-free gloves as preventive measures in hospitals. Indeed, in 2004 the French National Agency for Medicine and Health Products Safety carried out a market survey on latex medical gloves, and in 2005 it confirmed the interest in powder-free gloves in the management of latex allergy risk in hospitals, in parallel with restricted use of latex gloves if alternatives existed.<sup>31,35</sup> Indeed, the introduction of powder-free gloves began with experiments in some French hospitals and was extended to most hospitals after 2004–05. Recommendations to reduce exposure to latex gloves in the workplace have been made by many countries (the U.S.A. and several European countries among them), which has resulted in a decrease in latex allergy.<sup>34,36–38</sup> However, Bousquet et al. have pointed out a lack of appropriate studies to assess the effect of these policies.<sup>29</sup> The decline of NRL-induced OCU observed in our data in the HSW sector in France, particularly during the second part of the last decade following the hospital-wide interventions, suggests the effectiveness of such preventive actions.

Conversely, in sectors other than HSW, NRL-induced cases of OCU have remained relatively stable according to data from the RNV3P network, suggesting a need to extend public health policy to reduce exposure to NRL from latex gloves in these other sectors. Latex gloves should not be used in the workplace when they are not necessary (as in the agri-food, hair-dressing and cleaning sectors).

Lastly, no trend was apparent for non-NRL cases of OCU over the 2001–10 study period. It is important that future occupational health policies take urticant exposure into account, in order to reduce exposure in the different sectors shown in our analysis that could be at risk, such as manufacturing, social and personal service activities, and the automobile industry. Further research is needed to identify sensitizers and their sources of generation in the workplace (in particular proteins in the agri-food and research sectors), and to limit exposure by substitution, reduction of exposure, containment (e.g. use of robotics), the use of protective equipment and ventilation. It is also necessary to provide information and training for workers about allergens and safety, and to refer workers with OCU to physicians who have expertise to make the appropriate workplace adjustments.

In conclusion, we have used data taken from the RNV3P over a 10-year period to study, for the first time, the causes of OCU in the workplace by activity sector and time frame. The significant decrease in OCU related to NRL in the HSW sector following preventive measures enforced in the middle 2000s in French hospitals would appear to endorse the efficacy of such measures. As OCU related to other agents has been shown to be stable, we suggest that other occupational groups and sectors could also benefit from preventive measures.

## References

- 1 Brun E, European Agency for Safety and Health at Work. *Expert Forecast on Emerging Chemical Risks Related to Occupational Safety and Health*. Luxembourg: Office for Official Publications of the European Communities, 2009.
- 2 European Agency for Safety and Health at Work. *Occupational Skin Diseases and Dermal Exposure in the European Union (EU-25): Policy and Practice Overview*. Luxembourg: Office for Official Publications of the European Communities, 2008.
- 3 Nicholson PJ, Llewellyn D, English JS. Evidence-based guidelines for the prevention, identification and management of occupational contact dermatitis and urticaria. *Contact Derm* 2010; **63**:177–86.
- 4 Le Coz CJ. Urticaria. In: *Kanerva's Occupational Dermatology* (Rustemeyer T, Elsner P, John S-M, Maibach HI, eds), Berlin, Heidelberg: Springer-Verlag, 2012; 217–30.
- 5 Bourrain JL. Occupational contact urticaria. *Clin Rev Allergy Immunol* 2006; **30**:39–46.
- 6 Amaro C, Goossens A. Immunological occupational contact urticaria and contact dermatitis from proteins: a review. *Contact Derm* 2008; **58**:67–75.
- 7 Basketter D, Lahti A. Immediate contact reactions. In: *Contact Dermatitis* (Johansen JD, Frosch PJ, Lepoittevin J-P, eds), Berlin, Heidelberg: Springer, 2011; 137–53.

- 8 Kanerva L, Jolanki R, Toikkanen J et al. Statistics on occupational dermatoses in Finland. *Curr Probl Dermatol* 1995; **23**:28–40.
- 9 Kanerva L, Toikkanen J, Jolanki R, Estlander T. Statistical data on occupational contact urticaria. *Contact Dermatitis* 1996; **35**:229–33.
- 10 Cherry N, Meyer JD, Adisesh A et al. Surveillance of occupational skin disease: EPIDERM and OPRA. *Br J Dermatol* 2000; **142**:1128–34.
- 11 McDonald JC, Beck MH, Chen Y, Cherry NM. Incidence by occupation and industry of work-related skin diseases in the United Kingdom, 1996–2001. *Occup Med (Lond)* 2006; **56**:398–405.
- 12 Turner S, Carder M, van Tongeren M et al. The incidence of occupational skin disease as reported to The Health and Occupation Reporting (THOR) network between 2002 and 2005. *Br J Dermatol* 2007; **157**:713–22.
- 13 Williams JDL, Lee AYL, Matheson MC et al. Occupational contact urticaria: Australian data. *Br J Dermatol* 2008; **159**:125–31.
- 14 Bensefa-Colas L, Telle-Lamberton M, Paris C et al. Occupational allergic contact dermatitis and major allergens in France: temporal trends for the period 2001–2010. *Br J Dermatol* 2014; **171**:1375–85.
- 15 Bonnetterre V, Faisandier L, Bicout D et al. Programmed health surveillance and detection of emerging diseases in occupational health: contribution of the French national occupational disease surveillance and prevention network (RNV3P). *Occup Environ Med* 2010; **67**:178–86.
- 16 Paris C, Ngatchou-Wandji J, Luc A et al. Work-related asthma in France: recent trends for the period 2001–2009. *Occup Environ Med* 2012; **69**:391–7.
- 17 McNamee R, Carder M, Chen Y, Agius R. Measurement of trends in incidence of work-related skin and respiratory diseases, UK 1996–2005. *Occup Environ Med* 2008; **65**:808–14.
- 18 Rothman KJ, Lanes S, Sacks ST. The reporting odds ratio and its advantages over the proportional reporting ratio. *Pharmacoepidemiol Drug Saf* 2004; **13**:519–23.
- 19 Lachapelle J-M, Maibach HI. *Patch Testing and Prick Testing*. Berlin, Heidelberg: Springer, 2012.
- 20 Giménez-Arnau A. Contact urticaria and the environment. *Rev Environ Health* 2014; **29**:207–15.
- 21 Uter W. Surveillance in occupational contact dermatitis. In: *Kanerva's Occupational Dermatology* (Rustemeyer T, Elsner P, John S-M, Maibach HI, eds), Berlin, Heidelberg: Springer, 2012; 59–63.
- 22 Shapiro-Mendoza CK, Tomashek KM, Anderson RN, Wingo J. Recent national trends in sudden, unexpected infant deaths: more evidence supporting a change in classification or reporting. *Am J Epidemiol* 2006; **163**:762–9.
- 23 Diepgen TL, Coenraads PJ. Occupational contact dermatitis. In: *Kanerva's Occupational Dermatology* (Rustemeyer T, Elsner P, John S-M, Maibach HI, eds), Berlin, Heidelberg: Springer, 2012; 51–8.
- 24 Turner S, McNamee R, Agius R et al. Evaluating interventions aimed at reducing occupational exposure to latex and rubber glove allergens. *Occup Environ Med* 2012; **69**:925–31.
- 25 Doutre M-S. Occupational contact urticaria and protein contact dermatitis. *Eur J Dermatol* 2005; **15**:419–24.
- 26 Gimenez-Arnau A, Maurer M, De La Cuadra J, Maibach H. Immediate contact skin reactions, an update of contact urticaria, contact urticaria syndrome and protein contact dermatitis – “a never ending story”. *Eur J Dermatol* 2010; **20**:552–62.
- 27 Valks R, Conde-Salazar L, Cuevas M. Allergic contact urticaria from natural rubber latex in healthcare and non-healthcare workers. *Contact Dermatitis* 2004; **50**:222–4.
- 28 Jolanki R, Estlander T, Alanko K et al. Incidence rates of occupational contact urticaria caused by natural rubber latex. *Contact Dermatitis* 1999; **40**:329–31.
- 29 Bousquet J, Flahault A, Vandenplas O et al. Natural rubber latex allergy among health care workers: a systematic review of the evidence. *J Allergy Clin Immunol* 2006; **118**:447–54.
- 30 Royal College of Physicians of London, NHS Plus (Programme). *Latex Allergy: Occupational Aspects of Management. A National Guideline*. London: Royal College of Physicians, 2008.
- 31 French Health Products Safety Agency (AFSSAPS). *Control on Natural Rubber Latex Medical Gloves Market*. Paris: AFSSAPS, 2004.
- 32 Liss GM, Sussman GL. Latex sensitization: occupational versus general population prevalence rates. *Am J Ind Med* 1999; **35**:196–200.
- 33 Tang MBY, Leow YH, Ng V et al. Latex sensitisation in healthcare workers in Singapore. *Ann Acad Med Singapore* 2005; **34**:376–82.
- 34 Reunala T, Alenius H, Turjanmaa K, Palosuo T. Latex allergy and skin. *Curr Opin Allergy Clin Immunol* 2004; **4**:397–401.
- 35 French Health Products Safety Agency (AFSSAPS). *Control on Natural Rubber Latex Medical Gloves Market. Part II*. Paris: AFSSAPS, 2005.
- 36 National Institute for Occupational Safety and Health. Preventing allergic reactions to natural rubber latex in the workplace. DHHS (NIOSH) publication number 97-135. Available at: <http://www.cdc.gov/niosh/docs/97-135/> (last accessed 18 October 2015).
- 37 Kujala V. A review of current literature on epidemiology of immediate glove irritation and latex allergy. *Occup Med (Lond)* 1999; **49**:3–9.
- 38 Allmers H, Schmengler J, John SM. Decreasing incidence of occupational contact urticaria caused by natural rubber latex allergy in German health care workers. *J Allergy Clin Immunol* 2004; **114**:347–51.

## Appendix

### Members of the RNV3P collaboration group:

ANSES (M. Le Barbier, C. Marny), Amiens (C. Doutrelot-Philippon), Angers (Y. Roquelaure, A. Petit), Bordeaux (C. Verdun-Esquer, I. Leclerc), Brest (J.D. Dewitte, B. Loddé), Caen (B. Clin), Cherbourg (M.F. Marquignon), Clermont-Ferrand (A. Chamoux, F. Dutheil), Créteil (P. Andujar, J.C. Pairon), Dijon (H.J. Smolik, N. Fernandez), Grenoble (V. Bonnetterre, E. Michel), Le Havre (J.F. Gehanno), Lille (P. Frimat, C. Nisse), Limoges (M. Druet-Cabanac), Lyon (A. Massardier, B. Charbotel), Marseille (M.P. Lehucher-Michel), Montpellier (A. Roulet, F.X. Lesage), Nancy (C. Paris, E. Penven), Nantes (D. Dupas), Paris-Cochin (L. Bensefa-Colas, D. Choudat), Paris-Garches (A. Descatha, Z. Mediouni), Paris-Hôtel-Dieu (D. Léger, V. Bayon), Paris-Fernand Widal (J. Langrand, A. Villa), Poitiers (E. Ben-Brik, H. Martinez), Reims (F. Deschamps), Rennes (T. Gouyet, C. Verger), Rouen (A. Gislard, L. Rollin), Saint-Etienne (L. Fontana, C. Pélissier), Strasbourg (M. Gonzalez, N. Nourry), Toulouse (Y. Esquirol, F. Hérin), Tours (K. Haguenoer).