Occupational Cancer in a Paris Suburb:

First Results of a Proactive Research Study in Seine Saint-Denis

RESEAU «SURVEILLER LES CANCERS D'ORIGINE PROFESSIONNELLE EN SEINE SAINT-DENIS» RESEAU SCOP 93*

A multidisciplinary network, SCOP 93, investigated cancer patients in three hospitals in a Paris suburb that has an unusually high incidence of cancers, to identify those who had been exposed to occupational carcinogens, assess the adequacy of the French system for their compensation, and help develop priorities for prevention. In 2002–2003, 175 patients were interviewed, of whom 127 provided job histories. Of these, 74% of 107 men and 70% of 20 women were deemed likely to have occupational cancers, half of them following exposures to at least three different carcinogens. The network team prepared claims for the 26 patients whose cancers were potentially compensable by the rigid rules of the system; 21 of them, most of whom had cancers attributable to asbestos, received compensation. Suggestions for improving the system for compensation of occupational cancer victims in France are offered. *Key words*: workers' compensation; job descriptions; cancer victims; France.

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Between 1987 and 1990, a strong, significant, and growing excess of deaths and early mortality from cancers, particularly cancers of the lung, larynx, digestive tract, bladder, and pleura, became apparent in Seine Saint-Denis, a Paris suburb. Cancer is the leading cause of death among all ages in the Seine Saint-Denis population, with 2,724 cancer deaths in 1999 alone, whereas it is the second-highest cause of death (after cardiovascular diseases) in Ile de France and in France as a whole.[1]

The industrial history of the Seine-Saint-Denis district suggests that at least part of the high incidence of cancers is attributable to occupational exposures to carcinogens. According to the 1999 census data,[2] in the Seine Saint-Denis district, blue-collar workers represent 24.1% of the population, higher than the average in the Ile de France(16%), and almost the same as the average of blue-collar workers in France as a whole (24.4%). This socio-professional category is the one most affected by cancer.[2–4]

The extremity of the situation attracted the attention of medical staff, researchers, and professionals in public health institutions, who decided in the year 2000 to create a permanent multidisciplinary network—SCOP 93†—to investigate occupational exposures to carcinogens of cancer patients in Seine-Saint-Denis. The network team examines the occupational histories of these patients to identify those who have been exposed to any of a number of well-known occupational carcinogens, and to assess the adequacy of the French compensation system for providing rights to compensation for such patients. Another issue is to provide knowledge about workplaces in which workers are exposed to carcinogens in order to develop prevention strategies. This paper presents the method and the first year's experience of the network SCOP 93, focusing on the characteristics of the patients, their occupational exposures to carcinogens, and the compensation of occupationally exposed patients.

METHOD

Since March 2002, the network has registered all new patients who are Seine Saint-Denis residents and have been admitted to three Seine Saint-Denis hospitals (CHU Avicenne de Bobigny, hospital of Montfermeil, and hospital Robert Ballanger of Aulnay-sous-bois) for lung, pleural, laryngeal, sinus and ethmoid, or urinary tract cancers, mesothelioma or leukemia. All such cancers are recognized as potentially occupational in origin in France.

Once permission is obtained from the patient, sociologists interview him or her to put together a job history and obtain a detailed description of working conditions involved in every position the patient has held.

Occupational carcinogens in the patient's job history are identified by experts based on the list of 46 carcinogens of the International Agency for Research on Cancer,† which is used in the EU directive‡ and in the French regulation for prevention (see Appendix A). These experts are toxicologists, industrial hygienists, and occupational physicians. Exposures to carcinogens are

*Réseau SCOP 93 participants and sources of support are listed at the end of the article.

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†SCOP 93 is: Surveiller les Cancers d'Origine Professionnelle en Seine Saint-Denis, the zip code of which is 93.

†Web site: <http://www.iarc.fr/>.

‡Web site: http://europe.osha.eu.int/legislation/directives/leg2.

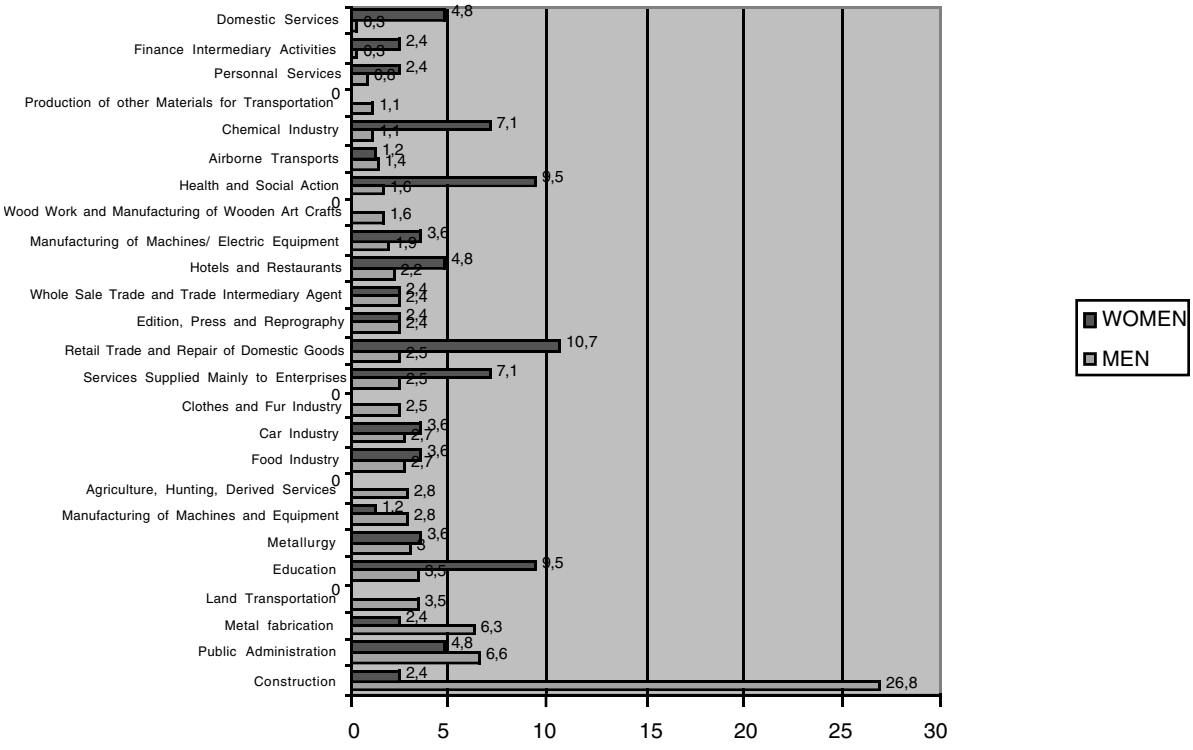

Figure 1—Distribution of jobs by activity sector and gender (%).

identified per period of employment within a company (coded according to the repertory of the activities associated with its type of work, INSEE) and per job (i.e., tasks that a worker has had to do). Possible occupational exposures to carcinogens are classified according to five criteria: probability (three categories), intensity (five categories), frequency, peaks of exposure, and duration. An exposure score (probability × intensity) is calculated. For each specific carcinogen, exposed jobs are classified according to the exposure scores as weak (scores 1–5), average (scores 6–9), or strong (scores 10–15).

In France, the compensation system for occupational illnesses is funded according to the principle of "presumption of imputability" within the framework of a list of occupational diseases (Social Security Law L461-2) or, within the framework of the complementary system, if a "direct and essential link" can be established between the illness and work (Social Security Law L461-1). The experts determine, in relation to the rules of the French compensation system, whether or not individual patients can legitimately notify the compensation board of their occupational cancers to claim compensation. Legitimacy is decided either in relation to a specific table of occupational diseases if the patient has contracted the disease and received the exposure mentioned in the applicable table, or within the complementary system of compensation. Every step of the compensation procedure is registered. The notification and compensation procedures are examined in relation to the rules of the French compensation system (see Appendix D).

The present analysis emphasizes the characteristics of the patients, the jobs of both men and women, carcinogens involved in their exposures and the compensation procedures.

RESULTS

During the period March 1, 2002, to February 28, 2003, 175 patients, 140 men (80%) and 35 women (20%), were registered. The average age of these patients was 63 years (range 31–94); nearly 40% of the patients were less than 60 years old. Lung cancer was the most frequent (77%), followed by bladder cancer (12%), mesothelioma and other pleural cancers (5.1%), leukemias (2.4%), and sinus cancer (0.6%).

Job Histories and Occupational Exposures to Carcinogens

Job histories were obtained for 127 of the 175 patients (107 men and 20 women). These 127 patients reported 793 jobs (or an average of seven jobs for men and four for women). The average job durations had been five years for men and seven years for women. For the men the occupation most often reported was construction, followed by public administration and metal work, and 68% had held blue-collar jobs. The three most common jobs of the women were retail trade, health care, and education, and 60% of the women were service employees (mainly secretaries or cleaning workers). Figures 1 and 2 present these data. Overall, for 46% of the

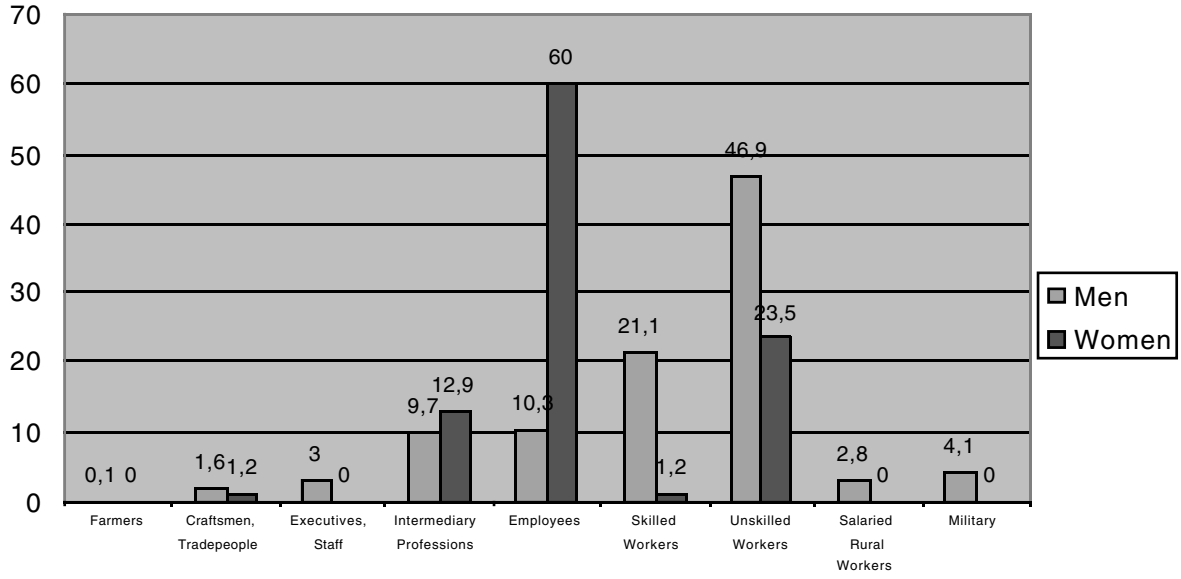

Figure 2—Distribution of jobs (%) by socio-professional categories (PCS, INSEE) and by gender.

reported jobs, the experts identified at least one exposure to carcinogens. Asbestos was the carcinogen most often implicated for both men and women (Table 1).

Exposures to Carcinogens, Compensation for Occupational Cancer

Among male patients with available job histories, 74% had been exposed to one or more of the occupational carcinogens included in the SCOP 93 list, and half had been exposed to three or more. The proportion for women (70%) was almost the same as that for men.

Among the 94 exposed patients, 11 women (of 14) and 24 men (of 80) were considered not eligible for compensation by the SCOP 93 experts (Appendix B), for the following reasons:

- intermittent, occasional exposures or exposures of very short duration were considered by the SCOP 93 experts insufficient to meet the criteria of the French compensation system. A case is accepted for compensation only when the exposure is assessed as "permanent." In some circumstances, there is also an obligatory minimal duration of exposure. For example, a patient who has lung cancer related to asbestos can receive compensation only when the patient has been exposed to asbestos for at least ten years.
- the putative carcinogenic substance does not appear on the French list of occupational diseases, and the causal link between the cancer and the specific individual occupational exposure to it cannot be proven.

The remaining exposed patients (56 men and three women) received an initial medical certificate of occupational disease (CMI§). Thirty-three of them (30 men and three women) did not submit claims to the occupational compensation board, the reasons being:

- death of the patient and family disappearance;
- psychological impossibility of managing the administrative process, which appears senseless in comparison with the misfortune that has struck the patient and his or her family;
- social and cultural precariousness as an obstacle in tackling such an administrative process.

Comparisons of the three groups of exposed patients, 1) without CMI, 2) having received a CMI and having submitted a claim, and 3) having received a CMI but not having submitted a claim, emphasize the unfavorable position of women in relation to the compensation for occupational illnesses: three out of four women in this cohort did not receive CMIs and not one of them submitted a claim for compensation.

The claims submitted were those of 26 patients, all men (Appendix C), 21 of whom were accepted for compensation because of the finding of cancer linked to occupational asbestos exposure, even though all of them had been occupationally exposed to several carcinogens. Four requests were rejected due to insufficient or non-proven exposure to occupational carcinogens or, within the framework of the complementary system, for the absence of a "direct and essential link" between the cancer and workplace exposure.

§Certificat Médical Initial = medical certificate of occupational disease.

TABLE 1 Distribution of Exposures and Exposure Scores Affected by Substance and Gender

	Men			Women		
Substances	Frequency*	%†	Total Scores 2+3 (%)‡	Frequency	%	Total Scores 2+3 (%)
Asbestos	184	52	76.1	7	35	42.9
Policyclic aromatic hydrocarbons	93	26.3	88.2	2	10	100
Crystalline silica	79	22.3	72.2	0	0	0
Benzene found in hydrocarbon compounds	53	15	77.4	6	30	50
Welding fumes	48	13.6	91.7	2	10	0
Chlorinated solvents	43	12.1	83.7	2	10	100
Lead	40	11.3	90	1	5	0
Exhaust fumes of diesel motors	34	9.6	96.9	0	0	0
Nickel and derived compounds	33	9.3	93.9	0	0	0
Cobalt and compounds	31	8.8	100	0	0	0
Wood dust	16	4.5	93.7	0	0	0
Formol	14	4	50	3	15	66.7
Gasoline exhaust fumes	14	4	93.3	0	0	0
Hexavalent chrome	9	2.5	77.8	1	5	0
Aromatic amines	8	2.3	25	2	10	0
Mineral acids	8	2.3	100	2	10	100
Halogenated aromatic hydrocarbons	7	2	85.7	0	0	0
Pesticides	6	1.7	33.3	0	0	0
Ionizing radiations	4	1.1	75	0	0	0
Arsenic and compounds	3	0.8	33.3	0	0	0
Cadmium and compounds	3	0.8	66.7	0	0	0
Acrylonitrile	2	0.6	0	0	0	0
Shoe industry and mending	2	0.6	100	1	5	0
Not listed§	26	7.3	—	0	0	—

*The number of jobs involving exposure to the substance. An individual job can involve exposures to one or more substances.
†The same job can include various exposures: the percentage given refers to the proportion of the exposed job, taken as a whole, to a specific substance.
‡Score = probability × intensity
1 = exposure score 1–5;
2 = exposure score 6–9;
3 = exposure score 10–15.
§Most of the products not listed refer to metallic dust.

The patient population of the three hospitals participating in the SCOP 93 network project represents a fourth of all cancer patients affiliated with the Seine Saint-Denis Health Insurance Board. In this district, throughout the year 2001, 27 cancer cases were compensated by the occupational compensation board. In the year in which SCOP carried out its study (March 2002–February 2003), 21 of the study's participant cases received compensation.

Chart 1 is a synthesis of the process from the initial recording of patients to the issuing of claims for occupational compensation.

DISCUSSION

Since 1893, French labor law has included an obligation for the employer to provide a clean atmosphere in the workplace. Today, the general duty of the employer in relation to occupational health and safety regulations is a modern version of this rule. In 1989, the European Framework Directive for prevention of diseases and injuries at workplaces determined the "risk assessment" duty for such prevention. This duty was incorporated into French labor law in 2001.

Epidemiologic and toxicologic studies provide general knowledge about cancers related to occupational exposures.[6] Nevertheless, in order to define strategies for prevention and compensation of occupational cancers, another sort of knowledge is necessary to connect the fundamental data of toxicology and etiologic epidemiology with the reality of exposed-job histories. Considering the delay that frequently occurs between the time of exposure and the presence of disease, this process can take up to 40 years.[7,8] The right to compensation for occupational disease is also dependent on precise reports of exposures in patients' job histories.[9]

For the SCOP 93 network, from a public health perspective, cancer is regarded as a sentinel event giving access to the individual patient's job history and to the occupational exposure to carcinogens. A patient's job history alone indicates the conditions and organization of his or her work.[8,10]

Lacking a regional register of cancer cases, the cancer incidence in the population of Seine Saint-

Denis is unknown. As a result, it is not possible to compare the patients of the study with the global population of the district. Nevertheless, the SCOP 93 team could verify the completeness of the recruitment of the cases by the medical services in relation to computerized reports of cases in the three hospitals concerned.

The method adopted to identify and qualify exposures to carcinogens based on the patients' job histories is founded on the complementarities of experiences: experiences of the patients concerning their activities throughout their job histories and experiences of experts with knowledge of work and occupational hazards. In the absence of any records of the levels of chemicals and dust in workplaces, such a method is the only way to obtain an estimate of patients' occupational exposures to carcinogens.

The SCOP 93 list of occupational carcinogens provides only a somewhat limited assessment of a cancer patient's occupational exposures. This list, which was decided upon by a scientific multidisciplinary board before the commencement of the study, includes only some of the best-known occupational carcinogens. It would make sense to broaden the list, considering not only the IARC and EU classifications but also the U.S. National Toxicology Program's listing of carcinogens.

The high rate of patients who had been exposed to occupational carcinogens and the fact that a majority of such patients had been exposed to several different carcinogens are worthy of note, suggesting synergy between occupational and environmental or behavioral exposures and also among the actions of the occupational carcinogens themselves. In regard to the women in the study, SCOP 93 experts encountered difficulties in qualifying their exposures due to a lack of epidemiologic studies, e.g., the effects of cleaning activities. Canadian research highlights the insufficiency of research on women's occupational health, particularly in relation to the precarious and intermittent types of employment and to the representations of women's health in the medical and scientific fields.[11,12]

Nevertheless, the aim of the SCOP 93 project is not to examine the causal links between one or several exposures and the cancer, but to examine the extents of occupational exposures to known specific carcinogens of cancer patients, and thus any deficiencies in strategies for compensation and prevention.

Chart 1 shows the gap between the number of patients diagnosed as having occupational cancers and the numbers of cases for which claims were submitted and compensation received. This gap can be explained by the discrepancies between the rules of the French workers' compensation system (Appendix D), scientific knowledge about occupational carcinogens, and the reality of the patients' job histories.

First, only 18 carcinogens appear in the official French list of occupational diseases. The IARC has identified three groups of carcinogens. Group I includes 95

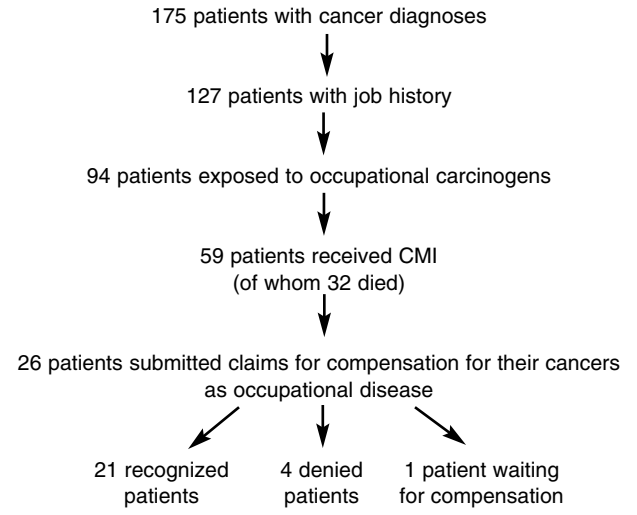

Chart 1 Synthesis of the Progress of the Patient Cohort, Data Collected by the SCOP 93 Network, March 1, 2002–February 28, 2003

recognized human carcinogens, 39 of which are potentially responsible for occupational exposures. Group 2A includes 65 probable human carcinogens, of which 33 are potential occupational carcinogens. In addition, many of the 498 compounds in group 2B (possible human carcinogens) are probably present in occupational settings, even though evidence of carcinogenicity is at present considered inadequate. The French list was established not in relation to scientific evidence but rather as a compromise between employers' and employees' representatives.[13,14] From the perspective of a nondiscriminating right to compensation for any victim of occupational cancer, an alternative procedure should be adopted in order to make the French list consistent with current scientific knowledge.

Second, an implicit model of occupational exposures inherent in specific jobs is the reference point for access to compensation of victims of occupational cancers on the French list. This model compensates only those patients with long-standing jobs, implying exposure to only one substance for a long period of time in the same position. That restriction excludes patients who have undergone multiple occupational exposures to carcinogens under conditions of employment that do not meet this criterion. This last situation is the one most frequently represented in the SCOP 93 study.[10]

Where patients were considered eligible for compensation, the SCOP 93 network's clinicians wrote medical certificates for compensation in relation to the rights for compensation of occupational diseases. As shown in the Chart 1, many of these patients did not submit claims for compensation to the health insurance board. To understand why involves consideration of a larger framework of inequalities, encompassing the difficulties in gaining access to health care and to social benefits arising from lack of education, language

barriers for migrants, inadequacy of available information, and obscurity of bureaucratic practices.

The observed difference between recognition of men's and women's rights to compensation reflects the prevailing position of women's rights relative to occupational disease compensation. The legitimacy of women's access such rights is not largely recognized in French society, especially for diseases such as lung cancer, which is considered mainly a tobacco-related disease.

The majority of successfully compensated cases at the end of the SCOP 93 process of assessment were related to asbestos. This was so even considering that all the patients had been exposed to several occupational carcinogens, and is consistent with the better benefits obtained by asbestos victims. In response to the social movement of the 1990s, the social security law (2000) created the compensation fund for asbestos victims to complement the basic occupational disease compensation.[13] This social movement did not expand its limits to include other occupational cancers. Thus, there is an inequality in the levels of compensation received by victims whose cancers are linked to asbestos and not linked to asbestos. In almost all cases in the study, the applications for compensation were asbestos-linked, because the system currently in place rewards more highly those who apply for compensation through the asbestos compensation fund. Such a practice renders invisible other exposures to different occupational carcinogens and the probable synergy between the actions of these different carcinogens. In the official statistics, the cancer cases involving asbestos appear to be almost the only cancer cases compensated, suggesting that new regulations are needed to provide the right to compensation for patients who have been exposed to other occupational carcinogens as well.

The patients who had worked in jobs involving exposures to carcinogens not included in the list for compensation of occupational diseases notified the board of their cancers in reference to the "complementary system" when the SCOP 93 experts concluded that there had been a "direct and essential link" between the disease and the exposures. However, in all these cases the commission (CRRMP¶) considered the link not proven. From a scientific point of view, it remains impossible for an individual to prove an unquestionable causal relationship between a multicausal disease such as cancer and one or more occupational exposures. A recent decision of the *cour de cassation* (the French supreme court), however, questioned such an interpretation of the law on occupational disease by the CRRMP. In a decision made December 19, 2002, in an occupational cancer case, the *cour de cassation* ruled that the occupational disease had to be recognised, the occupational hazards having played a part in the occurrence of the disease. The *cour de cassation* ruled this way as it was not possible to establish that the disease was exclusively due to other factors. It may be suggested to the health insurance authorities to introduce such a rule in the assessment of the cancer cases by the CRRMP.

Comparison of the data collected by SCOP 93 with the routine registered cases of the compensation board suggests some advancements due to the network's quantitative and qualitative enhancement of the visibility of occupational cancer. Fifteen years ago, in a research program, the occupational exposures of patients with lung cancer and the notification for occupational compensation were studied in two respiratory disease units in the Seine Saint-Denis district.[14] Half of the patients had been exposed to occupational carcinogens but none of them had received medical certificates of occupational disease in order to notify the board. Clinicians participating in the SCOP 93 network declared that prior to their association with the network they had not issued medical certificates of occupational disease.

CONCLUSION

In the Seine Saint-Denis district, where cancer is highly prevalent and increasing, the SCOP 93 network is producing a new set of data on occupational cancers. This program was made possible by the cooperation of medical staff, researchers, public health and occupational health professionals, and health insurance board officers, working together to accumulate data on occupational cancers. The first year's results emphasize the gravity of the situation, and demonstrate that exposures to occupational carcinogens persist. These patients' job histories and occupational exposures support the assumption that exposures to such occupational cancer-causing hazards remain probable if not certain. A qualitative analysis of the cancer-causing occupations reported by the patients and assessed by the experts is planned. The aim of the present analysis is to provide information for possible prevention strategies to labor inspectors, occupational physicians, and industrial hygienists. The only way to combat future occupational cancers is to reduce exposures to carcinogens in workplaces. The support of public authorities will be necessary, including recognition of the place of occupational health in public health policies.

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¶CRRMP = Commission Régionale de Reconnaissance des Maladies Professionnelles [regional commission of occupational disease compensation].

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APPENDIX A

Table for Coding Exposures to Carcinogenic Products, Substances, or Processes

SCOP 93 No.	Names of products, substances or processes	CIRC	SUMER (2001)	European Directives	Table No. MP or CRRMP1
1	Mineral acids, fumes or vapors, (chlorhydric acid, nitric acid, sulfuric acid, fluorhydric acid, etc.)	1			CRRMP
2	Acetamide (solvents, plastifiers, organic synthesis)	2B	431	3	CRRMP
3	Acrylamide (synthesis intermediary in the plastic industry)	2A		2	CRRMP
4	Acrylonitrile (synthesis intermediary in the plastic industry)	2B	(406)	2	CRRMP
5	Asbestos	1	416	1	30, 30bis
6	Aromatic amines (colorant synthesis, rubber and plastic industries, pharmaceutical industry, etc.)	1	411	1, 2	15 ter
7	Arsenic and compounds (including arsenopyrites)	1	441	1	20bis,20ter
8	Benzene (pure) (production of, use of)	1	470	1	4
9	Benzene in hydrocarbon compounds (white spirit till end of 1970s, fuels, etc.), painter work till end 1980s, press work till end 1970s, oil refining, etc.	1, 2A, 2B	406	1	4
10	Beryllium and compounds	1	449	2	CRRMP
11	Bis(chloro-methyl) ether and chloro-methyl-methyl ether	1	420	1	81
12	1,3-Butadiene (plastic and rubber industries, etc.)	2A	(422)	1	CRRMP
13	Cadmium and compounds	1	442	2	CRRMP
14	Vinyl chloride	1	(426)	1	52
15	Hexavalent chrome(chromic acid, chromates)	1	444	1, 2, 3	10ter
16	Cobalt and compounds (hard metals production, etc.)	2B		2	70ter
17	Epichlorhydrine	2A	434	2	CRRMP
18	Manufacturing of certain medicines (immunosuppressives, antineoplasics, growth hormones, etc.)	1,2A,2B			CRRMP
19	Production of isopropanol by strong acid proceeding (intermediaries such as diethyle sulfate, isopropyl sulfate, etc.)	1			CRRMP
20	Shoe making and repairing	1			10ter
21	Fibrers, ceramic fibres	2B		2	CRRMP
22	Formol	1		3	CRRMP
23	Welding fumes	2B			CRRMP
24	Exhaust fumes from diesel motors	2A			CRRMP
25	Gasoline exhaust fumes	2B			CRRMP
26	Hydrazine and compounds	2B	(451)	2	CRRMP
27	Halogenated aromatic hydrocarbons and/or nitrated (chloro- and nitrobenzenes, chloro-, bromo- and nitrotoluenes, etc.)	2B	412	2 and 3 or n.c.†	CRRMP
28	Policyclic aromatic hydrocarbons (particularly coal tar and pitch, creosotes, production of black carbone, production of coke, coal gasification, foundry of cast iron, soot, mineral oils (non-treated, moderately treated, used mineral oils, production of aluminum, combustion fumes, bitumen, heavy fuel remnants, etc.)	1, 2A, 2B	482	2	16bis
29	Rubber industries	1			CRRMP (cf 15ter)
30	Hairdressing occupations	2A			CRRMP
31	Textile occupations	2B			CRRMP
32	Iron mines	1			44bis
33	Micotoxines (Aflatoxins, Ochratoxins; etc.), for example, food contaminators	1, 2B	(464)	1	CRRMP
34	Nickel and compounds	1	446	1, 3	37ter
35	Nitrosamines, nitrosoguanidines, nitrosoureas, and other nitro compounds	2A	415	2	85, 15ter, CRRMP
36	Ethylene oxide	1	450	2	CRRMP
37	Pesticides (production, use) : lindane, chlorophenols, hexachlorobenzene, DDT, methyle bromide, etc.	2A, 2B		3, 1	CRRMP
38	Lead and inorganic compounds	2B		3	CRRMP
39	Polychlorobiphenyls (PCB)	2A			CRRMP
40	Wood dust	1	455		47

APPENDIX A (continued)

SCOP 93 No.	Names of products, substances or processes	CIRC	SUMER (2001)	European Directives	Table No. MP or CRRMP1
41	Ionizing radiations	1			6
42	Radionucléïdes (uranium, thorium, etc.) emitters of alpha and/or beta particles in internal exposure (inhalation of dust)	1			6
43	Crystalline silica (particularly quartz, cristobalite)	1	456	1	CRRMP
44	Chlorinated solvents (trichlorethylene, tetrachlorethylene, dichloromethane, chloroform, etc.)	2A, 2B		3,2	CRRMP
45	Styrene	2B			CRRMP
46	Antimony trioxide	2B		3	CRRMP

*Reference to the tables of the list of compensable occupational diseases or having to be presented to CRRMP (Comité régional de reconnaissance des maladies professionnelles, Regional Board for the Compensation of Occupational Diseases)
†n.c. = non-classified.

Notes:
1. The designations "mineral dusts" and "metallic dusts" must be avoided. The expert is asked to name as accurately as possible the concerned metals, for example : a) minerals : crystalline silica, nickel, etc., instead of mineral dust; b) elaboration of lead (zinc) from first fusion, pyrometallurgy : arsenic, cadmium, antimony, etc., if the expert suspects that it could be arsenic minerals etc., instead of metallic dust.
2. Hexachlorobenzene is a pesticide (33), and it is also a halogenated policyclic hydrocarbon (24).
3. There are arsenic pesticides (33), and as such they can be classified in 6.
4. Artificial mineral fibers (fiberglass, rockfiber) were classified into three different categories by the CIRC in 2001. Only ceramic fibers remain in the 2B category.
5. According to the accuracy of the records, the expert can refer to more particular substances or proceedings, recognized as carcinogenic by CIRC. For example : a) hairdressing occupations are potentially exposed to aromatic amines, formol, etc. coal tar, nitrosamines, among others, could have been used in certain formulations; b) the rubber industry occupations can potentially expose to aromatic amines, benzene, policyclic aromatic hydrocarbons, nitrosamines, butadiene, etc.; c) textile industry occupations can potentially expose to aromatic amines, mineral pigmentation (derived from hexavalent chrome, antimony), formol, etc.; d) shoe making and mending can potentially expose to aromatic amines, pesticides, hexavalent derived products from chrome, etc.

Instructions : The objective is to build a unique list the experts can refer to. Every derogation request has to be validated by the plenary board of experts that will in such case procede to the addition of the new substance or the new proceeding in the SCOP93 list.

APPENDIX B

Patients Exposed but Not Having Obtained a Medical Certificate of Occupational Disease

Status*	Cancer	Job(s)	Exposure(s)
E	Lung	Cleaning lady, unskilled worker,	Chlorinated solvents, shoe industry and mending
A	Lung	Maintenance worker, unskilled worker, packager, saleswoman, supervisor, kindergarden assistant	Asbestos (2 months)
R	Lung	Rodder, machine worker	Gasoline exhaust fumes of diesel motors
E	Lung	Worker, foreman, engineer	PAH (unsufficient information, short interview)
E	Lung	Press worker, maintenance worker, fork-lift truck driver, driver, truck driver, security guard, responsible for transport	Ionizing radiations (7 years), benzene (3 years)
E	Lung	Rural worker assistant, worker, nanny, domestic lady	Chlorinated solvents (4 years)
R	Lung	Forest warden assistant, fitter, equipment responsible, gas station manager, delivery driver, truck driver	Pesticides, PAH, wood dust, chlorinated solvents, benzene (2–3 years)
R	Lung	Ironer, cleaning lady	Formol (41 years), benzene (4 years)
	Lung	Electrician apprentice, office automation technician, maintenance worker, computer worker	Crystalline silica
E	Lung	Plumber apprentice, hollow-ware maker, shaper, tracer, taps system repairer, Industrial draftsman	Asbestos, lead, acetamide, acrylamide, 1,3-butadiene, welding fumes
E	Lung	Baker assistant, baker, delivery driver, storekeeper	Asbestos, exhaust fumes of diesel motors/ conventional motors (15 years)
E	Lung	Messenger, office boy, storekeeper-driver, fitter, factory worker assistant, geometer assistant, chocolate maker, delivery man, domestic assistant, leadsman, fitter assistant, telegraphist, sorting office employee, postman	Ionizing radiations (18 months), wood dust (1 year), aromatic amines (3 months), asbestos, PAH, silica, pesticides (1 year), asbestos (12 years but undeclared work)

APPENDIX B (continued)

Status*	Cancer	Job(s)	Exposure(s)
R	Lung	Industrial draftsman, unskilled worker in chain production, supervisor, delivery driver, office employee	Gasoline exhaust fumes of diesel motors (22 years)
E	Lung	Bricklayer apprentice, pastrycook apprentice, shelf-keeper, unskilled worker, delivery order, responsible, fork-lift truck driver, delivery driver	Gasoline exhaust fumes of diesel motors , silica
R	Lung	Vintager, farmer, shopkeeper, maintenance worker, unskilled worker, diver, cook	Arsenic (2 years), pesticides (8 years), asbestos (3 years)
R	Lung	Farm worker, newspaper hawker, unskilled worker, lumberjack, swashbuckler, warehouseman, pit boy, machine driver, salesman, salesman instructor	Asbestos (2 years), polycyclic aromatic hydro-carbons (1 year), gasoline exhaust fumes of diesel motors (4 years)
R	Lung	Pattern maker (modeller)	Wood dust, styrene, formol (45 years)
R	Lung	Mechanic designer, designing chief clerk	PAH, asbestos, silica (3–5 years)
R	Lung	Clerk	Asbestos
R	Lung	Farm worker, cook, unskilled worker, swing bridge keeper	Mineral acids, wood dust, formol
R	Lung	Ragman, unskilled worker, removal man, rural seasonal worker, swashbuckler	Asbestos (1 year), benzene, PAH, nitrosamine, silica (4 years), chrome, nickel, cobalt (3 years), rubber (1 year)
E	Lung	Saleswoman, nursing auxiliary	Mineral acids, (medical use in oncology treatments)
R	Lung	Mechanic cutter, maintenance worker, tailor craftsman	Aromatic amines
R	Lung	Press worker, wrapping supervisor, clothes store keeper, cleaning lady	Benzene in hydrocarbon compounds (12 years)
E	Lung	Unskilled worker, bricklayer	Benzene, chlorinated solvents, asbestos, silica
J	Lung	Maintenance worker, rural worker, crossing keeper, unskilled worker, fireman, production line fitter, waiter	Chlorinated solvents
R	Lung	Education instructress, worker, primary school teacher	Asbestos
	Lung	Mechanic, mounter, editor, warehouseman	Asbestos, welding fumes, benzene
E	Lung	Child minder, cleaning lady, saleswoman, cashier, printing employee, laundress	chlorinated solvents, asbestos
E	Lung	Bureau employee, cashier, typist, domestic help	Asbestos
E	Lung	Notary assistant, management technician	Benzene, aromatic compounds
R	Lung	Rural worker assistant, delivery man, press worker, delivery driver	Wood dust
R	Pleural	Economy apprentice, transport worker, salesman	Mineral acids, aromatic amines; (2 years)
R	Meso-thelioma	Typographer apprentice, typographer, charge of photo composition	Benzene in hydrocarbon compounds, formol, lead (9 years)
R	Bladder	Smith apprentice, worker, workshop foreman, supervisor of thermic process	Asbestos, ionizing radiations

*E = employed; R = retired; J = jobless.

APPENDIX C
Patients Having Obtained a Medical Certificate of Occupational Disease

Status*	Job(s)	Exposure(s)	Cancer	Disease Table†
Patients compensated for occupational disease				
E	Plumber, heating worker, roofer	Asbestos, PAH, silica, welding fumes	Lung	30 bis
E	Heating technician	Asbestos, halogenated aromatic hydrocarbons	Lung	30 bis
R	Mechanic	Asbestos, PAH, lead, cadmium	Lung	30 bis
R	Maintenance worker	Asbestos, PAH, chlorinated solvents	Lung	30 bis
R	Rubber manufacturing then smelting works	Asbestos, PAH, lead, gasoline exhaust fumes of diesel motors, rubber industry	Lung	30 bis
E	Unskilled worker	Asbestos, PAH, benzene in hydrocarbon compounds	Lung	30 bis
E	Lead and heating worker	Asbestos, lead, PAH, cobalt, nickel, welding fumes	Lung	30 bis
E	Builder's laborer	Asbestos	Lung	30 bis
R	Unskilled worker (different jobs in foundry), smelting worker	Asbestos, silica, PAH	Lung	30 bis
E	Rulling machine worker, responsible for ignition products, equipment Industry expert, involved in mechanic research	Asbestos, PAH	Lung	30 bis
J	Unskilled worker, fork-lift truck driver	Asbestos, pesticides, wood dust, gasoline exhaust fumes of diesel motors, nitrosamines, benzene (pure), chlorinated solvents, silica	Lung	30 bis
E	Farm worker, bricklayer, painter	Asbestos, silica, PAH, chrome6, benzene in hydrocarbon compounds arsenic, pesticides	Lung	30 bis
R	Carpenter, unskilled worker in plastic industry, cleaning worker, (for temporary work agency)	Asbestos, wood dust, acrylonitrile	Lung	CRRMP A4
E	Bricklayer, mason	Asbestos, silica, chrome 6, benzene in hydrocarbon compounds	Lung	CRRMP A3 30 bis
R	Unskilled worker skilled worker, chief of foundry workshop	Asbestos, silica, chlorinated solvents, shoe industry and mending	Meso–pleural	30
R	Apprentice, sheet-metal worker, worker skilled in drilling machine, maintenance in standardization and testing of instruments	Asbestos, PAH, welding fumes	Mesothelioma	30
R	Unskilled worker (different jobs in foundry), rail linesman	Silica, asbestos, PAH	Meso	30
R	Carpenter's apprentice	Wood dust	Ethmoïd	CRRMP A3
E	Methods control manager	PAH, asbestos, benzene in hydrocarbon compounds,	Leukemia	4
R	Construction unskilled worker, metallurgy worker	PAH, silica, asbestos	Lung	30 bis
R	Painter	Lead, asbestos, benzene in hydrocarbon compounds	Lung	30 bis
Waiting for notification				
E	Gas station worker	Benzene in hydrocarbon compounds, gasoline exhaust fumes of diesel motors and conventional motors, lead	Lung	CRRMP A4
Refused as occupational disease				
E	Plumber, electrician, unskilled worker	Asbestos	Lung	30 bis
R	Mechanic	Asbestos, chlorinated solvents, benzene in hydrocarbon compounds, gasoline exhaust fumes of diesel motors	Lung	30 bis
J	Press industry workers	Chlorinated solvents, nenzene in hydrocarbon compounds, PAH	Lung	CRRMP A4
E	Driller, puncher, ruling machine worker, fitter	PAH, nickel	Lung	CRRMP A4

*E = employed; R = retired; J = jobless.
†Tables of the French list of occupational diseases.

Appendix D
The Compensation System in France

At the base of French legislation are the law of April 1898 on occupational injuries and the law of October 1919 on occupational diseases, which created the system of workers' compensation. This system is founded on the principle of attribution rather than causality; French workers must prove that they were exposed to the causative agent, but not that the agent causes the disease. Workers' compensation insurance is provided by an independent fund, which is financed by the employers.

Basically, the compensation is accessible for a list of designated occupational diseases. The designation of a disease on the list depends not on the prevalence of risk but on negotiations among the principal actors—the state, employers, and trade-unions. By creating regulations, this group determines which diseases will be compensated; it also decides the types of work, durations of exposures to risk, and time periods of eligibility for compensation.

By the law of January 1993, a complementary system fo compensation was created for diseases related to work that are not included in the list of designated occupational diseases. It makes it possible for workers to get compensation if they don't fulfill one of the conditions of a designated disease or if a "*direct and essential link*" between the disease and occupational hazards can be demonstrated. The files of such claims are assessed by a regional medical commission with specialists and occupational physicians (le Comité Régional de Reconnaissance des Maladies Professionnelles, CRRMP).

The Claims Procedure for Designated Occupational Diseases

There are five major steps in the workers' compensation claims procedure in France.

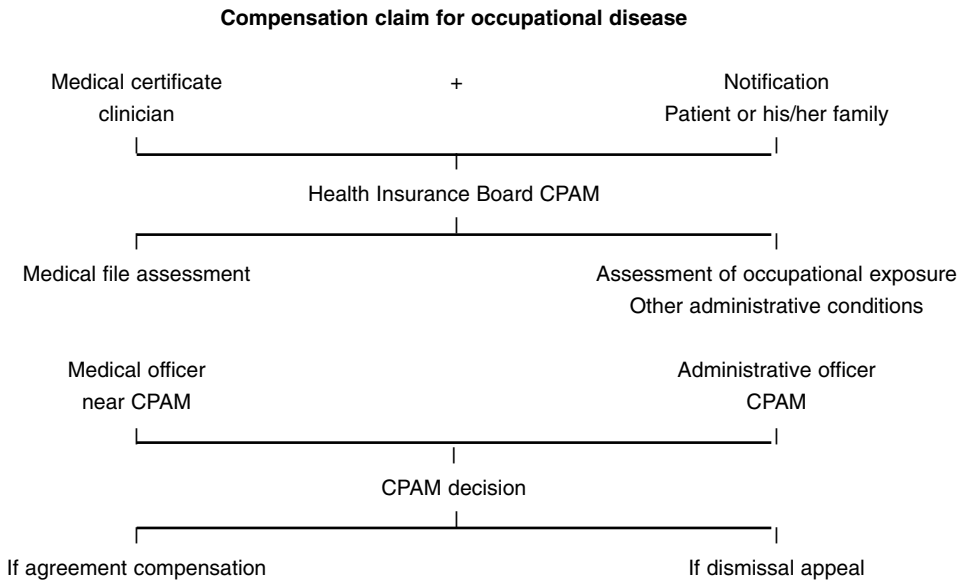
Initial Medical Certificate. The doctor who diagnoses the occupational illness writes this certificate. Logically, it should be done when the worker first consults a physician and asks for medical leave for a work-related condition, as delays are calculated from the date of this certificate. In practice, these certificates are written at any stage in the course of an illness.

Filing a claim. Workers are responsible for notifying and filing the claim, which must be accompanied by the medical certificate and sent to the Health Insurance Board of the district.

Examination of the file. If the health insurance office does not respond within three months (+ three months if the board is explaining why it is needed), the claim is automatically approved. The health insurance fund's consulting physician examines the file and gives his or her technical, medicolegal opinion on the diagnosis. The health insurance fund's administrative officers examine the other questions such as exposure and delays. To gather data on working conditions in the claimant's workplace, they can request help from the prevention services of the regional health insurance fund.

First decision. The health insurance fund officer is responsible for informing the worker of the decision, which is based on the advice of the consulting physician and the administrative officers.

Appeals. If the claim is rejected, the worker (or, in case of death, his or her family) bas two months in which to appeal. The appeal goes first to a commission composed of people representing the employers and the trade-unions. If the commission rejects the appeal, the worker has two months in which to file an appeal with the tribunal, which is presided over by a magistrate. Decisions of the tribunal can be appealed to the Court of Appeals.



Tables of Occupational Diseases for Cancer (Social Security Act art L461-1)

No. of Table in the Law	Carcinogen(s)	Type of Cancer
4	Benzene	Leukemia
6	Ionizing radiations	Lung cancer, leukemia, osteosarcoma
10ter	Chromic acid and other chromates	Nose cavity cancer, Lung cancer
15ter	Aromatic amines	Bladder cancer
16bis	Coal tar, coal oil, soot	Skin primitive epithelioma, lung cancer, bladder cancer
20bis	Arsenic	Lung cancer
20D	Arsenic	Skin primitive epithelioma, hepatic cancer, angiosarcoma
20ter	Arseno pyrite dust	Lung cancer
25A	Silica	Lung cancer
30bis	Asbestos	Lung cancer
30C	Asbestos	Lung cancer, mesothelioma
30D	Asbestos	Pleura cancer
36bis	Hydrocarbure compounds	Skin primitive epithlioma
37ter	Nickel (grilled ore process)	Ethmoid and sinus cancer
44bis	Iron dust, iron oxide fumes and dust	Lung cancer
45II	Hepatitis B and C viruses	Hepatic cancer
47B	Wood dust	Ethmoid and sinus cancers, nose cavity cancer
52	Vinyl chloride	Hepatic cancer, angiosarcoma
70ter	Cobalt and tungsten compounds	Lung cancer
81	Bis(chloromethyl)ether	Lung cancer
85	Nitrosoguanidine	Glioblastoma