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Survey report



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Work-related cancers: what recognition in Europe?



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comprendre les risques professionnels en Europe
understanding occupational risks in Europe

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Introduction

The International Agency for Research on Cancer (IARC) estimates that there were around 2.4 million new cases of cancer in the European Union¹ in 2006².

There are 422 substances identified as definite or possible carcinogens for humans, i.e. capable of causing a cancer or of increasing its frequency in an exposed population. Some exposures can be considered as work-related, whether it be to physical agents (ionising radiation), chemical agents (asbestos, benzene) or biological agents (certain viruses).

The relationship with work is not easy to identify, however, for several reasons:

- from the medical viewpoint, there is nothing to distinguish a tumour due to occupational exposure from an other tumour, and cancers are often multifactorial diseases, which makes it hard to identify their work-related origin;
- these diseases have a long latency period between exposure and the appearance of symptoms (on average 20 years, sometimes 40 years); it is therefore hard to identify the risk factors and any occupational exposure;
- at the time of the diagnostic, generally little attention is paid by doctors to the patient's occupational career.

At present, the causal relation between occupational exposure to asbestos and pleural mesothelioma, between wood dust and cancer of the nasal cavities, and between vinyl chloride monomer and angiosarcoma of the liver has been definitely established, barring significant extra-occupational factors. But for other very common cancers, such as lung and bladder cancer, the search for a causal link with occupational exposure is more difficult.

For example, although the carcinogenic agents that can be found in various workplaces are relatively well known, it is less easy to assess the population exposed to these substances. Likewise, it is hard to estimate the number of workers suffering from a work-related cancer. Now, occupational disease insurance systems cover a number of types of cancers, but the figures for recognised cases are such that it must be assumed there is a phenomenon of under-reporting of work-related cancers. And yet, in addition to medical supervision throughout the working life, a few European countries have established ad hoc post-occupational monitoring systems.

This report presents statistics relating to fourteen countries: **Germany, Austria, Belgium, Denmark, Spain, Finland, France, Italy, Luxembourg, Netherlands, Portugal**, the **Czech Republic, Switzerland** and **Sweden**. The information gathered may be of uneven quality on certain points, because it depends on the information systems from which it comes and on the specific features of national occupational risk insurance systems.

[1] In the EU-27, i.e. about 450 million Europeans

[2] <http://eu-cancer.iarc.fr/>

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1. Typology of occupational exposures and exposed population

1.1 Classification of carcinogenic substances

There are several classifications of agents that could cause the occurrence of a cancer, in particular the classification of the International Agency for Research on Cancer (IARC) and the European Union classification. We may specify that they are not exhaustive and do not propose a list of cancers associated with each carcinogenic agent.

1.1.1 IARC classification

The IARC classification³, established by committees of international experts in carcinogenesis, covers agents (chemical, biological and physical), exposure situations and certain industrial processes or exposure circumstances in everyday life. It is not of a regulatory nature. Agents are classified in five groups according to the state of scientific knowledge concerning their harmfulness for humans.

The IARC classification	
Group 1	The agent is carcinogenic to humans (108 agents)
Group 2A	The agent is probably carcinogenic to humans (66 agents)
Group 2B	The agent is possibly carcinogenic to humans (248 agents)
Group 3	The agent is not classifiable as to its carcinogenicity to humans (515 agents)
Group 4	The agent is probably not carcinogenic to humans. This group contains only a single substance.

The IARC classification does not indicate whether an agent is mainly work-related. It is difficult to define a carcinogen as work-related, for two main reasons.

The distinction between occupational exposure and environmental exposure is sometimes arbitrary. For example, an exposure to benzene is generally considered as work-related, but it is obvious that some groups of the general population are also exposed to this carcinogen. Conversely, exposure to pharmaceutical substances is not considered as work-related, but some occupations are exposed to them.

The second difficulty lies in the type of scientific proof that could enable such or such an agent to be termed a work-related carcinogen: although it is certain that exposure to asbestos dust can cause a mesothelioma, there are cases where an increase in a type of cancer is observed for a defined group of workers, but for which the carcinogenic agent in question cannot be identified with any certainty (e.g. bladder cancer in painters). In the same way, the carcinogenic nature of certain exposures has been demonstrated by experiments on animals or in laboratory, but there is no scientific evidence of their harmfulness for humans.

Recent scientific research⁴ has nevertheless been performed on the classification of certain carcinogenic agents as work-related, on the basis of the IARC monographs. To date, 30 agents carcinogenic to humans (IARC Group 1), 29 agents probably carcinogenic to humans (IARC Group 2A) and 114 possible agents (IARC Group 2B) have accordingly been classified as work-related.

[3] <http://monographs.iarc.fr/ENG/Classification/index.php>

[4] Listing occupational carcinogens, Siemiatycky et al, 2004, Environmental Health Perspectives, Vol.112 n°15, and IARC Carcinogen Update, Rousseau et al, 2005, Environmental Health Perspectives, Vol. 113, n°9

1.1.2 European Union (EU) classification

This classification, which coexists with the IARC classification, covers chemical substances only. Its main objective is to serve as a reference for Community regulations relating to chemical risk prevention and the labelling of hazardous substances and mixtures. This classification is based on three categories depending on the possible effect of the substance on humans.

Category 1 : substances that are known to be carcinogenic to humans (sufficient information is available to establish the existence of a relationship of cause and effect between human exposure to such substances and the occurrence of a cancer).

Category 2 : substances which should be regarded as if they are carcinogenic to humans (sufficient information is available to justify a strong presumption that human exposure to such substances can cause a cancer - generally based on appropriate long-term animal studies).

Category 3 : substances which cause concern for humans owing to possible carcinogenic effects, but in respect of which the available information is not adequate for making a satisfactory assessment (information is available from appropriate animal studies, but it is insufficient to classify the substance in the second category).

Note that a recent European regulation⁵ somewhat modified this classification. Substances will now be broken down into the following categories:

- 1A (known carcinogenic to humans);
- 1B (presumed carcinogenic to humans);
- 2 (substances suspected of being carcinogenic to humans).

1.2 Work-related carcinogenic risk and chemical, physical and biological agents

1.2.1 Chemical agents

There are a large number of carcinogenic chemical agents, some of which are used in work environments. In all sectors of activity, there is a risk of potential exposure to chemical substances of which some are carcinogenic, because chemical products are ubiquitous (maintenance products, environment, etc.). However, some branches of activity are more concerned than others, because they expose workers to one or more specific agent(s).

The table below summarises the main carcinogenic chemical agents liable to be emitted by certain processes or operations, citing examples of the sectors of activity or the jobs most affected, and their correspondence with the IARC and EU classifications.

[5] Regulation (EC) No 1272/2008 of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC and amending Regulation (EC) No 1907/2006

Main carcinogenic chemical agents liable to be emitted and sectors of activity concerned (source: INRS)

Carcinogenic agent (with its classification)	Sectors of activity concerned	Jobs concerned	Comments
Asbestos EU 1 IARC 1	Building, industry, services	All trades	Fibrous products, plasters, etc.
	Industry employing high temperatures	Maintenance worker, mason/ chimney sweep	
	Public works	Earthworks operator, mason, road surfacing worker	Asbestos cement pipes Removal of asphalts containing asbestos
Arsenic EU 1 (for certain oxides) IARC 1	Semiconductors	Manufacturing worker	
	Refining, metallurgy and non-ferrous metal smelting	Metallurgist Steel mill worker	
Benzene EU 1 IARC 1	Refinery	Operator, maintenance worker	Pure benzene or in hydrocarbon mixtures
	Garage	Mechanic	Exposure to petrol (vapours and skin contact)
	Fuel transport	Road tanker driver	Exposure to petrol vapours (fuel transfer)
Beryllium EU 2 IARC 1	Dental prosthesis laboratory	Dental laboratory technician	
	Copper-beryllium alloy smelting	Foundry worker	
	Machining and welding of copper-beryllium or aluminium- beryllium alloys	Fitter, installer, manufacturing worker	Alloy used for its properties of mechanical strength (aeronautics, aerospace, auto- motive, electronics, ceramics, nuclear sectors, etc.). Manufacture of friction parts
Coal pitches and tars IARC 1 Cf. PAHs	Public works	Road worker (surfacing)	Fluxed bitumen containing oil or coal tar
	Aluminium industry	Production worker	Manufacture and use of electrodes
Spray mist of strong mineral acids containing sulphuric acid IARC 1	Chemicals Fertilizer production Surface treatment	Production worker	
1,3-butadiene EU 1 IARC 2A	Petrochemicals	System operator	
Cadmium EU2 IARC 1	Battery and electric cell salvaging	System operator Furnace operator	Nickel-cadmium batteries
	Zinc, lead, copper refining	Refining worker	Presence of cadmium contamination in the ores in question
Hexavalent chromium (compounds) EU 1 for trioxide EU 2 for other compounds IARC 1	Steel construction	Stainless steel welder	See also nickel
	Sheet metal work	Sheet metal worker	
	Building and construction	Painter/paint remover	Old paints with zinc and lead chromates
Cobalt EU 2	Carbide tool sharpening	Sharpener	Presence of cobalt in the sintered metallic carbides

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Main carcinogenic chemical agents liable to be emitted and sectors of activity concerned (source: INRS)
(Continuing)

Carcinogenic agent (with its classification)	Sectors of activity concerned	Jobs concerned	Comments
Refractory ceramic fibres EU 2	Industry employing high temperatures	Maintenance worker, glass worker, foundryman, leaded glass glazier	Fibrous compacted or composite products/composites
	Chimney work, furnace production	Chimney sweep	
Formaldehyde EU 3 IARC 1	Use of urea-formol, phenol and melamine-formol resins	Operator press, manufacturing worker	Formaldehyde found either as a residual quantity in certain thermosetting plastic materials, or as a degradation product of certain thermosetting or thermoplastic materials
	Raw material processing Injection moulding of polyacetal Manufacture of laminates / injection moulding / other manufacturing processes based on phenolic or amino resins	Press operator	
Used or relatively unrefined mineral oils IARC 1 Cf. PAHs	Metallurgy	Worker on machine tool Operator on stamping line	The oil can become charged with aromatic polycyclic hydrocarbons (APHs) during use
	Rubber industry	Mixing operator	Extension oils
	Building and construction	Formwork setter	Check the APH content of re-used oils, severely degraded drained oils
	Garages	Mechanic	
Polycyclic aromatic hydrocarbons (PAHs)	See mineral oils and coal pitches and tars		
Diesel engine emissions IARC 2A	Transport	Garage mechanic, car park employee, ferry loading employee, toll collector	Presence of soots and carbon particles in exhaust fumes
	Garage, roadworthiness test centre	Garage mechanic, technician	
	Tunnel or underground work	Machine operator Other workers (concurrent work)	
Nickel (certain compounds) EU 1 IARC 1	Steel construction	Stainless steel welder	See also chromium
	Sheet metal work	Sheet metal worker	
Nitrosamines IARC 2A (certain types)	Rubber	Vulcanisation and packaging operators	Salt baths especially generate nitrosamines.
	Metal work and machining	Machine tool operator	The formation of nitrosamines during the storage or use of cutting fluids depends on the combined presence of certain amines and nitrites.
Carbon black IARC 2B	Rubber, chemicals	Charging and mixing operator	-
Ethylene oxide EU 2 IARC 1	Food processing Healthcare	Disinfection and sterilisation operator	Product used for disinfection and sterilisation

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**Main carcinogenic chemical agents liable to be emitted and sectors of activity concerned (source: INRS)
(Continuing and ending)**

Carcinogenic agent (with its classification)	Sectors of activity concerned	Jobs concerned	Comments
Lead IARC 2A	Stripping of metallic and wooden parts	Painter, maintenance worker	Removal of old paints containing lead (corrosion-resistant, "minium", etc.)
	Oxygen cutting of steel structures and pipes	Dismantler	
	Building renovation	Painter, maintenance worker	
	Production/restoration of stained glass windows	Leaded glass glazier	
Wood dusts IARC 1	Joinery, cabinetwork, carpentry, sawmilling	Joiner, cabinet maker, carpenter	
Crystalline silica IARC 1	Quarries, sand pits	Stonecutter, system operator, maintenance worker	
	Smelting	Stripper, grinder	
	Ceramics industry	Dental prosthetist, technician	
		Worker	
Building and construction trades (sanding and sawing of concrete, tiling, etc.)	Mason/chimney sweep		

1.2.2 Physical agents

Physical agents that could result in an increased risk of cancer can be subdivided into ionising radiation and non-ionising radiation, which themselves cover electromagnetic fields and optical radiation.

The sectors of activity exposed to the risks related to ionising radiation via the use of radioactive sources are, in particular, the nuclear industry (fuel extraction, manufacture, use and retreatment, waste storage and treatment) and the medical sector (radiotherapy, diagnostic radiology, nuclear medicine).

The cancers caused by occupational exposure to ionising radiation may be leukaemia, bronchopulmonary cancers, osteosarcomas, etc.

Of the non-ionising radiations, low-frequency electromagnetic fields have been classified by the International Agency for Research on Cancer (IARC) as possibly carcinogenic to humans (category 2B).

The sectors liable to be exposed to electromagnetic fields are, in particular, telecommunications, electric power production and distribution, the steel and metalworking industry, the electronics industry, the scientific and medical sectors and all sectors using electrical installations (transformers, electric presses, welding machines, etc.).

Of the optical radiations, it is ultraviolet radiation that, in the event of exposure to a significant dose, has long-term carcinogenic effects on the skin.

The main occupations exposed to UV radiation are those performed outdoors (farmers, gardeners, stockbreeders, forestry workers, building and construction workers, seaside and winter sports resort personnel, mountain sports professionals, etc.) and those exposed to artificial sources (electric arc welders, sheet metal workers, printers, operators of certain processes using UV radiation, etc.).

1.2.3 Agents biologiques

The International Agency for Research on Cancer (IARC) has classified as “carcinogenic to humans” (Group 1) biological agents such as the Epstein-Barr virus and human papillomaviruses, the effects of certain biological agents such as chronic infections by the hepatitis B and C viruses, and toxins secreted by certain biological agents.

These carcinogenic risks related to biological agents are found chiefly in the healthcare sector (hepatitis B and C viruses in particular) and, to a lesser extent, in the waste management sector (collection, sorting, etc.) and in any other activity where there is a risk of pricking by a syringe contaminated by the blood of a carrier of the hepatitis B or C virus. The sectors concerned by a possible exposure to mycotoxins are agriculture (aflatoxins and other mycotoxins generated by mould and present in hay, straw and cereals, etc.) and food processing (cereals, seeds, almonds and other commodities contaminated by mycotoxins).

1.3 Exposure to carcinogenic agents: the CAREX system (CARcinogen EXposure)

The workplace is a source of exposure to risk factors, and in particular numerous carcinogenic agents. Even though, in the general population, relatively few cancers can be attributed to an occupational exposure (see Chapter 2 on recognition), it is nevertheless a fact that in specific categories of workers, exposure is generally far higher than for the general population.

In order to assess these occupational exposures to carcinogenic agents, in the 1990s a group of international experts worked on preparation of the CAREX database⁶ as part of the EU programme “Europe Against Cancer”. This system aimed to provide the EU-15 countries, over the period 1990-1993, with information concerning exposure to carcinogenic agents and documented estimates concerning the number of exposed workers by country, by carcinogenic agent and by industrial sector. This data covers 139 carcinogens evaluated by the IARC.

From a methodological viewpoint, these estimates were performed in two stages. They were first established on the basis of national data concerning the working population and estimates of the exposure rate in two reference countries (United States and Finland). Next, a network of national experts evaluated these estimates according to their similarities or differences relative to the exposure circumstances perceived in their own countries.

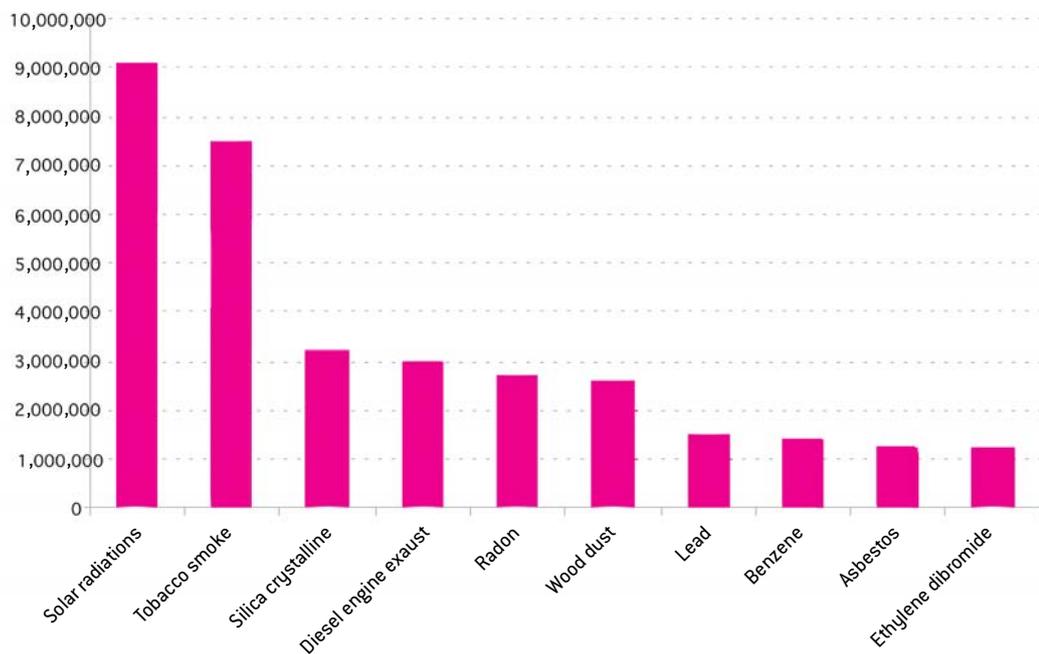
According to the results of the CAREX system published in 1998, 32 million workers (i.e. 23% of the working population) were exposed to the carcinogenic agents covered by the study in the EU-15 between 1990 and 1993. These workers as a whole sustained 42 million exposures, i.e. on average 1.3 exposures per worker. The most frequent worker exposures to carcinogenic agents are, in decreasing order, solar radiation, tobacco smoke, crystalline silica, diesel emissions, radon, wood dust, lead and benzene.

[6] To find out more: <http://www.ttl.fi/en/pages/default.aspx>

Working population exposed to carcinogenic agents during the period 1990-1993 by country (CAREX system)⁷

Country	Working population	Exposed population	% of working population exposed
Austria	3,086,425	786,12	25
Belgium	3,506,842	726,86	21
Denmark	2,812,902	684,03	24
Finland	2,138,381	510,53	24
France	21,786,228	4,937,345	23
Germany	34,035,522	8,225,886	24
Greece	3,332,580	910,48	27
Ireland	1,088,450	264,76	24
Italy	17,073,393	4,188,546	25
Luxembourg	186,493	47,526	25
Netherlands	6,463,694	1,090,280	17
Portugal	4,019,845	974,926	24
Spain	12,162,830	3,083,479	25
Sweden	4,003,674	815,536	20
United kingdom	22,821,375	4,973,126	22
Total EU-15	138,518,634	32,219,423	23

The ten most frequent occupational exposures for the population of the EU-15 during the period 1990-1993 (CAREX system)⁸



(7) Excerpt from Appendix 2 of Occupational exposure to carcinogens in the European Union in 1990-93, FIOH, Helsinki, March 1998

(8) Excerpt from Table 3 of Occupational exposure to carcinogens in the European Union in 1990-93, Occup Environ Med 2000

2. Cancers that could be recognised as work-related

Like for any disease, the job-related nature of a cancer can be recognised by the national organisation responsible for occupational disease insurance. It should be specified that, for each disease, each country imposes its own specific recognition conditions relating to the nature of the disease, the type of exposure and the job performed. If the job-related nature of the cancer is recognised, the sufferer will be reimbursed and compensated in accordance with the national legislation on compensation of occupational injuries and diseases in force in the country⁹.

Nearly all the European countries covered by this study have a national list of occupational diseases which confers on the registered diseases a presumption of occupational origin that is more or less strong depending on the country.

The following tables list nearly all the cancers registered to date on the various national lists of occupational diseases, by tumour location and with a breakdown according to the causal agent. It is very hard to list absolutely exhaustively all the types of cancers covered by all the lists, because the organisation of the lists is completely heterogeneous (from the very general list of causal agents followed by a few specific diseases in **Switzerland** to very precise tables in which each disease is associated with a causal agent and recognition criteria in **France**). Certain cancers specifically registered on the lists of few countries - or even just one - and for which there are very few cases of sufferers, are de facto excluded from the following tables.

These tables also mention whether the cancers are registered or not on the European list based on the Recommendation of 19 September 2003, which has only an indicative value.

There also exists in nearly every country a complementary system of recognition, under which sufferers must prove the link between their disease and their occupational activity.

2.1 Recognition under the list system

The following table lists the various types of cancers registered as such on the national lists of occupational diseases or as a result of the registration of causal agents liable to cause them. This information has been provided by the occupational disease insurance organisations of the countries in question.

Registration on a list does not exclude the fact that each country has its own recognition criteria to be met to enable the job-related nature of the cancer in question to be recognised (name of the disease, duration and/or intensity of exposure, etc.).

We specify that the cancers marked with a red dot have been registered recently¹⁰ on the list of occupational diseases of the country in question.

[9] To find out more about compensation for the victims of occupational injuries and diseases in Europe: Eurogip 2005 report on "Occupational injuries and diseases: lump sum or full reparation? European survey on the conditions of victim compensation"

[10] The report entitled "Overview of work-related cancers in Europe" published by Eurogip in 2002 already reviewed these lists; the red dots therefore correspond to cancers whose recognition under the list system has been made possible since then.

Recensement des cancers susceptibles d'être reconnus au titre des listes nationales de maladies professionnelles

Disease and/or Agent	Austria	Belgium	Denmark	Germany	Finland	France	Italy	Luxembourg	Portugal	Spain	Switzerland	European list
Skin cancers												
Arsenic and mineral compounds	•	•	•	•	•	•	•	•		•	•	•
Coal pitch	•	•	•	•		•	•	•	•	•	•	•
Petroleum derivatives	•	•	•	•		•	•	•	•	•	•	
Coal tars	•	•	•	•		•	•	•	•	•	•	•
Coal oils	•	•	•	•		•	•	•		•	•	•
Soot from coal combustion	•	•	•	•		•	•	•		•	•	•
Carbon black	•	•	•	•		•		•		•		
Paraffin and its compounds	•	•	•	•				•	•	•	•	•
Anthracene	•	•	•	•		•	•	•	•	•	•	•
Resins	•							•		•		
Carbazole and its compounds	•	•		•				•				•
Bitumen	•	•	•	•			•	•	•	•	•	•
Ionising radiation	•	•		•			•	•	•	•	•	•
Mineral oil	•		•	•		•			•	•	•	•
Bladder cancers												
Aromatic amines and their salts	•	•	•	•	•	•	•	•		•	•	•
N-nitroso-dibutylamine and its salts						•			•	•		
Tars, oils and coal pitch (* except for oils)			•(*)			•	•(*)		•	•		
Soot from coal combustion						•						
Bronchopulmonary cancers												
Primary cancer caused by:												
Ionising radiation	•	•		•		•		•	•	•	•	•
Chromic acid, chromates, alkaline or alkaline earth bichromates, zinc chromates	•	•	•	•	•	•	•	•	•	•	•	•
Tars, oils, coal pitch and soot from coal combustion		•	•	•		•	•	•	•		•	
Inhalation of dusts or fumes of arsenic and its compounds	•	•	•	•	•	•	•	•		•	•	•
Inhalation of beryllium dusts	•	•	•	•	•		•	•	•	•	•	•
Inhalation of asbestos dusts	•	•	•	•	•	•	•	•	•	•	•	•
Inhalation of nickel dusts or fumes	•	•	•	•	•	•	•	•	•	•	•	•
Inhalation of iron oxide dusts or fumes						•						
Inhalation of cadmium dusts	•		•		•	•	•		•	•	•	•
Inhalation of cobalt dusts combined with tungsten carbide before sintering			•			•		•	•		•	
Bis(chloromethyl) ether	•	•	•	•		•	•			•		
Malignant degeneration of the lung following:												
Inhalation of asbestos dusts	•	•	•	•	•	•	•	•	•	•	•	•
A silicosis or silicotuberculosis	•		•	•		•	•				•	

(to be continued on the next page)

Recensement des cancers susceptibles d'être reconnus au titre des listes nationales de maladies professionnelles (Continuing and ending)

Disease and/or Agent	Austria	Belgium	Denmark	Germany	Finland	France	Italy	Luxembourg	Portugal	Spain	Switzerland	European list
Bone cancers												
Sarcoma due to ionising radiation		•		•		•	•	•	•		•	•
Cancer of the ethmoid bone and paranasal sinuses due to wood dusts		•	•	•	•	•	•	•	•	•	•	•
Cancer of the ethmoid bone and paranasal sinuses due to nickel		•	•	•	•	•	•	•	•	•	•	•
Cancer of the nasal cavities due to chromium		•	•	•	•	•	•	•	•	•	•	
Cancer of the nasal cavities due to leather dusts		•	•				•			•	•	
Leukaemias												
Benzene		•	•	•	•	•	•	•	•	•	•	•
Ionising radiation		•	•	•		•	•	•	•	•	•	•
Hepatic cancers												
Arsenic and mineral compounds		•		•		•	•	•		•	•	
Vinyl chloride monomer		•	•	•	•	•	•	•		•	•	•
Hepatitis viruses		• B, C and delta	• Band C	•		•	• Band C recognised as work-related	•	• B			•
Ionising radiation				•			•					
Other types of cancers												
Cancers due to inhalation of asbestos dusts (other than lung cancers):												
Cancer of the larynx	•	•	•	•				•	•			•
Pleural mesothelioma	•	•	•	•	•	•	•	•	•	•	•	•
Mesothelioma of the peritonium	•	•	•	•		•	•	•		•	•	•
Mesothelioma of the pericardium	•	•	•	•	•	•	•	•	•	•		
Other cancers:												
Thyroid cancer due to ionising radiation	•	•	•	•			•	•			•	
Cancer of the larynx/oral cavities due to coal tars/pitches	•						•	•	•		•	
Cancer of the pancreas due to inhalation of arsenic	•			•				•				
Kidney cancer due to trichloroethylene				•				•				
Cancer of the larynx due to chromium	•							•	•	•		
Lung cancer caused by passive nicotine			•									

It can be observed that there are few major changes, in terms of cancers, between the national lists of 2002 and the current lists. Two countries differ somewhat (Spain and Denmark), to the extent that they took advantage of the publication of a new list of occupational diseases, in 2006 and 2005 respectively, to include in it several new types of cancers or new agents liable to cause an occupational cancer.

The lack of significant changes can be explained partly by the fact that the work-related origin of many cancers is without doubt for several decades now, and they have been registered on the various lists for a long time. It can be seen, moreover, that all the observed changes concern new types of cancers added to the lists and not removed from them. Moreover, this table does not reflect changes that may have taken place in various countries with regard to the criteria for recognition of these cancers.

Denmark: Comprehensive revision of the list of occupational diseases in 2005

After several years without any change in the Danish list of occupational diseases regarding cancers, a comprehensive revision was made in August 2005 on the basis of the results of the most recent research by the International Agency for Research on Cancer (IARC) in the World Health Organization (WHO).

The new list applicable to cases reported from 2005 onward contains 24 new entries in all, including new types of cancers and new exposures liable to cause certain cancers.

New occupational exposures associated with new cancers:

- Thyroid cancer caused by ionising radiation.
- Breast cancer caused by ionising radiation.
- Cancer of the nasopharynx (or cancer of the rhinopharynx) caused by formaldehyde has gone from Group 2A (caused by a probable carcinogen to humans) to Group 1 (caused by a known carcinogen for humans).

New occupational exposures associated with cancers already registered on the list:

- Aflatoxines (cancer of the liver and cancer of the bile duct).
- Radium-226 (bone cancer, cancer of the sinus mucosae and epithelial tumour).
- Radium-228 (bone cancer).
- Ortho-toluidine (bladder cancer).
- Particles of metallic cobalt in the presence of tungsten carbide (lung cancer).
- Inorganic compounds of lead (stomach cancer).
- Lung cancer caused by passive nicotine.

Regarding the latter entry, it should be specified that Denmark is the first country in Europe to have registered lung cancer caused by passive nicotine on its list of occupational diseases. Recognition is now possible if there has been a significant daily exposure to passive nicotine in the workplace over a large number of years, if the sufferer himself (herself) has never smoked and if he (she) has only been very moderately exposed to tobacco in his (her) private life.

New cancers associated with exposures already registered on the list:

- Work in the rubber industry (leukaemia).
- Manufacture of shoes and boots (leukaemia and bladder cancer).
- Talc containing asbestiform fibres (mesothelioma of the pleura and mesothelioma of the peritoneum).
- Coking (skin cancer and kidney cancer).
- Gasification of coal (skin cancer).
- Chromium base products (cancer of the nasal cavities and sinus cancer).
- Mustard gas/sulphur mustard (cancer of the larynx).
- Manufacture of isopropanol (cancer of the larynx).
- Coal tar and coal pitch (bladder cancer).
- Aluminium production (bladder cancer).
- Painting (bladder cancer).
- Dioxin (lung cancer, cancer of the connective tissues and non-Hodgkin's lymphoma).

In addition, the structure of the new list of occupational diseases has been simplified, with all the cancers being grouped in a single category.

2.2 Recognition under the off-list system

Theoretically, when the national legislation provides for the existence of a complementary system of recognition of occupational diseases (which is the case in all the countries in question except **Sweden** which has no mixed system but only a proof system, and **Spain** which has only a list system), all diseases can ultimately be accepted for occupational risk compensation under the conditions specific to each country.

In practice, because it is up to the sufferer to provide evidence of the work-related origin of his disease, the number of cases of occupational diseases recognised under this system is small. This is especially true for cancers, partly because the most frequent types of cancers in volume terms are generally already listed, and partly because of the difficulty of documenting the cause of cancers.

Little data is available concerning cancers recognised under the complementary system (or proof system) in the various countries. Some countries have communicated the following information based on the cases actually recognised during the last decade.

In **Germany**, the main types of cancers liable to be recognised as work-related under the complementary system¹¹ are skin cancer caused by exposure to ultraviolet radiation, cancer of the oesophagus caused by nitrosamines and lung cancer caused by exposure to 1,3-Propanesultone.

In **France**, several dozen cancers not mentioned in the national list of occupational diseases are recognised each year. Their diversity is such that it is not possible to establish an exhaustive list of them (see Appendix 2 for detailed data).

Italy is not able to provide information concerning the typology of cancers that can be recognised under the complementary system, but specifies that, between 2001 and 2008, out of the 6,247 cancer cases recognised as work-related, 957 were recognised under the complementary system (i.e. 15% of cases)¹².

In **Switzerland**, a single case of cancer was recognised off-list between 2000 and 2007; it was malignant tumour of the nasal cavities.

Austria notes only two cases of adenocarcinoma recognised under the complementary system since 2002, one in a quarry worker and the other in a worker in the chemicals sector.

In **Denmark**, following the classification by the WHO of night shift work as an “agent probably carcinogenic to humans” (Group 2A), in November 2007 the occupational disease insurance organisation decided to recognise as an occupational disease (under the complementary system) and compensate women having a breast cancer due to performing night shift work. This recognition is possible on certain conditions, and the dossiers are examined on a case by case basis: the night work must have been long-term (at least 1 night per week during 20 to 30 years) and any case involving a hereditary risk of breast cancer is rejected. By mid-2009, about forty women had received compensation (from 13,000 to 134,000 euros); most had worked in the hospital sector. Denmark is waiting for the publication of the conclusions of the International Agency for Research on Cancer (IARC) scheduled for 2010 to discuss the advisability of registering the effects of night work in its list of occupational diseases.

Belgium and **Luxembourg** mention no case of a cancer recognised off-list recently, despite the existence of a complementary system.

[11] For more precise data, see the cases recognised between 2004 and 2008

[12] See statistical table on page 37

3. Statistics concerning work-related cancers

It is not easy to quantify the phenomenon of work-related cancers on the European level, since it is already difficult to estimate their number at the level of a State, whatever the country in question.

There are of course numerous national epidemiological studies aiming to determine the number of work-related cancers in a given sector of activity or in a precise geographic area, for a specific type of cancer or causal agent. But there are not sufficient data to carry out such research for all carcinogenic agents and the entire working population of a country.

3.1 Estimates by the World Health Organization (WHO)

According to the WHO, 200,000 people worldwide die each year of cancers due to exposure in their workplace¹³. It estimates, for example, that “one in every ten deaths from lung cancer is closely related to risks incurred in the workplace. About 125 million workers worldwide are exposed to asbestos in their workplace and at least 90,000 die each year of asbestos-related diseases. Tens of thousands of others die of leukaemia caused by exposure to benzene, an organic solvent much used by workers, especially in the chemicals and diamond industries”.

In the 25 EU countries in 2006¹⁴, the World Health Organization’s International Agency for Research on Cancer (IARC) estimated the number of new cases of cancer at 2.3 million¹⁵ and, according to various international studies¹⁶, 4% to 8.5% of cancers are caused by occupational factors.

3.2 Cases recognised as occupational diseases

Known data is available concerning the number of cancers whose work-related nature has been recognised by the national occupational injury and disease insurance organisations. However, it is admitted that the number of cases identified is far less than the actual number occurring.

The reasons already mentioned to explain this under-reporting of occupational cancers are, primarily, the difficulty for the medical profession of identifying the work-related origin or not of the cases of cancer encountered, and the length of the latency period for cancers, which makes it hard to identify risk factors and a possible occupational exposure.

A distinction should be made between this aspect of under-reporting and the question of recognition, since generally the rates of recognition of cancers as occupational diseases are high.

[13] Media information note of 27 April 2007 (<http://www.who.int/mediacentre/news/notes/2007/np19/fr/>)

[14] This figure had been estimated at 2 million for 2004.

[15] Estimate published by the IARC in the Annals of Oncology of Wednesday 7 February 2007; Annals of Oncology is the monthly review of the European Society for Medical Oncology (<http://www.esmo.org/>).

[16] Doll, R., Peto, R., The cause of cancer: quantitative estimates of avoidable risk of cancer in the United States today, Oxford University Press, 1981. Nurminrn, M., Karjalainen, A., Epidemiologic estimate of the proportion of facilities related to occupational factors in Finland, Scandinavian Journal of Work, Environment & Health, 2001

These recognition statistics are of definite interest to the extent that, for [virtually] constant legislation in a given country, they make it possible to get an idea of the quantities involved and of the changes over time for such or such a type of cancer considered as work-related.

3.3.1 Eurostat data

Eurostat, the Statistical Office of the European Union, publishes statistics, harmonised by the EODS¹⁷ (European Occupational Diseases Statistics) method, concerning the number of cancers whose work-related origin has been recognised by the occupational injury and disease insurance organisation in 12 of the 15 countries that were members of the European Union at the time (Belgium, Denmark, Spain, Ireland, Italy, Luxembourg, Netherlands, Austria, Portugal, Finland, Sweden and the United Kingdom). These data are then extrapolated to the EU-15 according to the proportion of the population in employment.

The most recent data regarding occupational cancers date from 2001. Eurostat also specifies the causal agents for the four most frequent types of work-related cancers¹⁸.

Eurostat data on work-related cancers – 2001

Diagnostic	EU-12	EU-15 (extrapolated number)	Main causal agents
Mesothelioma	1,168	1,934	asbestos (98%), unknown or imprecise (2%)
Malignant lung tumour	208	344	asbestos (51%), unknown or imprecise (37%), chromium (3%), hydrocarbons (2%), miscellaneous (7%)
Malignant bladder tumour	56	93	unknown (54%), aromatic amines (23%), the remainder being mostly defined according to the industrial application (paints, colouring agents, plastics, etc.)
Malignant tumour of the nasal cavities and sinuses	44	72	wood dusts (80%), animals products (14%), unknown (6%)
Leukaemia	11	18	-
Other malignant tumours	12	20	-
Total	1,499	2,481	

3.2.2 National data 2000-2008: overview

Since the Eurostat harmonised data above are neither recent nor exhaustive given the application of a methodology for harmonisation of national data, they should be compared with the figures provided by the national occupational injury and disease insurance organisations. We specify that the scope of the population insured by these organisations may vary from one country to another (depending on whether or not the public sector, self-employed workers, etc. are included).

These statistics (presented in detail by country in Part 3-2-3) show the number of new cancer cases recognised as work-related between 2000 and 2008 by the competent insurance organisations in the following countries: Germany, Austria, Belgium, Denmark, Spain, France, Italy, the Czech Republic, Sweden and Switzerland. Only Belgium, Denmark and Switzerland were able to also provide statistics concerning claims for recognition as work-related cancer.

[17] European Occupational Diseases Statistics (EODS), Phase 1 methodology, Eurostat, 2000

[18] Eurostat, "Occupational Diseases in Europe in 2001", Statistics in Focus

Accordingly, the statistics processed for purposes of comparison between countries concerned recognised cancer cases, except for **Finland** which was able to provide only data relating to claims for recognition.

Since it is technically impossible to present these national data in a common framework, because each country has a specific statistical classification of occupational diseases which will influence the presentation of the figures, certain comparable factors have been excerpted and grouped together below in order to draw some general conclusions.

Summary table of cancer cases recognised as work-related between 2000 and 2008

Number of recognised cancers	2000	2001	2002	2003	2004	2005	2006	2007	2008
Austria	28	29	47	41	53	70	84	76	91
Belgium	114	118	148	178	144	178	245	168	219
Czech republic	50	55	49	45	26	39	38	37	24
Denmark	154	100	105	110	112	136	135	153	187
Finland*	138	114	140	145	167	148	139	150	168
France*	1,033	1,400	1,511	1,734	1,951	1,856	1,894	2,051	1,898
Germany					2,173	2,107	2,194	2,054	2,240
Italy*	nd	625	750	755	783	876	911	853	694
Luxembourg	2	6	5	5	10	16	13	15	16
Spain	6	4	14	7	6	13	4	15	62
Sweden						33	43	34	19
Switzerland	55	56	62	69	89	99	128	116	-

nd = not documented

* Notes:

- **Finland:** The table counts claims for recognition since, for some years now, the Federation of Accident Insurance Organisations (FAII) has been radically reorganising its recording system and it is therefore at present impossible to obtain data concerning recognised cases.
- **France:** Recognised cases are counted following the year of reporting. The data for 2008 are provisional, and therefore slightly under-estimated.
- **Italy:** The 2008 data are provisional and are likely to be consolidated upward in subsequent statistical publications by INAIL.

The figures given above correspond to the total number of cancers recognised, i.e. under both the list system and the off-list system.

However, the specific features of two countries should be mentioned: **Sweden** has only a proof system, and accordingly no list of occupational diseases similar to that of the other European countries; moreover, there is no complementary system in **Spain**.

In all the other countries, there is a mixed system, i.e. a list system and a complementary system.

However, analysis of the detailed statistics provided by the insurance organisations shows that the complementary system is a residual system of recognition of occupational cancers.

No case of an occupational cancer recognised in recent years under the complementary system has been counted in **Belgium** and **Luxembourg**, a single case in **Switzerland** between 2000 and 2007, and only two cases in **Austria** between 2000 and 2008; in **Germany** and **France**, 1.1% and 2.2% respectively of the cases recognised in 2008 were recognised under the complementary system. **Italy** is the only exception, with a rate of 13% in 2008.

The **Danish** and **Czech** statistics do not make it possible to assess the proportion of complementary system cases relative to the total number of recognised cases, and the question is not applicable to **Spain** and **Sweden**.

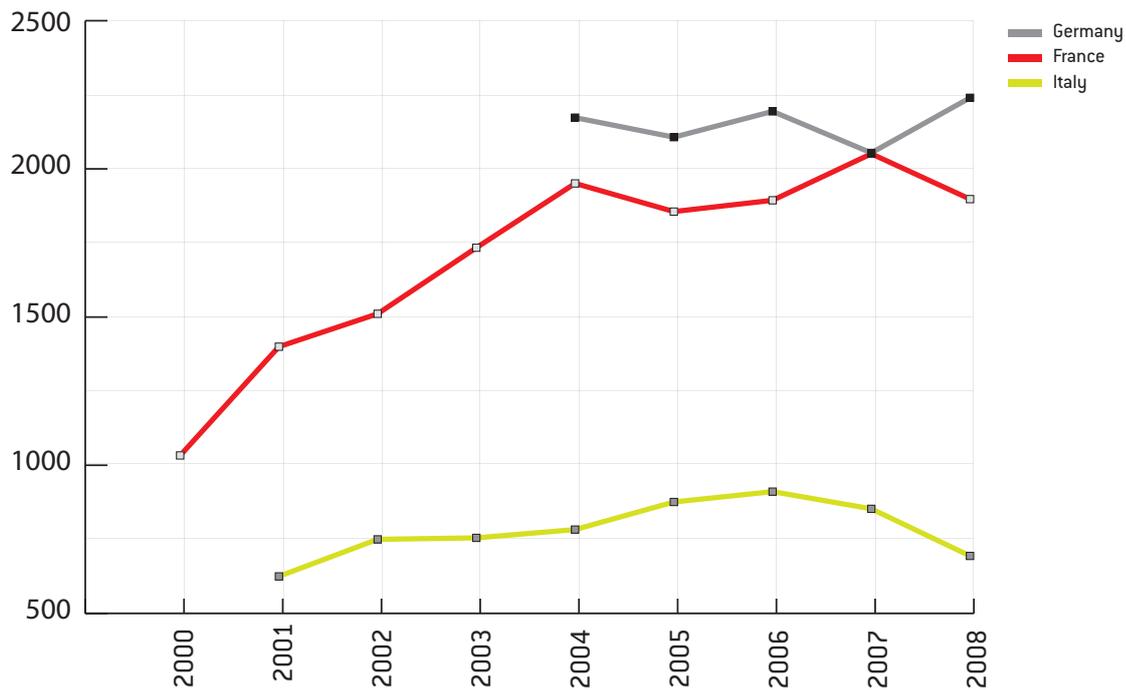
Changes in the number of recognised cancers

In the following three diagrams: for reasons of clarity, the countries have been grouped by classes of volumes of recognised cases corresponding to the last known year (2008):

- more than 300 cases,
- between 299 and 150 cases,
- less than 150 cases.

In Germany, France, Italy

Changes in the number of recognised cancers



* Notes: No data available from 2000 to 2003 for Germany; the 2008 data are provisional for France and Italy.

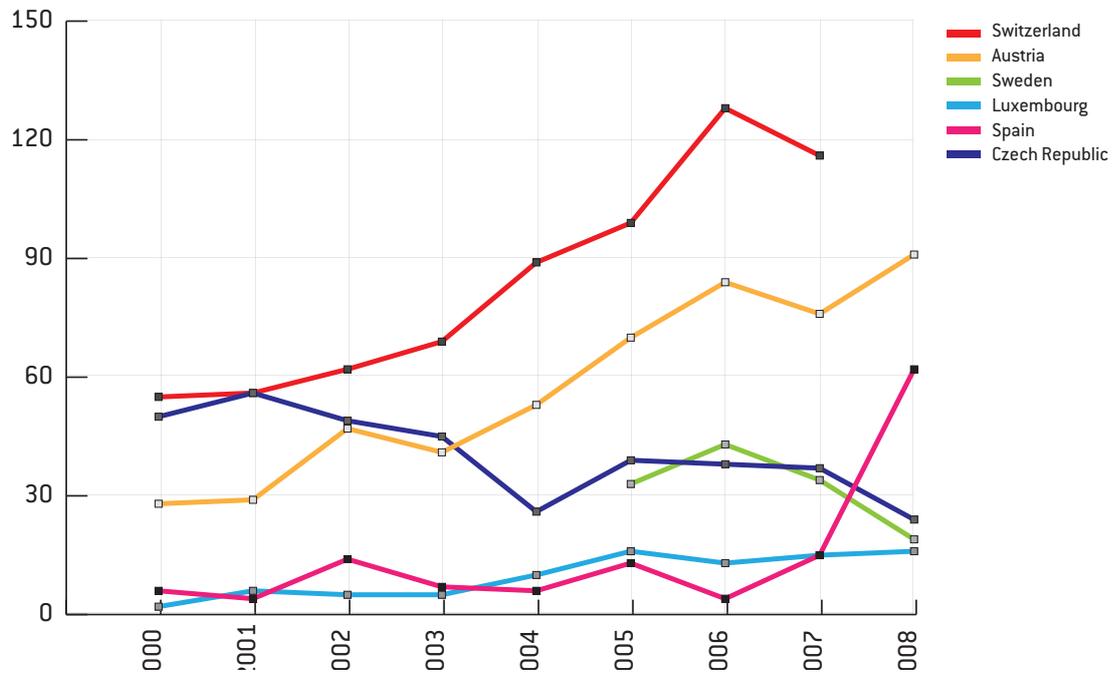
In Belgium, Denmark and Finland

Changes in the number of recognised cancers



In Austria, Spain, the Czech Republic, Sweden, Switzerland and Luxembourg

Changes in the number of recognised cancers



* Notes: The 2008 data are not available for Switzerland; no data available from 2000 to 2004 for Sweden.

The data communicated by the organisations show an almost universal trend to an increase in the number of recognised occupational cancers, with a few exceptions. The trends should be interpreted cautiously, however, for those countries where the number of recognised cases is small in absolute terms and for which a few more or a few less cases from one year to another can result in significant variations.

Recognised cancers relative to the insured population in 2006

Country	Recognised cases	Insured population	Recognition per 100,000 people insured
Austria	84	3,089,167	2.72
Belgium	245	2,483,948	9.86
Czech Republic	38	4,497,033	0.85
Denmark	135	2,710,462 (in 2005)	4.98
Finland*	139	2,129,000	6.53
France	1,894	18,146,434	10.44
Germany	2,194	33,382,080	6.07
Italy	911	17,686,835	5.15
Luxembourg	13	279,810	4.65
Spain*	4	15,502,738	0.03
Sweden	43	4,341,000	0.99
Switzerland	128	3,651,709	3.51

* Notes:

- **Spain:** The number of cancers recognised began to increase from 2007 on; if the 2008 data for population and recognised cases were taken, the ratio would be 0.39.
- **Finland:** The ratio is calculated based on claims for recognition (failing available data on recognised cases).

The recognised cancer cases have been compared with the insured population by the relevant organisations¹⁹. The year chosen was 2006 given its more exhaustive information for the two criteria of population and recognised cases.

The above table shows a certain heterogeneity between countries, because the ratios obtained range from 0.85 for the **Czech Republic** to 10.44 for **France**. Note the specific case of **Spain**, where statistical analysis is impeded by the very small number of recognised cancers relative to the insured population.

The countries in which the ratio is very low are probably faced with a more significant problem of under-reporting of occupational cancers than in the other countries. It is also possible that the nature or specific features of each system of recognition of occupational diseases have an impact on the ratio (e.g. **Sweden** where there is no list system but a system in which the sufferer must provide evidence of the work-related origin of his (her) disease).

[19] The data relating to the insured population are taken from the report entitled "Occupational diseases in Europe - 1990-2006 statistics and legal news" (Appendix 2) published by Eurogip in January 2009, except for Italy for which the insured population has been adjusted to remove the category of farmers not taken into account in the data concerning recognised cases.

Types of cancers most frequently recognised in 2008

Country	Recognised cancers	Broncho-pulmonary	Sinus	Bladder	Blood	Skin	Other
Austria	91	84	6	0	0	0	1
Belgium	219	195	19	2	1	0	2
Czech Republic	24	11	0	3	0	7	3
Denmark	187	112	6	9	1	13	46
Finland	168	160	2	2	1	0	3
France*	1,898	1,681	82	48	39	9	39
Germany	2,240	1,907	38	106	89	31	69
Italy*	694	556	33	72	0	5	28
Luxembourg	16	12	3	0	0	0	1
Sweden	19	15	1	0	0	0	3
TOTAL	5,556	4,733	190	242	131	65	195

* Notes:

- **France** : Provisional data for 2008; however, the consolidated figures for 2007 show an identical structure.
- **Italy** : Since cases of bronchopulmonary cancers also include cancers of the trachea and part of the digestive system, the figure reported in the table is probably slightly overestimated.

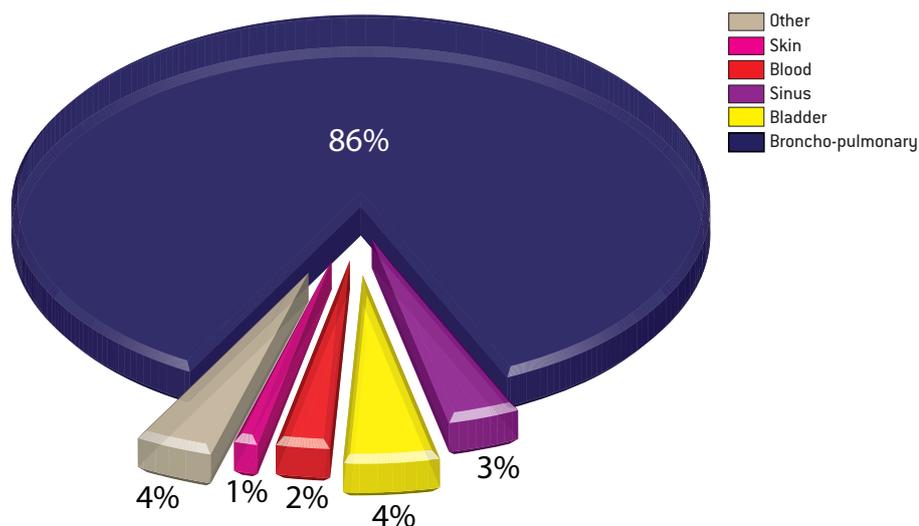
The above table lists the statistics relating to the five types of cancers most frequently recognised in each country according to their location.

Grouping the most frequent cancers by the organ affected is not easy given that the presentation of national statistics is organised very differently from one country to another.

Since the statistics from the Spanish and Swiss information systems are available only classified by causal agent, these countries were unable to be included in this analysis.

This table presents the statistics for 2008, which are the most recent statistics available on this subject.

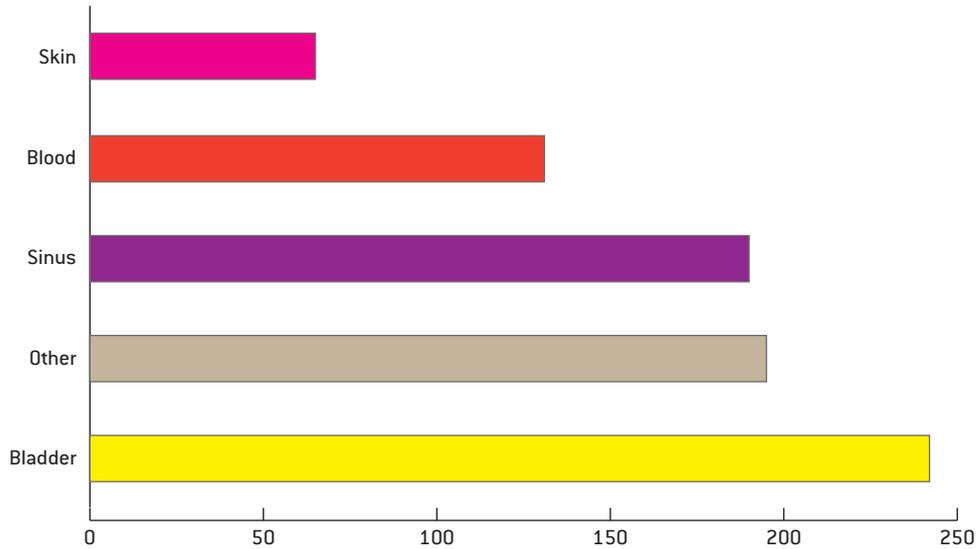
The five types of cancers most frequently recognized in 2008



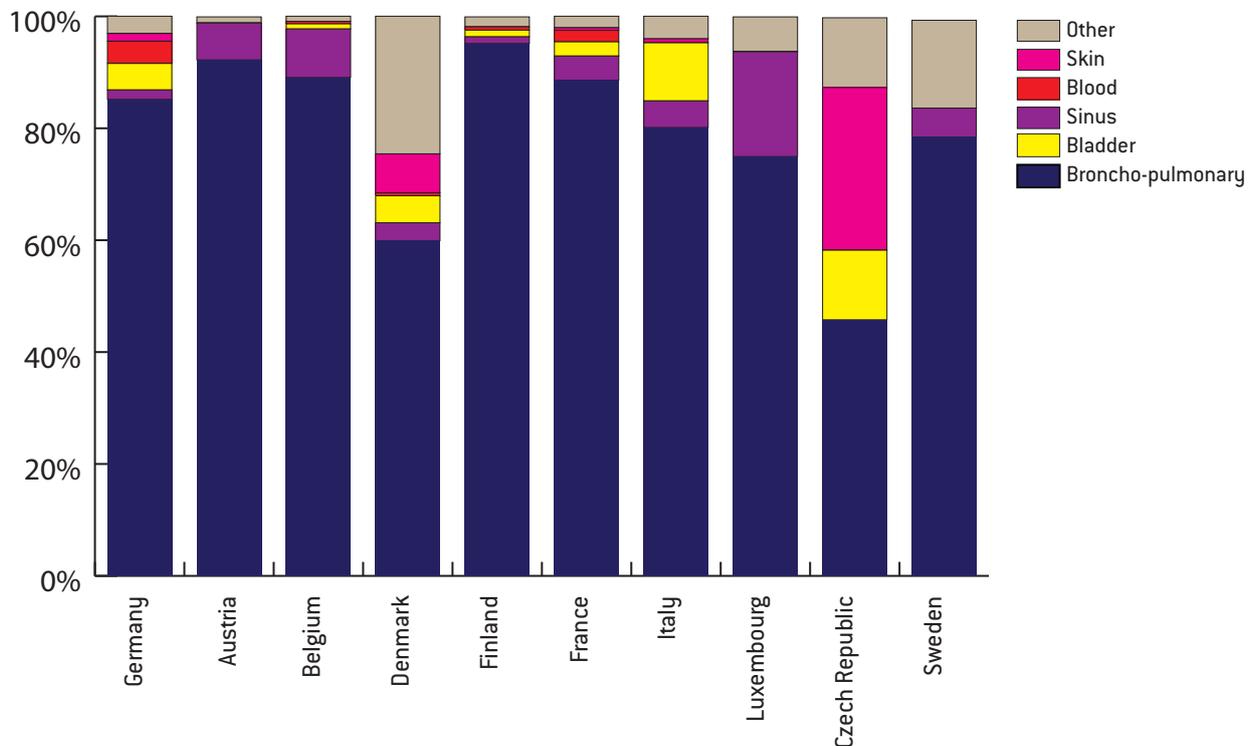
Bronchopulmonary cancers (including the pleura, peritonium and pericardium) and cancers of the sinuses, the bladder and the blood represent nearly all the cancers recognised in 2008 in the 10 countries in question, i.e. 97% (or 5,361 cases out of the 5,556 cancers recognised).

By themselves, bronchopulmonary cancers account for 86% of cancers recognised, followed a long way behind by the other cancers identified (bladder 4%, sinuses 3%, blood 2% and skin 1%). Recognised work-related cancers affecting other organs account for only 4% of the recognised total.

Cancers other than bronchopulmonary cancers most frequently recognised in 2008



Breakdown of the types of cancers most frequently recognised by country in 2008



Bronchopulmonary cancer, of the pleura, the peritonium and the pericardium, far outweighs all the recognised cancers (the causal agent asbestos being the cause of most of them - see following graph). It accounts for 60% of cancers recognised in **Denmark** and up to 92% in **Austria** (95% of reported cancers in **Finland**).

Considering the five most frequently recognised cancers by country in 2008, it can also be observed that **Austria**, **Luxembourg**, the **Czech Republic** and **Sweden** are characterised by a lack of heterogeneity of the types of cancers recognised: exclusively lung and sinus cancers in **Austria**, **Luxembourg** and **Sweden**, to which can be added a few cases of skin cancers in the **Czech Republic**.

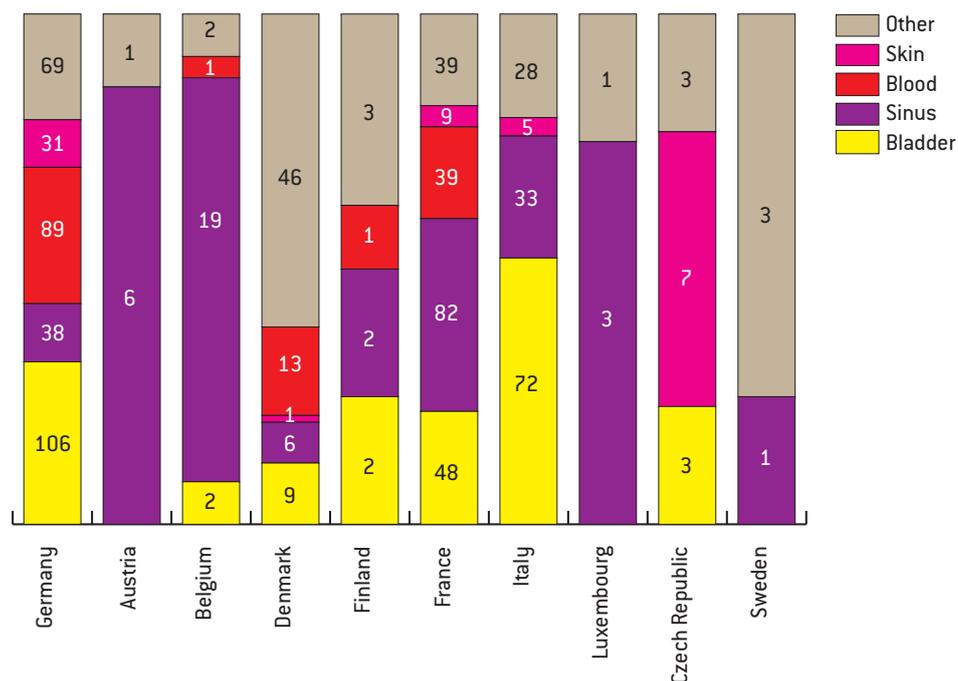
This can be explained mainly by the fact that these four countries are also those which recognise very few cancers in absolute terms (for 2008: 91 in **Austria**, 16 in **Luxembourg**, 24 in the **Czech Republic** and 19 in **Sweden**).

“Diversification” of the types of cancers recognised is therefore less easy than in the other countries.

For those countries that recognise several hundred cancer cases each year (**Germany**, **Belgium**, **Denmark**, **France**, **Italy**), the structure is identical: in each of them there are at least four of the five types of cancers identified as most frequently recognised, with a smaller proportion for blood and skin cancers.

Finally, it may be noted that the proportion of “other cancers” (other than bronchopulmonary cancers, cancers of the pleura, the peritonium and the pericardium, and sinus, bladder and blood cancers) is relatively variable, between 0.9% in **Belgium** and 25% in **Denmark**. However, except for **Denmark**, all the countries are at less than 15%.

Breakdown of types of cancers other than bronchopulmonary cancers recognised by country in 2008:



Predominance of the asbestos causal factor in recognised cancers

Most of the national statistics, however their presentation be organised (classification by causal agent only, by tumour location only, combination of these two criteria or separate presentation according to the two criteria), allow cases of occupational cancers caused by asbestos to be isolated²⁰. Where applicable, the cases recognised under the complementary system have been added (even when asbestos is only one of the agents causing the recognised cancer).

Predominance of the asbestos causal factor in recognised cancers

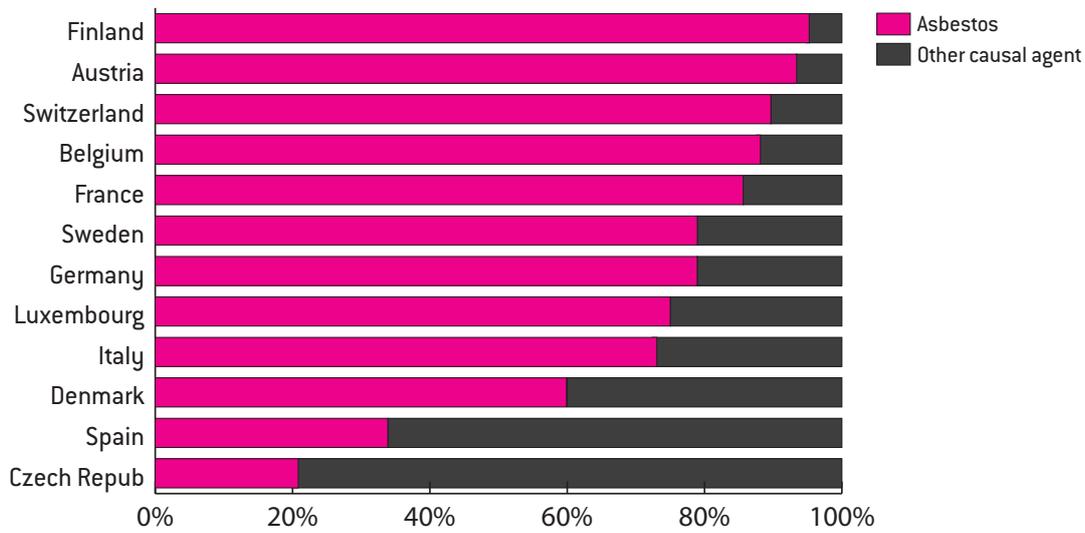
Country	Total number of cancers recognised	Recognised asbestos-related cancers
Austria	91	85
Belgium	219	193
Czech Republic	24	5
Denmark*	187	112
Finland*	168	160
France*	1,898	1,625
Germany	2,240	1,768
Italy*	694	507
Luxembourg*	16	12
Spain	62	21
Sweden*	19	15
Switzerland*	116	104
TOTAL	5,734	4,607

* Notes:

- For **Denmark**, **Luxembourg** and **Sweden**, the figure corresponding to the causal factor asbestos covers mesothelioma cases and all bronchopulmonary cancer cases recognised; it is therefore likely that it is slightly overestimated to the extent that bronchopulmonary cancers caused by other agents could have been counted (same case for Finland regarding its claims for recognition); since we are considering figures of the order of 1 case for Sweden, the overestimate is bound to be slight for this country; the assimilation of all bronchopulmonary cancers to asbestos-related cancers may have a greater impact on the rates obtained for Luxembourg (9 cases concerned) and Denmark (32 cases concerned).
- For **France** and **Italy**, the number of cases is possibly slightly under-estimated, because only cases recognised under the list system were considered, since the data from the complementary system does not enable the causal agent to be isolated. Also note that, for France, the data considered are provisional 2008 data, but the consolidated 2007 data show the same proportion.
- For **Switzerland**, the available data are those for 2007.

(20) For more detailed information: "Asbestos-related occupational diseases in Europe", Eurogip, March 2006

Weight of the causal agent asbestos in total cancers recognised in 2008 by country



Considering all the countries for which we have statistics, it can be seen that asbestos accounts for 80.7% of all the cancers recognised as work-related. However, this proportion varies depending on the country, and one observes that this causal agent accounts for a far smaller proportion in two countries: the **Czech Republic** and **Spain**.

For the other countries the proportion ranges between 60% for **Denmark** and 95.2% for **Finland** [claims for recognition].

3.2.3 Detailed national data 2000-2008

The following statistical data were provided by the occupational injury and disease insurance organisations of the countries covered by the study.

They show the number of new cancer cases recognised as work-related between 2000 and 2008 in the following countries: **Germany, Austria, Belgium, Denmark, Spain, France, Italy**, the **Czech Republic, Sweden** and **Switzerland**. **Belgium, Denmark** and **Switzerland** were able to also provide statistics concerning claims for recognition as work-related cancer.

As regards **Finland**, the statistics communicated correspond to claims for recognition as work-related cancers.

The presentation of these statistics is organised very differently from one country to another. Some use the criterion of the seat of the disease²¹ (**Denmark, Sweden**), others the harmful agent causing the disease (**Spain, Finland, Luxembourg, Switzerland**), while some countries combine these two criteria (**Germany, Austria, Belgium, France**) or use them separately (**Italy, the Czech Republic**).

Most of the countries make no distinction, in their statistics, between cases recognised under the list system and those recognised under an open system, where applicable. However, two countries (**Germany** and **France**) have detailed statistics on cases recognised off-list: see appendices.

(21) Some countries use the ICD-10 classification for this, in which case the code has been kept. ICD-10 refers to the 10th edition of the International Statistical Classification of Diseases and Related Health Problems, published by the WHO.

GERMANY (Source: DGUV): Cases recognised between 2004 and 2008

Type of cancer	Suspected causal agent	2004	2005	2006	2007	2008
Bronchopulmonary	Chromium	6	12	7	10	11
	Arsenic	3	2	3	4	2
	Halogenated alkyl aryl oxides (except TCDD)	1	1	4	1	
	Tetrachlorodibenzo-p-dioxin (TCDD)		1		1	
	Uranium	150	140	149	10	1
	Radium	1				
	X-rays	2	5	18	1	
	Other ionising radiations*	1	2	4	101	105
	Silicotic tumour burden	2	5			
	Asbestos	797	702	721	720	718
	Nickel		2	8	3	4
	Coking plant gases (PAHs)	21	11	19	12	23
	Quartz dusts	85	46	52	45	40
Pleura	Asbestos	834	831	890	879	939
Peritonium	Asbestos	23	21	19	13	37
Pericardium	Asbestos	5	6	4	3	12
Nose	Chromium		2		2	
	Arsenic	1				
	Nickel	1		2		
	Wood dusts	36	39	45	39	38
Larynx	Chromium	1		1		
	Uranium	8	46	8		
	Other ionising radiations*		2		2	1
	Asbestos	51	54	69	75	54
	Nickel			1		
Pharynx/oral cavity	Coking plant gases (PAHs)	2			3	1
	Uranium	4	17	4		
Blood	Other ionising radiations*		2	2		
	Benzene	23	20	25	18	86
	Uranium		3			1
	X-rays	1	6	5		1
Skin	Other ionising radiations*	2	1		1	1
	Tetrachlorodibenzo-p-dioxin (TCDD)	1				
	Radium	1	1			
	X-rays	2		1	2	
	Other ionising radiations*				2	1
Urinary organs	Pitch, tar, bitumen oils (PAHs)	6	14	15	3	23
	Aromatic amines	85	89	99	80	105
	Halogenated alkyl aryl oxides (except TCDD)	2				
	Tetrachlorodibenzo-p-dioxin (TCDD)		1	1		1

(to be continued on the next page)

ALLEMAGNE (source : DGUV) : cas reconnus entre 2004 et 2008 (Continuing and ending)

Liver	Halogenated hydrocarbons (except VC and Tri)	1		1	1	
	Vinyl chloride (VC)	1	5	1	4	2
	Trichlorethylene (Tri)				2	1
	Uranium		3	3		
	Other ionising radiations*			1		3
Kidney	Trichlorethylene (Tri)	5	2	4	1	3
	Halogenated alkyl aryl oxides (except TCDD)				1	
	Uranium		1			
Other organs		8	2	3	5	2
Sub-total of cancers on list		2 173	2 097	2 189	2 044	2 216
Cancers recognised off-list (see Appendix 1)		15	10	5	10	24
TOTAL recognised cancers		2 118	2 107	2 194	2 054	2 240

* Radiations other than X-rays

AUSTRIA (Source: AUVA): Cases recognised between 2000 and 2008

Types of cancers		2000	2001	2002	2003	2004	2005	2006	2007	2008
Skin cancer		0	1	0	0	0	2	0	0	0
Cancer or other neoplasia of the urinary tracts through exposure to aromatic amines		1	0	2	3	0	0	2	4	0
Malignant neoplasia of the costal pleura, the lungs and the oesophagus through asbestos exposure	Malignant neoplasia of the oesophagus, the lungs and the costal pleura through asbestos exposure (title until 2005)	25	27	42	33	4	15	0	0	0
	Malignant neoplasia of the costal pleura, the heart region and the peritonium through asbestos exposure (title since 2006)	0	0	0	0	33	29	46	38	57
	Malignant neoplasia of the lungs through asbestos exposure (title since 2006)	0	0	0	0	14	18	29	29	27
	Malignant neoplasia of the oesophagus through asbestos exposure (title since 2006)	0	0	0	0	0	0	1	1	1
	Sub-total Malignant neoplasia of the costal pleura, the lungs and the oesophagus through asbestos exposure	25	27	42	33	51	62	76	68	85
Adenocarcinoma of the nasal cavities and their turbinate bones through exposure to hard wood dust		2	1	3	5	2	6	6	4	6
TOTAL		28	29	47	41	53	70	84	76	91

BELGIUM (Source: FMP): Claims for recognition between 2001 and 2005 and cases recognised between 2000 and 2008

Type of cancer	Suspected causal agent	Claims for recognition					Recognised cases									
		2001	2002	2003	2004	2005	2000	2001	2002	2003	2004	2005	2006	2007	2008	
Lung	Inorganic arsenic	1			1		1	2	1			1			1	
	Hexavalent chromium		5	1			2	3	2	3	2	1	6	1	1	
	Nickel		1	1			2			1						
	Naphthalene homologues	1	1	1		1										
	Polycyclic aromatic hydrocarbons			1							1		1	1		
	Zinc														1	
	Asbestos	43	49	51	45	31	15	26	45	43	41	33	59	51	57	
Pleura	Asbestos	65	91	84	110	91	61	58	68	92	74	96	140	96	135	
Peritonium	Asbestos	4	5	4	5	2	4	5	7	6	2	5				
Paranasal and nasal cavity sinuses	Wood	16	20	24	18	24	19	18	20	18	16	40	28	14	19	
	Hexavalent chromium													1		
Larynx	Asbestos		1	1		2				2	1	1	1		1	
Leukaemia	Benzene	6	11	7	7	4	6	2	2	8	6	1	5	1	1	
	Ionising radiation												2			
Bladder	Certain aromatic amines												3	3	2	
Thyroid	Ionising radiation	5	1	3	4		4	4	3	4	1				1	
Liver	Hepatitis B or C virus		1							1						
TOTAL		141	186	178	190	155	114	118	148	178	144	178	245	168	219	

DENMARK [Source: Arbejdsskadestyrelsen]: Claims for recognition and cases recognised between 2000 and 2009

Diagnostic	Claims for recognition										Recognised cases									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Brain tumour			1	12																
Nose	7	4	7	3	5	4		15	50	44	8	4	3	4	4	4		2	6	5
Sinus	2				1						3			1						
Oral cavity	4	5	3	1	4	1					1		1	1						
Pharynx	2	2	3	2	2								1			1				
Oesophagus	3	1	3		2															
Larynx	4	5	2	4	3	5	13	6	4	3		1	2	2		3	4	6	2	
Thyroid		2	1	3	2	1	1	2	3				1	1				2		
Trachea			1											1						
Lung/bronchi	99	64	84	97	82	94	101	135	133	88	43	27	35	47	43	56	38	43	43	32
Mesothelioma	86	63	63	48	60	72	88	93	108	102	91	57	55	44	55	60	74	65	67	77
Peritonium	6	3	3	4	2	3	4	6	4	3	3	5	4	3	3	2	4	3	2	2
Liver					1	2	1	4		2								1		
Bile duct				1																
Pancreas	5	3	1	7	2															
Stomach	1	1	2	3	1															
Digestive organs	5	1		4	1	2														
Connective tissues (sarcoma)	2	2	1	4		1	4	4	1											
Kidney	5	2	1	5	3	3	4	3	1				1				1	1		
Renal pelvis		3				2							1							
Bladder	13	6	6	10	8	12	17	26	16	10	2	3		3	2	5	2	10	9	4
Breast	3	3	6	6	1	2	3	80	190	129									39	23
Testicles		1	2	6	1	2														
Rectum				3	3															
Skin	3	3	2	6	7	6	2	18	15	3	1		2	3	2	1	2	7	13	4
Lymphatic system	7	4	3	16	8	6	9	6	3	1				1	2	4				
Blood (leukaemia)		2		1	1	2		5	3	2	1							1		1
Acute leukaemia	2	2	1	2				1		2	1	1		1		1				
Chronic leukaemia	1	1	2	3				3	1	1	1	1	2	3				3	1	1
Other blood cancers, other types of leukaemia	1	1	2	3				3	1	1								1		
Other types of cancers	1		1	2	4	8	53	77	61	35		1		1		1	6	11	6	3
Total	262	184	199	255	204	228	301	484	593	417	154	100	105	110	112	136	135	153	187	151

SPAIN (Source: Ministry of Labour): Cases recognised between 2000 and 2008

Causal agent	2000	2001	2002	2003	2004	2005	2006	2007	2008
Asbestos	5	3	13	6	5	8	2	7	21
Vinyl chloride	1								
Aromatic amines		1				1		1	3
Ionising radiation			1	1	1	3	1		
Chromium							1	2	5
Nickel								4	5
Cyanide and its derivatives								1	2
Arsenic									4
Cadmium									1
PAHs									16
Wood dusts									5
TOTAL	6	4	14	7	6	13	4	15	62

FINLAND (Source: Tapaturmavakuutuslaitosten - Federation of Accident Insurance Organisations): Claims for recognition between 2000 and 2008

Cancer cases reported	ICD-10	2000	2001	2002	2003	2004	2005	2006	2007	2008
Reporting under the list system										
Malignant tumour of the lung and bronchi	C.34	86	67	100	96	100	86	83	75	96
Mesothelioma	C.45	32	39	30	37	58	43	41	56	59
Malignant tumour of the pleura	C.38	4	2	1	4	2	3	1	4	5
Myeloid leukaemia	C.92				1	1	1	3	1	1
Malignant bladder tumour	C.67	1		1			1			2
Malignant melanoma	C.43				1		1	1	1	
Other malignant skin tumour	C.44	1		1	1		1			
Malignant tumour of the paranasal sinuses	C.31				1		1			1
Sub-total		124	108	133	141	161	137	129	137	164
Malignant tumour of unspecified seat*	C.80	2		1		1	2	1		2
Unknown seat*	C	2	2	2			1	2		
Secondary malignant tumour of the respiratory and digestive organs*	C.78	1	1						2	
Diffuse non-Hodgkin's lymphoma*	C.83	1				1		1		1
Follicular [nodular] non-Hodgkin's lymphoma*	C.82							1	2	
Non-Hodgkin's lymphoma, of other and unspecified types*	C.85						1			
Sub-total		6	3	3		2	4	5	4	3
Reporting under the complementary system										
Malignant tumour of the larynx	C.32	3			1		2		1	
Multiple myeloma and malignant plasma cell tumours	C.90			1	1		1		1	
Malignant tumour of the tongue, other and unspecified parts	C.02	2						1		
Malignant tumour of the gall bladder	C.23	1			1				1	
Malignant tumour of the respiratory system and intra-thoracic organs, of other and ill-defined seats	C.39	1	1						1	
Malignant tumour of the retroperitonium and the peritonium	C.48					1		1	1	
Malignant tumour of the body of uterus	C.54	1	1	1						
Malignant tumour of the tonsil	C.09			1					1	
Malignant tumour of the rectum	C.20			1		1				
Malignant tumour of the nasal cavities and the middle ear	C.30						1			1
Malignant tumour of the trachea	C.33							2		
Malignant tumour of the thyroid	C.73		1			1				
Hodgkin's disease	C.81						1	1		
Malignant tumour of the floor of the mouth	C.04								1	
Malignant tumour of the palate	C.05				1					
Malignant tumour of the lip, the oral cavity and the pharynx, and of other and ill-defined seats	C.14					1				
Malignant tumour of the hepatic ducts, other and unspecified parts	C.24						1			
Malignant tumour of the pancreas	C.25								1	
Malignant tumour of the prostate	C.61								1	
Malignant tumour of the kidney	C.64						1			
Sub-total		8	3	4	4	4	7	5	9	1
TOTAL		138	114	140	145	167	148	139	150	168

* it is not possible to indicate whether these cancer cases come under the list of occupational diseases or not.

FRANCE (Source: CNAMTS - Direction des Risques Professionnels): Cases recognised between 2000 and 2008

Causal agent	Disease	2000	2001	2002	2003	2004	2005	2006	2007	2008*
Benzene	Leukaemias	17	26	34	31	25	27	22	42	27
	Hypercytoses of myelodysplasic origin		4	2	4	3	2		2	2
	Myeloproliferative syndrome	4	6	7	9	11	6	9	11	11
Ionising radiation	Primary broncho-pulmonary cancer due to inhalation	9	12	14	17	8	11	14	7	10
	Osteosarcoma	1	2	1	1	2			3	
	Leukaemias	11	11	12	8	9	9	9	13	9
Chromic acid, chromates and alkaline or alkaline earth bichromates, and zinc chromate	Primary broncho-pulmonary cancer	8	7	5	8	13	7	13	6	15
	Cancer of the nasal cavities							1	1	
Aromatic amines and N-nitrosodibutylamine	Primary malignant lesions of the vesical epithelium	8	11	15	26	17	19	22	25	25
Tars, oils and coal pitch and soot from coal combustion	Primary skin carcinomas	3	5	3	5	5	5	7	4	4
	Primary broncho-pulmonary cancer	12	11	11	10	9	7	23	14	9
	Malignant bladder tumours	3	4	2	19	15	10	15	22	18
Arsenic and its mineral compounds	Discoid lenticular dyskeratosis (Bowen's disease)	1				1				
Arsenical dusts or fumes	Primary bronchial cancer			1	4	2		1	1	
Dusts or fumes containing auriferous arsenical pyrites	Primary bronchial cancer		1							
Mineral dusts	Primary broncho-pulmonary cancer			1	3	13	15	10	12	10
Asbestos dusts	Malignant bronchopulmonary degeneration complicating benign lesions	127	168	173	156	134	150	137	176	201
	Primary malignant mesothelioma of the pleura	250	339	325	377	416	355	403	394	354
	Primary malignant mesothelioma of the peritoneum	8	7	10	18	26	18	33	24	20
	Primary malignant mesothelioma of the pericardium	1	3	3	3	5	3	3	5	4
	Other primary pleural tumours	19	20	22	25	26	22	19	13	15
	Primary broncho-pulmonary cancer	434	632	744	864	1 080	1 043	1 024	1 123	1 031
Petroleum derivatives	Primary skin carcinomas	2	3	1	3	3	1		4	5
Nickel matte roasting operations	Primary cancer of the ethmoid bone and the paranasal sinuses			1					2	
	Primary bronchial cancer				1			1	1	
Underground work in iron ore mines	Primary broncho-pulmonary cancer	7	7	4	8	7	4	7	4	3
Hepatitis A, B, C, D and E viruses	Hepato-cellular carcinoma post-hepatitis C virus			1	1					
Wood dusts	Carcinoma of the nasal cavities				4	12	13	17	14	10
	Primary cancer of the ethmoid bone and the paranasal sinuses	87	85	72	62	69	74	66	79	70
Vinyl chloride monomer	Angiosarcoma		1			2	1			2
Cobalt dusts combined with tungsten carbide before sintering	Primary broncho-pulmonary cancer	1	2	2	1	4	1		1	1
Bis(chloromethyl) ether	Primary bronchial cancer			1				1		
	Sub-total of cancers on list	1 013	1 367	1 467	1 668	1 917	1 803	1 858	2 003	1 856
	Off-list cancers	20	33	44	66	34	49	37	48	42
	Work-related cancers as a whole	1 033	1 400	1 511	1 734	1 951	1 852	1 895	2 051	1 898

* provisory data

The above count was made following the year of reporting. It includes cases recognised within the framework of the tables of occupational diseases properly speaking (indent 2 of Article L.461-1 of the “Code de la Sécurité Sociale” (French Social Security Code). It also includes cases relating to a cancer which, although named in a table, does not fulfil one or more conditions explicitly provided for by this table, and has for this reason been recognised under the complementary system (indent 3 of the same article) to the extent that the sufferer has been able to establish a direct link between the disease and his (her) customary work.

The cancer cases not covered by the tables (indent 4 of the same article) are counted under the title “off-list cancers” and are the subject of a detailed presentation in Appendix 2.

ITALY (Source: INAIL)

Claims for recognition between 2004 and 2008

Although it is unable to provide precise statistics concerning claims for recognition as work-related cancers, INAIL specifies²² that cancers are among the diseases for which there is the greatest number of claims for recognition. And an increasing number are reported, with about 2,000 cases per year in 2008 (compared with 1,700 cases in 2004). Almost half of the reported cases are apparently due to asbestos, followed by cancers related to the respiratory system (400 cases per year) and bladder cancers (300 in 2008).

Claims for recognition for industry and services	2004	2005	2006	2007	2008
Total claims for recognition	25,235	25,111	25,022	26,743	27,539
- of which off-list cancers	735	963	903	960	892
- of which asbestos cancers	751	833	893	870	809

Cases recognised between 2001 and 2008 (Source: INAIL)

Location of tumour	2001	2002	2003	2004	2005	2006	2007	2008
Pleura	286	369	366	400	398	423	420	324
Trachea, bronchi, lung	201	207	226	201	256	259	232	207
Bladder	35	59	62	66	74	84	71	72
Nasal cavity, middle ear and sinus	28	37	36	30	32	41	34	33
Other tumours of the digestive system, the peritonium and the retroperitoneal tissue	21	21	15	14	24	17	20	25
In-situ carcinoma of various systems, tumours with an unpredictable evolution	3	9	4	15	22	26	15	4
Larynx	9	7	10	11	9	11	11	10
Other organs of the respiratory system and unspecified thoracic organs	3	4	9	9	14	18	13	4
Myeloid leukaemia	5	8	6	8	5	5	4	
Melanomas and other malignant skin tumours	7	4	4	4	5	5	6	5
Kidney and other organs of the urinary system	4	3	3	3	6	4	4	1
Other tumours	23	22	14	22	31	18	23	9
TOTAL	625	750	755	783	876	911	853	694

(to be continued on the next page)

[22] INAIL 2008 annual report, page 48

Cases recognised between 2001 and 2008 [Source: INAIL] (continuing and ending)

Causal agent	2001	2002	2003	2004	2005	2006	2007	2008
Lead						1		
Arsenic		1	1		2	2	1	
Chromium	6	4	5	5	2	6	8	4
Beryllium				1				
Nickel	1	1			1	1		
Cyanide		1						
Alcohols and glycols				1		1		
Carbon monoxide		1		2			3	
Aliphatic hydrocarbons				1	1	1		
Aromatic hydrocarbons	18	15	11	17	15	20	25	21
Phenols, thiophenol						1		
Aliphatic amines	26	37	32	26	32	30	31	32
Halogenated derivatives				1		1	1	1
Vinyl chloride	3	2	1		3	1	1	
Ethers and epoxides				1	1			
Aldehydes, organic acids	1	1				1		
Skin cancers			2	1		1	2	
Ionising radiation	5	4	8	5	13	9	8	5
Undersea work								1
Asbestos	465	536	542	563	612	612	605	498
Wood dusts	24	27	24	25	19	23	25	27
Leather dusts	3	10	10	8	13	15	10	6
Cancers following silicosis						2		
Cancers following asbestosis		1	6	4	7	13	7	9
Undefined								1
Off-list cancers	73	109	113	122	155	170	126	89
TOTAL	625	750	755	783	876	911	853	694

LUXEMBOURG [Source: Association d'Assurance contre les Accidents]: Cases recognised between 2000 and 2008

Recognised cancer cases	2000	2001	2002	2003	2004	2005	2006	2007	2008
Mesothelioma of the pleura and the peritonium	2	4	4	4	4	2	5	4	3
Adenocarcinoma of the nasal cavities		1	1		1	1	1	3	3
Primary bronchopulmonary cancers		1		1	3	7	7	8	9
Neoformations or skin cancers					1	1			
Mucous diseases, cancers of the urinary tracts					1	3			
Disease of the respiratory tracts due to aluminium						2			
Neoformations of the respiratory tracts due to nickel									1
TOTAL	2	6	5	5	10	16	13	15	16

THE CZECH REPUBLIC [Source: Státní Zdravotní Ústav - National Institute of Public Health]:
Cases recognised between 2000 and 2008

Type of cancers by causal agent	2000	2001	2002	2003	2004	2005	2006	2007	2008
Nickel and its compounds	1								
Halogenated hydrocarbons		1							
Benzene	1								
Aromatic compounds (nitro or amino)	1	3	2	2		2	1	2	3
Polychlorinated biphenyls, dibenzodioxins and dibenzofurans							1	1	1
Condensed polycyclic hydrocarbons	1	2	2		1	2	2	3	4
Halogenated derivatives of alkanes (bis(chloromethyl) ethers)				1					
Ionising radiation (skin)	1	2		1	2	4	5	6	6
Leukaemia			2	1	1	1		1	
Ionising radiation (other malignant tumours)		1		1					
Pleural or peritoneal mesothelioma (asbestos)	7	6	6	5	3	8	5	7	5
Lung cancer with asbestosis or pleural hyalinosi (asbestos)	1	7	2	1	4	2	5	2	
Radioactive substances (lung)	35	30	33	33	15	20	16	15	5
Coking plant gases (lung)	2	3	2				2		
Wood dusts (nose or sinus mucous membranes)							1		
TOTAL	50	55	49	45	26	39	38	37	24

Type of cancers by organ	ICD-10 Code	2000	2001	2002	2003	2004	2005	2006	2007	2008
Floor of the mouth	C.04			1						
Tonsil	C.09							1		
Anus and anal canal	C.21								1	
Nasal cavities and middle ear	C.30							1		
Larynx	C.32				3					
Lung and bronchi	C.34	39	41	37	33	19	22	23	19	6
Heart, mediastinum and pleura	C.38		1							
Respiratory system and intra-thoracic organs, other and ill-defined seats	C.39		1							
Other malignant skin tumours	C.44	1	2		1	2	4	5	6	7
Mesothelioma	C.45	7	4	6	5	3	8	5	7	5
Testicles	C.62							1		1
Kidney (except renal pelvis)	C.64		1				1			1
Renal pelvis	C.65									1
Bladder	C.67	2	4	3	2	1	3	1	3	3
Brain	C.71		1							
Thyroid	C.73							1		
Myeloid leukaemia	C.92	1		2	1	1	1		1	
TOTAL CANCER CASES		50	55	49	45	26	39	38	37	24

SWEDEN (Source: Försäkringskassan): Cases recognised between 2005 and 2008

Type of cancer by organ	ICD-10	2005	2006	2007	2008
Tonsil	C09.9	1			
Oropharynx	C10.9		1	1	
Rhinopharynx	C11.9	1			
Ethmoid sinus	C31.1			1	1
Bronchi and lung	C34 to C34.9X	4	7	9	1
Mesothelioma	C45 to C45.9	20	26	15	14
Connective tissues and other soft tissues	C49.9 ; C49.-P	1		1	
Prostate	C61.9			1	
Hodgkin's disease	C81.9		1	1	1
Non-Hodgkin's lymphoma	C82 to C85.9	1	6		1
Multiple myeloma	C90 ; C90.0		1	1	1
Leukaemia	C91.9 to C92.1	3		1	
Carcinoma of the liver, vesicle and hepatic ducts	D01.5	1			
Benign tumour of the meninges	D32.0		1		
Trachea, bronchi and lung (unpredictable or unknown evolution)	D38.1			1	
Brain and central nervous system (unpredictable or unknown evolution)	D43			2	
Connective tissues and other soft tissues (unpredictable or unknown evolution)	D48.1A	1			
TOTAL		33	43	34	19

SWITZERLAND (Source: Schweizerische Unfallversicherungsanstalt²³ - Swiss National Accident Insurance Fund): Claims for recognition and cases recognised between 2000 and 2007

Causal agent	Claims for recognition								Recognised cases							
	2000	2001	2002	2003	2004	2005	2006	2007	2000	2001	2002	2003	2004	2005	2006	2007
Aromatic amines	3	1	2	5	6	6	2	8	3	1	1	5	6	5	2	7
Asbestos	62	59	68	73	93	102	133	124	50	55	58	59	77	87	115	104
Benzene	1		1		2		3	5							1	2
Diseases due to non-ionizing radiation (UV)		1		1	1	1		2				1				2
Wood dusts			3	3	3	5	6	1			2	3	3	5	6	1
Tar				1			1					1			1	
Other	10	5	5	8	13	11	14	3	2		1		3	2	3	
TOTAL	76	66	79	91	118	125	159	143	55	56	62	69	89	99	128	116

(23) SUVA is the leading Swiss insurer against occupational injuries and diseases. However, the figures presented cover all the cases handled by the various insurers at the national level.

The case of the NETHERLANDS

This country has no specific occupational injury and disease insurance system, and hence no statistics relating to recognised cancer cases.

However, company doctors are required to report to the Nederlands Centrum voor Beroepsziekten - NCvB (Dutch Centre for Occupational Diseases) cases of diseases they suspect as being of work-related origin. In 2008, the NCvB received sixteen cancer reports²⁴.

Cancer cases reported as occupational diseases in 2008

Diagnostic	Number	%
Skin cancer	8	50.0
Mesothelioma	5	31.3
Cancer of the kidney/urinary tracts	2	12.5
Brain tumour	1	6.3

Most of the reports concern skin cancers, including one malignant melanoma.

[24] Information taken from the 2009 report by the Nederlands Centrum voor Beroepsziekten

4. Post-occupational monitoring of exposed workers

All the countries provide for medical monitoring of employees exposed to carcinogens as part of the occupational health services financed by the company. But this monitoring stops de facto as soon as workers become inactive, either through unemployment or retirement.

Now, since the latency period for cancers is several decades, it is often when workers have ceased their occupational activity that the cancers occur.

A few rare European countries have therefore established a “systematic” system for monitoring pensioners who have been exposed to carcinogenic agents (not to be confused with post-exposure monitoring) and several others have established a specific system for former employees exposed to a carcinogen, especially asbestos.

4.1 Schemes covering carcinogenic agents

In **France**, there exists since 1995 a post-occupational monitoring system for workers who have been exposed to carcinogenic agents. It provides for specific medical supervision free of charge, and complementary examinations (X-rays, scanners, etc.) every two years, to enable early detection of a possible cancer.

In practice, this system remains little used. In 2002, only 3,300 people benefited from it²⁵, whereas based on exposure data there should be nearly 20 times more. The main reason for this is that the interested parties are not aware of the existence of this system; application of the system is very closely linked to the communication activities of the primary health insurance funds (CPAM: entities responsible for compensation of occupational injuries and diseases) targeting employees, pensioners, enterprises, industrial doctors and self-employed doctors.

The public authorities have therefore established two programmes²⁶, Spirale for employed workers and Espri for self-employed workers, designed to identify pensioners who have been exposed to carcinogenic agents. The pilot phase of each of these programmes, limited to asbestos for Espri and to asbestos and wood dusts for Spirale, has already shown that it is possible to make the post-occupational monitoring system more efficient.

In **Switzerland**, medical monitoring of workers exposed to carcinogenic substances in the past has been regulated since 1984 (order on occupational injury and disease prevention of 19 December 1983, Article 74). This monitoring extends to people who have been exposed to C1 carcinogens (substances that are known to be carcinogenic/mutagenic to humans). Other carcinogenic agents of categories C2 (substances which should be regarded as if they are carcinogenic/mutagenic to humans) and C3 (substances which cause concern for humans owing to possible carcinogenic/mutagenic effects) are also monitored.

It is the SUVA (leading insurer against injuries, whether work-related or not, and occupational diseases) which contacts by mail pensioners who have been exposed to CMR substances (substances that are carcinogenic, mutagenic and/or toxic for reproduction) on the basis of a headcount performed based on the compulsory reports of the exposing employers. Currently, around 7,000 people are monitored, of which 4,500 for exposure to asbestos.

[25] “Cour des Comptes” (government audit agency), Special public report on “Occupational injury and disease risk management”, February 2002

[26] To find out more, go to: www.spirale.rppc.fr and www.invs.sante.fr/surveillance/espri

Characteristics of the Swiss post-occupational monitoring system

Monitoring target		Monitoring organisation	
Carcinogenic agent concerned	Type of cancer concerned	Frequency of examinations	Length of monitoring period
Benzene	Leukaemia	Each year	Until age 75
		As the patient wishes	After age 75
Asbestos	Lung cancer	Every five years	During the first 15 years following the start of exposure
		Every two years	Until age 75
		As the patient wishes	After age 75
Aromatic amines	Bladder cancer	Each year	Lifelong
Tar, pitch, polycyclic aromatic hydrocarbons	Skin cancer	Every five years	During the first 15 years following the start of exposure
		Every two years	For the rest of their lives
Vinyl chloride	Liver cancer	Every two years	Until age 75
		As the patient wishes	After age 75

Note that, except for asbestos exposure, only exposures exceeding six months are taken into account.

4.2 Specific schemes for diseases caused by asbestos

In **Germany**, medical monitoring of workers exposed or having been exposed to asbestos (including pensioners) is organised by the Zentrale Erfassungsstelle asbeststaubgefährdeter Arbeitnehmer - ZAs (Central agency for registration of workers exposed to asbestos dusts), which was set up in 1972 and is financed by the Berufsgenossenschaften²⁷.

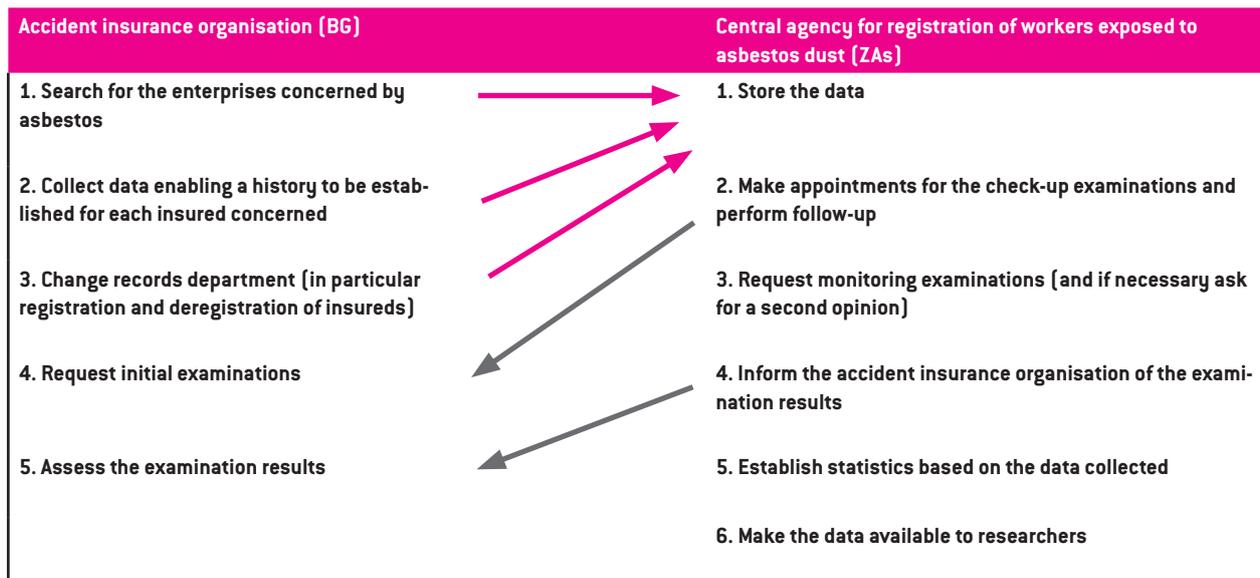
The information relating to exposed workers and to the nature and intensity of the exposure reaches the ZAs via the Berufsgenossenschaften, which receive it from the employers (this is an obligation since 1984) and check it. The ZAs then registers this data, organises screening (in particular after exposure and after retirement) and the collection of medical data for both the recognition procedure and for scientific research.

The medical examinations are performed every 12 to 36 months, depending on the level of exposure, the time elapsed since the first exposure and the person's age. These examinations, performed by specially trained doctors, consist of a study of the subject's medical history, work career and tobacco behaviour, a clinical examination, spirometric testing and an X-ray examination of the respiratory tracts.

Thanks to this system, a number of asbestos-related occupational cancers have been able to be detected and reported. It is estimated, for example, that each year the ZAs's examinations result in about 890 additional presumptions of attribution of an asbestos-related occupational disease (not only cancers).

[27] German occupational risk insurance and prevention organisations

Breakdown of tasks among the BG and the ZAs



In **Norway**, all employees who have worked for at least two years in contact with asbestos prior to 1980 pass an X-ray exam at retirement, and receive a written document from their employer informing them that they must repeat this exam every two to five years depending on their exposure. These people are identified by means of the register of employees who have worked in contact with asbestos that must be kept by each employer; if the firm is shut down, this register is sent to the Labour Inspectorate. This system was established as early as 1976.

In **Spain** and **Italy**, countries that are highly decentralised, there have been some recent regional initiatives providing for post-occupational monitoring of people who have been exposed to asbestos, but in the form of pilot projects.

In **Finland**, the occupational health services are competent to monitor workers who are or have been exposed to asbestos, via radiographic examinations performed every three years. However, pensioners do not benefit from this system. But a similar programme including people aged under 70 existed between 1987 and 1992, when Finland banned the use of asbestos.

4.3 System of individual registration of exposures to carcinogens: the example of the SIREP in Italy

In Italy, the ISPESL (Istituto Superiore Prevenzione e Sicurezza sul Lavoro²⁸) has established and keeps up-to-date a system for recording occupational exposures to carcinogenic agents (SIREP) which, as at 31 December 2008, contained information on 5,500 companies and 70,000 exposed workers.

This database should eventually contain the following information:

- Company name;
- Company location (at least the province - "provincia");
- Sector of activity (according to a classification by the Italian Statistics Institute, ISTAT);
- First name, family name, gender and date of birth of each exposed worker;
- Carcinogenic substance involved;
- Worker's position (according to the ISTAT classification);
- Measurement of the personal exposure level (where applicable).

The data input to the database is communicated to the ISPESL by employers, who are legally required to send a copy of their register of exposures to CMR substances (established by the industrial doctor) and provide an update every three years. These registers list workers for whom the evaluation of exposure to CMR substances has shown a risk for health and who are therefore subject to special health monitoring.

The carcinogenic agents reported most frequently are hard wood dusts (20% of total exposures), benzene (12%), chromium VI compounds (8%) and PAHs (6%). Next come compounds of nickel, asbestos, cadmium, trichlorethylene and arsenic.

[28] Higher institution for occupational health and safety

Appendices: Cancer cases recognised under the open system

Appendix 1: between 2004 and 2008 in Germany

2004 - 15 cases recognised under the open system

Diagnostic	Causal agent	Occupation	Economic sector
Lung cancer	PAHs*	Mixer operator	Chemicals
	PAHs*, asbestos	Steel mill worker	Metallurgy
	PAHs*	Rolling mill operator	Metallurgy
	Tar, PAHs*	Highway engineer	Construction
	PAHs*, asbestos, trichlorethylene, benzol	Car driver, worker in a tyre workshop, road tanker cleaner	Transport
	PAHs*	Chimney sweep	Construction
	Tar, PAHs*	Tamper operator, installer	Construction
	PAHs*	Highway engineer	Construction
	PAHs*	Mouldmaker, coremaker	Precision mechanical engineering and electrical engineering
	PAHs*	Electrode cleaner	Chemicals
	PAHs*	Ingot mouldmaker, electric furnace reconditioner	Precision mechanical engineering and electrical engineering
Carcinoma of the oesophagus	Dust, heat, fumes, in particular of nitrosamines	Workshop metalworker	Chemicals
Bladder cancer, carcinoma of the prostate, chronic lymphatic leukaemia	1,3-Propanesultone	Technical assistant in a large chemicals firm	Chemicals
Brain stem glioblastoma	1,3-Propanesultone	Laboratory manager	Chemicals

* PAHs: Polycyclic Aromatic Hydrocarbons

2005 - 10 cases recognised under the open system

Diagnostic	Causal agent	Occupation	Economic sector
Lung cancer	PAHs*	Metalworker	Metallurgy
	Asphalt, PAHs*	Casual worker for road construction	Construction
	Benzopyrene	Electrolysis and furnace worker	Chemicals
	PAHs*	Bulldozer operator, coke ramp worker	Chemicals
Carcinoma of the oesophagus	Nitrosamines	Vulcaniser (moulded products)	Chemicals
Basal cell carcinomas and miscellaneous actinic keratoses	UV radiation	Welder	Metallurgy
Mesothelioma of the tunica vaginalis testis	Operations on ceiling boarding containing asbestos	Plant health product sprayer	Hygiene department
Carcinoma of the trachea (neoplasia of the trachea)	Asbestos + indirect exposure	Electric cable winder	Precision mechanical engineering and electrical engineering
Spino-cellular carcinoma of the left thumb	UV light	Occupation: bridge construction in tropical countries	Metallurgy
Spino-cellular carcinoma on the face skin	Extreme exposure to sun	Project manager and chief engineer on research ships	Trade and administration

* PAHs: Polycyclic Aromatic Hydrocarbons

2006 - 5 cases recognised under the open system

Diagnostic	Causal agent	Occupation	Economic sector
Bronchocarcinoma	Benzopyrene, PAHs*, asbestos	Strip winder, preheater, cutting operator, storeroom worker, cleaner	Chemicals
Spino-cellular carcinoma of the skin	WIG welding work, arc welding, ST37 steel, ultraviolet radiation	welder	Trade and administration
Lung cancer	131 years/BaP, PAHs*	Highway engineer	Construction
Bronchocarcinoma	Asbestos, benzopyrene, PAHs*	Worker in arc welding workshop	Chemicals
Basal cell carcinoma on the left temple and on the chest, actinic keratoses on the face	Exposure to sun in subtropical regions and work in Mediterranean countries, exposure to rays from welding work	Installer, fitter	Metallurgy

* PAHs: Polycyclic Aromatic Hydrocarbons

2007 - 10 cases recognised under the open system

Diagnostic	Causal agent	Occupation	Economic sector
Mesothelioma of the tunica vaginalis testis (perididymitis)	Fine asbestos dust	Casual metalworker	Precision mechanical engineering and electrical engineering
Bronchocarcinoma	Syncancerogenesis by asbestos and PAHs*	Metallurgy crane operator	Metallurgy
	Benzopyrene	Soderberg plant worker	Chemicals
	Syncancerogenesis by asbestos (83.6% exposure to asbestos risk) and PAHs* (28.8% exposure to PAH risk*)	Mouldmaker and foundryman	Metallurgy
	PAHs*, benzopyrene	Optical fibre and insulating materials producer	Quarry and gravel industry
Malignant neoplasia of the respiratory tracts/lungs	Tar, bitumen, PAHs*	Highway engineer, paving work	Construction
Small-cell bronchogenic carcinoma of the upper left lung lobe caused by exposure to asbestos dust and PAHs*	Syncancerogenesis by asbestos and PAHs*	Mouldmaker, coremaker in metal casting	Metallurgy
Small-cell bronchogenic carcinoma, left-hand, central	Syncancerogenesis by asbestos and PAHs*	Cleaner, sandblaster, spray-painter	Metallurgy
Other malignant skin tumours	1,3 Propanesultone	Chemical engineering system operator	Chemicals
Spinocellular carcinoma starting from the right main bronchus	Syncancerogenesis by asbestos and PAHs*	Machine operator and welding torch peeling worker	Metallurgy

* PAHs: Polycyclic Aromatic Hydrocarbons

2008 - 24 cases recognised under the open system

Diagnostic	Causal agent	Occupation	Economic sector
Sclerodermiform basal cell carcinoma of the nose, miscellaneous actinic keratoses, chiefly due to exposure to UV for work-related reasons, over many years	Exposure to sun	Work in indoor/outdoor swimming pool	Public service
Actinic precancerous lesions, basal cell carcinomas	Work in the open air (exposure to sun)	Road maintenance	Public service
Actinic keratoses and spinocellular carcinomas	Exposure to sun	Gardener	Public service
Precancerous lesions (actinic keratoses)	Exposure to sun	Ship officer and captain	Transport
Bronchocarcinoma	Benzopyrene, fine asbestos dusts	Retort room worker	Chemicals
	Polycyclic aromatic amines, benzopyrene	Electrolysis worker / furnace controller	Chemicals
	PAHs* (benzopyrene)	Electrolysis worker / furnace controller	Chemicals
	PAHs*	Industrial cleaner	Transport
	Polycyclic aromatic hydrocarbons	Casual employee	Construction
	Asbestos, PAHs*	Steel construction metalworker	Metallurgy
	Exposure to 1,3-Propanesultone	Laboratory assistant, worker in the chemicals sector	Chemicals
	PAHs*, asbestos	Roofer	Construction
	Asbestos, PAHs*	Other operators of power production and similar systems	Mining
	Asbestos, PAHs*	Roofer	Construction
	PAHs*	Worker in the chemicals sector	Chemicals
Carcinoma of the oesophagus	Nitrosamines	Worker and producer in the rubber industry	Chemicals
	Exposure to nitrosamines	Press room foreman (rubber production)	Chemicals
Actinic keratoses on the head, shoulder, chest and arms, spinocellular carcinoma on the forehead	UV light	Ship captain	Transport
Actinic keratosis on the head and trunk, spinocellular carcinoma on the face	UV light	Ship captain	Transport
Lung cancer	PAHs*	Paving machine operator	Construction
	Asbestos and benzopyrene	Worker in an aluminium firm	Chemicals
	Asbestos and benzopyrene	Metalworker	Chemicals
Malignant skin tumour	UV radiation	Metalworker	Gas, urban heating and water
Adenocarcinoma of the upper lung lobe	Asbestos, PAHs*	Other operators of power production and similar systems	Mining

* PAHs: Polycyclic Aromatic Hydrocarbons

It should be emphasised that since 2009 the recognition of several cancers mentioned in the above statistics (concerning recognition by the complementary system) has been studied from a list system viewpoint, because lung cancer caused by PAHs (subject to a certain combined exposure to benzopyrene) and lung cancer caused simultaneously by exposure to asbestos dusts and PAHs (on certain conditions) have been included in the German list of occupational diseases. These two types of cancers by themselves account for over half of the cases recognised under the complementary system; this system therefore works well in Germany as a veritable “antechamber” for diseases that could be registered on the list of occupational diseases.

Appendix 2: Between 2000 and 2008 under the open system in France²⁹

Diseases	ICD-10	2000	2001	2002	2003	2004	2005	2006	2007	2008
Malignant tumour of the tongue, other and unspecified parts	C02			1						
Malignant tumour of the parotid gland	C07									2
Malignant tumour of the tonsil	C09					1				1
Malignant tumour of the oropharynx	C10			1		3	1			
Malignant tumour of the epiglottic vallecula	C10.0								1	
Malignant tumour of the anterior surface of the epiglottis	C10.1					1				
Malignant tumour of the rhinopharynx	C11	1		1	2	2	1			1
Malignant tumour in locations adjacent to the rhinopharynx	C11.8							1		
Malignant tumour of the rhinopharynx, without details	C11.9							1		
Malignant tumour of the piriform sinus	C12		1	3			4			2
Malignant tumour of the hypopharynx	C13				1					
Malignant tumour of the lip, the oral cavity and the pharynx, and of other and ill-defined seats	C14	2		1	1					
Malignant tumour of the upper third of the oesophagus	C15.3							1		
Malignant tumour of the stomach	C16				1		2			
Malignant tumour of the stomach, without details	C16.9								1	
Malignant tumour of the colon	C18				1					
Malignant tumour of the recto-sigmoid junction	C19							1		
Malignant tumour of the anus and the anal canal	C21			1						
Hepato-cellular carcinoma	C22.0				1		1			1
Malignant tumour of the liver, without details	C22.9								1	
Malignant tumour of the gall bladder	C23									1
Malignant tumour of the pancreas	C25	1	2				1			
Malignant tumour of the pancreatic canal	C25.3									1
Malignant tumour of the pancreas, without details	C25.9							1		
Malignant tumour of the nasal cavities and the middle ear	C30			1						
Malignant tumour of the nasal cavities	C30.0								2	
Malignant tumour of the paranasal sinuses	C31	1							2	
Malignant tumour of the maxillary sinus	C31.0						1		1	
Malignant tumour of the ethmoid sinus	C31.1						2	1		
Malignant tumour of the paranasal sinuses, without details	C31.9							1		
Malignant tumour of the larynx	C32	2	2	5	6	7	11		6	1
Malignant tumour of the glottis	C32.0							1	3	1
Malignant tumour of the supraglottic stage	C32.1								1	
Malignant tumour of the subglottic stage	C32.2						1			
Malignant tumour of the larynx, without details	C32.9							3	4	1
Malignant tumour of the bronchi and lung	C34	10	22	26	31	5	6		5	6
Malignant tumour of the upper lobe, bronchi or lung	C34.1				1			2	1	
Malignant tumour of the middle lobe, bronchi or lung	C34.2				1					1
Malignant tumour of the lower lobe, bronchi or lung	C34.3							1	1	
Malignant tumour of the bronchi or lung, without details	C34.9		1		1			8	3	1
Malignant tumour of the thymus	C37							1		
Malignant tumour of the heart, the mediastinum and the pleura	C38			1						

[29] The favourable decisions of the Regional Committees for Recognition of Occupational Diseases between 2000 and 2008 have been taken into account

Appendix 2: Between 2000 and 2008 under the open system in France (Continuing and ending)

Diseases	ICD-10	2000	2001	2002	2003	2004	2005	2006	2007	2008
Malignant tumour of the mediastinum, unspecified part	C38.3						1			
Malignant tumour of the pleura	C38.4				1		2			
Malignant tumour of ill-defined seats of the respiratory system	C39.9							1		
Other malignant skin tumours	C44				1	1				
Malignant tumour of the skin of lip	C44.0						1			
Malignant tumour of the face skin, other and unspecified parts	C44.3							1	1	
Mesothelioma in other seats	C45.7						2			
Malignant tumour of the retroperitoneum and the peritoneum	C48		1							
Malignant tumour of the connective tissue and other soft tissues	C49			1						
Malignant breast tumour, without details	C50.9								1	
Malignant tumour of the testicle	C62					1				
Malignant tumour of the kidney, except the renal pelvis	C64				14	5	4	2	4	4
Malignant tumour of the ureter	C66									1
Malignant bladder tumour	C67	1	2		1	2	2		3	3
Malignant tumour of the bladder trigone	C67.0				1				1	
Malignant tumour of the ureterostoma	C67.6							1		
Malignant tumour in locations adjacent to the bladder	C67.8									1
Malignant tumour of the bladder, without details	C67.9							2		1
Malignant brain tumour	C71		1							
Malignant tumour of the thyroid	C73							1		
Malignant tumour of the lymph nodes, secondary and unspecified	C77			1		1				
Secondary malignant tumour in other seats	C79		1			1				1
Secondary malignant tumour in other specified seats	C79.8									1
Follicular [nodular] non-Hodgkin's lymphoma	C82	1			1		1			
Follicular small cleaved cell lymphoma	C82.0							1		
Follicular large cell lymphoma	C82.2							1	1	1
Follicular non-Hodgkin's lymphoma, without details	C82.9					1		1	1	1
Diffuse non-Hodgkin's lymphoma	C83						2		2	2
Lymphoblastic lymphoma (diffuse)	C83.5							1		
Diffuse non-Hodgkin's lymphoma, without details	C83.9									1
Non-Hodgkin's lymphoma, of other and unspecified types	C85					2				
B-cell lymphomas, without details	C85.1								1	
Non-Hodgkin's lymphoma, of unspecified type	C85.9						3	2		1
Myeloid leukaemia	C92					1				
Acute myeloid leukaemia	C92.0									3
Malignant tumours of the lymphoid, haematopoietic and similar tissues, other and unspecified	C96	1		1						
In-situ carcinoma in other specified seats	D09.7									1
Myelodysplastic syndromes	D46								1	
TOTAL		20	33	44	66	34	49	37	48	42



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