

## Incidence and detection of occupational cancers in nine European countries

**Germany, Austria, Belgium, Denmark,  
Finland, France, Italy, Sweden and Switzerland**



of the insurance against accidents  
at work and occupational diseases



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## Introduction

A cancer is said to be "occupational" when it is the consequence of a worker's exposure to a carcinogenic factor in their workplace.

Certain links between tumours and carcinogenic agents present in the workplace are now clearly identified. This does not necessarily mean that the various national occupational disease insurance organizations apply the same conditions of recognition. The procedure for investigation and assessment of the causal link between occupational exposure and a disease can therefore vary from one country to another.

Carcinogens present in the workplace can be of chemical origin (heavy metals, asbestos, mineral oils, wood dusts, crystalline silica, benzene, tar, etc.), physical (radiation emitted in radiology, UV, electromagnetic fields) or biological (some viruses being cancer risk factors).

Accordingly, the sectors of activity most affected by these exposures are the construction sector, metallurgy, chemical industries, leather and rubber, wood, the oil industry and agriculture.

The problem with occupational cancers is therefore not so much recognizing them as occupational diseases but succeeding in detecting cases for which a claim for recognition may be made to the insurance organization.

In the case of a worker suffering from a cancer, the possible relation to the work is not easy to identify to the extent that, from the medical viewpoint, there is no difference between a tumour due to an occupational exposure and another tumour, and since cancers are often multifactorial diseases which mean it is difficult to identify their work-related origin.

Generally, at the time of the diagnostic, doctors pay little attention to the patient's occupational career. They lack information and training regarding occupational diseases and are inherently more interested in the treatment of the disease than in its cause.

Moreover, cancers have a long latency period between exposure and the appearance of symptoms (on average 20

years, sometimes as much as 40 years); it is therefore often hard to identify the risk factors and a possible occupational exposure.

Workers also have a poor knowledge of the carcinogenic substances to which they have been exposed in their workplace. Finally, the complexity and length of the recognition procedure, and fear of losing one's job, can all be factors preventing reporting to the insurer.

Just as some have endeavoured to estimate the number of workers exposed to carcinogenic agents in their workplace<sup>(1)</sup>, scientists have attempted to assess the number of workers affected by a work-related cancer or, more precisely, the proportion of cancers potentially having a work-related origin. This proportion is estimated to be in a range of 4% to 8.5%, and to vary significantly depending on the location of the cancers.

If one compares, on the scale of a country and over a given period, the data concerning the number of cancer cases recorded and the number of claims for recognition as an occupational cancer, the range mentioned is far from being reached. Everyone admits that there is a phenomenon of under-reporting of occupational cancers.

Identifying cases of occupational cancer therefore has major implications. Personal implications for the victims, because if the work-related origin of the disease is recognized, the compensation is generally better than that awarded by the health and disability insurance organizations, and also collective implications, because it is not possible to prevent and combat a phenomenon whose extent is hard to measure.

That is why measures have been taken in some countries to try to identify cases of cancer which could have a work-related origin. These initiatives will be described after presenting an overview of the occupational cancer incidence rate in nine European countries: Germany, Austria, Belgium, Denmark, Finland, France, Italy, Sweden and Switzerland.

(1) European CAREX programme (database on exposure to carcinogenic agents). Read, on this subject, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1739859/pdf/v057p00010.pdf> - Refer to <https://www.ttl.fi/en/carex/>

## 1• Review of the incidence rate of occupational cancers

### 1•1 Evolution of claims for recognition and cases recognized between 2005 and 2016

The claim for recognition is the procedure followed with the occupational disease insurance organization to have the job-related nature of a disease recognized, so as to entitle the victims (or their legal beneficiaries) to rights, and in particular the payment of benefits. In Denmark and Sweden, this is more specifically a claim for benefits for permanent disability.

In most European countries, this claim-for-recognition procedure should be distinguished from the procedure for reporting diseases suspected as being of work-related origin and affecting certain professions such as those working in healthcare. The aim of the latter procedure is chiefly to allow an empirical evaluation of the existence of work-related diseases irrespective of any insurance considerations.

The recognition of a cancer case as an occupational disease is the decision by which the insurance organization, following an investigation procedure, validates that all medical and legal requirements are met. These requirements differ from country to country. In the case of diseases as serious as cancer, this recognition gives de facto entitlement to benefits (healthcare, compensation for temporary or permanent disability).

The data presented hereafter covers not only the cases

reported or recognized by virtue of the national lists of occupational diseases but also, where applicable, those reported or recognized under the off-list system<sup>(2)</sup>. We specify, in this respect, that Sweden has merely a proof system (no list of occupational diseases except infectious diseases).

The curves below show, over the decade, a relative stability (in Denmark, Belgium, France, Italy and Sweden) or an increase (in Austria, only recently in Germany and Switzerland) in the number of cases of occupational cancer reported and recognized. A downward trend can be seen in no country, except possibly in Finland (but only about thirty fewer cases were recognized between 2008 and 2014).

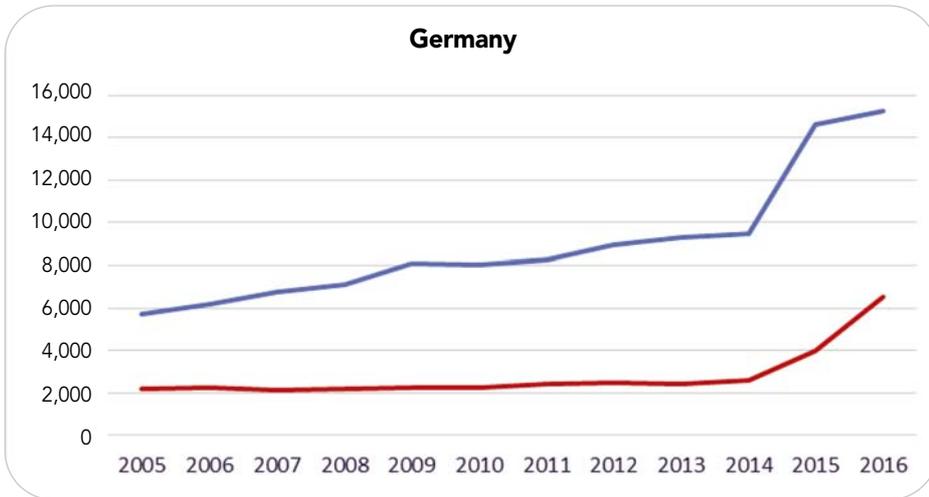
And this will be the case so long as the peak incidence rate of asbestos-related cancers (which represent a large proportion of occupational cancers) has not been reached, i.e. around 2020 depending on the country<sup>(3)</sup>. In some countries, this peak may already have been reached, as in Denmark in 2015-2016.

We specify that the sharp increase in cases reported and recognized in Germany since 2015 corresponds to the inclusion of skin cancer caused by UV radiation in Germany's list of occupational diseases.

In Denmark, the surge in claims for recognition after 2007 is the consequence of the introduction of a system for detecting mesotheliomas and cancers of the nasal cavities.

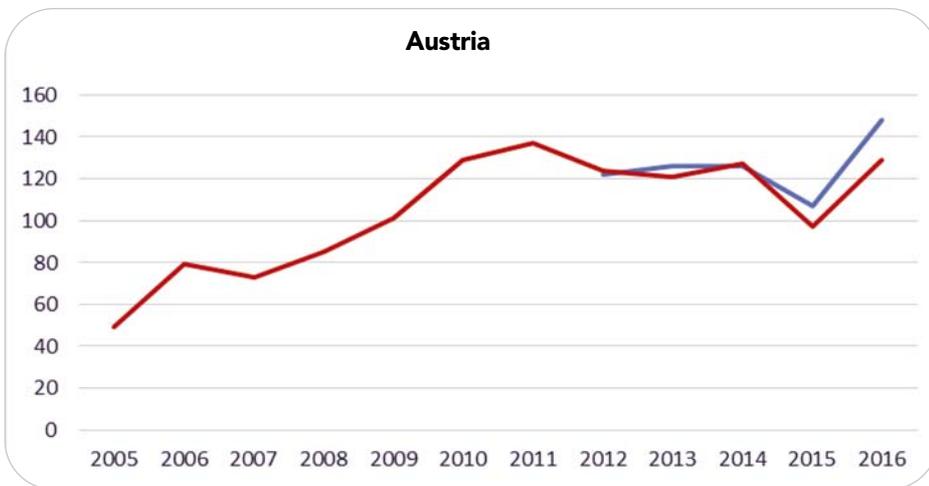
(2) In most European countries, the work-related nature of a disease can be recognized in two ways. If the disease appears on the national list of occupational diseases, the process of investigation of the claim is easier; otherwise, the claim is investigated under a complementary system in which proof must be provided of the causal link between the disease and the occupational activity.

(3) PETO et al. The European mesothelioma epidemic. *Br J Cancer*. 1999, 79: 666-72



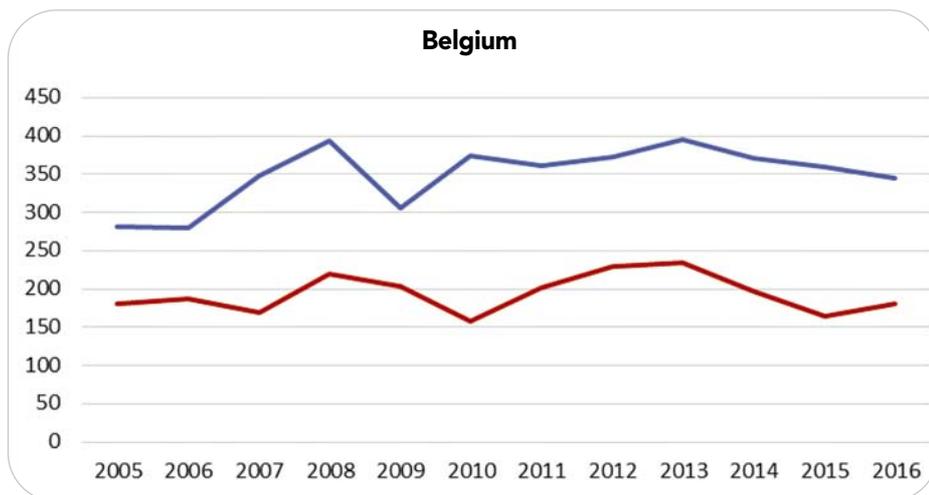
Claims for recognition

Recognized cases



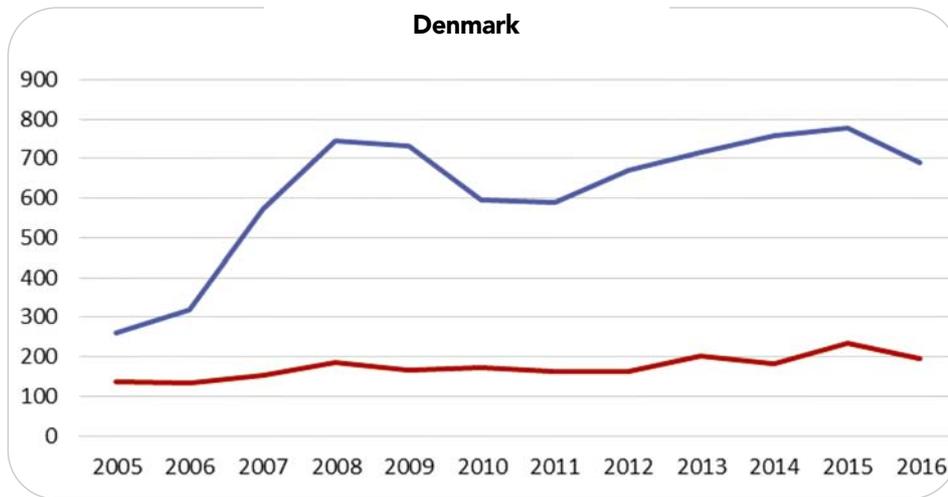
Claims for recognition

Recognized cases



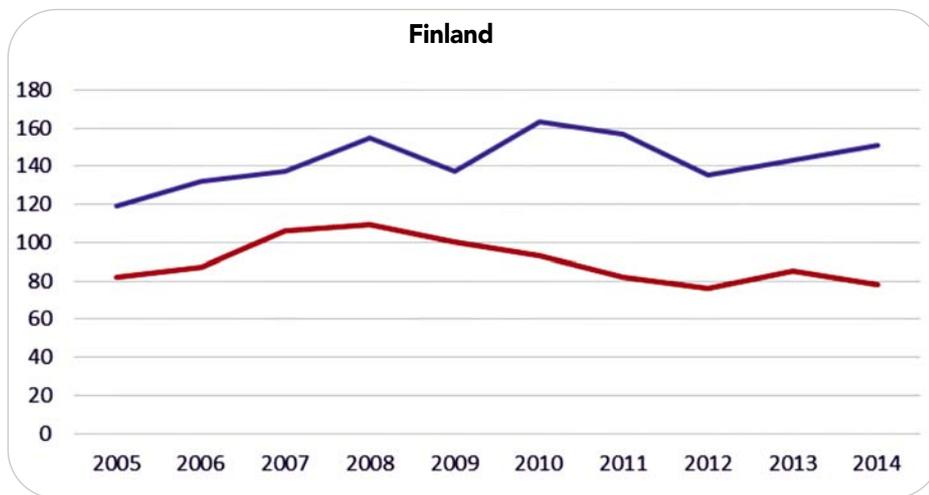
Claims for recognition

Recognized cases



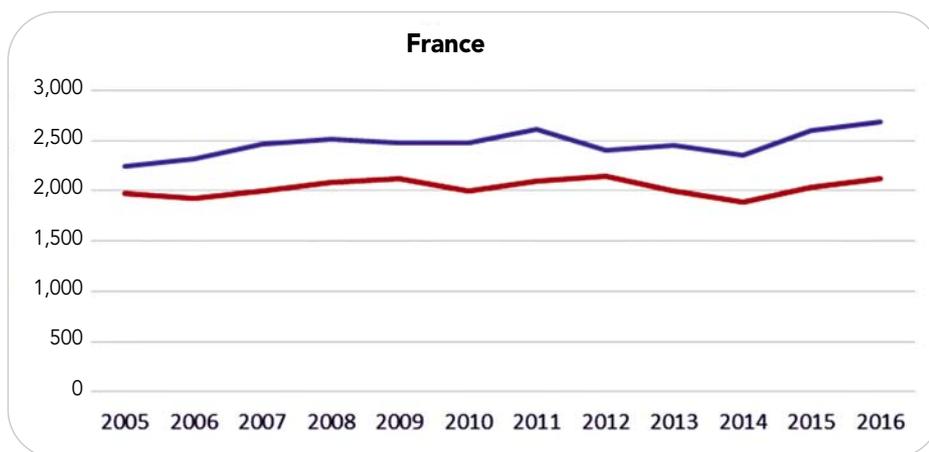
Claims for recognition

Recognized cases



Claims for recognition

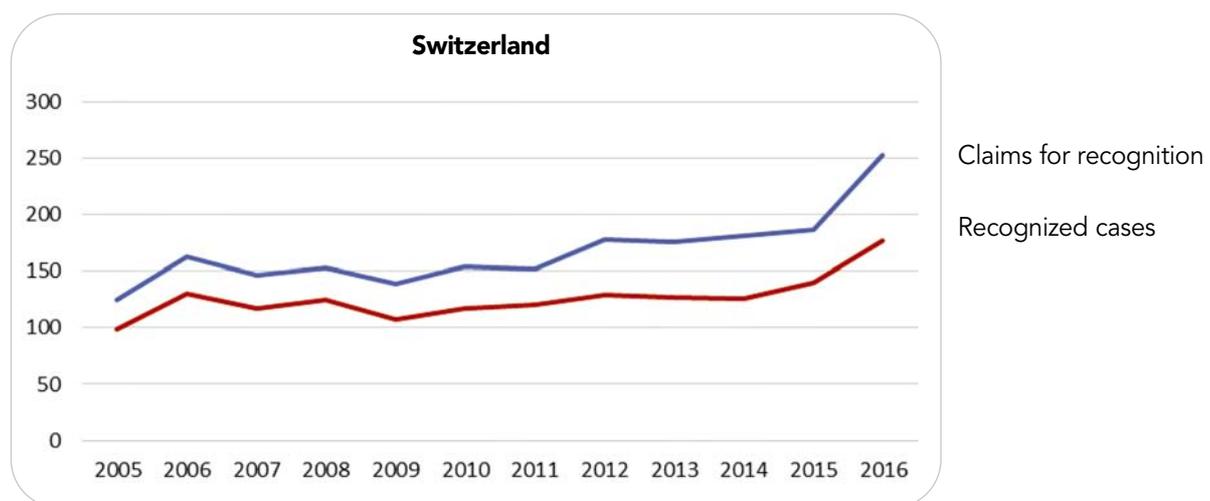
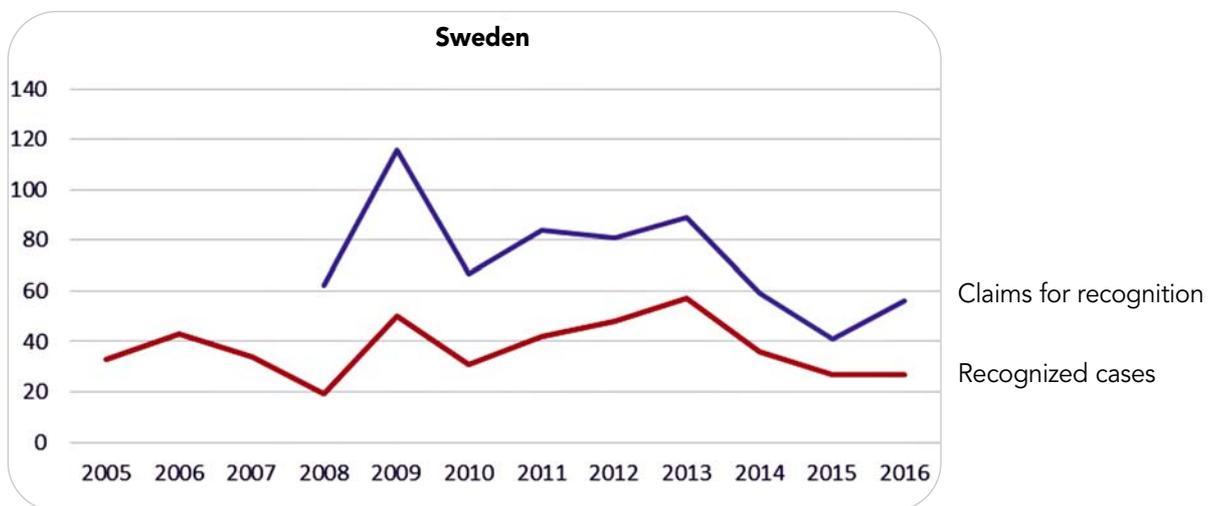
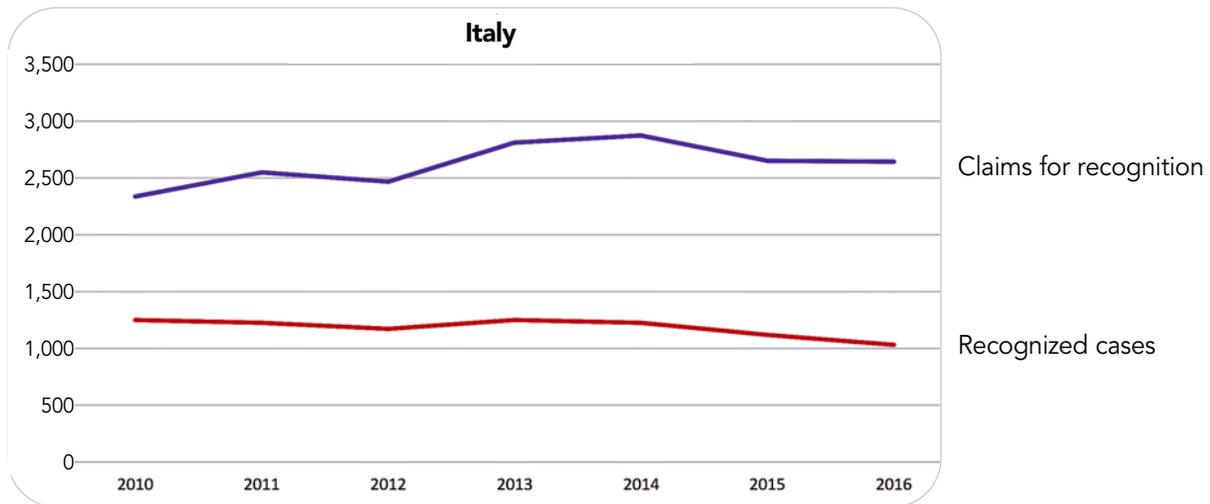
Recognized cases



Claims for recognition\*

Recognized cases\*

\*off-list cancers excluded



## 1•2 The most prevalent occupational cancers

Looking at the cancers recognized as occupational diseases in 2016, a handful of cancer types related to certain occupational exposures account for nearly all the cases.

Despite the peculiarities inherent in the statistical nomenclatures of each country, it was possible to present, under common colour codes, the typology (tumour site and exposure) of cancer cases recognized as occupational diseases in 2016:

- cancers caused by asbestos dust with, when possible, a distinction between mesotheliomas, bronchopulmonary cancers and laryngeal cancers;
- cancers of the nose / sinuses caused by wood dust;
- urinary tract cancers caused by aromatic amines;
- skin cancers caused by all exposures taken into account by each country;
- leukaemias caused by benzene;
- other cancers that do not fall into the typologies listed above.

Only Danish data, which are based on tumour site without mentioning exposure, are not quite comparable to other countries.

These different distributions are the consequence of many factors as mentioned below (see 1.3).

In every country except Germany (since the introduction of UV-induced skin cancer in the OD list in 2015), can-

cers caused by asbestos dust represent the overwhelming majority of cancers recognized.

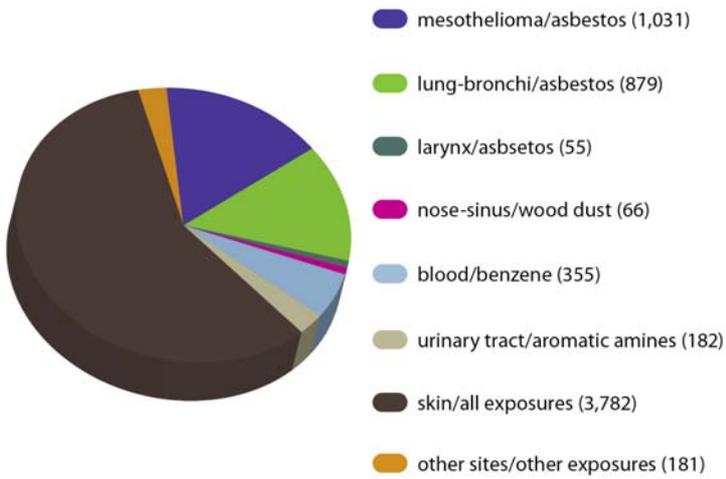
For example, mesotheliomas (cancers of the pleura, the peritonium and the pericardium) account for more than one-third of cancers in Denmark, more than half in Austria and in Italy, two-thirds in Belgium, almost 90% in Switzerland and virtually all cancers in Sweden.

Asbestos-related lung cancers are also predominant in Belgium (25% of the total), in Italy (23%), in Austria (28%) and especially in France (over half of occupational cancers). They are probably also predominant in Denmark; the Danish statistical classification is organized according to the organ affected and covers a number of possible exposures, which makes it impossible to know the exact number of asbestos-related lung cancers.

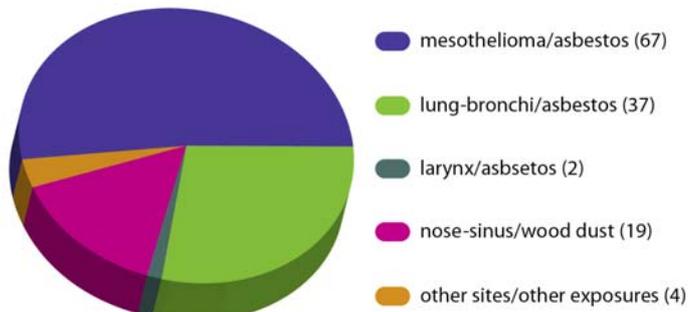
The cancers found almost everywhere in large proportions, although less than those caused by asbestos, are sinonasal cancer caused by wood dust (Germany 1%, Austria 15%, Belgium 7%, France 4%, Switzerland 1%), cancer of the urinary tract caused by aromatic amines (Germany 4%, Denmark 6% for all types of exposure combined, France 6%, Italy 7%, Switzerland 2%) and leukaemia caused by benzene (Germany 8%, Belgium 1%, France 2%, Italy 2%, Switzerland 1%).

As regards to as OD recognisable skin cancer, while its incidence is very small in France and Switzerland, and even non-existent in Austria and Sweden, it constitutes the majority of cancers recognized in 2016 in Germany (39%) and almost 15% in Denmark.

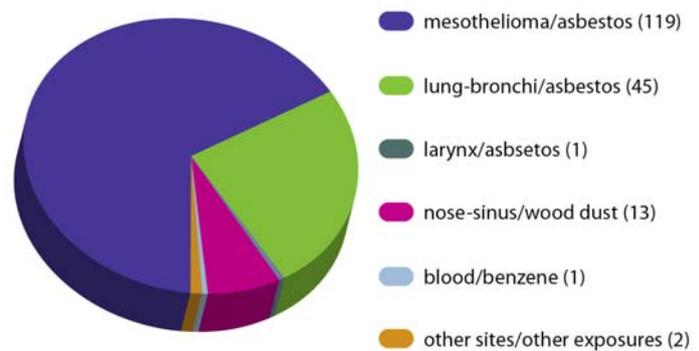
### Germany - 2016



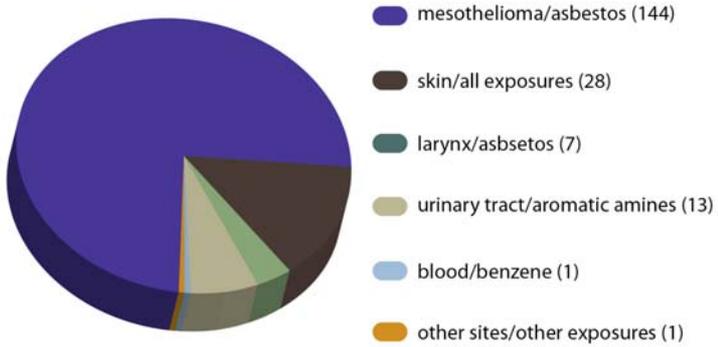
### Austria - 2016



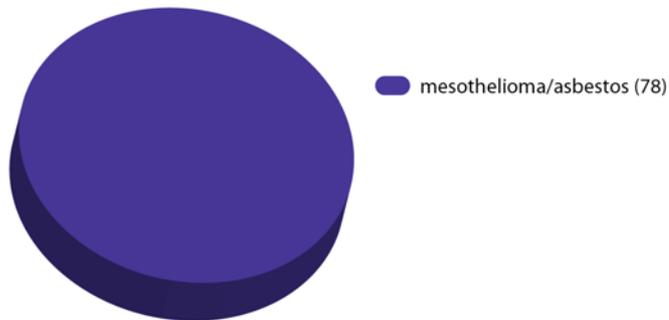
### Belgium - 2016



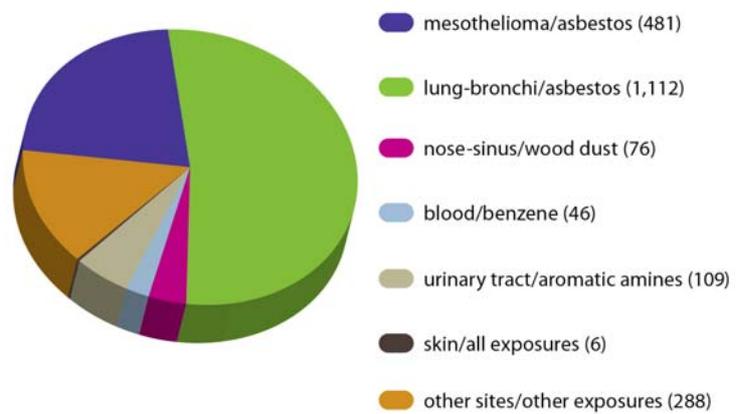
Denmark - 2016



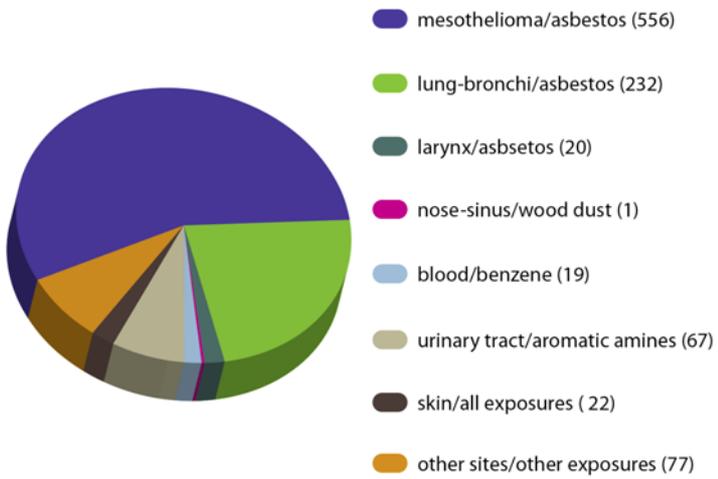
Finland - 2014



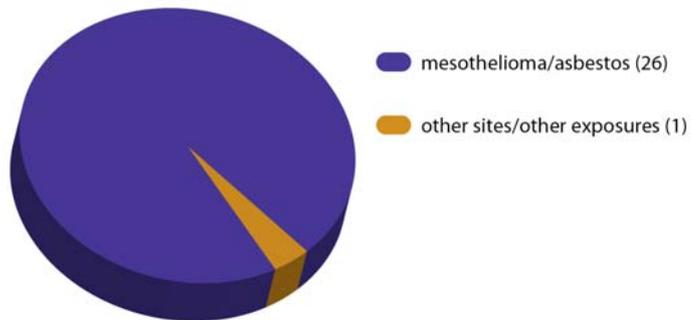
France - 2016



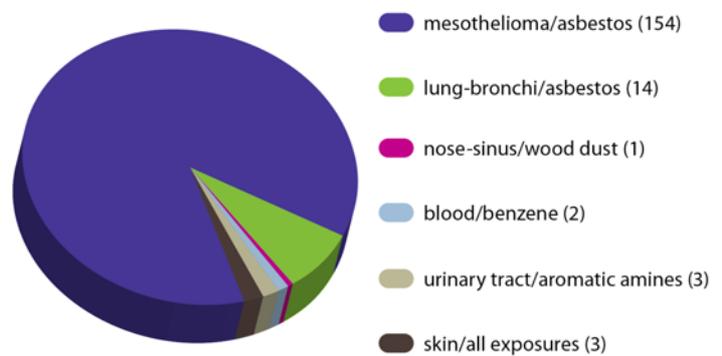
### Italy - 2016



### Sweden - 2016



### Switzerland - 2016



### 1•3 General comparative table of occupational cancers in 2016

It is always difficult to make comparisons between national statistics. In this case, namely for occupational diseases, the differences in incidence rate from one country to another can be explained both by differences in risk exposure levels (and hence potential victims) and by the diversity of insurance systems (which has an impact on the number of cases actually recognized).

The types and levels of occupational exposure to carcinogenic agents diverge from one country to another depending on the scale of their risky economic activities. For example, the position held by the chemicals industry and the construction sector will influence the number of workers exposed to chemical substances that are carcinogenic, mutagenic or toxic for reproduction (CMR substances), during their production process or their use.

Apart from this theoretical exposure, exposure conditions can also vary depending on the degree of efficiency of the preventive measures adopted on the national level. Admittedly, there exist common European regulations on the protection of workers from carcinogenic agents. These regulations lay down major principles such as the need to assess risks, elimination or replacement with a less harmful product when it is technically possible and, failing that, the implementation of appropriate protective measures. These European regulations also set occupational exposure limit values for numerous carcinogenic agents. But the application of these instructions varies from one country to another, so that in practice the efficiency of means of prevention is variable, and as a consequence the level of worker protection is also variable.

Moreover, the diversity of systems for support to victims of occupational diseases undoubtedly influences the number of cancers recognized as being of occupational origin. For example, although the content of the national lists of occupational diseases is relatively uniform<sup>(4)</sup> with

regard to cancers, Germany's inclusion of skin cancer caused by UV radiation in its list in 2015 had the immediate effect of seeing a massive recognition of new cases. This insurance-related effect now places Germany at the head of the countries that recognize the most cancers (for an equivalent insured population, see table on page 13). The recognition criteria relating to exposure (duration, intensity, work in question) and the force of presumption of imputability related to the list can likewise have an impact on the number of recognitions. Regarding this, the extremely large number of asbestos-related bronchopulmonary cancers recognized in France can partly be explained by this type of factors<sup>(5)</sup>.

Finally, since an occupational disease cannot be recognized if it has not first been the subject of a claim for recognition to the competent insurance organization, it is obvious that the more or less satisfactory functioning of the occupational disease reporting system also influences the number of cases recognized following the investigation process.

Irrespective of the number of cancers that each country currently recognizes and compensates as being of occupational origin, they all agree that these cancers are underreported. International and national scientific studies endeavour to estimate the proportion of cancers that could be the consequence of an exposure to carcinogenic agents in the course of work and could accordingly be the subject of a claim for recognition as an occupational disease. A range of 4% to 8.5% of cases is adopted in several reports, but this percentage is highly variable depending on the organ affected.

Aware of this problem of under-reporting of cancers, several countries have established systems making it possible to detect more cases than those tapped via the traditional circuit of the spontaneous claim for recognition.

(4) "Work-related cancers: What recognition in Europe?", EUROGIP, April 2010  
[https://eurogip.fr/images/publications/EUROGIP\\_RecoCancerspro\\_49E.pdf](https://eurogip.fr/images/publications/EUROGIP_RecoCancerspro_49E.pdf)

(5) "Asbestos-related occupational diseases in Europe", EUROGIP, March 2006 (page 10)  
<https://www.eurogip.fr/images/publications/EUROGIP-24E-AsbestosOccDiseases.pdf>

General data on occupational cancers in 2016					
Country	Claims for recognition	Cases recognized	Ratio of recognized occupational cancers per 100,000 insured*	% of cancers recognized off-list	Proportion of cancers in total recognized occupational diseases (%)
Germany	15,234	6,559	15.1	0.43 (28 cases)	32
Austria	148	129	3.73	0	11
Belgium	344	181	4.69	0.55 (1 case)	7
Denmark	688	194	6.93	0	5
Finland (2014)	NC	78	3,71	NA	5
France	2,679	2,118	11.39	4.44 (94 cases)	3
Italy	2,642	1,033	6.31	NC	6
Sweden	56	27	0.5	NA	5
Switzerland	253	177	4.41	0	7

\*Population insured by each national organization, including the public sector (except in France, private sector only). In Denmark, statistics regarding the insured population are not available; the ratio is therefore based on the number of employees in Denmark in 2016 including self-employed workers. In those countries which also insure nonworkers (school pupils, students, etc.), these categories have not been counted. The number of insured is given per capita (except France, expressed in full-time equivalents).

NC: non communicated - NA: non applicable

## 2• Occupational cancer cases detection systems

Two sorts of initiatives have been identified: those enabling (former) workers exposed to carcinogenic agents in the past to obtain access to regular monitoring of their health, and those which involve targeting (former) workers suffering from a cancer which could result from an occupational exposure.

### 2•1 Post-occupational monitoring of workers exposed to carcinogenic agents

In accordance with the 2004/37/EC Directive on carcinogenic agents, all European countries provide for medical monitoring of employees exposed to carcinogens as part of the occupational health services financed by companies. But, de facto, this monitoring stops as soon as workers become inactive 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.

That is why some countries have established systems for monitoring workers formerly exposed to carcinogenic agents, including retired workers.

Although such systems are provided for in the legislation of several countries, it is the German and Swiss examples that are described here. This is partly because they are documented, and partly because their functioning is considered satisfactory, in other words they manage to reach their target.

#### The German example

In accordance with the German regulations on occupational medicine, employers are required to perform medical surveillance of their workers, which, in certain conditions, must continue to be proposed for a long time after ceasing their work. When the work relationship ceases, this obligation is transferred to the German national insurance organization for occupational injuries and diseases (DGUV). "DGUV Vorsorge" (<https://www.dguv-vorsorge.de/vorsorge/index.jsp>) covers several organizations (GVS, ODIN, etc.) responsible for medical monitoring of insured who have been exposed to carcinogenic substances and their effects during and after their period of

work. The organization and financial cost of this monitoring is their responsibility.

In principle, it is the employer or the statutory accident insurance (Berufsgenossenschaften for the private sector and Unfallkassen for the public sector) with which he is affiliated which forwards to the competent organizations all the documents making it possible to identify and contact the workers concerned, after making sure that the latter consent to this procedure. The worker or former worker may also ask to benefit from post-exposure and post-occupational monitoring, and in this case the reality of their exposure is verified beforehand. Generally, it is the document which formally sets out the occupational risk assessment which determines which (former) workers have been exposed to carcinogenic agents and are therefore eligible for the schemes.

At present, about half a million workers and former workers receive medical monitoring due to an exposure during their work to asbestos dusts, silica dusts, synthetic mineral dusts or other carcinogenic or mutagenic substances or mixtures, and radiation.

For the early detection of cancers by preventive examinations, non- or weakly-invasive methods are preferred. In addition to conventional examination methods, the DGUV conducts research in the field of molecular markers for the early diagnosis of cancer.

#### Concerning more specifically the medical monitoring of workers exposed to or having been exposed to asbestos:

This is performed by Gesundheitsvorsorge (GVS), formerly Zentrale Erfassungsstelle asbeststaubgefährdeter Arbeitnehmer (central agency for registration of workers exposed to asbestos dusts) founded in 1972.

The information relating to exposed workers and the type and intensity of exposure reaches GVS via the statutory accident insurance. The latter receive the information from employers (this is an obligation since 1984) and verify it.

GVS records this data, organizes screening (in particular after exposure and after retirement) and collects the 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.

GERMANY: Main examples of medical monitoring			
MONITORING OBJECTIVE		MONITORING ORGANIZATION	
Carcinogenic agent in question	Type of cancer	Monitoring frequency (every 12 to 36 months)	Length of monitoring period
Asbestos	Lung cancer / mesothelioma	Annual to triennial	For life after exposure
	Lung cancer	Annual (LD-HRCT)	For life after exposure for the high-risk group (after age 55, nicotine greater than or equal to 30 pack-years, 10 years' asbestos exposure before 1985)
Aromatic amines	Bladder cancer	Annual to triennial	For life after exposure
Silica	Lung cancer	Annual to triennial	For life after exposure
High-temperature insulation wools	Lung cancer	Annual to triennial	For life after exposure
Fibre-forming mine dusts, silica, radiation due to uranium mines	Lung cancer	Annual to triennial	For life after exposure
Tar, pitch, polycyclic aromatic hydrocarbons	Skin cancer	Biennial to triennial	For life after exposure
Vinyl chloride	Liver cancer	Biennial to triennial	For life after exposure
Benzene	Leukaemia	Biennial to triennial	For life after exposure
Oak and beech dusts	Nose cancer	Every 18 months to triennial	For life after exposure
Hexavalent chromium	Lung cancer	Biennial to triennial	For life after exposure

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 when indicated an X-ray examination of the respiratory tracts.

Regarding more specifically screening for lung cancer and according to the NLST-study<sup>(6)</sup> former workers who were previously exposed to asbestos and with a particularly high risk of disease were also offered low dose high-resolution CT screening (LD-HRCT) for the early detection of lung cancer. In addition, the German Social Accident

Insurance is currently reviewing the use of biomarkers for early detection for asbestos related lung cancer and mesothelioma.

From 1972 to 2016, 601,134 workers were registered with GVS. At the end of 2016, 87,673 people were subjected to screening tests because they were still exposed to asbestos during their work (building demolition and renovation), and 243,655 because of a prior exposure.

The number of diseases caused by asbestos dusts detected by this monitoring scheme is estimated at about 900 each year.

(6) National Lung Screening Trial: a vast trial conducted in the United States between 2002 and 2007

## The Swiss example

Although it is slightly less extensive than the German system, the Swiss model of medical monitoring of workers exposed to carcinogenic substances in the past is similar to it in certain aspects. For example, the identification of the targeted persons is performed on the basis of the compulsory reports of the employers who exposed them. Moreover, it is the leading Swiss insurer against occupational diseases (also the insurer for occupational injuries and other types of accidents, SUVA) which organizes the medical monitoring after contacting by mail pensioners who have been exposed to CMR substances (substances that are carcinogenic, mutagenic or toxic for reproduction).

Currently, around 7,000 people are monitored, of which

4,500 for exposure to asbestos. Note that, except for asbestos exposure, only exposures exceeding six months are taken into account.

Regarding more specifically screening for lung cancer after asbestos exposure, in a personal letter sent to persons aged 55 to 75 SUVA recommends screening by scanner when the asbestos exposure alone or combined exposure to asbestos and tobacco represents a high risk of lung cancer equivalent to a tobacco consumption of 30 pack-years, i.e. the criteria for inclusion in the NLST (cf. footnote 6 p. 15).

In cases of asbestos exposure only, i.e. for non-smokers, screening by scanner is also recommended when the Helsinki criteria are met<sup>(7)</sup>. In Switzerland, these criteria serve as conditions of recognition for asbestos-related lung cancer.

- (7) Helsinki criteria (exposure to asbestos dusts). According to Scand J Work Environ Health. Asbestos, asbestosis and cancer: the Helsinki criteria for diagnosis and attribution. 1997, Aug. 23: 311-316:
- At least 1 year if major exposure (job in an asbestos cement factory, demolition work involving definite exposure to asbestos or direct handling of asbestos).
  - From 5 to 10 years if moderate exposure (for example, work in the docks in a confined space, regular work in contact with asbestos cement roofs, plumbing work implying regular exposure to asbestos and the work of mechanics having to change truck brake linings frequently, with work performed indoors counting for more than work performed outdoors, and direct exposure for more than indirect exposure).
  - Or exposure calculated as at least 25 fibres/cm<sup>3</sup> per year, i.e. an exposure equivalent to at least 1 fibre/cm<sup>3</sup> over 25 years or 2 fibres/cm<sup>3</sup> over 12-and-a-half years.

SWITZERLAND: Characteristics of the post-occupational monitoring system			
MONITORING TARGET		MONITORING ORGANIZATION	
Carcinogenic agent in question	Type of cancer	Monitoring frequency	Length of monitoring period
Benzene	Leukaemia	Each year	Up to age 75
		As the patient wishes	After age 75
Asbestos	Lung cancer	Every 5 years	During the first 15 years following the start of exposure
		Every 2 years	Up to age 75
		As the patient wishes	After age 75
Aromatic amines	Bladder cancer	Each year	Lifelong
Tar, pitch, polycyclic aromatic hydrocarbons	Skin cancer	Every 5 years	During the first 15 years following the start of exposure
		Every 2 years	Lifelong
Vinyl chloride	Liver cancer	Every 2 years	Up to age 75
		As the patient wishes	After age 75

For smokers, due to the combined risk of asbestos exposure and tobacco abuse, screening by scanner is also recommended where there is a high risk of lung cancer within the NLST range, even if the Helsinki criteria are not met. For those persons suffering from asbestos-related occupational diseases, SUVA also provides for a medical questionnaire, an examination of the heart and lungs, and an examination of the pulmonary functions performed at regular intervals by the family doctor or by a lung specialist. The frequency of these examinations is defined on a case-by-case basis by the competent industrial doctor. In addition, a computer-assisted tomography examination is performed each year.

### **BELGIUM: Reimbursement of medical expenses for nose cancer screening on former wood workers**

The federal agency for occupational risk Fedris (formerly the Occupational Diseases Fund which merge with the Accident at work Fund) has since 2014 offered to reimburse medical expenses, up to twice a year, for the consultation of an eye, nose and EHT specialist to screen for nose or sinus cancer in workers who have been exposed to wood dust.

This screening is free of charge if the applicant fulfils the following combined conditions:

- Have worked for a period of at least 20 years in the wood sector (in the private sector or in a provincial or municipal government department);
- Be aged at least 55;
- No longer work for the employer on whose premises the exposure occurred;
- Show one of the following symptoms: nose clogged on one side for more than 15 days without any obvious reason, bleeding of the nose without having sustained particular shocks, and a reduction in or loss of the sense of smell.

The application for reimbursement of medical expenses for screening is made at the initiative of the former worker. After the consultation, the ENT specialist sends their report and is reimbursed by FEDRIS. If a nose or sinus cancer is diagnosed, receipt of the medical report with the results of the biopsy leads automatically to the opening of a dossier for compensation as an occupational disease.

In 2014, 229 former wood workers underwent this exa-

mination and three nose cancers were detected in this way at an early stage as part of this programme. The following years, the number of applications for reimbursement of medical expenses fell to 10 in 2017, of which five were admissible.

## **2•2 Proactive systems for detecting sufferers**

Unlike the systems described above which offer formerly exposed workers screening for the occurrence of a cancer, the following initiatives target people who are already ill in order to determine, with their consent, whether their cancer could have a work-related origin. Where applicable, these patients are prompted to make a claim for recognition as an occupational disease.

### **Denmark: Cross-checking of reports with the cancer register**

In Denmark, the under-reporting of occupational cancers was the subject of several studies<sup>(8)</sup> published in 1990, 1996 and 2007. Also, a 2012 report<sup>(9)</sup> dealt with the under-reporting of occupational diseases in general.

All these documents stress the large gap between the number of cases recorded in the Cancer Register and the number of cases reported to the occupational disease insurance organization, and this for two types of cancer for which there is a high probability of a work-related origin: pleural mesothelioma and cases of adenocarcinoma of the nasal cavities and sinuses.

This observation led Denmark to establish in 2007 a system for automatic mutual reporting of cases corresponding to these two types of cancer between the National Health Office (Sundhedsstyrelsen) which administers the Cancer Register and Arbejdsmarkedets Erhvervssikring (formerly Arbejdsskade styrelsen) which insures those suffering from occupational diseases.

The Danish Cancer Register is renowned for its reliability: it lists nearly all the cancers diagnosed in the Danish population since 1942, with a very high rate of coverage of the country.

- 8) Reporting of occupational cancer in Denmark. Skov T, Mikkelsen S, Svane O, Lyng E. Scand J Work Environ Health 1990  
Underreporting of occupational cancers in Denmark, Danø H, Skov T, Lyng E., Scand J Work Environ Health 1996  
Registration of selected cases of occupational cancer (1994-2002) with the Danish National Board of Industrial Injuries, Hansen, Rasmussen, Omland, Olsen. Danish National Board of Industrial Injuries, 2007
- (9) Report by the working group on reporting of occupational diseases published on 23 April 2012 (in Danish): <http://aes.dk/~media/ask/pdf/rappporter/pdfrapportanmeldelseafarbejdsskaderpdf.ashx>

The initiative had a major impact on the number of claims for recognition relating to these two types of cancer. For example, mesothelioma claims increased by 50% after the establishment of the system. And the figures show that the system gave an even greater boost to cases of cancer of the nasal cavities and sinuses. After 10 years of operation, the Cancer Register has become the biggest supplier of claims for recognition for these two diseases.

After several years marked by the treatment of newly reported but not recent cases, the reporting level tended to return to the level before the experiment for mesotheliomas. It can also be assumed that the fall observed in recent years is the consequence of an early prohibition of asbestos by Denmark (i.e. in 1980, except for asbestos cement products in 1986), bearing in mind that the latency period for mesotheliomas is 20 to 40 years.

On the other hand, reports of cancer of the nasal cavi-

ties (mostly via the Cancer Register) remain at a high level.

As regards recognition of the cases reported thanks to this system as an occupational disease, it may seem surprising that the rise in the number of reports from 2007 was not necessarily accompanied by an increase in the number of recognitions. A high rate of rejection of cancers of the nasal cavities can be observed in particular. This situation apparently does not concern mesothelioma cases, for which the rates of recognition are generally stable.

It should be specified that the systematic nature of the transfer of dossiers between the Cancer Register and the occupational disease insurance organization means that numerous cases diagnosed incorrectly and recorded as such by the former are rejected by the latter. Moreover, in some cases the victims/their legal beneficiaries object to the insurance organization examining their dossier, which will in that case be rejected.

DENMARK: Number of reports of cases of mesothelioma and cancer of the nasal cavities to the Arbejdsmarkedets Erhvervssikring insurance organization between 2006 and 2016											
Reported cases	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Mesothelioma	92	141	141	155	127	127	142	126	130	98	99
of which reported by the Cancer Register	-	15	39	36	40	35	45	71	91	74	66
of which reported by doctors or other applicants	92	126	102	119	87	92	97	55	39	24	33
Cancer of the nasal cavities/sinuses	6	84	151	127	127	101	95	54	53	65	83
of which reported by the Cancer Register	-	36	83	66	84	69	76	49	47	62	78
of which reported by doctors or other applicants	6	48	68	60	43	29	19	5	6	3	5

**DENMARK: Number of cases of mesothelioma and of cancer of the nasal cavities and sinuses reported and recognized**

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
<b>Mesothelioma</b>										
Cases reported	141	141	155	127	127	142	126	130	98	99
Cases recognized	93	76	81	79	85	87	84	87	71	70
<b>Cancer of the nasal cavities and sinuses</b>										
Cases reported	84	151	127	127	101	95	54	53	65	83
Cases recognized	12	9	9	6	7	8	3	4	1	5

**Italy: Search for a possible work-related origin in a hospital environment**

The Italian initiative selected as an experiment in good practice for combating the under-reporting of occupational cancers is a system of systematic searching based on cases diagnosed and treated in a hospital environment in the province of Brescia<sup>(10)</sup>. This province is located in Lombardy, in northern Italy, a highly industrialized region with, according to the statistics of the regional cancer registers, a high incidence of lung cancer.

In 1998, an agreement was signed between the local health agency (Azienda Sanitaria Locale - ASL) as part of the activities of its Prevention Department, the chair of occupational medicine of the University of Brescia and the occupational medicine operating unit of the civil hospitals of Brescia, in order to identify cases of work-related lung cancer.

The initiative involves the pneumology, thoracic surgery and general medical services and the hospital's radiology institute, which are the departments most deeply involved with the diagnosis and therapy of patients suffering from lung cancer.

This joint work of identification, evaluation and docu-

mentation of cases of lung tumours for which a work-related origin is suspected aims primarily to improve the epidemiological data possessed by ASL in order to more effectively prevent occupational cancers. The initiative also has practical repercussions in insurance terms.

Stages of the procedure:

For each new lung cancer diagnosed, the hospital doctor in charge of the patient produces a brief occupational case history and fills in an electronic form containing the following data: civil status, clinico-histological diagnostic, tobacco abuse, a few aspects of the occupational case history collected "at the patient's bedside" (sector of activity, job, period, duration). Only a few minutes are needed to produce this document.

This data sheet is sent to the hospital's Occupational Medicine Service.

Based on these sheets, the industrial doctor archives nonsuspect cases (e.g. office work, housewife, etc.) and assesses suspected cases via a direct interview with the patient or a specialist consultation.

For each patient assessed, a clinical file is created containing the relevant documentation relating to the hospitalization (radiological, endoscopic and histopathological references which led to the cancer diagnostic).

(10) I tumori occupazionali "ritrovati". Considerazioni sul ruolo del Medico del Lavoro nella ricerca sistematica e nella diagnosi eziologica dei tumori polmonari, alla luce di una casistica. S. Porru, A. Scotto di Carlo, Donatella Placidi, Cecilia Arici, G. Tassi, L. Alessio, *Med Lav* 2006 ; 97, 4 :565-580 - [http://www.lamedicinadellavoro.it/summary/2006/vol\\_97\\_04/01\\_vol\\_97\\_04.pdf](http://www.lamedicinadellavoro.it/summary/2006/vol_97_04/01_vol_97_04.pdf)

I tumori occupazionali ritrovati: contributo del medico del lavoro e vantaggi della ricerca sistematica. S.Porru, A. Scotto di Carlo, L. Alessio. *G Ital Med Lav Erg* 2009 ; 31 :3, Suppl, 108-112

Reducing the underreporting of lung cancer attributable to occupation: outcomes from a hospital-based systematic search in Northern Italy. Porru S1, Carta A2, Toninelli E2, Bozzola G3, Arici C2 *Int Arch Occup Environ Health*. 2016 Aug; 89(6):981-9. doi: 10.1007/s00420-016-1135-5. Epub 2016 Apr 30.

ITALY: Assessment of cases diagnosed/appraised between May 1998 and December 2013

Systematic search scheme data	Number	Percentage
Cases diagnosed and reported to the Occupational Medicine Service	3,274 (about 200/an)	100%
Cases archived	1,752	53%
Cases having undergone an occupational medicine appraisal	1,522	47%
Establishment of a causal link	395	12% 26% of cases appraised

A more detailed occupational case history is then established. In 99% of cases, it is collected directly from the patient. It brings together information on the period of the work activity, the name and head office of the establishment, the main production characteristics of the company, and the job. It also mentions any use of or exposure to chemical or physical substances, wearing of PPE where applicable, and the presence in the company of airborne pollutant capture systems. This career record ("curriculum laboris") is reconstructed without any time limit. The industrial doctor consults the employment record book if it is available, and if necessary seeks additional technical information (risk assessment document, environmental surveys) from the companies (in particular the manager of the risk prevention department), or goes directly to the workplaces. The industrial doctor of the company and the ASL's doctor (who has a good knowledge of the risk map on the local level) are sometimes consulted. The enquiry also concerns any of the patient's leisure activities that could have exposed them to carcinogenic agents.

Finally, the Occupational Medicine Service performs detection of other tumours, other lung affections or other occupational diseases.

On completion of this process, the Occupational Medicine Service sends to the doctor in the department which took charge of the patient a detailed report containing the occupational and pathological case histories and conclusions regarding the causal link between the disease and an occupational exposure, accompanied by references to the scientific literature. In addition, the report reminds the doctor of his medico-legal obligations: reporting of the case to the competent ASL (to be saved in its database), drafting of a report for the legal authority, and writing of the first occupational disease certificate to be

submitted to the patient, necessary for making a claim for recognition to INAIL. Usually, advice is also sent regarding assistance to patients, e.g. the procedures for access to the INAIL insurance organization.

Between 1998 (the year in which the system was set up) and 2013, 3,274 lung cancer reports were sent to the hospital's Occupational Medicine Service. Some cases were ruled out immediately, for want of the patient's agreement or due to their critical health condition.

Half of the cases were archived, because no occupational exposure to lung carcinogens was able to be identified.

The other half of the cases were assessed for a possible work-related origin. Of 1,522 cases, the Occupational Medicine Service confirmed an occupational aetiology for a quarter of them. The main carcinogenic agents identified in these patients were silica, asbestos and polycyclic aromatic hydrocarbons. Most of the patients were smokers or former smokers.

For some patients, the pathological case history revealed the existence of another work-related disease: asbestosis, bladder cancer, systemic sclerosis (attributed to exposure to silica), benign pleuropathies (due to asbestos) and chronic obstructive lung disease.

Data from the INAIL insurance organization (available up to 2010) show that, at that date, it had received 240 claims for recognition from patients appraised as part of this experiment. 39% of these cases were recognized as occupational cancers.

Despite the existence of cases for which a first occupational disease certificate had been submitted to the patient but for which no claim for recognition was made, and despite the high rate of rejection by the insurer, this systematic search procedure is regarded as positive:

- Over a similar lapse of time, more cases have been

- appraised by the Occupational Medicine Service, then reported and recognized by INAIL, since the introduction of this procedure;
- The assessment of the link between cancer and occupational exposure takes place in optimal conditions, because usually at the patient's bedside and immediately after producing the diagnostic;
  - In some cases, this procedure made it possible to put in place preventive measures in the workplace for patients who continued to work: stricter monitoring of workers' health, risk assessment, advice for retention in employment, and inspections. These measures were implemented through greater cooperation between industrial doctors in companies, local health authorities, employers, the persons in charge of risk assessment and the trade union organizations.

### France: Targeting and support for potential patients by the local sickness fund

Since 2008, France has experimented a programme for detecting the possible work-related origin of tumours of the bladder. The programme started in a few regions and has gradually been extended to all of France.

Occupational exposures (to polycyclic aromatic hydrocarbons derived from coal and charcoal, certain aromatic amines, and nitrosamine N-nitrosodibutylamine) are, together with tobacco, the main risk factors for these tumours.

The aim is to identify, among patients afflicted by a cancer of the bladder or the upper urinary tract, those who

were exposed during their working life to harmful agents, and raise their awareness of the procedure for reporting as an occupational disease with a view to recognition.

Concretely, the local sickness insurance fund (CPAM) and the Medical Department, after identifying by a computer search insured people who have had a bladder cancer classified as a Long Duration Disease (LDD)<sup>(11)</sup>, send to the targeted people a letter informing them of the detection programme and its purpose.

Those persons who consent are contacted by telephone to reconstitute their professional career on the basis of a questionnaire. If a work-related origin proves likely or possible, they are invited to fill in an occupational disease reporting form.

The table below shows the change in the number of bladder cancer cases recognized since 2008 in each region. It shows a latency time of two six-month periods between the start of the experiment and the increase in the number of cases reported and recognized.

In 2013, i.e. five years after the start of the experiment and when it was impacting six regions accounting for half of the French population, the programme had made it possible to detect a total of 1,855 potentially work-related cases of bladder cancer, representing 6% of the bladder cancers registered as Long Duration Diseases over the same reference period. For half of these detected cases a claim for recognition had been made, and 60% of these claims had led to recognition as an occupational disease.

In the whole of mainland France, the number of cases recognized undeniably increased, being multiplied by a factor of 7.5 between 2007 and 2016.

(11) "Long duration Diseases" are conditions which involve prolonged treatment and an extremely costly therapy and which can therefore be 100% reimbursed by the health insurance organization.



FRANCE: Change, by region, in the number of bladder cancer cases recognized as an occupational disease between 2007 and 2016

Region	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Normandie	4	9	9	16	20	24	32	30	25	30
Nord-Picardie	4	6	22	39	45	44	44	46	33	23
Sud-Est	2	3	0	1	6	6	5	11	14	25
Ile-de-France	5	10	3	9	18	31	38	39	50	46
Nord-Est	1	4	1	2	3	5	17	15	26	24
Bourgogne-France-Comté	0	2	2	2	2	9	14	6	3	12
Midi-Pyrénées	0	2	0	0	2	4	3	2	4	10
Aquitaine	0	1	1	3	1	5	0	1	2	6
Languedoc-Roussillon	3	1	2	0	0	1	0	2	2	1
Bretagne	1	0	1	0	1	1	1	0	3	4
Pays de la Loire	1	1	2	1	1	2	3	5	3	11
Centre	3	1	1	1	1	2	1	3	4	6
Auvergne	0	0	0	1	1	2	1	1	0	6
Alsace-Moselle	6	0	6	5	1	4	2	5	5	13
Rhône-Alpes	1	2	2	3	4	7	1	4	8	10
Centre-ouest	0	0	2	1	1	2	0	1	0	4
<b>TOTAL mainland</b>	<b>31</b>	<b>42</b>	<b>54</b>	<b>84</b>	<b>107</b>	<b>149</b>	<b>162</b>	<b>171</b>	<b>182</b>	<b>231</b>

Source: Annual Report, page 133

Shaded area: period of introduction of the system in the region in question

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## Conclusion

Some initiatives described above aim to detect cancer at an early stage and thus improve chances of recovery. They are addressing people who have a significantly increased risk of cancer through their occupational exposure. When a cancer case is detected in such programs, it is much more likely that the occupational origin is identified and recognised. Other initiatives help victims of occupational cancers to assert their right to specific compensation from the occupational injury insurance which is generally more generous than that awarded for a mere illness or disability. All these actions also contribute to the establishment of more reliable incident rate statistics, which are a necessary tool for occupational risk prevention stakeholders to target their priorities.

However, these initiatives are still scarce, limited (because targeted on certain cancers), and costly in terms of time and personnel. They are not easily transposable from one country to another, because their performance depends on factors such as the reliability of cancer registers, the level of computerization of information flows relating to health, and the existence of strong links between the various healthcare stakeholders (hospitals, regions, and health and occupational risk insurance organizations).

To improve the level of detecting and reporting of occupational cancers generally and sustainably, it is recommended to further raise the awareness of general practitioners and hospital doctors of the search for occupa-

tional causes of cancers, either by enhancing their knowledge as part of their initial or continuous training, or by providing them with tools facilitating detection of the work-related origin of the cases that they diagnose and medically monitor.

The search for victims of occupational cancers is of course not sufficient. The prevention of these diseases is a major challenge for all occupational health stakeholders.

On the European level, cancers caused by work have become one of the main legislative projects concerning the workforce, as attested by the process of revision of the 2004 European directive on carcinogenic agents<sup>(12)</sup> initiated in 2016, with four priorities:

- Inclusion of substances toxic for reproduction in the scope of application of the directive;
- Adoption of new occupational exposure limit values (OELVs);
- Revision of the existing OELVs;
- Adoption of criteria for defining OELVs.

The first phase of this revision has already led to adoption of the 2017/2398 directive (to be transposed into national law before 17 January 2020), which requires that Member States organize monitoring of workers' health beyond the period of exposure, adopts OELVs for 11 new substances<sup>(13)</sup>, and revises the OELVs for hard wood dusts and vinyl chloride monomer.

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(12) Directive 2004/37/EC of the European Parliament and of the Council of 29 April 2004 on the protection of workers from the risks related to exposure to carcinogens or mutagens at work

(13) 1,2-epoxypropane, 1,3-butadiene, 2-nitropropane, acrylamide, bromoethylene, vinyl bromide, chromium (VI) compounds, ethylene oxide, hydrazine, o-toluidine, and refractory ceramic fibres and crystalline silica dust generated by the quarrying, cutting and crushing of materials such as concrete, brick or rock.



**Eurogip** is a French interest grouping (groupement d'intérêt public, GIP) founded in 1991 within the Social Security system. Its activities - studies, projects, information-communication, OSH standardization and coordination of notified bodies - all focus on prevention or insurance against accidents at work and occupational diseases in Europe.

[www.eurogip.fr](http://www.eurogip.fr)



The **European Forum of the insurance against accidents at work and occupational diseases** was founded in 1992. Its aim is to promote and safeguard the principle of such a specific insurance. It monitors actively the process of convergence between the systems in Europe.

[www.europeanforum.org](http://www.europeanforum.org)

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