Burden of work-related cancer in France

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Materials and methods

1. Carcinogenic exposures at work: past and present

2. Compensated cases of cancer

3. The social burden of work-related cancers

Main sources of data

Information on:	Type of source:	Time window:
Institutional sources		
Exposures	SUMER survey (Ministry of labor) CAREX (INRS)	1994, 2003 (2010) 1990-93
Compensated cases of cancer (« OCs »)	Yearly statistics of work related injuries and ODs (National health insurance CNAM-TS, AT-MP)	Since 1985 (partial) Since 1995 (complete)
Attributable cases	French Institute for Public Health Surveillance (InVS) National academy of medicine	1995 (incidence) 1999 (mortality) 2000 (incidence, mortality)
The GISCOP permanent study		
Exposures and compensation process	An original interventional research carried out in patients suffering (respiratory) cancer in a Paris' suburb	1930-2011 (exposures) 2002-2011 (compensation)

Number of exposed workers in 2003, France (SUMER)

2 370 000 exposed (13.5% workers)

3 596 100 exposures (prior week)

« Comparison » with CAREX on 28 chemical carcinogens 1990-94

At least 74 carcinogenic agents

4 938 890 exposed

(22.7% of the active population)

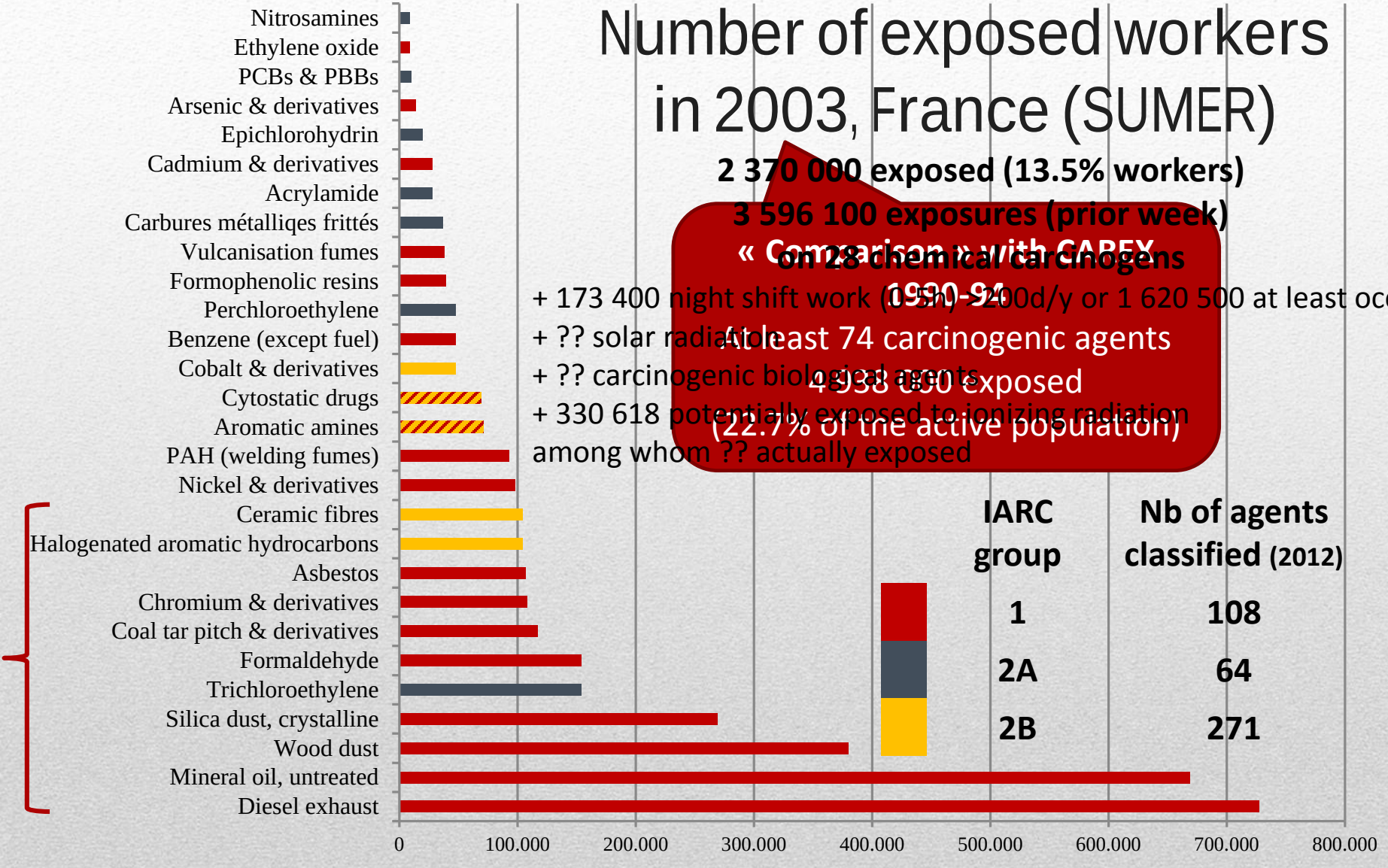
+ 173 400 night shift work (03h) >200d/y or 1 620 500 at least occ[al]

+ ?? solar radiation

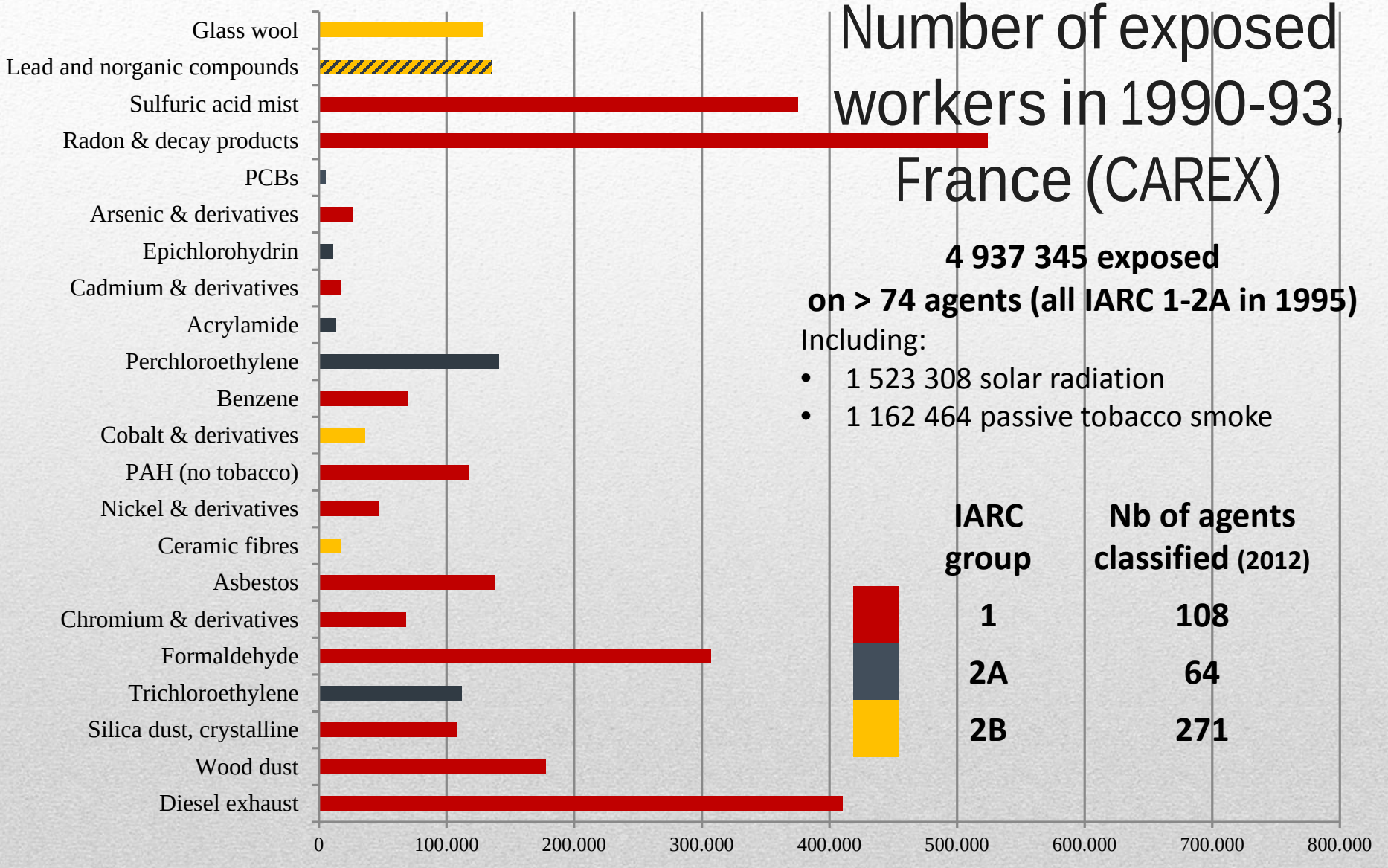
+ ?? carcinogenic biological agents

+ 330 618 potentially exposed to ionizing radiation

among whom ?? actually exposed



1. Carcinogenic exposures at work: Past and present



Number of exposed workers in 1990-93, France (CAREX)

4 937 345 exposed

on > 74 agents (all IARC 1-2A in 1995)

Including:

- 1 523 308 solar radiation
- 1 162 464 passive tobacco smoke

IARC group	Nb of agents classified (2012)
1	108
2A	64
2B	271

Job and sector trends (SUMER 2003)

Category of workers (17.5 millions workers)	Proportion (%) Exposed	No CPE	Additionnal information
Total	**13.5**	**42.3**	**26% score 3-5, 22% multi-exposed**
Skilled BCW	*30.9*		
Unskilled BCW	*22.5*		
Intermediary jobs	*11.1*		
Construction	*34.9*		
Agriculture	*21.9*		
Industry	*21.2*		
Installation, maintenance, repair	*43.3*		
Production	*28.1*		
Handling, storage, transportation	*10.6*		
Apprentice	*18.8*		
Temporary workers	*14.9*		
Under permanent contrat	*13.8*	42.5	

Comparison SUMER 1994-2003 (15.5 millions workers):

+1% exposed
More exposures by worker (but better Q)
+3% short exposures (43% vs. 40%)
Similar distribution of scores
-8% without CPE (47% vs. 39%)

Year	Mineral oils	Asbestos	Wood dust
1994	4.4%	0.8%	1.6%
2003	4.1%	0.6%	2.3%

The GISCOP study

Seine-Saint-Denis is a French department located in the north-east suburb of Paris.

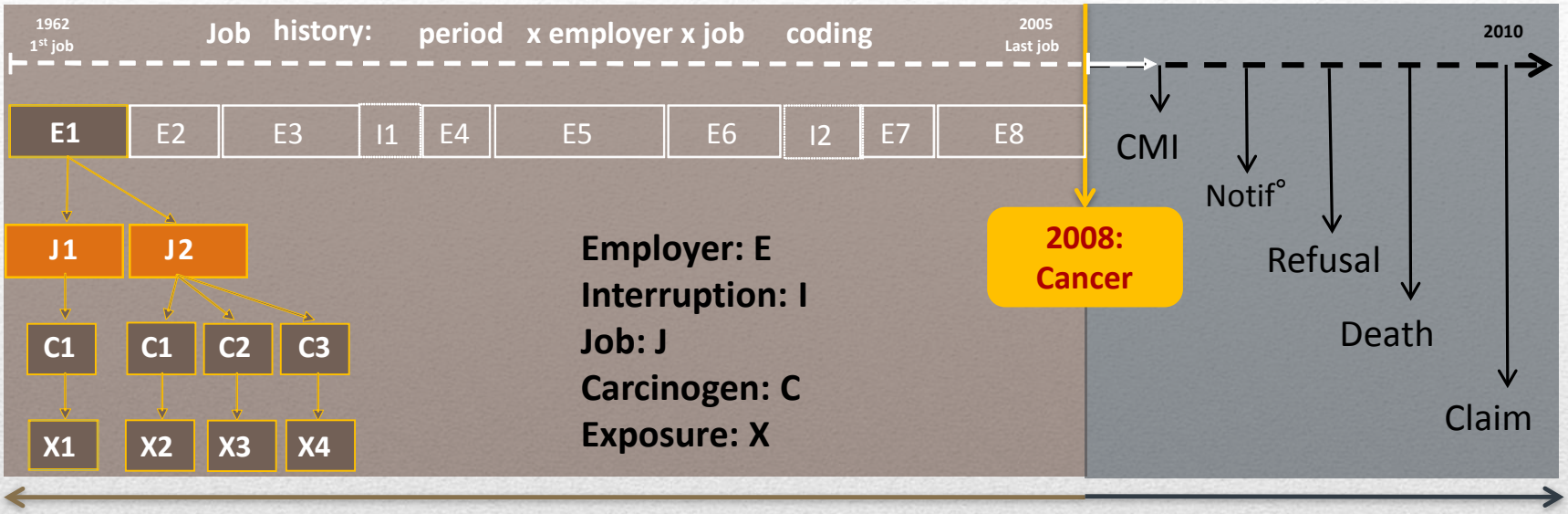
Excess in cancer mortality rate:
- between 1991-1999 (from 10 to 30% compared to the Paris suburbs average)[1]
- between 2000-2007 the gap is narrowing (from 5 to 12%) [2]

Former intensive industrial region

Blue-collar workers

Sources:
Map: http://www.ide.fr
[1]*Pépin 2007, Atlas de mortalité par cancer en IdF, ORS IdF*
[2]*Pépin & Chatignoux 2012, Atlas de mortalité par cancer en IdF, ORS IdF*

The GISCOP study



Retrospective assessment:
interview (job history) + collective expertise (exposures)

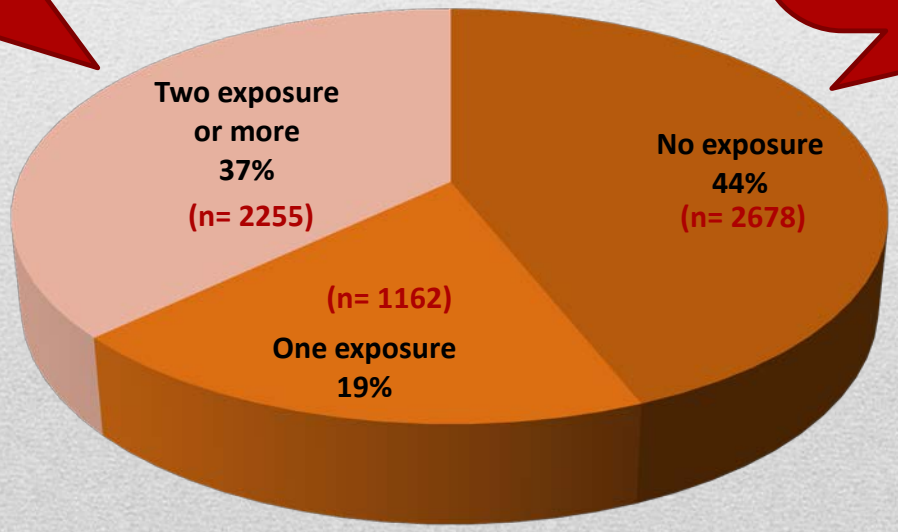
Prospective follow-up of notification of OD

- **Permanent** survey in 3 Seine-Saint-Denis hospitals since March 2002
- **Incident cases** diagnosed in patients living in Seine-Saint-Denis
- **Cancer** sites known for their links with occupational carcinogens

Multiple exposures in the GISCOP study

Jobs held by men, blue collar workers, craftmen and intermediary professionals, jobs in construction, car and metallurgy industry, and printing sectors most exposed and multi-exposed

Asbestos (28.7% of exposed jobs), silica (16.7%), PAH (14.1%), benzene (9,9%), chlorinated solvents (9,1%) and welding fumes (7,6%) are the carcinogens the most found in patients' jobs over the lifecourse



Job exposures to carcinogens
(n=6096)

Based on 1017 job histories

Source: GISCOP study
01/03/2002-31/12/2011

Invisible exposures

- Sectors under (or not!) studied:
  - Maintenance and repair, functions which contribute directly to the production, ex: industrial maintenance (nuclear power, metallurgy, oil & chemical industry, car repairs)
  - Construction workplaces , which combine lots of activities (demolition, renovation, construction & reconstruction) and different types of profession (builders, plumbers, electricians…)
  - Cleaning & waste management (ex : cleaning of offices, hospitals or planes, radioactive decontamination, chemical waste management)
- Sub-contracting & contingent work
- Sexual division of occupational hazards
- Clusters of exposed workers

The French compensation system of ODs

1919 : Occupational disease (OD) compensation Act

- a list of 113 OD tables, of which 22 recognized some type of cancer
- Presumption of occupational origin : *« is presumed of being an OD any disease which is included in a OD table for a worker or ex-worker who has been exposed to occupational conditions & hazards specified in this table »*

1993 : The complementary system

- Regional committees for OD compensation (CRRMP)
- A direct (and essential) link between the disease and working conditions

Cancer related to an OD Table

But : one or several criteria are not met : Time-limit/duration of work/type of work

*The "**direct link**" between disease and work ?*

Out-table work related cancer

Not listed in a table and permanent partial disability (25%)cases

….

*The « **essential and direct link** » between disease an work?*

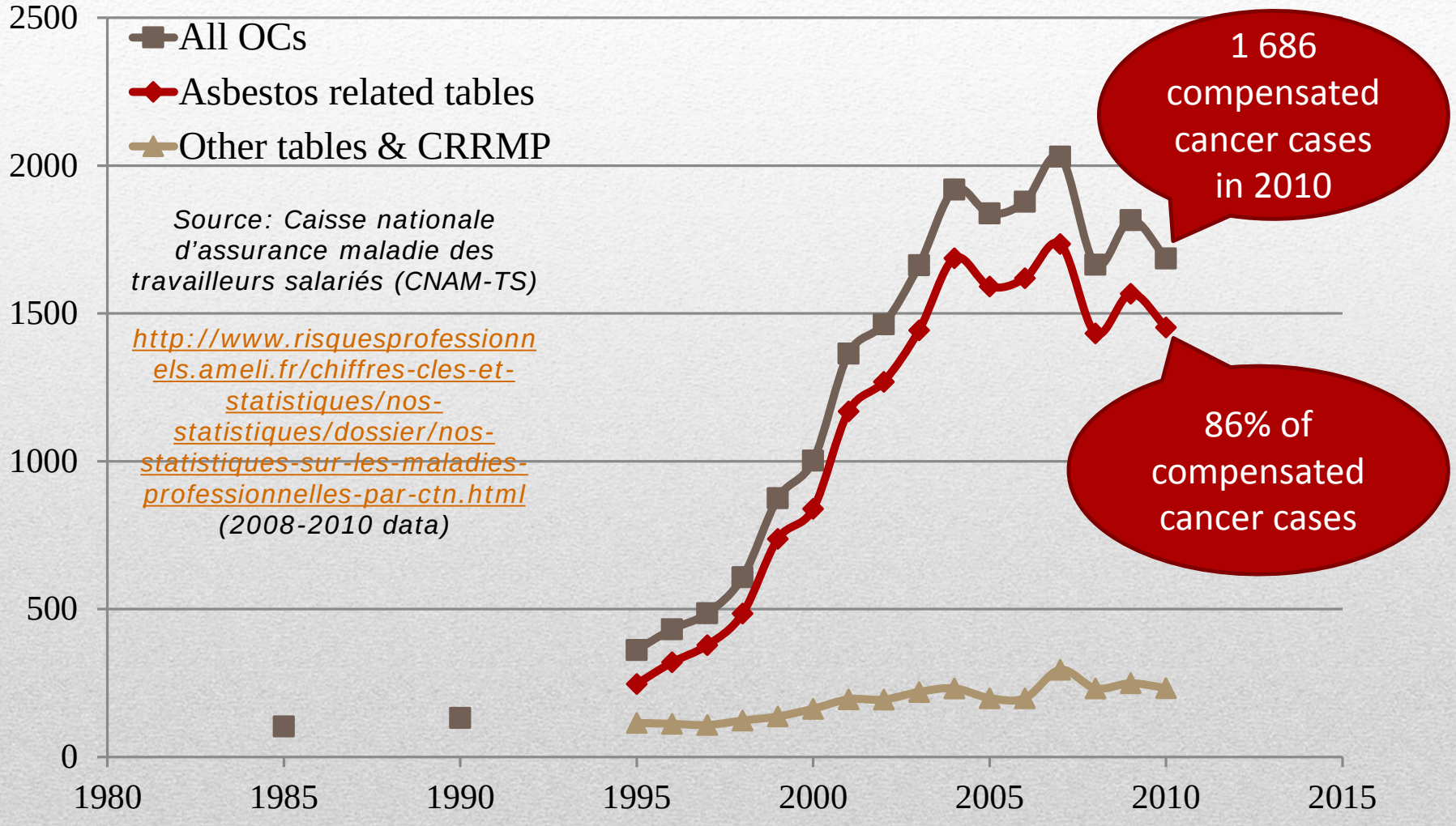
Occupational cancer in OD tables

Only 22 of the 113 **tables** *of the Social Security Act[1] allow recognition of* ***cancer*** *cases as occupational diseases*

- **4** (benzene) *: leukaemia*
- **6** *(*ionis. rad.) *: leukaemia, lung, osseous sarcoma*
- **10ter** (chrome 6**) :** *lung, paranasal cavities*
- **15ter** (aromatic amines) *: bladder*
- **16bis** (coal, PAH) *: skin, lung, bladder*
- **20** *:* (arsenic) *: skin, hepatic angiosarcoma*
- **20bis & 20ter** (arsenic)**, 25** (silica), **30bis** (asbestos), **44bis** (iron dust), **61bis** (cadmium), **70ter** (cobalt) **and 81** (bis-chloromethyl-ether) *: lung*
- **30** (asbestos) *: lung, mesothelioma*
- **36bis** (derived compounds of oil) *: skin, primitive carcinoma*
- **37ter** (nickel) *: lung, ethmoïd and face sinus*
- **45** (hepatitis viruses) *: liver*
- **47** (wood dust) *: ethmoïd and face sinuses),*
- **52** (chloride of vinyl monomer) *: hepatic angiosarcoma*
- **85** (nitrosamines) *: brain glioblastoma*
- **43bis** (formaldehyde)*: nasopharynx*

*[1]They must be related to mentioned carcinogens and works. Available on : http://**www.legifrance.gouv.fr/***

Evolution of compensated cases in France 1985-2010



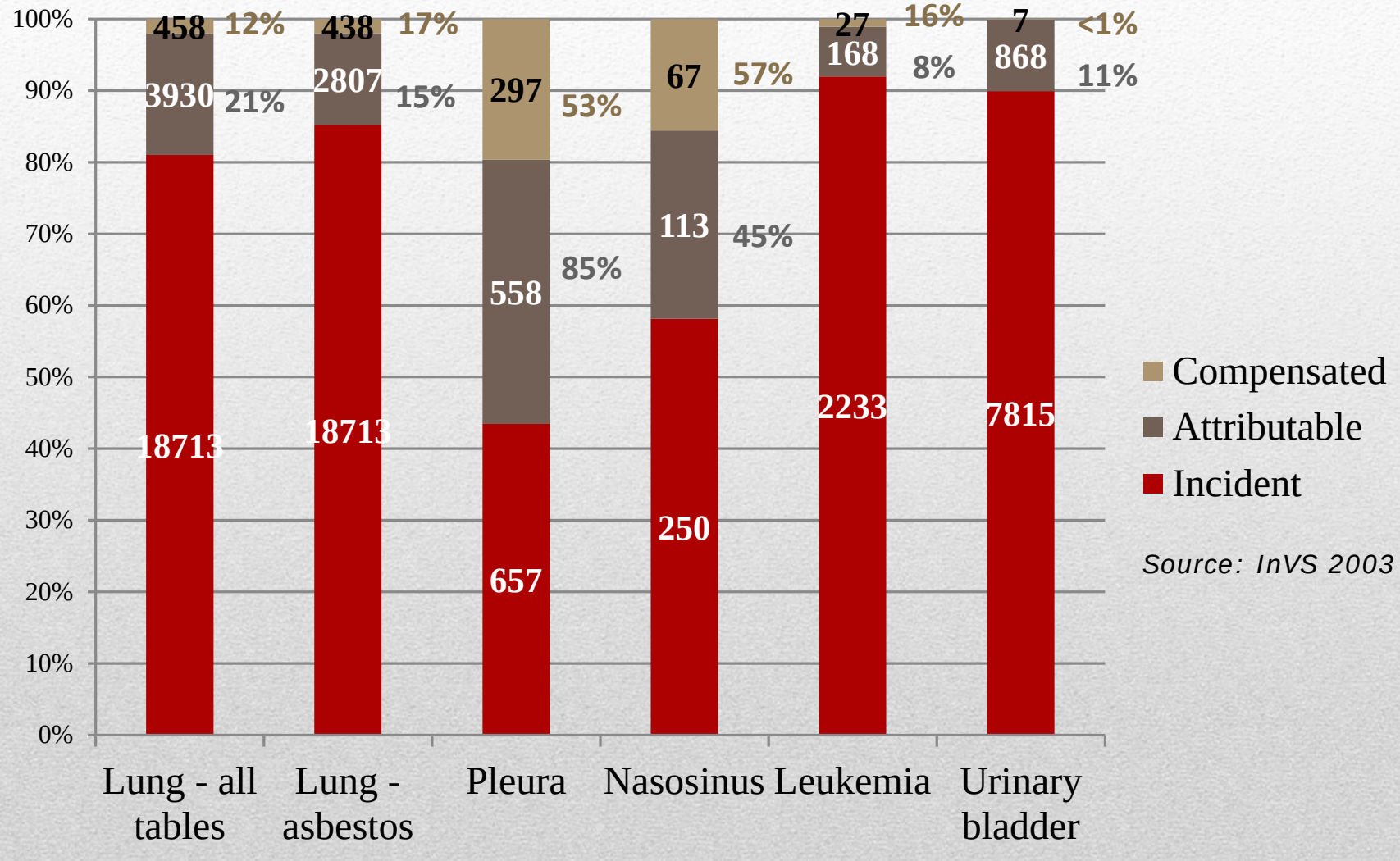
Attributable cases in France - Men (1995, 1999)

Cancer site	Nb of cases		Low AF	High AF	Lower estimate	Higher estimate
Lung cancer	Incidence	18 713	13%	29%	2 433	5 427
	Deaths	20 867	13%	29%	2 713	6 051
Lung cancer (asbestos)	Incidence	18 713	10%	20%	1 871	3742
	Deaths	20 867	10%	20%	2 086	4 172
Pleural mesothelioma	Incidence	632-681				599
Naso-sinus	Incidence	250				02
Leukemia	Incidence	2 233				13
Urinary bladder	Incidence	7 815				10
	Deaths	3 470	10%	14.2%		492
Total	**Incidence**	**29 668**			**3 767**	**7 651**

Update incidence 2005:
4 826 to 9 606 in men

Source: InVS 2003

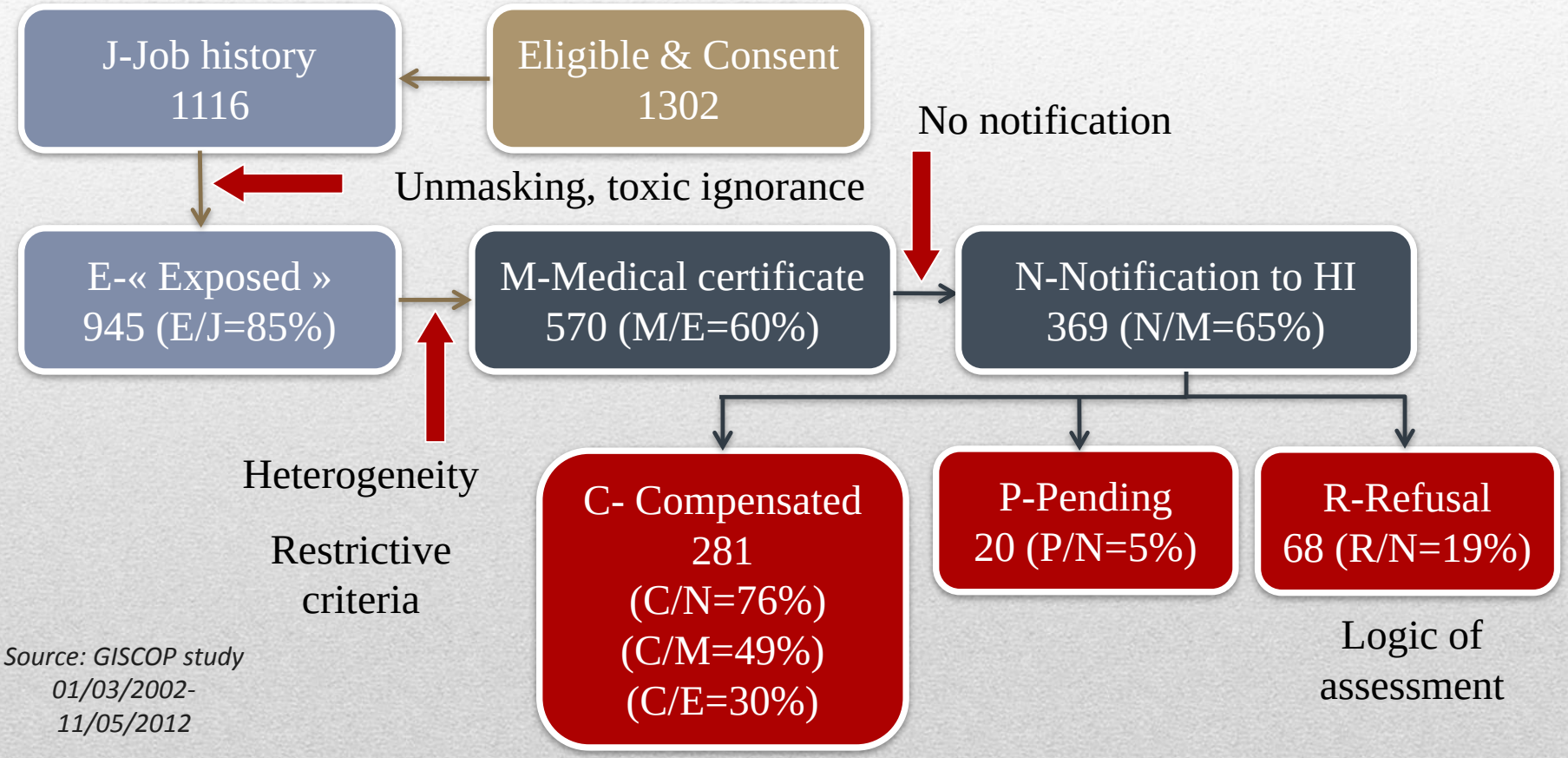
« Occupational cancers » in France



Missing tables of « occupational cancer »

- At least 45 (17 IARC group 1, 28 group 2A) agents or activities (InVS 2005)
- Tables needing to be adapted:
  - Restrictive list of activities (ex: chromium VI)
  - Duration of exposure (ex: asbestos)
  - Medical history (ex: silica dust ad lung cancer, condition of prior silicosis)
  - …
- Priority tables (Diricq commission report, 2011):
  - Ovary and larynx cancers - asbestos
  - Breast cancer - night shift work
  - Colorectal cancer - wood dust (table 47)
  - …
- Multiple exposures

The social construction of the invisibility of work-related cancers in France



Source: GISCOP study 01/03/2002-11/05/2012

A dominant model of interpretation hiding occupational & environmental hazards

Attributable causes of cancer :

1. individual behaviors: smoking, alcohol
2. genetic risk factors: «at risk work » or « at risk workers »?
3. individual conditions not included in the IARC list of carcinogens: estimate of cancer cases which did not appear by the fact to avoid obesity and to have a physical activity

(Source: Attributable Causes of Cancer in France in the year 2000. IARC Working Group Reports, Lyon, 2007)

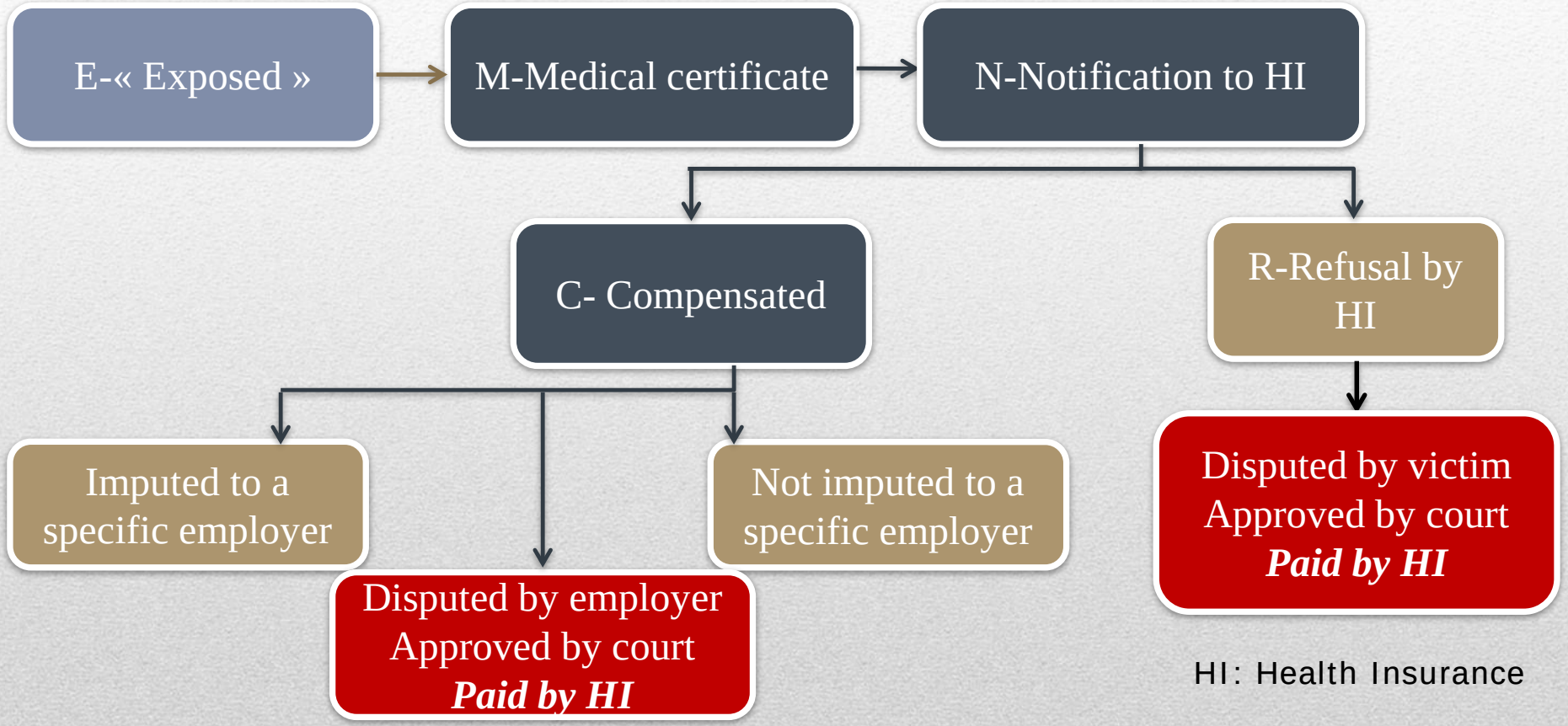
Learning from biology & toxicology
Each cancer = a complex history

- Cancer is not responding to the simple model :

  "one cause = one or several effect(s)"

- It is a process :
  - long (several decades)
  - complex (several events, several steps)
  - Involving multiple necessary and sufficient "causes"
- For a person suffering cancer, it is not possible to scientifically choose between the different possible "causes" : smoking? alcohol? occupational and/or environmental exposure to carcinogens?
- Synergistic effects are under-studied and socially invisible

The cost of under-notification and under-compensation



HI: Health Insurance

Estimated cost for HI=251-657 millions€/year (Diricq 2011)

Social inequalities and deficit of prevention

- Eurofound results (2010): the proportion of European workers exposed to chemicals is increasing (15%)
- No data on the social division of carcinogen exposure
- Asbestos issues as emblematic of the dilemma for protecting workers from carcinogens exposure at the final step of the « industrial hazards chains »
- In spite of changes in work organization, no change in the prevention & compensation systems of occupational cancer

Charles C. Ebbets (1932), *picture of 11 workers at the 69th floor of the General Electric building, NYC*

Thank you for your attention