

# **ESTIMATES OF THE FRACTION OF SEVERAL CANCERS ATTRIBUTABLE TO OCCUPATIONAL EXPOSURE TO SOME CARCINOGENS IN FRANCE**

*USE OF JOB EXPOSURE MATRICES DEVELOPED WITHIN THE  
MATGENE PROGRAM*

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## CONTEXT

- The burden of occupational diseases, for the most non-specific, is important in France.
- Only a few recent French studies allow to quantify it objectively.
- The Occupational Health Direction of the French National Public Health Agency has developed several tools, specific to the French workplace, to evaluate retrospective occupational exposure to carcinogens and their impact on the health of the population:  
Matgéné program
- A current large scale study (all agents, all cancers) carried out by IARC

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## METHOD – ATTRIBUTABLE FRACTION

- Proportion of cases that would not occur in a population if factor were eliminated
- Levin's formula :  $AF = PE * (RR - 1) / (1 + PE * (RR - 1))$ , with:
  - PE, prevalence of lifetime occupational exposure
  - RR, relative risk of disease due to that exposure.
- Occupational exposures and cancers

Carcinogen	Cancer
Asbestos	Lung, laryngeal, pleural mesothelioma, ovarian
Silica	Lung, laryngeal*
Benzene	Leukemia
Trichlorethylene	Kidney

\* : *insufficient evidence IARC*

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## PREVALENCE OF LIFETIME EXPOSURE BY AGE AND SEX

- Job exposure matrices
- Linked to a representative sample of the adult French population (25-74 years old - 2007)
- Level of exposure (all, > threshold)
- Assumptions :
  - The various jobs are independent
  - Exposure > 74 years = expo 74 years
  - Exposure < 25 years = 0
  - Latency = 10 years (solid tumors)

## RELATIVE RISK

- From the national and international literature
- Two RR : RR min and RR max, defining an interval containing all IC95% selected in the literature

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## METHOD – ATTRIBUTABLE FRACTION AND INCIDENT CASES

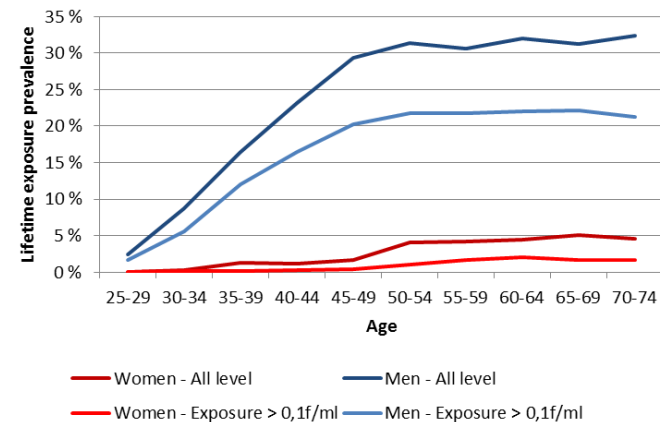
- Two attributable fractions:
  - AF min: prevalence of lifetime exposure to any level and RR min
  - AF max: prevalence of lifetime exposure to « substantial » level (>threshold) and RR max
- Incident attributable cases: incident cases estimates from the Francim network (year 2012) x attributable fraction
- Proportion of compensated cases: number of cases compensated as occupational disease (OD) / estimate of attributable number covered by the General National Health Insurance fund (80%)

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## FINDINGS – THRESHOLD AND LIFETIME EXPOSURE PREVALENCE

### Lifetime exposure prevalence

Agent	Threshold (T)	Sex	Lifetime exposure prevalence	
			All level	> T
Asbestos	0,1 f/ml	Men	23.6%	16.4%
		Women	2.5%	0.8%
Silica	0,1 mg/m <sup>3</sup>	Men	13.4%	5.1%
		Women	0.6%	0.2%
Benzene	1 ppm	Men	8.1%	1.25%
		Women	1.1%	0.1%
Trichloroethylene	25 ppm	Men	8.4%	0.15%
		Women	0.95%	0.1%



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## FINDINGS – ATTRIBUTABLE FRACTION

Agent	Cancer	RR		Attributable fraction (AF)			
		min	max	Men		Women	
				min	max	min	max
Asbestos	Lung	1.2	1.9	5.9%	16.2%	0.9%	1.4%
	Laryngeal	1.2	3.1	5.9%	31,0%	0.8%	3.1%
	Pleural mesothelioma*			74.5%	91.7%	25.3%	58,0%
	Ovarian	1.4	2.5			1.6%	2.1%
Silica	Lung	1.05	1.75	0.9%	5.1%	0,0%	0.4%
	Laryngeal**	1.2	1.9	3.4%	6.1%	0.2%	0.4%
Benzene	Leukemia	1.2	5.1	1.9%	10.4%	0.42%	0.46%
Trichlorethylene	Kidney	1.15	1.5	1.7%	5.4%	0.2%	0.8%

\* : AF from the Programme national de surveillance du mésothéliome (PNSM)

\*\* : insufficient evidence IARC

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## FINDINGS - INCIDENT ATTRIBUTABLE CASES AND COMPENSATED CASES RATES

Agent	Cancer	Annual number of incident attributable cases						Rate of OD compensation	
		Men		Women		Total		Total	
		Min	Max	Min	Max	Min	Max	Min	Max
Asbestos	Lung	1670	4566	97	153	1767	4719	27%	73%
	Laryngeal	166	876	4	15	170	891	-	-
	Pleural mesothelioma*	603	743	75	172	678	915	56%	76%
	Ovarian			74	97	74	97	-	-
	<i>Total</i>	<i>2439</i>	<i>6185</i>	<i>250</i>	<i>437</i>	<i>2689</i>	<i>6622</i>	<i>27%</i>	<i>67%</i>
Silica	Lung	245	1437	5	45	250	1482	1%	6%
	Laryngeal**	96	172	1	2	97	174	-	-
	<i>Total</i>	<i>341</i>	<i>1609</i>	<i>6</i>	<i>47</i>	<i>347</i>	<i>1656</i>	<i>1%</i>	<i>6%</i>
Benzene	Leukemia	88	474	15	16	103	490	7%	32%
Trichlorethylene	Kidney	132	423	9	29	141	452	-	-

\* : annual number of incident attributable cases from the Programme national de surveillance du mésothéliome (PNSM)

\*\* : insufficient evidence IARC

- : no occupational recognition



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## LIMITATIONS

- RR: international literature, old studies, specific populations (men, industrial sectors ...), confounding factors ...
- Prevalence of exposure: assumption of independence between jobs, latency, threshold...
- Number of incident attributable cancers in 2012: use of the attributable fraction estimated from the 2007 lifetime prevalence.
- Proportion of carcinogen-related occupational diseases compensated: assuming that 80% attributable cancer are in the French general employees social insurance fund
- ...

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## CONCLUSION

- Findings important to improve occupational health and public health knowledges
- They confirm:
  - The burden of occupational exposures in occurrence of cancers in the French population
  - The importance of the under-repaired cancers attributable to occupational exposures
- Importance of an enhancement of the prevention of exposures to carcinogens at the workplace with a better:
  - Exposures identification
  - Promotion of information to health professional about pathologies in relation with occupational exposures and medico-social aspects
  - Information to patients on their rights regarding the recognition as occupational disease