CITTÀ DI CARPI

DA VENIAM SCRIPTIS QUORUM NON GLORIA NOBIS CAUSA, SED UTILITAS OFFICIUMQUE FUIT

COLLEGIUM RAMAZZINI
ANNUAL RAMAZZINI DAYS 2014

24-26 OCTOBER 2014
CARPI, ITALY

2014 Ramazzini Lecture

Epidemiological surveillance of occupational cancer in Latin American and other recently industrialized countries

Benedetto Terracini

”Developing countries”

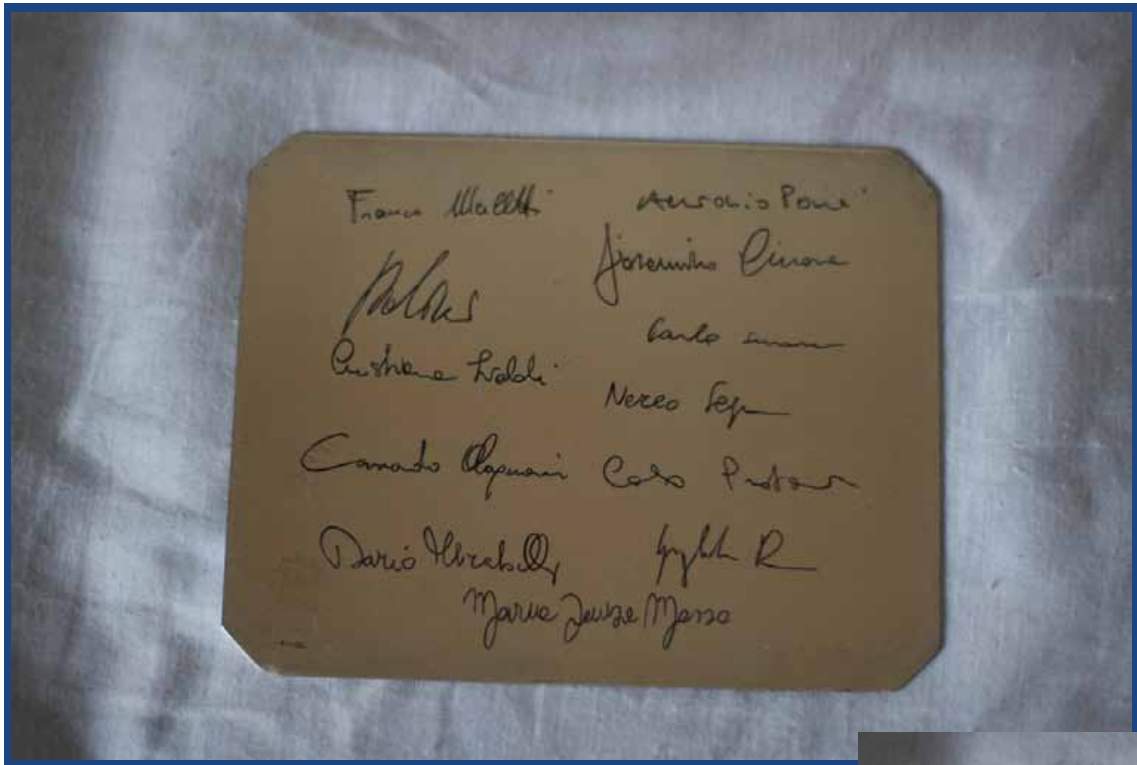
(term used by President Truman in 1949)

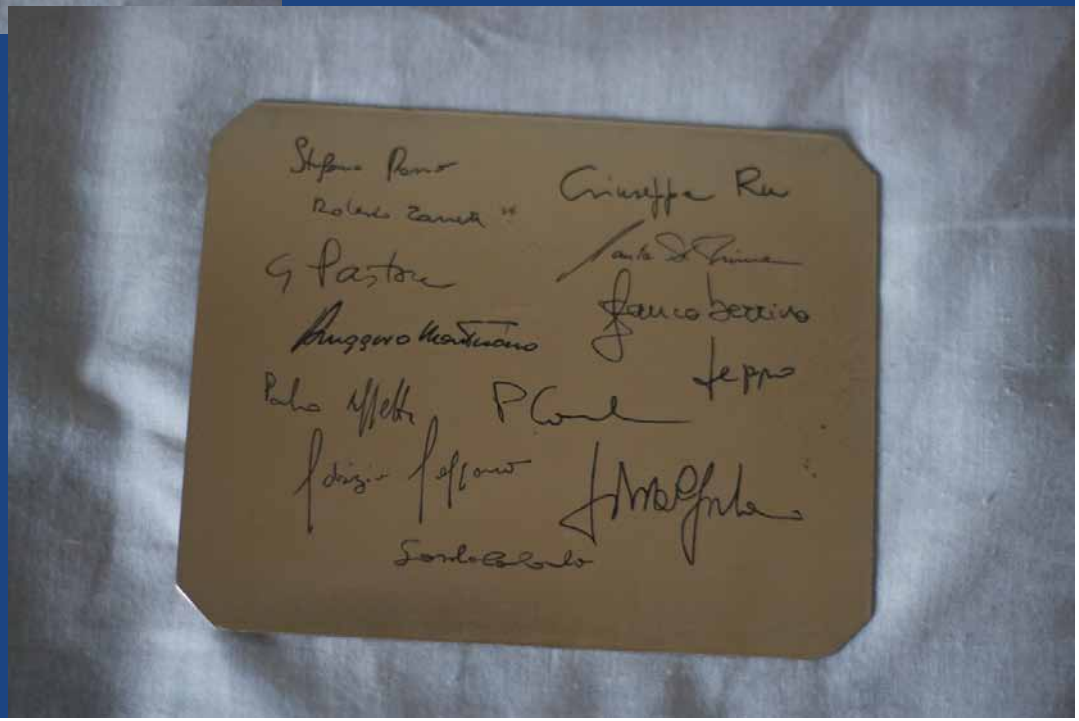
The term reflects a Western concept of development.

It implies that “Developing Countries” are bound to go through the same phases of development that Western Countries have experienced during the industrial revolution.

The incapacity (or unwillingness) of the Western world to conceive a development that may follow other paths and pursue other goals … may be seen as almost equivalent to the perpetuation of neocolonialism (i.e. apparent political independence as well as … tenaciours economic dependance).

(L Tomatis “Poverty and cancer”, IARC Sci Publ 138, 1997)





- **HOW OUR STORY BEGAN …**

(the impact of 1968)

- .

ecomuseo all'IPCA

ecomuseo all' IPCA

In oltre vent'anni più di cento operai dell'Ipca di Cirié sono deceduti per cancro. Mentre a Torino si svolge il processo contro i dirigenti della fabbrica, abbiamo raccolto le testimonianze dei sopravvissuti e delle vedove. Ecco il racconto allucinante di una tragedia che, purtroppo, non è ancora finita.

Il colore della morte

Dal nostro inviato Alberto Salani
Foto di Walter Mori

56

Cirié, maggio

Due occhi spenti in un volto risucchiato, da mummia. Più che parlare farfuglia, la sigaretta gli trema fra le dita, si muove incerto. La moglie dietro, attenta. « Povero il mio uomo », dice. L'uomo si chiama Giovanni Chiesa, ha sessantadue anni, per quaranta ha lavorato all'Ipca, ora è in pensione. Vive in una casetta in campagna, vorrebbe dare una mano nei campi, « ma vede come sono ridotto? », sospira. A poche centinaia di metri da qui scorre lo Stura, dove un tempo morivano i pesci d'inquinamento, un po' più a sud c'è l'Ipca, dove per anni sono morti i cristiani di cancro. Giovanni Chiesa è un sopravvissuto; è stato avvelenato giorno dopo giorno, ha respirato vapori tossici, tornava a casa con le mani e le braccia tutte blu e gialle, la pelle che si staccava, un gran puzzo addosso, sfibrato. Poi i ricoveri, prima al Mauriziano poi a Villa Cristina a Torino, i medici che scuotevano la testa, diagnosi senza speranza. E invece quest'uomo ce l'ha

Benito Franza alla vescica m per lo stesso quello dei chi mentre il tribu

Albino Stella (1929 - 1979) e Gino Franza (1931 – 1976)

Barefoot epidemiologists

Gino Franza and Albino Stella were two IPCA workers dying of bladder cancer caused by the production of carcinogenic aromatic amines.

They had not graduated in Harvard but they found out that there was a cancer cluster in IPCA and that it was not due to chance.

They guided the workers' action leading to the first trial in Italian courts for an outbreak of occupational cancer.

The IPCA trial

- Plaintiffs' lawyers (and their consultants) handed over their honorary to fund a scholarship for a young epidemiologist investigating the etiology of bladder cancer.

- In 1979, Paolo Vineis was the first recipient of the scholarship.

DOI: 10.1093/jnci/djq214
Advance Access publication on June 14, 2010.

BRIEF COMMUNICATION

Bladder Cancer Mortality of Workers Exposed to Aromatic Amines: A 58-Year Follow-up

Enrico Pira, Giorgio Piolatto, Eva Negri, Canzio Romano, Paolo Boffetta, Loren Lipworth, Joseph K. McLaughlin, Carlo La Vecchia

Manuscript received October 15, 2009; revised April 27, 2010; accepted May 3, 2010

Correspondence to: Loren Lipworth, ScD, International Epidemiology Institute, 1455 Research Blvd, Ste 550, Rockville, MD 20850 (e-mail: loren@iei.us).

We previously investigated bladder cancer risk in a cohort of dyestuff workers who were heavily exposed to aromatic amines from 1922 through 1972. We updated the follow-up by 14 years (through 2003) for 590 exposed workers to include more than 30 years of follow-up since last exposure to aromatic amines. Expected numbers of deaths from bladder cancer and other causes were computed by use of national mortality rates from 1951 to 1980 and regional mortality rates subsequently. There were 394 deaths, compared with 262.7 expected (standardized mortality ratio = 1.50, 95% confidence interval = 1.36 to 1.66). Overall, 56 deaths from bladder cancer were observed, compared with 3.4 expected (standardized mortality ratio = 16.5, 95% confidence interval = 12.4 to 21.4). The standardized mortality ratio for bladder cancer increased with younger age at first exposure and increasing duration of exposure. Although the standardized mortality ratio for bladder cancer steadily decreased with time since exposure stopped, the absolute risk remained approximately constant at 3.5 deaths per 1000 man-years up to 29 years after exposure stopped. Excess risk was apparent 30 years or more after last exposure.

J Natl Cancer Inst 2010;102:1096–1099

Aromatic amines are a group of well-known bladder carcinogens. Exposure to aromatic amines has been discontinued in most countries, but relatively little data are available on the patterns of long-term health risks many years after cessation of exposure (1,2–8). A substantial excess of mortality from bladder cancer was observed in a cohort of 664 workers who were heavily exposed to aromatic amines between 1922 and 1972 in a dyestuff factory in northern Italy (2–4). In the most recent published follow-up of this cohort through December 1989, 49 bladder cancer–specific deaths were observed overall, compared with 1.6 expected (standardized mortality ratio [SMR] = 30.4) (4). In more detailed analyses by time of exposure, risk was still elevated (SMR = 14.8; seven deaths vs 0.5 expected) 20 years or more after exposure stopped. Along with two other studies, one in the United States (5) and one in Wales (6), this cohort study is among the few providing information on bladder cancer risk after exposure specifically to *o*-toluidine.

In this analysis, we included an additional 14 years of observation of this Italian cohort through 2003 by including more than 30 years of follow-up since last exposure to aromatic amines for all workers to provide unique, long-term information on bladder cancer risk among workers after extremely heavy exposure to several aromatic amines many years in the past.

Further details on the study methods, including exposure definition, have been previously published (2–4). The original cohort definition was approved in the 1970s by the Institutional Board of the Department of Occupational Health, University of Turin, according to the regulations at the time. The study did not involve direct contact with the workers. Briefly, the original cohort was composed of 906 men who had worked at least 1 year in the dyestuff plant between 1922 and 1972 and who were alive in 1946. We did not consider 204 men who were not directly involved in jobs entailing exposure to aromatic amines because no deaths from bladder cancer were observed in this group (3) and because the expected number of deaths from bladder cancer was also low, and 112 men who had been lost to follow-up before December 31, 1989. This left 590 exposed workers; of these, 271 had died between 1946 and 1989, leaving 319 men for extended follow-up through December 31, 2003. Follow-up was truncated when a participant reached age 85 years because of the poor quality of death certification for those older than that age. We traced 305 (96%) of the 319 workers alive in 1989, yielding a total of 17754 man-years at risk in this analysis.

Information was available on date and place of birth, dates of start and termination of employment, job history (including categories of exposure to selected amines), and the last known address. As described by Rubino et al. (2), who used knowledge of carcinogenicity of aromatic amines, workers with any of the following four categories of aromatic amine exposure were considered at highest risk and are grouped into one category for this analysis: α-naphthylamine manufacture, β-naththylamine manufacture, benzidine manufacture, and mixed manufacture of benzidine and naphthylamine (n = 133). The other three categories of workers included workers never involved in manufacture, but only in use of naphthylamine and benzidine (n = 134), workers with intermittent contact with naphthylamine and benzidine (n = 276), and workers who were involved only in manufacture of fuchsin or *o*-toluidine (n = 47). Ten workers exposed to both benzidine and/or naphthylamine and to fuchsin and/or *o*-toluidine manufacture were considered in the first category. For all time-related factors (duration and time since first or last exposure), we grouped all four categories of exposure together. Further verification of vital status was obtained from registries of current residence, and death certificates were obtained from registration offices at the municipality of death.

The expected numbers of deaths from bladder cancer and other causes were computed by use of national mortality rates (9) from 1951 to 1980 and regional mortality rates (10) when available (ie, from 1981 to 2003), stratified in 5-year age groups from


EPIDEMIOLOGIA
& PREVENZIONE
Rivista dell'Associazione italiana di epidemiologia
ANNO 32 (3) LUGLIO-OTTOBRE 2008
Come nacque
il progetto delle
Monografie
Iarc
un racconto/resoconto
di Renzo Tomatis
presentazioni
di Ruggero Montesano e Harri Vainio
inferenze
Via Ricciarelli 29, 20148 Milano.
Poste Italiane spa - Sped. in abb.
post. DL 353/2003 convertito in leg-
ge 27.02.04 n.46 - art.1, com.1, DCB
Milano - Una copia 13,50 euro
ISSN 1120-9763 luglio-ottobre 2008

"For most diseases, the identification of the causes has … immediately captivated a general consensus about the measures to be taken in order to prevent and cure them.

In the case of cancer, on the contrary, the identification of a chemical or a mixture as a cause has usually been received with hostility.

The recognition of a chemical as a cause of cancer has invariably met with a strong opposition by those who dominate the financial power and are also in the condition of molding the political decisions."

L. Tomatis "Come nacque il progetto delle Monografie Iarc",
E&P 2008

"… in order to make sure for the project to be useful to those who are exposed to harmful chemicals and for the Monographs to become an effective tool for their protection, I had to get rid of …. the academic approach … (and) to …. dissent from the statements of the official academic establishment.

L. Tomatis "Come nacque il progetto delle Monografie Iarc", E&P 2008

The tension between scientific rigour and the application of the precautionary simple: two contrasting attitudes

- Scientists only believing in "hard" science and reluctant to accept evidence that fall short of a rigorous experimental demonstration (eg. those who in the 50s considered the epidemiological studies on the effects of tobacco smoking to provide "only statistical", and not experimental evidence).

- Scientists for whom epidemiological findings of doubtful interpretation shouldn't be discarded as evidence of potential hazard and require precautionary action

Saracci & Vineis Environmental Health 2011

Impartiality and non-neutrality (but also awareness, responsibility and accountability)

The lay people expect a public health professional to be:

- **impartial: i.e. he/she should use uniform criteria when evaluating each piece of evidence on the issue about which he/she must express an opinion and take a decision.**

- **non neutral with regard to people's health; i.e. he/she works out the residual uncertainty of the evidence in a direction favourable to the health of the exposed population.**

R. Saracci, E&P 2014

The contrary of “non neutral” is “neutral”

As far as the value “health”, being neutral:

- does not mean being “scientifically objective” as insinuated by an arrogant mistification which is largely diffused in the scientific world.

- implies that values other than health (eg personal advantage) are considered as priorities when solving scientific uncertainties.

R. Saracci, E&P 2014

- **I did not intend to speak about conflicts of interest but ……**

HYPOTHESIS AND THEORY ARTICLE
published: 30 May 2014
doi: 10.3389/fgene.2014.00151

Tumors that mimic asbestos-related mesothelioma: time to consider a genetics-based tumor registry?

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The diagnosis of mesothelioma is not always straightforward, despite known immunohistochemical markers and other diagnostic techniques. One reason for the difficulty is that extrapleural tumors resembling mesothelioma may have several possible etiologies, especially in cases with no meaningful history of amphibole asbestos exposure. When the diagnosis of mesothelioma is based on histologic features alone, primary mesotheliomas may resemble various primary or metastatic cancers that have directly invaded the serosal membranes. Some of these metastatic malignancies, particularly carcinomas and sarcomas of the pleura, pericardium and peritoneum, may undergo desmoplastic reaction in the pleura, thereby mimicking mesothelioma, rather than the primary tumor. Encasement of the lung by direct spread or metastasis, termed pseudomesotheliomatous spread, occurs with several other primary cancer types, including certain late-stage tumors from genetic cancer syndromes exhibiting chromosomal instability. Although immunohistochemical staining patterns differentiate most carcinomas, lymphomas, and mestastatic sarcomas from mesotheliomas, specific genetic markers in tumor or somatic tissues have been recently identified that may also distinguish these tumor types from asbestos-related mesothelioma. A registry for genetic screening of mesothelioma cases would help lead to improvements in diagnostic criteria, prognostic accuracy and treatment efficacy, as well as improved estimates of primary mesothelioma incidence and of background rates of cancers unrelated to asbestos that might be otherwise mistaken for mesothelioma. This information would also help better define the dose-response relationships for mesothelioma and asbestos exposure, as well as other risk factors for mesothelioma and other mesenchymal or advanced metastatic tumors that may be indistinguishable by histology and staining characteristics.

Keywords: germ cell tumors, synovial sarcoma, pericardial mesothelioma, mullerian tissue cancers, chromosomal instability, human, asbestos

ACKNOWLEDGMENTS

We thank David Garabrant, Mark Burton, Fionna Mowat, and Jane Teta for their peer review and insights. The authors are independent consulting scientists who have researched asbestos on behalf of private clients in regulatory and litigation settings. This manuscript was funded solely by the authors and their employers, and no client participated in the creation or editing of this work.

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Mutation Research/Reviews in Mutation Research

journal homepage: www.elsevier.com/locate/reviewsmr
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Genetic susceptibility to malignant pleural mesothelioma and other asbestos-associated diseases

Monica Neri [a,*], Donatella Ugolini [b,c], Irma Dianzani [d], Federica Gemignani [e], Stefano Landi [e], Alfredo Cesario [f,g], Corrado Magnani [h], Luciano Mutti [i], Riccardo Puntoni [b], Stefano Bonassi [a]

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[i] *Department of Medicine and Laboratory of Clinical Oncology, Local Health Unit 11, Vercelli, Italy*

The long-term goal, besides the obvious improvement in the exposure assessment, will be the integration of data from differentially expressed genes and genomic polymorphisms in a biologically meaningful context. This approach will allow identifying those molecular pathways regulated by candidate genes which affect individual risk, and will help to efficiently address preventive policies in exposed populations.

Acknowledgments

This study was supported by grants funded by Associazione Italiana per la Ricerca sul Cancro (AIRC), "Ricerca Sanitaria Finalizzata della Regione Piemonte" and Fondazione Buzzi-Unicem per la Ricerca sul Mesotelioma.

References

Neri M, Ugolini D, Dianzani I, Gemignani F, Landi S, Cesario A, Magnani C, Mutti L, Puntoni R, Bonassi S.

Genetic susceptibility to malignant pleural mesothelioma and other asbestos-associated diseases.

Mutat Res. 2008 Jul-Aug;659(1-2):126-36. Epub 2008 Feb 23. Review.

A reasonable suggestion …

(For scientific institutions and journals) warning bells should ring and,
…. an independent review should be required, when a scientist, is:

working as an industry consultant or working with a consulting company that specializes in carrying out industry-financed studies that deny harm caused by the industries' products and activities;

putting forward scientific work that serves the industry's interests;

showing indifference to or rejection of the precautionary principle;

preventing … health protections that independent scientists and reputable scientific agencies are calling for.

Ruff K, Mirabelli D , New Solutions, 2014

Finally, I would like to thank all the prosecutors and judges who gave me the opportunity to work for the Italian justice.

Much use of epidemiology is done in Italian Courts.

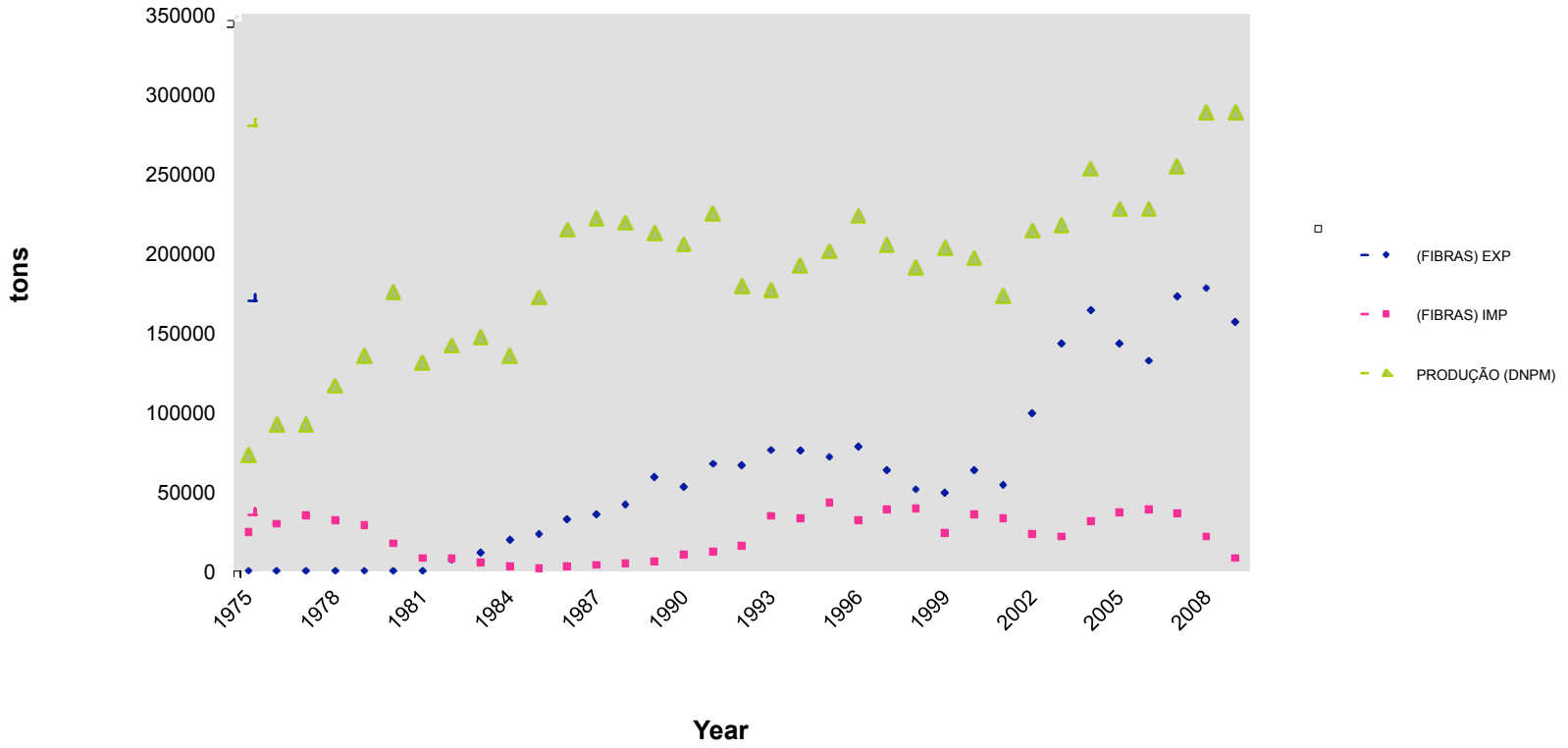
This must be considered as “logical”, in a country where barely half of the asbestos victims obtain some sort of recognition.

Most prosecutors attach as much importance to prevention as to punishment of the criminals.

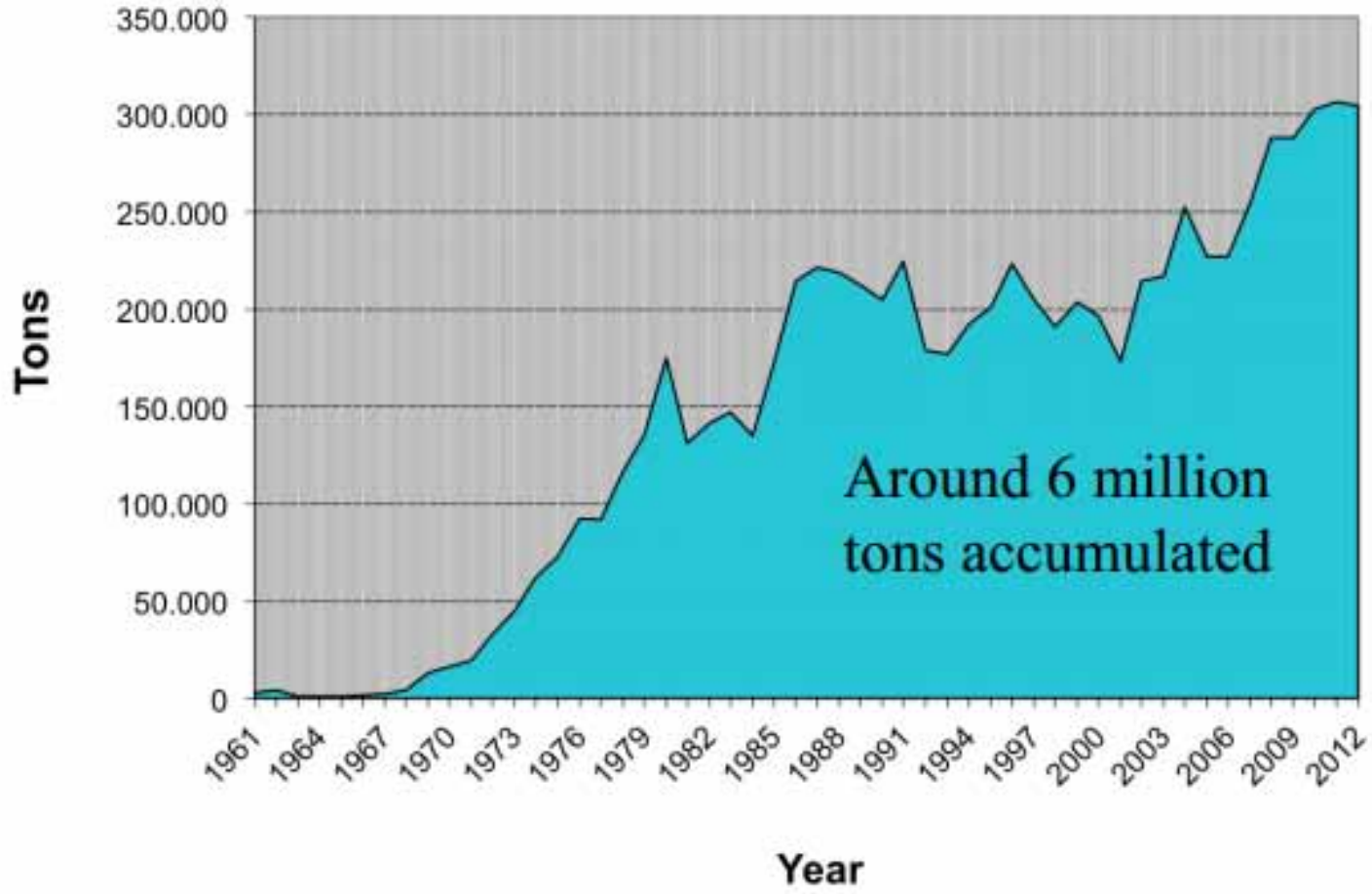
Five Brazilian states have prohibited the uses of asbestos, including the State of São Paulo but it has been alleged by the industry stakeholders and a few workers' unions that the State laws contradict a Federal law.

The final decision now lies on the lap of the Brazilian Supreme Court.

Produção, Exportação e Importação de Asbesto, Brasil, 1975-2009



Asbestos accumulated in the country, Brazil



Consumo annuo di amianto nel XX° secolo in alcuni paesi, in migliaia di tonnellate

	1930	1940	1950	1960	1970	1980	1990	2000
USA	92	237	660	643	668	359	32	0
UK	23	95	108	163	149	93	15	0
Ita	7	13	24	73	132	181	62	0
Mex	0	1	5	13	40	79	39	36
Bra	0	1	9	26	38	195	163	172
India	0	5	11	23	50	163	119	145
Indon	0	0	0	1	-	119	29	43

(fonte: Virtas)

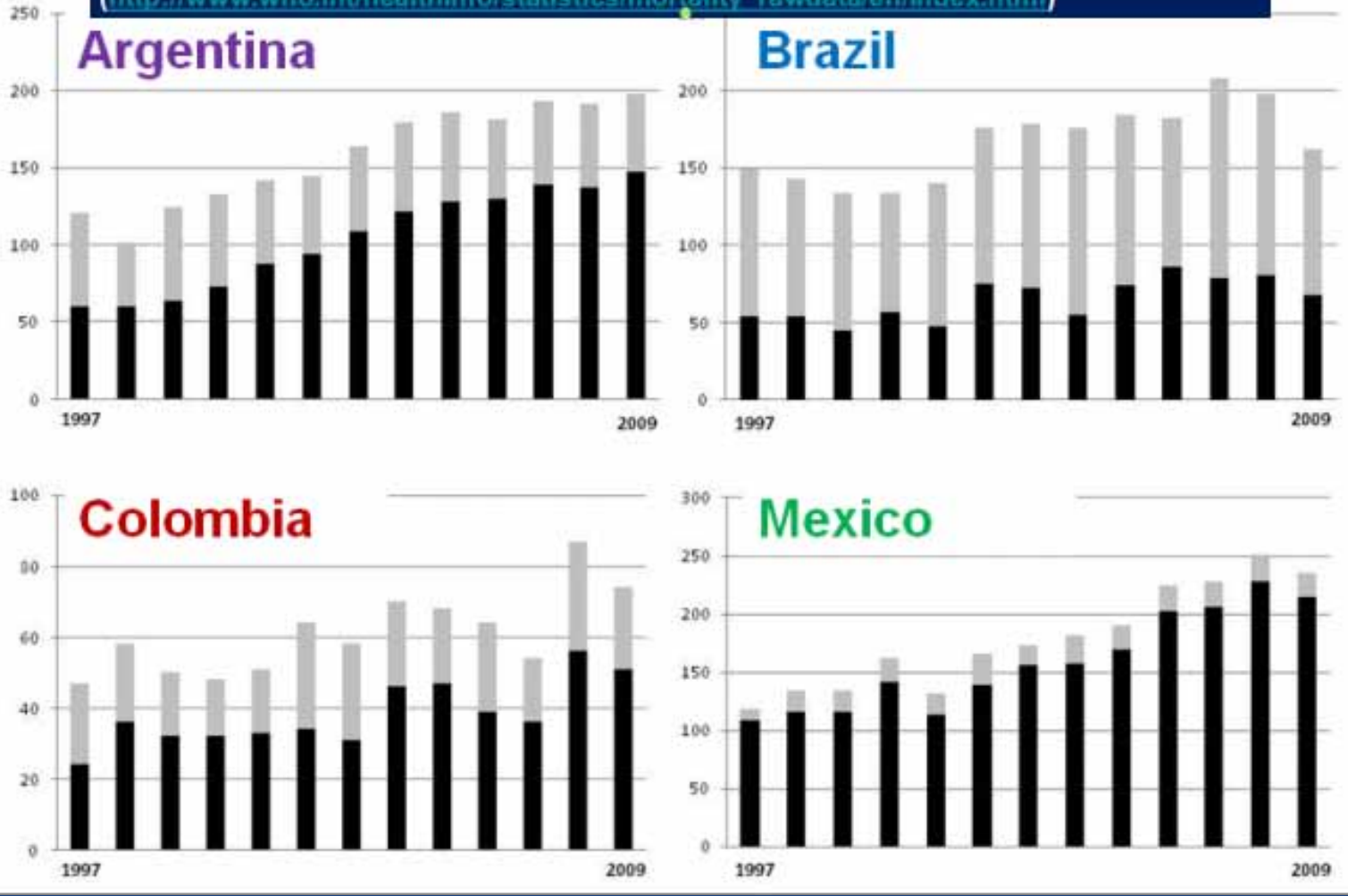
Reported mortality of mesothelioma in 1994-2008 in countries with data for mesothelioma mortalityand use of asbestos

Rank	Country	Cum use x 1000 tons, 1920-70	Average n of mesothelioma deaths/year
1	USA	21841	2437
2	UK	4830	1991
3	Germany	4144	1063
4	Japan	3210	801
5	France	2353	826
6	Canada	1955	321
7	Italy	1935	1235
12	Brazil	577	96
16	Mexico	423	151

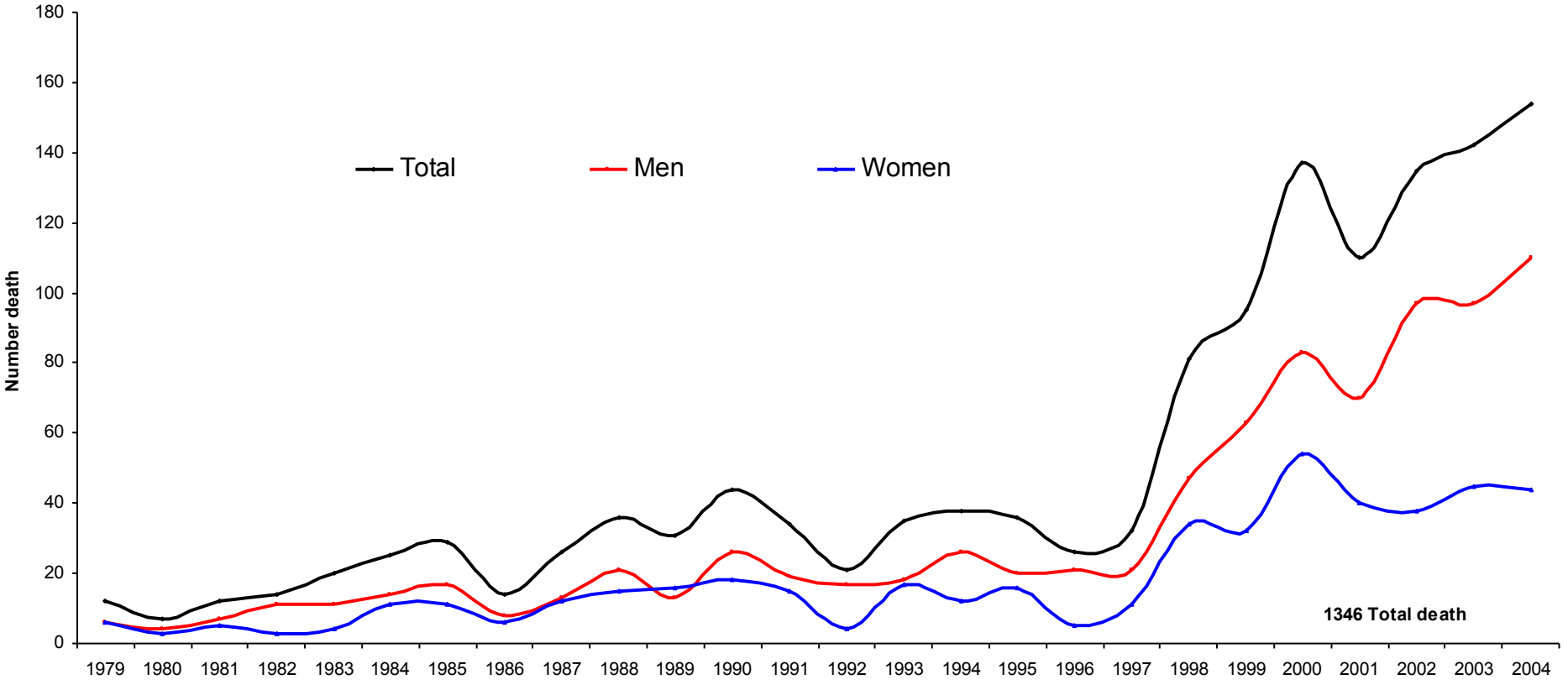
(Park et al EHP 2011)

Figure 2. Mortality from "mesothelioma" (C45 in the 10th revision of the International Classification of diseases - ICD) and "pleural cancers excluding mesothelioma" (C38.4 10th ICD) in Argentina, Brazil, Colombia and Mexico during 1997-2009. Yearly number of C45 deaths in black, number of C38.4 deaths in grey.

Data from the WHO Health statistics database (http://www.who.int/healthinfo/statistics/mortality_rawdata/en/index.html)



Mortality of pleural mesothelioma. Mexico 1979-2004



Age adjusted incidence rates (x 100.000 x year) In some Cancer Registries 2003-2007 and indicators of quality.

		Men	Women	MV%	DCO %	M/i men	M/I women
Korea	C.45	0.2 (252)	0.1 (144)	90	2	58.5	48.5
	C38.1-3	0.3 (332)	0.1 (128)	79	5	38.3	41.6
	C38.4	0.1 (106)	0.0 (80)	75	9		
Torino	C.45	1.8 (98)	1.0 (60)	99	0	---	---
	C.38.1-3	0.3 (8)	0.3 (8)	81	6	58.1	80.0
	C38.4	0.2 (12)	0.0 (4)	50	0		
Sao Paulo	C.45	0.2 (39)	0.1 (22)	87	12	89.7	113.6
	C38.1-3	0.5 (122)	0.3 (81)	38	26	88.1	99.2
	C38.4	0.1 (12)	0.0 (10)	65	0		
Canada	C.45	1.4 (1860)	0.3 (388)	92	1	76.3	74.1
	C38.1-3	0.2 (182)	0.1 (91)	60	6	44.0	37.3
	C38.4	0.1 (91)	0.0 (49)	41	6		

MV: histologic confirmation

DCO: death certificate only

M/I ratio between mortality and incidence rates.

Source CI5-X

Number of entries in Medline with the term "pleural cancer" and the name of the country (July 31, 2014)

Country	Number of entries	Country	Number of entries
Mexico	49	Peru	1
Ecuador	2	Chile	3
Brazil	14	Argentina	5
United Kingdom	141	Italy	405

No entries for Nicaragua, Guatemala, Honduras, El Salvador, Cuba, Venezuela, Bolivia, Uruguay, Costarica, Panama, Surinam, Colombia, Paraguay.

Case-control studies on asbestos-related cancer carried out in Latin American countries and quoted in Medline

Mex	meso	ORs > 3 and up to 14	Aguilar Madrid G et al Amer J Industr Med 2010
Bra	larynx	No association with asb	Sartor S et al Cad Saude Publ 2007
Bra	lung	No association with asb	Wunsch-Filo V et al Scand J Wk Environ Hlth 1998
Uru	lung	No association with asb	De Stefani E et al Scand J Wk Environ Hlth 1996
Arg	lung	No association with asb	Matos E et al OEM 2000

A hospital based case-control study on lung cancer in metropolitan Sao Paulo

398 lung cancer cases and 860 controls.

Interviews in 1990-91.

Occupational exposures assessed through industrial titles, occupational categories and a Job Exposure Matrix

Cases and controls with "possibly high exposure" and "definite high exposure" to asbestos were respectively 144 and 297 and 13 and 28. Those definitely exposed for 10+ years with 40+ years of latency were 11 and 22 (RR 0.87 95%CI 0.39-1.91).

No statistically significant excess for any of the other specific lung carcinogens included in the study (PAH, Arsenic, dust, nickel and chromium).

Statistically significant association with work in machinery industry, pottery manufacture and textile workers.

(Wunsch-Filho V, Moncau JE, Mirabelli D, Boffetta P
Scand J Work Environ Hlth 1998;24:118-123)

A hospital based case-control study on laryngeal cancer in Sao Paulo

Hospital based: 122 cases 187 matched controls.
Diagnoses 1999-2002.
Detailed occupational questionnaire subsequently interpreted by trained professionals

ORs significantly above 1 for exposure to respirable free cristalline silica (OR 1.83), soot (OR 1.78), fumes (OR 2.55) and live animals (OR 1.80).

No association with asbestos: figures of cases and controls exposed to asbestos not given.

(Sartor SG, Elaf-Neto J, Travier N, Wunsch-Filho V, Arcuri A, Kowalski LP, Boffetta P
Cad Saude Publ 2007;23:1473-1481)

Audiência Pública para debater a Lei Paulista 12.648/2007 que proíbe o uso do amianto no Estado de São Paulo

Eduardo Algranti
Elizabete Medina C. Mendonça
Marco Antonio Bussacos
***Serviço de Medicina,* FUNDACENTRO**
São Paulo

MINISTÉRIO DO TRABALHO E EMPREGO
FUNDACENTRO
FUNDAÇÃO JORGE DUPRAT FIGUEIREDO DE SEGURANÇA E MEDICINA DO TRABALHO

Óbitos relacionados à Doenças Associadas ao Asbesto

- **Dos 157 óbitos ocorridos até 31/12/2010 com causa básica determinada:**

- **7 óbitos devidos a Asbestose**
- **7 óbitos devidos a Câncer de Pulmão (sendo 5 com positividade para critérios de atribuição ao asbesto)**
- **3 óbitos devidos a Câncer de Boca e Laringe**
- **6 óbitos devidos a Mesotelioma**

- **No total: 21 a 23 casos de DAA, dentre os quais 14 a 16 cânceres**

ORIGINAL ARTICLE

Non-malignant consequences of decreasing asbestos exposure in the Brazil chrysotile mines and mills

E Bagatin, J A Neder, L E Nery, M Terra-Filho, J Kavakama, A Castelo, V Capelozzi, A Sette, S Kitamura, M Favero, D C Moreira-Filho, R Tavares, C Peres, M R Becklake

Occup Environ Med 2005;**62**:381–389. doi: 10.1136/oem.2004.016188

See end of article for authors' affiliations

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Accepted 15 December 2004

Aims: To investigate the consequences of improvement in the workplace environment over six decades (1940–96) in asbestos miners and millers from a developing country (Brazil).

Methods: A total of 3634 Brazilian workers with at least one year of exposure completed a respiratory symptoms questionnaire, chest radiography, and a spirometric evaluation. The study population was separated into three groups whose working conditions improved over time: group I (1940–66, n = 180), group II (1967–76, n = 1317), and group III (1977–96, n = 2137).

Results: Respiratory symptoms were significantly related to spirometric abnormalities, smoking, and latency time. Breathlessness, in particular, was also associated with age, pleural abnormality and increased cumulative exposure to asbestos fibres. The odds ratios (OR) for parenchymal and/or non-malignant pleural disease were significantly lower in groups II and III compared to group I subjects (0.29 (0.12–0.69) and 0.19 (0.08–0.45), respectively), independent of age and smoking status. Similar results were found when groups were compared at equivalent latency times (groups I *v* II: 30–45 years; groups II *v* III: 20–25 years). Ageing, dyspnoea, past and current smoking, and radiographic abnormalities were associated with ventilatory impairment. Lower spirometric values were found in groups I and II compared to group III: lung function values were also lower in higher quartiles of latency and of cumulative exposure in these subjects.

Conclusions: Progressive improvement in occupational hygiene in a developing country is likely to reduce the risk of non-malignant consequences of dust inhalation in asbestos miners and millers.

PROJETO ASBESTO AMBIENTAL

"EXPOSIÇÃO AMBIENTAL AO ASBESTO: AVALIAÇÃO DO RISCO E EFEITOS NA SAÚDE"

Processo CNPq N° 420001/2006-9

RELATÓRIO FINAL

PESQUISADOR RESPONSÁVEL:
Prof. Dr. Mário Terra Filho - INCOR-HC-FMUSP

PESQUISDOR EXECUTANTE:
Prof. Dr. Ericson Bagatin - AST-DSC-FCM-UNICAMP

SÃO PAULO – AGOSTO DE 2010

PROJETO ASBESTO AMBIENTAL

Criticism to the occupational study by Bagatin et al presented by B. Terracini at the Brazilian Supreme Court

The study does not allow for any estimate of absolute risk of long-term effects of occupational exposure to Brazilian chrysotile because of:

- Active search of cases of cancer was excluded from the design of the study.
- Selection bias (high loss of workers to follow up).
- Relative risks do not consider age at time of observation and latency since beginning of exposure.
- Workers in group IIIB (i.e. those receiving the highest level of protection in the history of the mine) have been followed up for a period too short for any estimate of absolute risk (even for non malignant conditions such as pleural plaques).

Factors which might explain the relatively low incidence of mesothelioma in Brazil

- Under diagnosis and under registration of cases.
- Limited cancer registration in the areas experiencing the highest exposure to asbestos (but Sao Paulo ….).
- Massive industrial use of asbestos in Brazil started decades later than in North American and European countries.
- Contrary to other recently industrialized countries (eg Mexico), Brazil has used almost exclusively its own chrysotile. Imports of amphiboles have been negligible.

Total export of asbestos from South Africa 1980-2003 x 1000 metric tons

Rank	Country	Crocidolite	Amosite	Chrysotile	total
1	Japan	15	180	908	1102
2	South Korea	<1	15	453	468
5	Italy	67	22	1	90
16	Mexico	30	<1	<1	31
21	India	15	1	4	20
31	Argentina	7	4	<1	12
33	Colombia	8	<1	1	10
43	Chile	6	<1	<1	6
50	Brazil	2	<1	1	4

Harington et al 2010

The relevance of epidemiological findings in recently industrialized countries

The value and the relevance of the identification of occupational hazards are universal: valid findings are useful (and should be used) for the protection of workers independently of the country or continent where they have been obtained.

Nevertheless, country specific studies are important, since: population attributable risks (and the consequent estimate of the number of preventable cases of disease) are place- and time specific.

Local estimates will also expedite the awareness of the need for remediation n the Public Health Authorities and in the population.

The implementation of local epidemiological studies will produce local public health expertise, which is greatly needed.

Proposals for epidemiological surveillance of asbestos-related diseases in recently Industrialized countries.

. Improve quality and exhaustiveness of current health statistics. Cancer registries and mesothelioma registries can help, but you can do a lot with mortality statistics, provided they are of controlled quality and exhaustive.

Ensure adequate labour statistics.

Ensure local expertise on workplace and environmental hygiene.

Launch epidemiological studies addressed to lung cancer and to non malignant conditions.

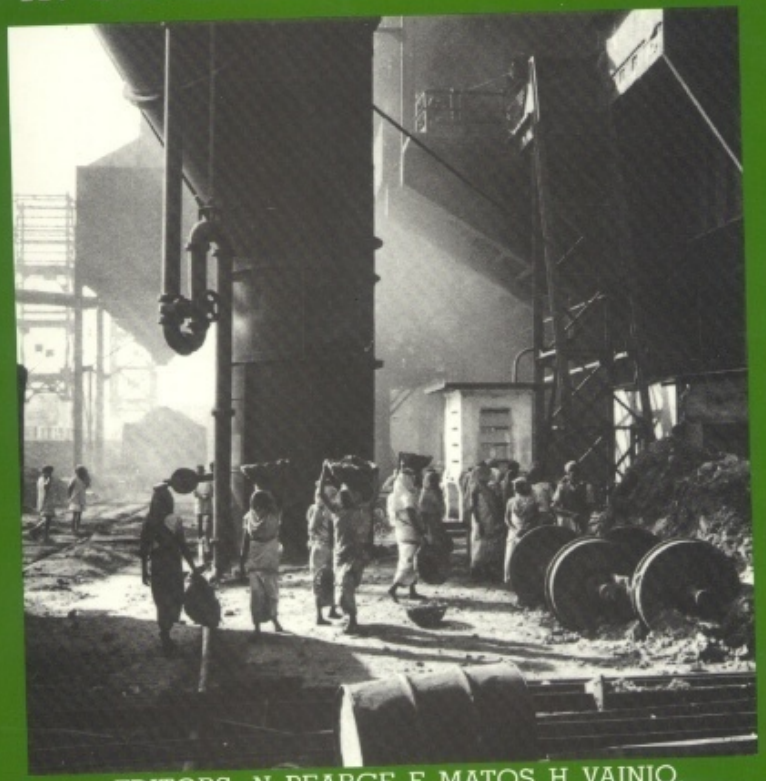
For normal people (workers, asbestos victims, politicians, advocates, other stakeholders etc) the mesothelioma issue is easily grasped from Health statistics (notwithstanding their frequenly poor quality)

Perceiving the severity of asbestos-related lung cancer is more problematic. Lung cancer is a multifactorial disease. Estimating the fraction attributable to asbestos requires more sophisticated epidemiological methods.

In any case, chrysotile produces at least as many lung cancers as mesotheliomas (probably more)

INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (WHO)
INSTITUTE OF OCCUPATIONAL HEALTH, FINLAND
INTERNATIONAL LABOUR OFFICE

OCCUPATIONAL CANCER IN DEVELOPING COUNTRIES



EDITORS: N. PEARCE, E. MATOS, H. VAINIO,
P. BOFFETTA and M. KOGEVINAS

IARC SCIENTIFIC PUBLICATIONS

N° 129

LYON 1994

Factors that contribute to transfer of hazardous industries

- Need for “hard” currency
- Cheap labour force
- Limited legislation on workers’ rights and environment and poor implementation of existing legislation

- Jeyaratnam J
- In IARC Sci Publ 129, 1984

A review on exposures to occupational carcinogens in Africa

- Suboptimal implementation and monitoring of environmental protection standards.
- Extensive use of workers in the informal sector.
- Outdated industrial technologies.
- Lack of awareness of potential hazards in industrry

V McCormack & J Schuz Cancer Epidemiol 2012

- Primary prevention of occupational cancer requires explicit social security, labor and health legislation.

- While great achievements … have been made in some parts of the world, there is less worker protection … in countries where workers have little choice and scant social and /or political influence

Espina et al 2013

- **The historical role of epidemiology implies … the construction of a theoretical basis that includes he health/sickness care process as part of the social organization…**

- **It is unthinkable that changes in health will occur without major changes at a societal level ….**

- **Barreto MS**
- **The globalization of epidemiology:**
- **critical thoughts from Latin America**
- **. Int J Epidemiol 2004**

- **In this continent, at the time devastated by harsh dictatorships, by immense social inequalities and by the abject poverty in which a large part of he population lived and still lives … epidemiology (is) an important means of revealing the iniquitous social and health situation that still prevails.**

- **Barreto ML**
- **The globalization of epidemiology:**
- **critical thoughts from Latin America**
- **Int J Epidemiol 2004**

EUROPEAN CODE AGAINST CANCER

12 ways to reduce your cancer risk

1. Do not smoke. Do not use any form of tobacco.
2. Make your home smoke free. Support smoke-free policies in your workplace.
3. Take action to be a healthy body weight.
4. Be physically active in everyday life. Limit the time you spend sitting.
5. Have a healthy diet:
   - Eat plenty of whole grains, pulses, vegetables and fruits.
   - Limit high-calorie foods (foods high in sugar or fat) and avoid sugary drinks.
   - Avoid processed meat; limit red meat and foods high in salt.
6. If you drink alcohol of any type, limit your intake. Not drinking alcohol is better for cancer prevention.
7. Avoid too much sun, especially for children. Use sun protection. Do not use sunbeds.
8. In the workplace, protect yourself against cancer-causing substances by following health and safety instructions.
9. Find out if you are exposed to radiation from naturally high radon levels in your home. Take action to reduce high radon levels.
10. For women:
    - Breastfeeding reduces the mother's cancer risk. If you can, breastfeed your baby.
    - Hormone replacement therapy (HRT) increases the risk of certain cancers. Limit use of HRT.
11. Ensure your children take part in vaccination programmes for:
    - Hepatitis B (for newborns)
    - Human papillomavirus (HPV) (for girls).
12. Take part in organized cancer screening programmes for:
    - Bowel cancer (men and women)
    - Breast cancer (women)
    - Cervical cancer (women).

The European Code Against Cancer focuses on actions that individual citizens can take to help prevent cancer. Successful cancer prevention requires these individual actions to be supported by governmental policies and actions.

Find out more about the European Code Against Cancer at: http://cancer-code-europe.iarc.fr

International Agency for Research on Cancer
World Health Organization

These recommendations are the result of a project coordinated by the International Agency for Research on Cancer and co-financed by the European Commission

17-18 MARCH 2011

INTERNATIONAL CONFERENCE ON
Environmental and Occupational Determinants of Cancer:
Interventions for Primary Prevention
ASTURIAS (AVILÉS AND GIJÓN), SPAIN

Asturias Declaration: A Call to Action

Twelve million cancers are diagnosed each year worldwide, and each year over 7 million people die of cancer. The majority of all cancers occurs in low- and middle-income countries, and this proportion is increasing. A substantial percentage of all cancers is caused by environmental and occupational exposures. Pregnant women, fetuses, infants, children and workers are especially vulnerable.

Many cancers caused by environmental and occupational exposures can be prevented. Primary prevention - prevention of the exposures that cause cancer - is the single most effective means of prevention. Primary prevention keeps cancer from ever occurring. Primary prevention saves lives and saves billions of dollars. Primary prevention depends absolutely on independent, publicly-funded research on environmental and occupational causes of cancer.

The Asturias Declaration calls for the primary prevention of environmental and occupational cancer in countries around the world. The following are key recommendations:

1. Prevention of the environmental and occupational exposures that cause cancer must be an integral component of cancer control worldwide. Such prevention will require strong collaboration across sectors - the health, environment, labour, trade and financial sectors and among countries, and also with civil society and the media.
2. WHO to develop a global framework for control of environmental and occupational causes of cancer that concentrates on occupational and environmental causes of cancer identified by IARC as proven or probable carcinogens.
3. WHO to lead development of measurable indicators of exposure and disease to guide cancer surveillance in countries around the world.
4. All countries to adopt and enforce legislation for protection of populations, especially the most vulnerable populations, against environmental and occupational cancers.
5. All countries to develop communication campaigns that educate populations about environmental and occupational causes of cancer and about preventive strategies.
6. Corporations to comply with all rules and regulations for prevention of environmental and occupational cancers and to use the same protective measures in all countries, developed and developing, in which they operate.
7. Research to discover still unrecognized environmental and occupational causes of cancers so as to guide future prevention.

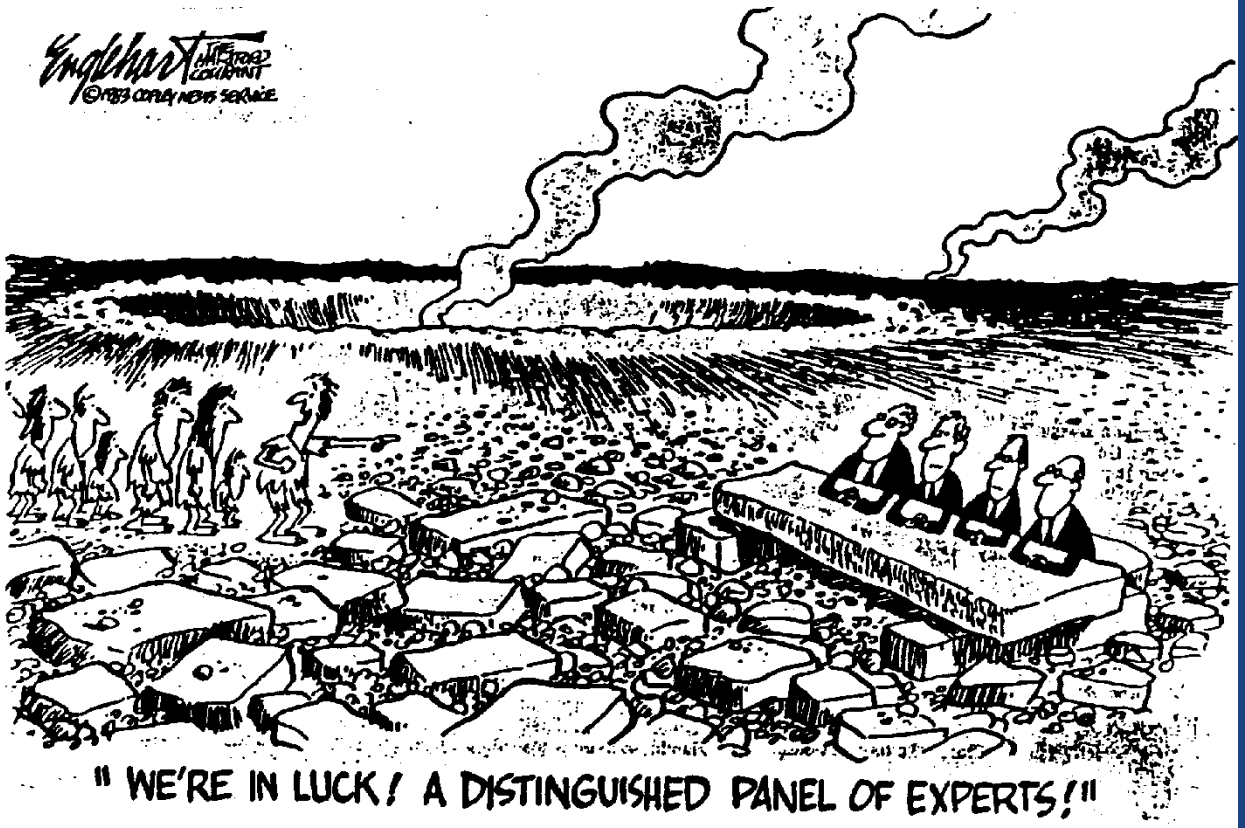
Collegium Ramazzini statements in the new millenium

- 2004 The precautionary principle
- 2004 Call for a reduction in exposure to benzene
- 2004 Lessons learned since the Bhopal disaster in 1984
- 2004 Call for an international ban on asbestos
- 2008 Cancer prevention, screening and early diagnosis
- 2008 Control or pesticides in the European Union
- 2008 Call for worldwide reduction in exposure to lead
- 2010 Control of biocides in the European Union
- 2010 Asbestos is still with us
- 2011 The safety and health of migrant labour
- 2013 Endocrine disrupting chemicals in the European Union

Implementation science…

…deserves particular attention in order to ensure that the knowledge generated is integrated effectively into decisions … and that the delivery of cancer prevention policies reaches vulnerable communities, especially in the developing world.

(Madon S et al, Science 2007)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