Lavoro e cancro nelle donne

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Sex and gender: modifiers of health, disease, and medicine

Franck Mauvais-Jarvis, Noel Bairey Merz, Peter J Barnes, Roberta D Brinton, Juan-Jesus Carrero, Dawn L DeMeo, Geert J De Vries, C Neill Epperson, Ramaswamy Govindan, Sabra L Klein, Amedeo Lonardo, Pauline M Maki, Louise D McCullough, Vera Regitz-Zagrosek, Judith G Regensteiner, Joshua B Rubin, Kathryn Sandberg, Ayako Suzuki

Clinicians can encounter sex and gender disparities in diagnostic and therapeutic responses. These disparities are noted in epidemiology, pathophysiology, clinical manifestations, disease progression, and response to treatment. This Review discusses the fundamental influences of sex and gender as modifiers of the major causes of death and morbidity. We articulate how the genetic, epigenetic, and hormonal influences of biological sex influence physiology and disease, and how the social constructs of gender affect the behaviour of the community, clinicians, and patients in the health-care system and interact with pathobiology. We aim to guide clinicians and researchers to consider sex and gender in their approach to diagnosis, prevention, and treatment of diseases as a necessary and fundamental step towards precision medicine, which will benefit men's and women's health.

LANCET 2020

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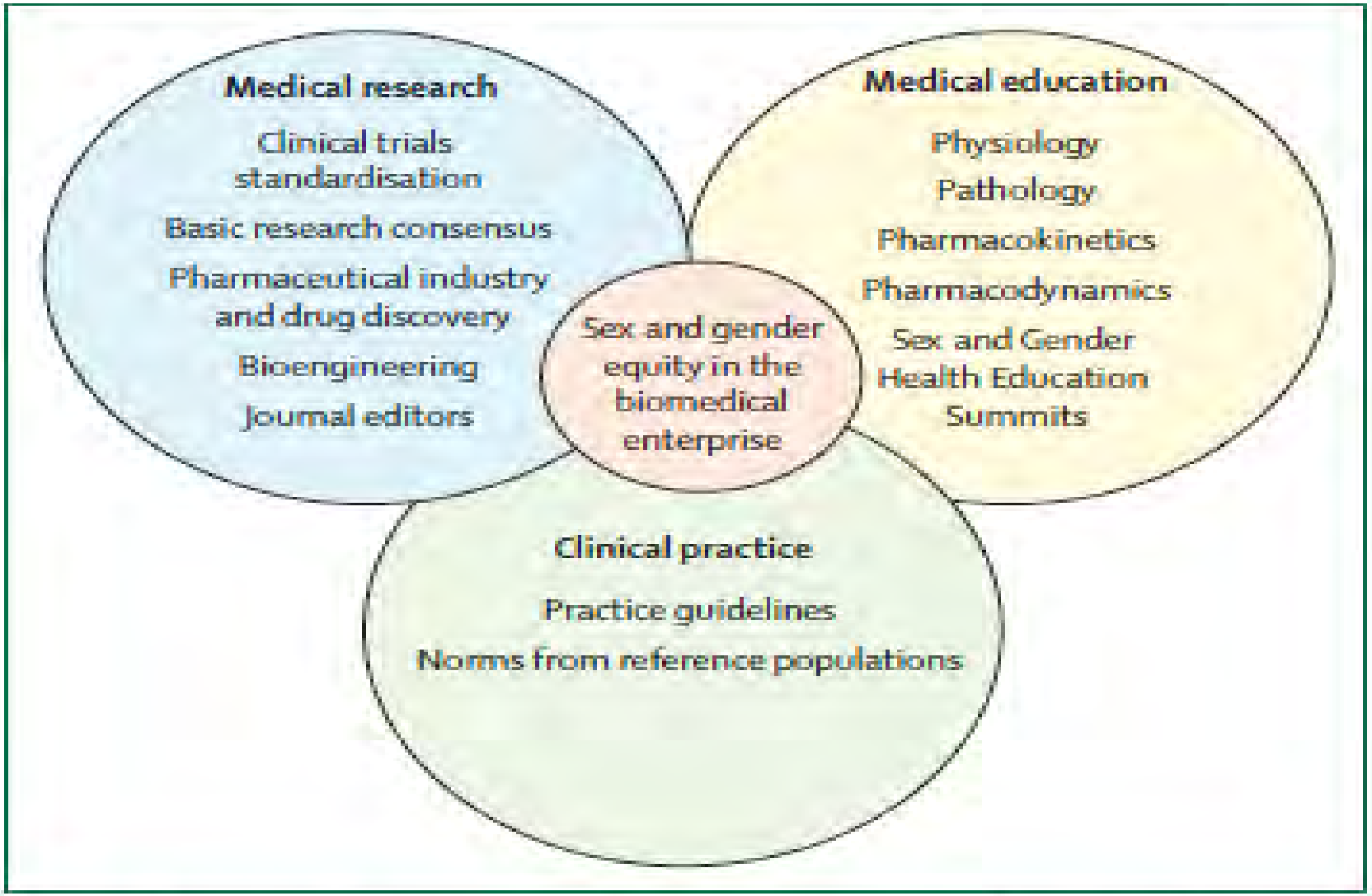

Figure 5: **Summary of recommendations to promote sex and gender equity in the biomedical enterprise**

I NUMERI DEL CANCRO IN ITALIA 2020

Associazione Italiana di Oncologia Medica

AIRTUM

SIAPEC - IAP

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Quanti sono i tumori nelle donne?

I dati dell'AIRTUM

Incidenza	Maschi				Femmine			
	Nord	Centro	Sud-Isole	ITALIA	Nord	Centro	Sud-Isole	ITALIA
Vie aerodigestive superiori*	29,0	23,0	23,5	27,0	7,4	5,7	4,9	6,5
Esofago	7,8	4,1	3,4	6,3	2,0	1,4	0,8	1,6
Stomaco	32,6	36,9	24,5	30,7	16,1	19,1	12,9	15,5
Colon-retto	93,0	95,7	85,0	91,0	58,6	62,1	55,1	57,9
Fegato	32,1	21,6	30,9	30,8	10,3	7,4	12,4	10,6
Colecisti vie biliari	7,4	7,0	8,6	7,7	6,5	6,2	8,0	6,9
Pancreas	24,0	19,6	17,2	21,6	18,4	15,8	13,2	16,7
Polmone	105,2	102,9	102,9	104,3	34,7	32,8	21,1	30,6
Osso	1,4	1,6	1,4	1,4	1,1	1,2	0,9	1,0
Melanomi	23,5	26,6	12,4	20,4	19,0	20,8	10,4	16,5
Mesotelioma	5,2	2,8	3,2	4,4	1,6	0,6	0,7	1,3
Sarcoma di Kaposi	1,9	1,1	2,8	2,1	0,5	0,3	1,0	0,6
Tessuti molli	4,3	4,3	3,6	4,1	2,7	2,6	2,2	2,5
Mammella	1,9	1,5	1,5	1,7	162,6	145,2	123,6	149,7
Ovaio					15,4	15,7	14,5	15,2
Utero cervice					7,6	8,0	6,9	7,4
Utero (corpo)					24,4	25,3	22,8	24,1
Prostata	147,3	139,6	108,3	135,7				
Testicolo	7,3	6,7	6,6	7,0				
Rene e vie urinarie**	31,8	31,8	19,1	28,1	13,3	13,3	8,2	11,8
Vescica***	67,4	73,4	70,6	68,9	13,0	13,8	10,8	12,4
S.N.C.^	11,4	12,1	10,3	11,2	7,7	8,1	7,2	7,6
Tiroide	9,2	11,0	9,5	9,4	24,9	28,6	27,2	26,0
L. Hodgkin	4,2	4,7	3,9	4,1	3,5	3,6	3,3	3,4
L. non Hodgkin	26,2	23,7	20,2	24,2	18,3	16,0	13,9	16,8
Mieloma	11,1	12,2	10,6	11,1	7,8	8,3	7,3	7,7
Leucemie, tutte	17,2	18,2	17,8	17,5	10,2	10,7	10,9	10,5
Totale	**735,5**	**708,5**	**635,7**	**704,4**	**512,0**	**493,9**	**423,0**	**484,7**

TABELLA 8. Tasso medio annuale di incidenza dei tumori in Italia, per sede/tipo, sesso, e area geografica§

I NUMERI DEL CANCRO IN ITALIA 2020

Rango	Maschi			Femmine		
	Età			Età		
	0-49	50-69	70+	0-49	50-69	70+
Totale casi incidenti	100% n=15.829	100% n=76.201	100% n=102.724	100% n=29.918	100% n=66.446	100% n=85.493
1°	Testicolo 12%	Prostata 22%	Prostata 20%	Mammella 41%	Mammella 35%	Mammella 22%
2°	Melanomi 10%	Polmone 14%	Polmone 17%	Tiroide 15%	Colon-retto 11%	Colon-retto 16%
3°	LNH 8%	Colon-retto 12%	Colon-retto 14%	Melanomi 8%	Utero (corpo) 7%	Polmone 8%
4°	Tiroide 8%	Vescica* 9%	Vescica* 11%	Colon-retto 4%	Polmone 7%	Pancreas 6%
5°	Colon-retto 7%	VADS** 5%	Stomaco 5%	Utero cervice 4%	Tiroide 5%	Stomaco 5%

TABELLA 7. Cinque tumori più frequenti (esclusi i carcinomi della cute non melanomi) come percentuale sul totale dei tumori incidenti stimati per il 2020, per sesso e fascia di età

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I numeri del cancro 2019

Polmone

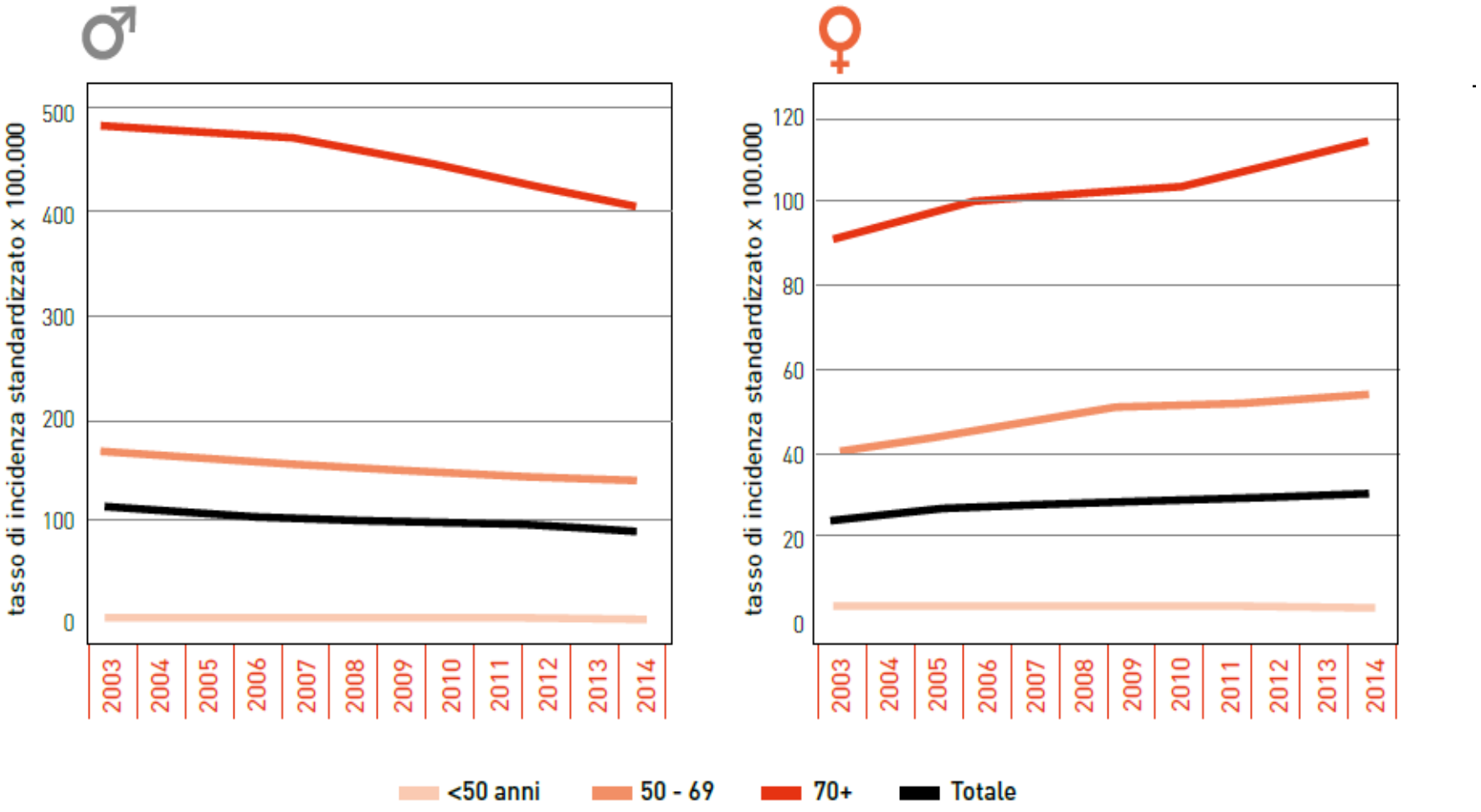

FIGURA 19. Tumore del polmone. AIRTUM. Trend temporali di incidenza 2003-2014, per fascia di età. Tassi standardizzati popolazione europea 2013

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I numeri del cancro 2019

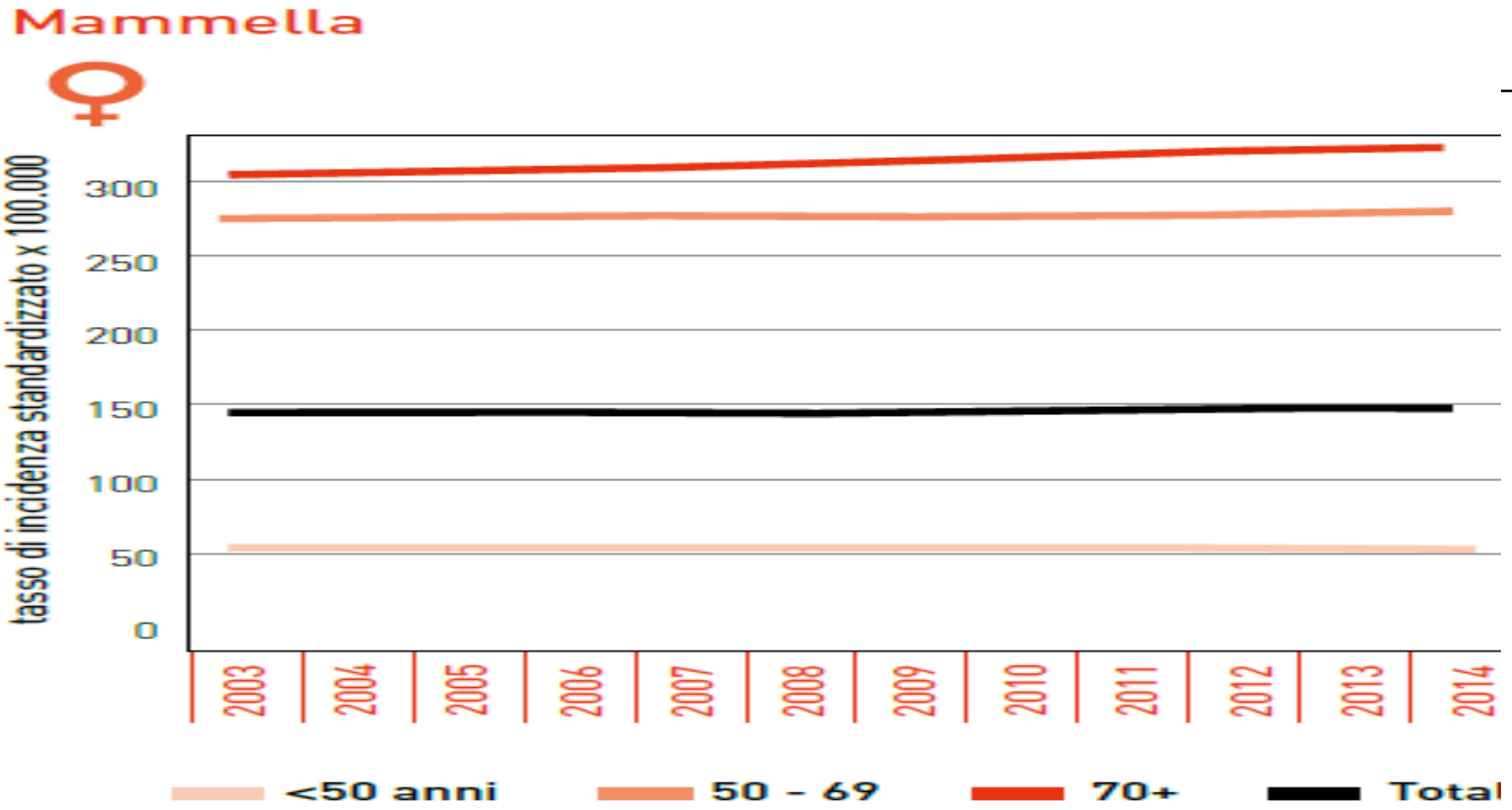
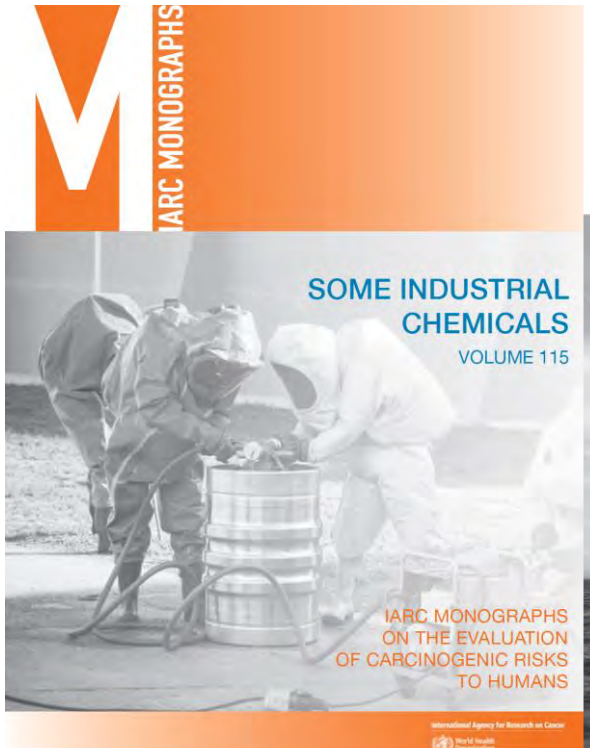
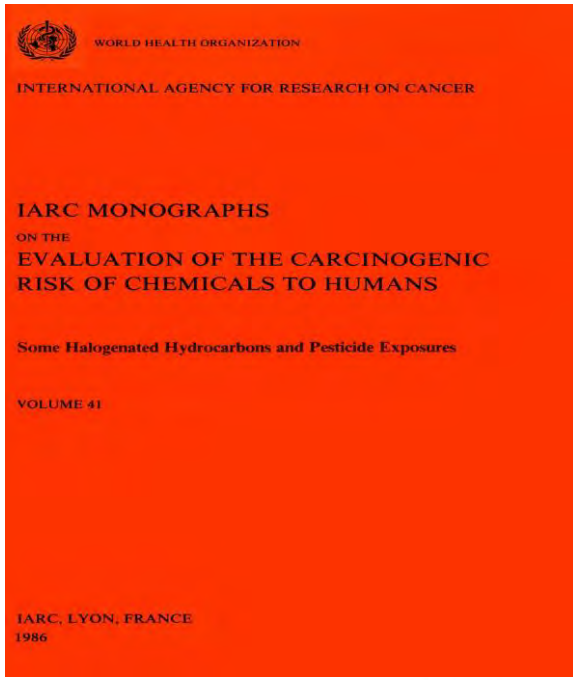


FIGURA 21. Tumore della mammella femminile. AIRTUM. Trend temporali di incidenza 2003-2014, per fascia di età. Tassi standardizzati popolazione europea 2013

Le esposizioni associate

Le valutazioni della IARC





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Elenco degli agenti classificati con sufficiente o limitata evidenza negli esseri umani per le diverse sedi tumorali, volumi da 1 a 129*

da * classificazioni IARC modificata (ultimo accesso 8 giugno 2020)

Sedi tumorali	Agenti cancerogeni con sufficiente evidenza nell'uomo	Agenti con limitata evidenza nell'uomo
Organi respiratori		
Polmone	**Produzione alluminio** **Arsenico e composti dell'arsenico inorganico** **Amianto (tutte le forme)** **Berillio e composti del berillio** **Bis (clorometil) etere; clorometil metil etere (grado tecnico)** **Cadmio e composti del Cadmio** **Composti del cromo (VI)** **Carbone, emissione interna da combustione domestica** **Gassificazione del carbone** **Peci di catrame di carbone** **Produzione carbone Coke** ***Fumi di scarico Diesel*** **Miniere di ematite (sotterranee)** **Fusione ferro e acciaio** MOPP (mistura di vincristine-prednisone-nitrogen mustard-procarbazine) **Inquinamento atmosferico** **Composti del nickel** **Verniciatori** **Plutonio** **Radon 222 e suoi prodotti di decadimento** **Produzione industriale di gomma** **Polvere di silice, cristallina** **Fuliggine** **Mostarda solforata** **Fumo di tabacco, passivo** Fumo di tabacco Fumo di tabacco passivo **Radiazioni X, Radiazioni γ** **Particolato inquinamento aria outdoor** **Processo Acheson, esposizione professionale associata** **Fumi di saldatura** Consumo di oppio	**Nebbie di acidi forti inorganici** **Vetrerie artistiche,contenitori in vetro e manufatti pressati (di manifattura)** **Benzene** Biomassa combustibile (principalmente legno), emissione indoor da combustione domestica **Bitumi, esposizione professionale a ossidi di bitumi durante coperture dei tetti** **Bitumi, esposizione professionale a bitumi ossidati e loro emissione durante il lavoro di colaggio asfalto** **Fabbricazione elettrodo di Carbonio** **Tolueni α-clorurati e benzil cloruro (esposizione combinata)** **Metallo di cobalto con carburo di Tugsteno** **Creosoti** **Frittura, emissione da alte Temperature** **Insetticidi non arsenicali (esposizione professionale, durante il trattamento e l'applicazione)** **Processi di stampa** **2,3,7,8-Tetraclorodibenzo-para -diossina** **Carburo di silicio fibrosa** **Diazinone** Idrazine

Le associazioni

Esposizioni lavorative

Evidenza certa: 28 su 31

Evidenza limitata:16 su 17

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Elenco degli agenti classificati con sufficiente o limitata evidenza negli esseri umani per le diverse sedi tumorali, volumi da 1 a 129*

da * classificazioni IARC modificata (ultimo accesso 3 giugno 2019)

Tratto urinario		
Vescica urinaria	**Produzione alluminio** **4-Aminobifenile** **Arsenico e composti dell'Arsenico** **Produzione Auramina** **Benzidina** Clornafazina Ciclofosfamide **Produzione Magenta** **2-Naftilamina** **Verniciatori** **Industria di produzione della gomma** *Schistosoma haematobium* Fumo di tabacco **orto-Toluidina** **Radiazioni X, Radiazioni γ**	**4-Cloro-orto-Toluidina** **Peci di catrame di carbone** **Lavaggio a secco** **Fumi di scarico Diesel** **Parrucchieri e barbieri (esposizione professionale)** **Processi di stampa** **Fuliggine** **Produzione tessile** **Tetracloroetilene** 2-mercaptobenzotiazole Pioglitazone **Fuliggine**

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List of classifications by cancer sites with *sufficient* or *limited evidence* in humans, *IARC Monographs* Volumes 1–129[a]

Cancer site	Carcinogenic agents with *sufficient evidence* in humans	Agents with *limited evidence* in humans
Breast and female genital organs		
Breast	Alcoholic beverages Diethylstilbestrol Estrogen–progestogen contraceptives Estrogen–progestogen menopausal therapy	Dieldrin Digoxin Estrogen menopausal therapy Ethylene oxide Night shift work
Ovary	Asbestos (all forms) Estrogen menopausal therapy Tobacco smoking	Talc-based body powder (perineal use) X-radiation, gamma-radiation

Lavoro e tumori nelle donne

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Nonostante alcuni primi esempi del passato

- **Tumore al seno nelle suore (Ramazzini 1700)**
- **Tumore osseo nelle lavoratrici che dipingevano i quadrante degli orologi (Martland and Humphries 1929)**

-Tumore del polmone nella produzione e purificazione del radio (Hunter 1976)

Gli studi di epidemiologia occupazionale hanno riguardato soprattutto gli uomini

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AMERICAN JOURNAL OF INDUSTRIAL MEDICINE 58:276–281 (2015)

The Inclusion of Women in Studies of Occupational Cancer: A Review of the Epidemiologic Literature From 1991–2009

Karin Hohenadel, MSc,[1*] Priyanka Raj, MPH,[1] Paul A. Demers, PhD,[1,2] Shelia Hoar Zahm, ScD,[3] and Aaron Blair, PhD[3]

Introduction *Since the early 1990s, researchers have been concerned with the low rate at which women are included in epidemiologic studies of occupational cancer. A previous evaluation determined that one-third of articles published between 1970 and 1990 included women.*

Methods *To assess whether there has been an improvement in recent years, papers on occupational cancer between 1991 and 2009 were reviewed in fifteen journals.*

Results *The proportion of articles that included men remained stable around 90%, while the proportion of articles that included women increased substantially, from 39% in 1991–1995 to 62% in 2006–2009. Articles that assessed risk among men only or men and women presented a higher number of risk estimates and were more likely to evaluate dose-response relationships than studies including women.*

Conclusions *Despite advances in the inclusion of women in studies of occupational cancer, disparities remain in the number of studies of occupational cancer and depth of analysis in studies that included women.* Am. J. Ind. Med. 58:276–281, 2015.

Karin Hohenadel, ISPRO

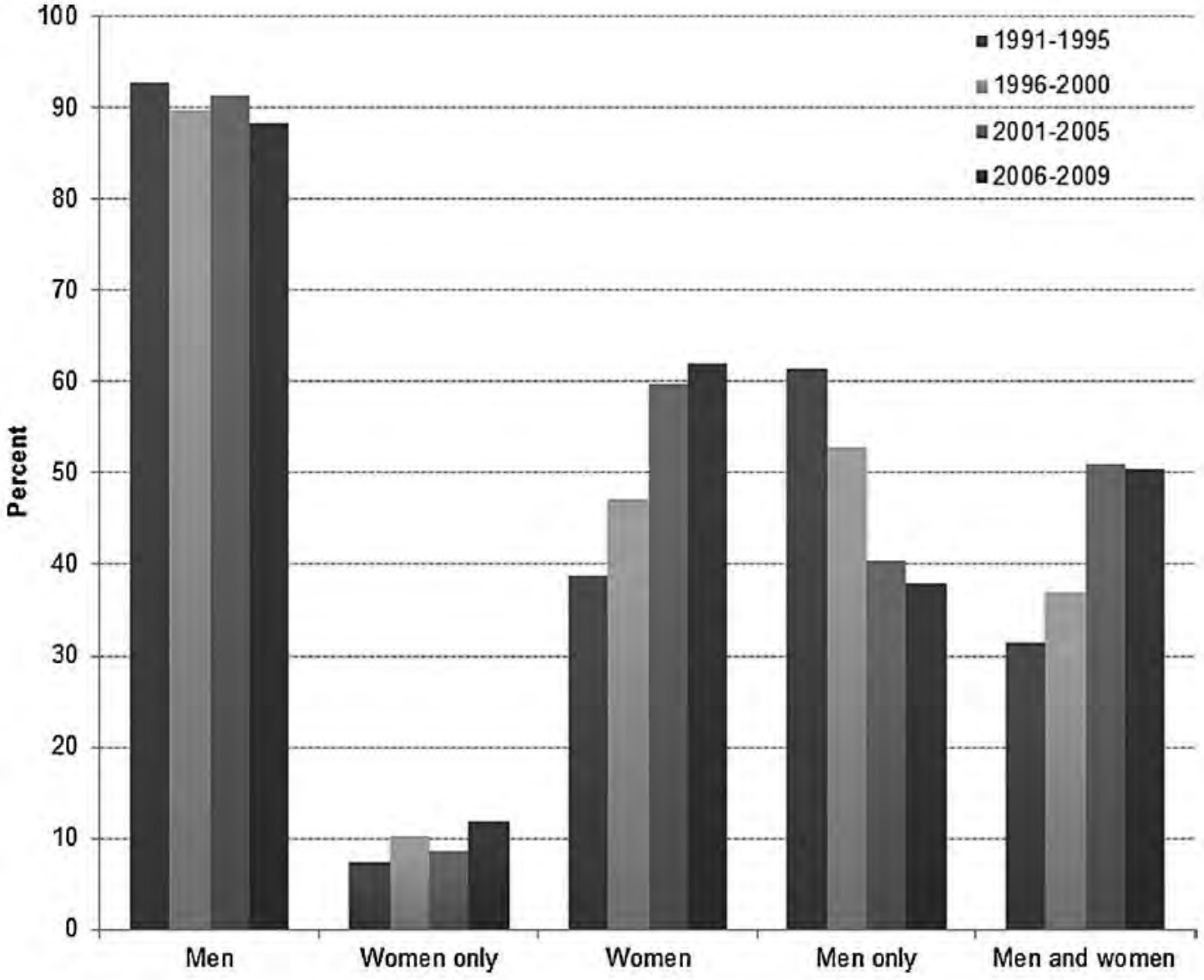

FIGURE 1. Articles assessing the relationship between an occupational factor and cancer, by publication period and gender

Karin Hohenadel, 2015

TABLE II. Percent of Articles Assessing the Relationship Between and Occupational Factor and Cancer by Cancer Type

	All	Any men		Women *only*		Any women		Men *only*		Men and women	
Cancer type	**N**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Oral cavity and pharynx	433	415	95.8	18	4.2	226	52.2	207	47.8	208	48.0
Digestive system	767	722	94.1	45	5.9	379	49.4	388	50.6	334	43.5
Respiratory system	935	890	95.2	44	4.7	404	43.2	529	56.6	360	38.5
Bones and joints	173	170	98.3	3	1.7	96	55.5	77	44.5	93	53.8
Skin excluding basal and squamous cell	424	401	94.6	23	5.4	227	53.5	197	46.5	204	48.1
Breast	328	238	72.6	90	27.4	284	86.6	44	13.4	194	59.1
Female genital system	205	–	–	45	22.0	205	100.0	–	–	158	77.1
Male genital system	556	556	100.0	–	–	–	–	301	54.1	255	45.9
Urinary	625	592	94.7	33	5.3	322	51.5	303	48.5	289	46.2
Eye and orbit	71	68	95.8	3	4.2	45	63.4	26	36.6	42	59.2
Brain and other nervous system	514	487	94.7	27	5.3	280	54.5	234	45.5	253	49.2
Endocrine system	185	174	94.1	11	5.9	120	64.9	65	35.1	109	58.9
Lymphoma	630	598	94.9	32	5.1	321	51.0	309	49.0	290	46.0
Myeloma	366	345	94.3	21	5.7	204	55.7	162	44.3	183	50.0
Leukemia	642	611	95.2	31	4.8	344	53.6	298	46.4	313	48.8
Mesothelioma	88	87	98.9	1	1.1	40	45.5	48	54.5	39	44.3
Kaposi sarcoma	6	6	100.0	0	0.0	3	50.0	3	50.0	3	50.0

Studying Cancer Among Female Workers: Methods and Preliminary Results from a Record-Linkage System in Italy

In the context of a national program for occupational health surveillance, we examined cancer mortality among women from two study populations. The Torino Longitudinal Study includes 159,039 women, resident in Torino, northern Italy, 18 to 64 years old and economically active at the 1981 census. The Italian Cross-sectional Study includes 2,038 deaths among 6,073,071 Italian women, 18 to 64 years old and economically active at the 1981 census. Preliminary results indicate that women in higher socioeconomic classes showed excess overall cancer mortality. This excess was almost entirely explained by increased breast cancer among teachers, managers, and public officials. Metal, wood, and clothing manual workers showed a significantly increased risk of ovarian cancer. Some excesses of lung and digestive cancers were noticeable among women in the textile and clothing industry and in the restaurant, bar, and hotel trade. Further study is under way.

Studying Cancer Among Female Workers: Methods and Preliminary Results from a Record-Linkage System in Italy

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way.

TABLE 4
Cancer Mortality Among Women in the Trade "Restaurants, Bars, and Hotels" in the Torino Longitudinal Study and the Italian Cross-sectional Study

Cause*	Observed	Standardized Mortality Ratio	*P*	Cases	Mortality Odds Ratio	*P*
All malignant neoplasms (140–209)	37	104	0.86	47	77	0.19
Oral cavity and pharynx (140–149)	2	410	0.18	1	253	0.36
Esophagus (150)	0			1	315	0.24
Stomach (151)	1	69	0.84	4	97	0.95
Intestine and colon (152–153)	2	90	0.77	2	73	0.66
Rectum (154)	2	165	0.67	1	81	0.84
Liver (155)	3	204	0.37	5	174	0.24
Pancreas (157)	3	192	0.41	1	56	0.57
Lung (162)	6	175	0.27	4	121	0.71
Pleura (163)	1	625	0.30	0		
Breast (174)	7	65	0.31	14	96	0.90
Uterus (179–182)	2	99	0.66	2	49	0.32
Ovary (183)	1	36	0.46	4	112	0.83
Brain (191)	0			1	40	0.35
Non-Hodgkin's lymphoma (200, 202)	3	564	0.04	0		
Leukemia (204–208)	3	262	0.22	0		
All causes (001–999)	69	109	0.52	114		

* Numbers in parentheses are codes according to the International Classification of Diseases, 9th Revision.

European Journal of Epidemiology **15**: 51–57, 1999.

Health and work among women in Italy: An overview of the epidemiological literature

Roberta Pirastu[1], Susanna Lagorio[2], Lucia Miligi[3] & Adele Seniori Costantini[3]

[1]*Department of Animal and Human Biology, Università La Sapienza, Rome;* [2]*The Istituto Superiore di Sanità, Rome;* [3]*The Center for Study and Prevention of Cancer, Unit of Occupational Epidemiology, Florence, Italy*

Accepted in revised form 6 September 1998

Abstract. The objective of this paper is to give an overview of the epidemiological studies completed in Italy during the past 25 years, about the role of occupational exposures on the development of adverse health effects on women. The implications for research developments are also discussed. The epidemiological investigations of selected categories of work-related health effects published in Italy in the years 1970–1995 were identified from the medical literature databases. The total number of studies is 142, including cohort mortality studies (n = 12), case–control studies of different neoplasms (n = 14), investigations of adverse reproductive effects (n = 8) and studies of occupational diseases different from the above (n = 94). In most investigations, women workers were not the main study objective and hence the number of females under study was small. The conclusions is that in Italy, given the dearth of studies of female workers and the preponderance of women in many economic sectors, i.e. the textile and shoe industry, health care, personal services and schools, there is a need to identify women workers in the above industries and occupations as priorities for epidemiological research and surveillance.

Table 3. Economic sectors and job titles in IARC Group 1, 2A and 2B and percentages of employed women, Italy, Census 1981

IARC Group[a]	No. women (% of males and females workforce)[b]
Group 1	
Shoe industry	385.414 (76)
Furniture industry	63.530 (22)
Group 2A	
Art glass industry	7.625 (17)
Hairdresser	39.805 (81)
Group 2B	
Textile industry	245.865 (61)

[a] IARC Monographs on the Evaluation of Carcinogenic Risks to Humans. Lyon: IARC, March 1994. [b] Italy, Census 1981.

Pirastu et al. 1999

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Gender differences in occupational exposure patterns

Amanda Eng,[1] Andrea 't Mannetje,[1] Dave McLean,[1] Lis Ellison-Loschmann,[1] Soo Cheng,[1] Neil Pearce[1,2]

Methods Men and women aged 20—64 years were randomly selected from the Electoral Roll and invited to take part in a telephone interview, which collected information on self-reported occupational exposure to specific dusts and chemicals, physical exposures and organisational factors. The authors used logistic regression to calculate prevalence ORs and 95% CIs comparing the exposure prevalence of males (n=1431) and females (n=1572), adjusting for age. To investigate whether men and women in the same occupation were equally exposed, the authors also matched males to females on current occupation using the five-digit code (n=1208) and conducted conditional logistic regression adjusting for age.

Results Overall, male workers were two to four times more likely to report exposure to dust and chemical substances, loud noise, irregular hours, night shifts and vibrating tools. Women were 30% more likely to report repetitive tasks and working at high speed, and more likely to report exposure to disinfectants, hair dyes and textile dust. When men were compared with women with the same occupation, gender differences were attenuated. However, males remained significantly more likely to report exposure to welding fumes, herbicides, wood dust, solvents, tools that vibrate, irregular hours and night-shift work. Women remained more likely to report repetitive tasks and working at high speed, and in addition were more likely to report awkward or tiring positions compared with men with the same occupation.

Conclusion This population-based study showed substantial differences in occupational exposure patterns between men and women, even within the same occupation. Thus, the influence of gender should not be overlooked in occupational health research.

What this paper adds

- The majority of occupational health and exposure assessment studies have traditionally been carried out in men. Therefore, very few studies have compared the distribution of occupational risk factors between women and men.
- There are substantial differences in occupational exposure patterns between men and women, and these disparities were observed both between and within occupations.
- The influence of gender should not be overlooked in occupational-health research.

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Table 3 Differences in occupational exposure prevalence between males and females

Exposure	Exposure in males and females (whole sample)				Exposure in males and females with the same occupation (matched sample)*			
	Total n=3003 (%)	Male n=1431 (%)	Female n=1572 (%)	OR (95% CI)†	Total n=1208 (%)	Male n=604 (%)	Female n=604 (%)	OR (95% CI)†
Dust/chemical factors								
Dust	29.3	40.3	19.3	2.83 (2.40 to 3.33)	23.2	25.0	21.4	1.24 (0.94 to 1.63)
Smoke/fume/gas	21.4	29.5	14.0	2.61 (2.17 to 3.13)	17.6	20.2	14.9	1.54 (1.11 to 2.14)
Oils and solvents	20.9	29.8	12.8	3.00 (2.48 to 3.62)	15.2	17.9	12.4	1.62 (1.16 to 2.27)
Acids or alkalis	9.4	13.4	5.8	2.57 (1.98 to 3.34)	8.0	8.8	7.1	1.35 (0.85 to 2.15)
Pesticides	9.6	14.5	5.0	3.14 (2.39 to 4.11)	8.0	8.8	7.3	1.27 (0.75 to 2.15)
Any of the above	45.4	57.0	34.7	2.52 (2.17 to 2.92)	38.3	41.1	35.6	1.34 (1.03 to 1.73)
Physical factors								
Lifting‡	39.2	43.1	35.8	1.40 (1.21 to 1.62)	32.3	31.6	33.1	0.98 (0.74 to 1.30)
Loud noise‡	29.9	40.1	20.5	2.70 (2.29 to 3.18)	23.2	24.8	21.7	1.21 (0.90 to 1.63)
Awkward or tiring positions‡	56.1	54.5	57.6	0.91 (0.78 to 1.05)	49.9	45.8	54.1	0.73 (0.57 to 0.92)
Awkward grip or hand movements‡	38.2	40.5	36.1	1.25 (1.08 to 1.45)	32.1	31.5	32.8	0.94 (0.72 to 1.22)
Standing‡	28.0	27.3	28.6	0.95 (0.81 to 1.11)	24.6	24.1	25.1	0.91 (0.67 to 1.22)
Tools that vibrate‡	11.4	17.6	5.7	3.80 (2.94 to 4.90)	8.2	10.3	6.2	2.06 (1.29 to 3.29)
Organisational factors								
Repetitive tasks‡	68.2	64.7	71.5	0.76 (0.65 to 0.89)	63.8	61.0	66.6	0.78 (0.59 to 1.01)
Working at very high speed‡	51.2	47.0	55.0	0.75 (0.65 to 0.87)	48.0	43.2	52.7	0.70 (0.55 to 0.89)
Working to tight deadlines‡	73.1	74.9	71.4	1.26 (1.07 to 1.49)	73.7	73.2	74.1	1.04 (0.79 to 1.36)
Night shift	7.1	10.2	4.3	2.57 (1.89 to 3.50)	5.7	8.0	3.4	3.32 (1.73 to 6.36)
Irregular hours	16.1	20.1	12.5	1.76 (1.44 to 2.15)	14.4	17.9	11.0	1.97 (1.37 to 2.83)
Stress								
Not at all–mildly	39.7	36.6	42.6	1.00 (ref)	37.1	33.0	41.1	1.00 (ref)
Moderately	45.2	48.5	42.2	1.36 (1.16 to 1.59)	46.3	49.5	43.1	1.52 (1.17 to 1.99)
Very–extremely	15.1	15.0	15.3	1.14 (0.92 to 1.42)	16.6	17.5	15.8	1.43 (1.00 to 2.05)
Household responsibility	34.7	29.3	39.6	0.66 (0.57 to 0.78)	32.8	30.0	35.6	0.76 (0.59 to 0.98)

Prevalence ORs and 95% CIs use the unexposed as the reference group for each occupational factor.
*Males and females matched on current occupation (New Zealand Standard Classification of Occupations five-digit code).
†Adjusted for age.
‡A quarter of the time or more.

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Dusts										
Agricultural dust	21	0.7	1.1	0.3	3.37 (1.23 to 9.23)	10	0.8	0.8	0.8	0.89 (0.21 to 3.78)
Animal dust	21	0.7	1.0	0.5	2.04 (0.82 to 5.08)	11	0.9	0.8	1.0	0.68 (0.20 to 2.28)
Grain dust	15	0.5	0.8	0.2	4.46 (1.25 to 15.88)	10	0.8	1.2	0.5	2.46 (0.60 to 10.05)
Paper dust	29	1.0	0.9	1.0	0.90 (0.43 to 1.87)	11	0.9	0.7	1.2	0.45 (0.12 to 1.62)
Construction dust	87	2.9	5.4	0.6	9.18 (4.73 to 17.84)	17	1.4	1.3	1.5	0.77 (0.28 to 2.15)
Metal dust	94	3.1	5.6	0.9	6.91 (3.89 to 12.28)	10	0.8	1.0	0.7	1.58 (0.44 to 5.67)
Wood dust	210	7.0	12.4	2.1	6.71 (4.59 to 9.81)	57	4.7	6.1	3.3	2.11 (1.13 to 3.93)
Household dust	121	4.0	2.1	5.8	0.35 (0.23 to 0.53)	46	3.8	3.2	4.5	0.70 (0.38 to 1.27)
Road dust	142	4.7	6.8	2.9	2.46 (1.71 to 3.53)	48	4.0	4.1	3.8	1.16 (0.64 to 2.09)
Flour dust	17	0.6	0.8	0.3	2.61 (0.91 to 7.44)	9	0.8	1.0	0.5	2.00 (0.49 to 8.07)
Solvents										
Solvents	331	11.0	15.2	7.2	2.34 (1.84 to 2.98)	108	8.9	10.8	7.1	1.74 (1.14 to 2.64)
Acetone	27	0.9	1.1	0.7	1.62 (0.75 to 3.51)	9	0.8	0.7	0.8	0.97 (0.26 to 3.68)
Adhesive	125	4.2	6.2	2.4	2.82 (1.91 to 4.18)	34	2.8	3.0	2.7	1.22 (0.56 to 2.66)
Alcohol	109	3.6	3.6	3.7	0.99 (0.67 to 1.46)	38	3.2	3.0	3.3	0.99 (0.50 to 1.95)
Degreasers	39	1.3	2.0	0.6	3.51 (1.70 to 7.26)	18	1.5	1.8	1.2	1.53 (0.55 to 4.27)
Methylated spirits	54	1.8	1.7	1.9	0.91 (0.53 to 1.57)	17	1.4	1.5	1.3	1.26 (0.48 to 3.31)
Turpentine	50	1.7	2.3	1.1	2.20 (1.22 to 3.98)	17	1.4	1.5	1.3	1.38 (0.52 to 3.67)
Formaldehyde	16	0.5	0.6	0.5	1.08 (0.40 to 2.90)	8	0.7	1.0	0.3	3.16 (0.63 to 15.78)
Engine fuels and emissions										
Diesel engine emission	72	2.4	4.2	0.8	5.78 (3.09 to 10.80)	18	1.5	1.8	1.2	1.51 (0.57 to 3.95)
Diesel fuel	46	1.5	3.0	0.2	16.40 (5.07 to 53.04)	7	0.6	1.0	0.2	7.42 (0.87 to 63.11)
Engine emission	183	6.1	8.7	3.7	2.59 (1.88 to 3.57)	82	6.8	7.6	6.0	1.38 (0.83 to 2.29)
Engine oil	98	3.3	6.1	0.7	9.52 (5.06 to 17.92)	28	2.3	2.8	1.8	1.73 (0.78 to 3.85)
Kerosene	17	0.6	1.1	0.1	18.34 (2.43 to 138.73)	3	0.3	0.3	0.2	1.93 (0.17 to 21.32)
Petrol fuel	25	0.8	1.5	0.2	8.35 (2.49 to 27.99)	6	0.5	0.7	0.3	2.59 (0.46 to 14.63)
Petrol fumes	26	0.9	1.3	0.5	3.13 (1.31 to 7.48)	7	0.6	0.5	0.7	0.59 (0.13 to 2.76)
Liquefied petroleum gas	39	1.3	2.3	0.4	6.78 (2.82 to 16.28)	16	1.3	1.8	0.8	2.55 (0.86 to 7.52)
Environmental tobacco smoke	36	1.2	0.6	1.7	0.36 (0.17 to 0.77)	12	1.0	0.8	1.2	0.66 (0.21 to 2.12)
Machinery oils and fumes										
Machinery oils	42	1.4	2.5	0.5	5.58 (2.47 to 12.61)	8	0.7	0.8	0.5	1.49 (0.34 to 6.54)
Machinery fumes	28	0.9	1.5	0.4	4.13 (1.67 to 10.22)	9	0.8	0.8	0.7	1.40 (0.36 to 5.43)
Hydraulic oil	30	1.0	2.0	0.1	34.57 (4.70 to 254.23)	5	0.4	0.7	0.2	4.82 (0.53 to 43.69)
Lubricants	76	2.5	4.3	1.0	4.81 (2.71 to 8.52)	20	1.7	1.5	1.8	0.82 (0.33 to 2.01)
Cutting fluids	20	0.7	1.3	0.1	10.48 (2.42 to 45.34)	5	0.4	0.7	0.2	4.23 (0.47 to 37.92)
Welding	88	2.9	5.9	0.2	33.66 (10.61 to 106.76)	11	0.9	1.5	0.3	5.25 (1.10 to 25.10)
Ink and dyes										
Dyes	23	0.8	1.1	0.5	2.60 (1.06 to 6.36)	12	1.0	1.3	0.7	1.92 (0.58 to 6.40)
Printing	16	0.5	1.1	0.1	17.37 (2.29 to 131.92)	7	0.6	1.0	0.2	7.08 (0.85 to 59.18)
Inks	32	1.1	1.4	0.8	1.94 (0.94 to 4.01)	15	1.2	1.3	1.2	1.40 (0.46 to 4.23)

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Table 4 Differences in specific occupational exposure prevalence between males and females

	Exposure in males and females (whole sample)					Exposure in males and females with the same occupation (matched sample)*				
	Total (N=3003)		Male (N=1431)	Female (N=1572)		Total (N=1208)		Male (N=604)	Female (N=604)	
Exposure	N	%	%	%	OR (95% CI)†	N	%	%	%	OR (95% CI)†
Acids and alkalis										
Alkalis	105	3.5	4.3	2.8	1.54 (1.03 to 2.28)	46	3.8	4.3	3.3	1.41 (0.75 to 2.66)
Acids	195	6.5	10.6	2.8	4.22 (2.99 to 5.96)	65	5.4	6.5	4.3	1.74 (0.98 to 3.09)
Hydrochloric acid	31	1.0	1.8	0.3	5.98 (2.29 to 15.63)	13	1.1	1.5	0.7	3.05 (0.80 to 11.63)
Sulfuric acid	45	1.5	2.9	0.3	11.75 (4.19 to 32.93)	12	1.0	1.5	0.5	3.19 (0.86 to 11.90)
Cleaning products										
Cleaning products	411	13.7	14.2	13.2	1.11 (0.90 to 1.37)	148	12.3	12.3	12.3	0.97 (0.66 to 1.44)
Bleach	51	1.7	1.1	2.3	0.45 (0.25 to 0.83)	12	1.0	0.8	1.2	0.57 (0.18 to 1.83)
Disinfectant	127	4.2	3.0	5.3	0.56 (0.38 to 0.81)	30	2.5	2.2	2.8	0.76 (0.36 to 1.57)
Caustic soda	54	1.8	2.0	1.7	1.19 (0.69 to 2.04)	28	2.3	2.5	2.2	1.24 (0.57 to 2.71)
Chlorine products	112	3.7	3.5	3.9	0.88 (0.60 to 1.29)	36	3.0	2.5	3.5	0.66 (0.33 to 1.32)
Pesticides										
Fungicides	61	2.0	2.7	1.4	1.96 (1.16 to 3.33)	24	2.0	2.3	1.7	1.31 (0.52 to 3.27)
Insecticides	70	2.3	3.1	1.6	1.97 (1.20 to 3.23)	23	1.9	2.5	1.3	2.51 (0.87 to 7.22)
Herbicides	167	5.6	8.9	2.5	3.64 (2.53 to 5.24)	77	6.4	8.1	4.6	4.37 (1.85 to 10.31)
Fertiliser	28	0.9	1.5	0.5	3.31 (1.40 to 7.81)	12	1.0	1.0	1.0	1.07 (0.33 to 3.43)
Drench (animal)	30	1.0	1.6	0.5	3.64 (1.56 to 8.53)	18	1.5	1.8	1.2	2.55 (0.74 to 8.83)
Timber treatment	69	2.3	4.4	0.4	11.59 (5.00 to 26.88)	10	0.8	1.0	0.7	1.32 (0.37 to 4.73)

Eng at al., 2013

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Scarselli et al. BMC Public Health (2018) 18:413
https://doi.org/10.1186/s12889-018-5332-x

BMC Public Health

RESEARCH ARTICLE Open Access

Gender differences in occupational exposure to carcinogens among Italian workers

Alberto Scarselli*, Marisa Corfiati, Davide Di Marzio, Alessandro Marinaccio and Sergio Iavicoli

Abstract

Background: Many carcinogenic chemicals are still used or produced in several economic sectors. The aim of this study is to investigate differences in occupational exposure patterns to carcinogens by gender in Italy.

Methods: Information about the most common carcinogens recorded in the Italian occupational exposures database (SIREP) for the period 1996–2015 was retrieved. Descriptive statistics were calculated for exposure-related variables (carcinogenic agent, occupational group, economic activity sector, and workforce size). The chi-square(χ^2) test was used to verify differences between genders, and logistic regression analysis was performed to evaluate the association between gender and risk of having higher exposure levels, after adjusting for age. Concurrent exposures to multiple carcinogens were investigated using the two-step cluster analysis.

Results: A total of 166,617 exposure measurements were selected for 40 different carcinogens. Exposed workers were only in a small proportion women (9%), and mostly aged 20–44 years (70%) in both genders. Women were more likely to be exposed than men to higher levels for several carcinogens even after correction for age at exposure, and the exposure level was significantly ($p < 0.01$) associated with occupation, economic sector and workforce size. The five main clusters of co-exposures identified in the entire dataset showed a differential distribution across economic sectors between genders.

Conclusions: The exposures to occupational carcinogens have distinguishing characteristics in women, that are explained in part by work and job segregation. Because of the presence of high-exposed groups of female workers in many industrial sectors, further research and prevention efforts are recommended.

Keywords: Gender disparities, Exposure assessment, Occupational health, Surveillance system, Prevention database, Carcinogenic agents

Conclusions

This study shows significant disparities in the prevalence and level of occupational exposures to carcinogens among female and male workers in the Italian workforce. Moreover, in certain occupational settings women, compared to men, were more likely to be exposed to high levels of carcinogens. The overall findings provide useful information both for decision making in prevention policies and for programming epidemiological studies on occupational cancer in the female workforce. Likewise, an accurate carcinogenic risk assessment based on concentration levels and co-exposure patterns can help to address prevention and health promotion plans in the workplaces.

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TUMORI AD ALTA FRAZIONE EZIOLOGICA

MESOTELIOMA MALIGNO

TUMORI NASO SINUSALI

Sinonasal Cancer, Occupation, and Tobacco Smoking in European Women and Men

1999

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TABLE II. Sinonasal Cancer Risk Related to Occupational Exposures by Gender

	$N_{(cases)}$/ $n_{(controls)}$	% Cases exposed	OR	95% CI
Women				
Wood dust	4/9	4.0	1.17	(0.31–4.47)
Formaldehyde	15/41	15.0	0.83	(0.41–1.69)
Leather dust	7/7	7.0	2.71	(0.78–9.43)
Other a priori high risk occupations*	43/104	44.8	1.21	(0.69–2.12)
Men				
Wood dust	168/389	38.4	2.36	(1.75–3.20)
Formaldehyde	229/493	52.3	1.66	(1.27–2.17)
Leather dust	26/42	5.9	1.92	(1.10–3.35)
Other a priori high risk occupations*	165/659	61.1	1.10	(0.82–1.49)

TABLE V. Attributable Risk for Sinonasal Cancer Related to Occupational Exposures and Smoking, by Gender and Histology Type

Exposure	AR (%) All	AR (%) Women	AR (%) Men	AR (%) Squamous cell carcinoma	AR (%) Adeno-carcinoma
Wood	18	1	22	−6	68
Leather	3	4	3	1	6
Other a priori high risk occupations[a]	8	8	6	20	−36
All occupational exposures[b]	33	11	39	22	77
Smoking	15	1	23	23	−3

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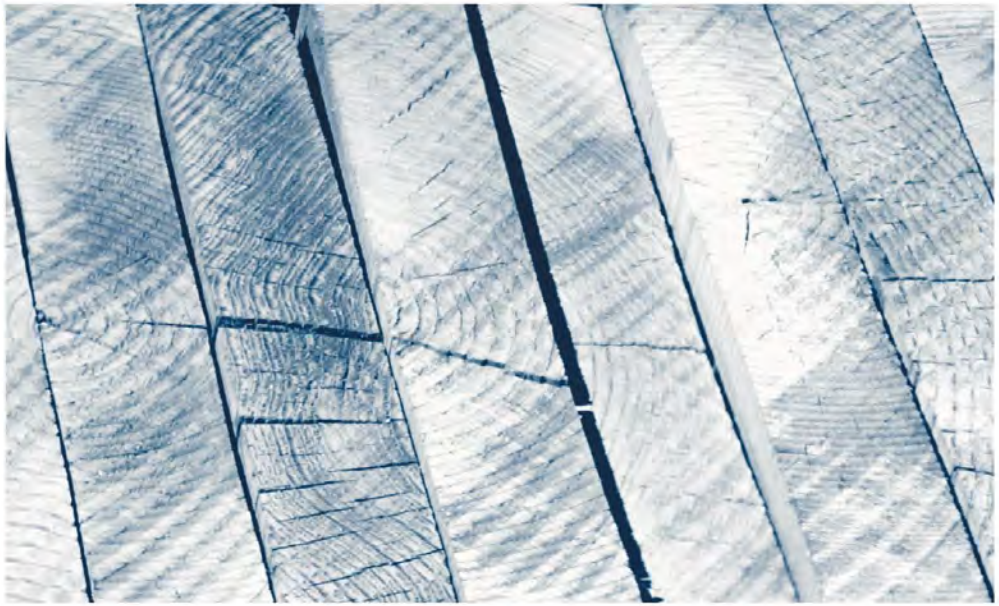
Il Registro Nazionale dei Tumori Naso-Sinusali (ReNaTuNS)

Evidenze epidemiologiche, quadro di riferimento, risultati dell'attività di sorveglianza

Primo rapporto



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Il Registro N
dei Tumori N

Evidenze epidemiol
dell'attività di sorve

Primo rapporto

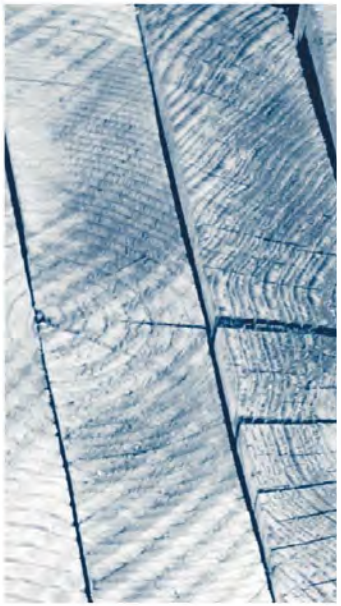

Tabella 10 CODICI ATECO91 SELEZIONATI PER LA STIMA DEGLI ESPOSTI OCCUPAZIONALI A POLVERE DI LEGNO E CUOIO

Codice	Settore di attività economica	Unità locali	Uomini	Donne	Totale dipendenti
19.10.0	Preparazione e concia del cuoio	2.838	20.195	7.358	27.553
19.20.0	Fabbricazione di articoli da viaggio, borse, articoli da correggiaio e selleria	7.393	7.722	18.355	26.077
19.30.1	Fabbricazione di calzature non in gomma	5.588	31.546	38.916	70.462
19.30.2	Fabbricazione di parti e accessori per calzature non in gomma	6.811	10.424	19.525	29.949
20.10.0	Taglio, piallatura e trattamento del legno	2.350	10.307	3.413	13.720
20.20.0	Fabbricazione di fogli da impiallacciatura; fabbricazione di compensato, pannelli stratificati (ad anima listellata), pannelli di fibre,di particelle ed altri pannelli	537	7.897	3.351	11.248
20.30.1	Fabbricazione di porte e finestre in legno (escluse porte blindate)	18.087	21.863	3.341	25.204
20.30.2	Fabbricazione di altri elementi di carpenteria in legno e falegnameria	15.700	22.473	3.687	26.160
20.40.0	Fabbricazione di imballaggi in legno	1.915	8.240	1.801	10.041
20.51.1	Fabbricazione di prodotti vari in legno (esclusi i mobili)	6.703	15.226	5.686	20.912
20.51.2	Laboratori di corniciai	4.272	1.494	834	2.328
20.52.1	Fabbricazione dei prodotti della lavorazione del sughero	405	1.366	621	1.987
36.11.1	Fabbricazione di sedie e sedili, inclusi quelli per aeromobili, autoveicoli, navi e treni	1.364	9.226	5.325	14.551
36.11.2	Fabbricazione di poltrone e divani	9.767	16.568	13.872	30.440
36.12.2	Fabbricazione di mobili non metallici per uffici, negozi, ecc.	2.462	14.250	3.501	17.751
36.13.0	Fabbricazione di mobili per cucina	1.056	10.181	2.918	13.099
36.14.1	Fabbricazione di altri mobili in legno	18.263	45.782	16.512	62.294
36.14.2	Fabbricazione di mobili in giunco, vimini ed altro materiale simile	355	1.628	735	2.363
	Totale	105.866	256.388	149.751	406.139

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Tabella 11 DISTRIBUZIONE PER REGIONE DELLE UNITÀ LOCALI E DEI DIPENDENTI NEI SETTORI DI ATTIVITÀ ECONOMICA SELEZIONATI PER ESPOSIZIONE OCCUPAZIONALE A POLVERE DI LEGNO E CUOIO

Regione	Unità locali	Uomini	Donne	Totale dipendenti
Piemonte	5.580	9.692	4.080	13.772
Valle d'Aosta	303	253	25	278
Lombardia	17.212	36.463	17.991	54.454
Trentino-Alto Adige	3.262	7.201	1.345	8.546
Veneto	14.786	52.587	30.372	82.959
Friuli-Venezia Giulia	3.463	17.142	10.179	27.321
Liguria	1.498	1.390	367	1.757
Emilia-Romagna	6.270	14.610	11.899	26.509
Toscana	14.164	29.511	26.600	56.111
Umbria	1.677	3.995	1.259	5.254
Marche	8.115	27.646	23.783	51.429
Lazio	5.326	4.982	1.201	6.183
Abruzzo	2.205	5.533	2.877	8.410
Molise	356	829	118	947
Campania	6.740	14.586	5.926	20.512
Puglia	5.391	17.022	8.472	25.494
Basilicata	734	2.921	1.323	4.244
Calabria	1.972	1.966	502	2.468
Sicilia	4.620	4.916	781	5.697
Sardegna	2.192	3.143	651	3.794

Accepted: 5 October 2017
DOI: 10.1002/ajim.22789

RESEARCH ARTICLE

WILEY AMERICAN JOURNAL OF INDUSTRIAL MEDICINE

Sinonasal cancer in the Italian national surveillance system: Epidemiology, occupation, and public health implications

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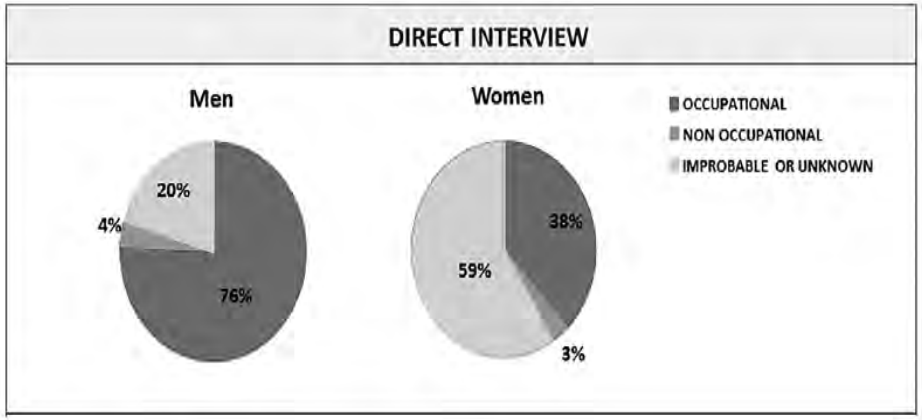

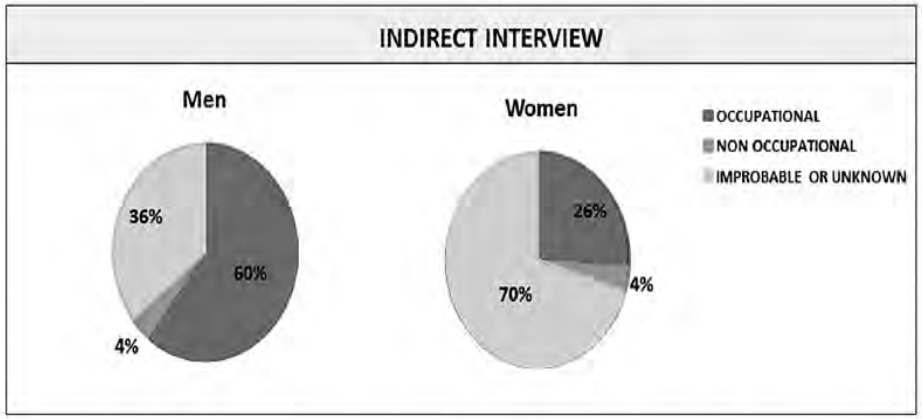

ges of sinonasal cancer cases with direct or indirect interview by modalities of exposure. Men and v

TABLE 1 Sinonasal cancer cases (*N*, %) by age class, incidence period, diagnosis evaluation, and exposure evaluation; ReNaTuNS[a], 2000-2016

	Men		Women	
Age-class (yrs)	*N*	%	*N*	%
≤54	173	15.6	96	23.0
55-64	244	22.0	78	18.7
65-74	376	33.8	108	25.8
≥75	318	28.6	136	32.5
Incidence period				
2000-2004	176	15.8	50	12.0
2005-2009	352	31.7	142	34.0
2010-2014	495	44.6	205	49.0
2015-2016 *(in progress)*	88	7.9	21	5.0
Diagnosis evaluation				
Confirmed	1096	98.6	408	97.6
Probable	15	1.4	10	2.4
Exposure setting				
Defined	878	79.0	297	71.1
Occupational[b]	641	73.0	103	34.7
Domestic[b]	4	0.5	4	1.3
Hobby activities[b]	31	3.5	6	2.0
Improbable or unknown[b]	202	23.0	184	62.0
Non-defined	233	21.0	121	28.9
Total	1111	100.0	418	100.0

[a]ReNaTuNS, "Registro Nazionale dei Tumori Naso-Sinusali".
[b]Percentages calculated on the total of cases with a defined exposure

COR TUNS TOSCANO 2005-2020

AGENTE CANCEROGENO	UOMINI	DONNE	TOTALE	% DONNE ESPOSTE
Polveri di legno	136	13	176	7,4
Polveri di cuoio	97	18	140	12,9
Polvere tessile	10	16	33	48,5
Formaldeide	24	8	33	24,3
Cromo	25	2	32	6,3

Soggetti esposti a cancerogeni con livello di esposizione certa, probabile e possibile.

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ORIGINAL ARTICLE

The epidemiology of malignant mesothelioma in women: gender differences and modalities of asbestos exposure

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What this paper adds

- Malignant mesothelioma is a rare tumour prevalently due to occupational and environmental exposure to asbestos and the attributable fraction to known sources of asbestos exposure in women is generally much lower than in men;
- In Italy a permanent surveillance system for mesothelioma incidence (ReNaM) is active with 21 463 collected cases in the period between 1993 and 2012 and 16 458 (76.7%) of them investigated for exposure;
- In ReNaM, gender ratio (F/M) is 0.38 and 0.70 (0.14 and 0.30 in the occupational exposed subjects subgroup) for pleural and peritoneal forms respectively;
- Italy presents a larger presence of women among mesothelioma cases due to the relevance of non-occupational exposures and to the historically high female workforce participation in several industrial settings (mainly non-asbestos textile sector);
- The awareness of occupational or environmental origin of mesothelioma in women could improve the efficiency of the public compensation system and the prevention policies, redefining the tools for investigating asbestos exposure in a gender perspective.

Marinaccio A, *et al*. *Occup Environ Med* 2018;

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Table 1 Main characteristics of malignant mesothelioma cases (n=21,398) collected by the Italian national mesothelioma register (ReNaM) by cancer site and gender. Italy, incidence period: 1993–2012

	Pleural			Peritoneal			Pericardial		
	Females	Males	F/M	Females	Males	F/M	Females	Males	F/M
Age classes									
≤44	100	213	0.47	39	52	0.75	1	6	0.17
45–64	1375	4281	0.32*	203	284	0.71	6	10	0.60
65–84	3516	9182	0.38	314	467	0.67	8	19	0.42
≥85	505	783	0.64*	19	14	1.36	1	–	–
Period of diagnosis									
1993–1997	533	1511	0.35	66	93	0.71	3	5	0.60
1998–2002	1381	3610	0.38	144	189	0.76	6	13	0.46
2003–2007	1826	4712	0.39	192	271	0.71	5	7	0.71
2008–2012	1756	4626	0.38	173	264	0.66	2	10	0.20
Diagnostic certainty									
MM certain	4144	11 705	0.35*	473	685	0.69	12	27	0.44
MM probable	660	1329	0.50*	81	85	0.95*	2	7	0.29
MM possible	692	1425	0.49*	21	47	0.45	2	1	2.00
Morphology									
Epithelioid	3038	7733	0.39	301	478	0.63	5	12	0.42
Fibrous	313	1244	0.25*	21	31	0.68	2	3	0.67
Bifphasic	513	1654	0.31*	72	65	1.11*	4	5	0.80
MM NOS	683	1805	0.38	141	154	0.92*	3	11	0.27
Not available	949	2023	0.47*	40	89	0.45*	2	4	0.50
Asbestos exposure†									
Occupational	1321	9525	0.14*	132	444	0.30*	4	18	0.22
Non-occupational	1151	492	2.34*	75	27	2.78*	1	–	–
Familial	632	106	5.96*	43	4	10.75*	–	–	–
Environmental	368	285	1.29*	24	16	1.50*	1	–	–
Leisure activities	151	101	1.50*	8	7	1.14	–	–	
Unknown, not probable	1497	1450	1.03*	184	124	1.48*	9	4	2.25*
Total	3969	11 467	0.35	391	595	0.66	14	22	0.64
Not available	1527	2992	0.51	184	222	0.83	2	13	0.15
Overall	5496	14 459	0.38	575	817	0.70	16	35	0.46

*Gender ratio significantly different from the overall value ($p<0.05$).
†Asbestos exposure is available for 16 458 MM cases.

ORIGINAL ARTICLE

Italian pool of asbestos workers cohorts: mortality trends of asbestos-related neoplasms after long time since first exposure

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Methods Pool of 43 previously studied Italian asbestos cohorts (asbestos cement, rolling stock, shipbuilding), with mortality follow-up updated to 2010. SMRs were computed for the 1970â€"2010 period, for the major causes, with consideration of duration and TSFE, using reference rates by age, sex, region and calendar period.

Results The study included 51 801 subjects (5741 women): 55.9% alive, 42.6% died (cause known for 95%) and 1.5% lost to follow-up. Mortality was significantly increased for all deaths (SMR: men: 1.05, 95% CI 1.03 to 1.06; women: 1.17, 95% CI to 1.12 to 1.22), all malignancies combined (SMR: men: 1.17, 95% CI to 1.14 to 1.20; women: 1.33, 95% CI 1.24 to 1.43), pleural and peritoneal malignancies (SMR: men: 13.28 and 4.77, 95% CI 12.24 to 14.37 and 4.00 to 5.64; women: 28.44 and 6.75, 95% CI 23.83 to 33.69 and 4.70 to 9.39), lung (SMR: men: 1.26, 95% CI 1.21 to 1.31; women: 1.43, 95% CI 1.13 to 1.78) and ovarian cancer (SMR=1.38, 95% CI 1.00 to 1.87) and asbestosis (SMR: men: 300.7, 95% CI 270.7 to 333.2; women: 389.6, 95% CI 290.1 to 512.3). Pleural cancer rate increased during the first 40 years of TSFE and reached a plateau after.

Discussion The study confirmed the increased risk for cancer of the lung, ovary, pleura and peritoneum but not of the larynx and the digestive tract. Pleural cancer mortality reached a plateau at long TSFE, coherently with recent reports.

What this paper adds

- Asbestos is a known human carcinogen largely diffused in occupational and environmental setting, nowadays in particular in low-income, middle-income countries.
- We conducted a large cohort study pooling 43 Italian industrial cohorts of asbestos using industries to update mortality analyses in former exposed workers and to study cancer risk after over 40 years of time since first exposure.
- Results in this first report of the project confirm the increased risk for pleural and peritoneal malignancy, lung and ovarian cancer and asbestosis and also suggest an increased risk for bladder cancer, but give little support to the association with other cancers.
- Risk of death for pleural malignancies flattens after long time since first exposure. This result is not compatible with the traditional model which predicts a continuous exponential increase in risk of mesothelioma. These results prompt a revision of the model and have practical implication for prevention, risk apportionment and forecasts of future burden of disease.

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Table 2 Pooled Italian asbestos cohort study

	Men					Women				
Causes of death	Observed	Expected	SMR	95% CI		Observed	Expected	SMR	95% CI	
All causes	18370	17551.8	1.05	1.03	1.06	2503	2138.0	1.17	1.12	1.22
MN	7361	6293.7	1.17	1.14	1.20	818	612.7	1.33	1.24	1.43
MN lip, oral cavity and pharynx	149	191.5	0.78	0.66	0.91	9	6.6	1.37	0.62	2.59
MN digestive organs (including peritoneum)	2198	2194.5	1.00	0.96	1.04	262	226.9	1.16	1.02	1.30
MN stomach	523	575.2	0.91	0.83	0.99	44	47.9	0.92	0.67	1.23
MN small intestine	14	10.8	1.30	0.71	2.18	1	1.2	0.84	0.02	4.68
MN colon	408	413.2	0.99	0.89	1.09	62	52.8	1.17	0.90	1.50
MN rectum	173	180.4	0.96	0.82	1.11	22	20.3	1.08	0.68	1.64
MN of liver and intrahepatic bile ducts	378	380.4	0.99	0.90	1.10	25	28.9	0.87	0.56	1.28
MN peritoneum	136	28.5	4.77	4.00	5.64	35	5.2	6.75	4.70	9.39
MN respiratory organs	3207	2155.3	1.49	1.44	1.54	217	62.6	3.47	3.02	3.96
MN larynx	141	162.9	0.87	0.73	1.02	2	1.6	1.24	0.15	4.48
MN lung	2415	1918.6	1.26	1.21	1.31	78	54.6	1.43	1.13	1.78
MN pleura	611	46.0	13.28	12.24	14.37	134	4.7	28.44	23.83	33.69
MN uterus						34	35.7	0.95	0.66	1.33
MN ovary						43	31.1	1.38	1.00	1.87
MN prostate	352	361.4	0.97	0.87	1.08					
MN bladder	291	249.2	1.17	1.04	1.31	19	9.5	1.99	1.20	3.11
MN kidney	157	160.7	0.98	0.83	1.14	6	10.2	0.59	0.22	1.29
Leukaemia and lymphoma	446	434.2	1.03	0.93	1.13	47	50.7	0.93	0.68	1.23
MN unspecified site	220	158.3	1.39	1.21	1.59	19	18.1	1.05	0.63	1.64
Psychiatric diseases	143	161.0	0.89	0.75	1.05	51	34.6	1.47	1.10	1.94
Neurological diseases	275	361.2	0.76	0.67	0.86	45	63.3	0.71	0.52	0.95
Cardiovascular diseases	5452	6209.0	0.88	0.85	0.90	909	912.2	1.00	0.93	1.06
Respiratory diseases	1413	1113.4	1.27	1.20	1.34	154	108.7	1.42	1.20	1.66
Digestive diseases	932	1034.5	0.90	0.84	0.96	118	104.3	1.13	0.94	1.36
Genitourinary diseases	184	219.0	0.84	0.72	0.97	31	27.8	1.12	0.76	1.58
Asbestosis	366	1.2	300.72	270.70	333.17	51	0.1	389.61	290.09	512.27
Pneumoconioses	455	50.4	9.03	8.22	9.90	53	0.3	193.6	145.0	253.21
Accidents and violence	851	1004.7	0.85	0.79	0.91	76	78.6	0.97	0.76	1.21
Poorly specified causes	230	120.9	1.90	1.66	2.16	75	32.93	2.28	1.79	2.86

Number of observed and expected deaths, SMR and 95% CI by gender and cause of death after 1 January 1970 (see text)

Ferrante D, *et al*. *Occup Environ Med* 2017;

Malignant mesothelioma: Ongoing controversies about its etiology in females

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Abstract

Malignant mesothelioma (MM) is one of the most aggressive cancers with the poorest of outcomes. There is no doubt that mesothelioma in males is related to asbestos exposure, but some authors suggest that most of the cases diagnosed in females are "idiopathic." In our assessment of the science, the "low risk" of mesothelioma in females is because of the nonsystematic recording of exposure histories among females. Indeed, asbestos exposure is mentioned in only some of the studies that include females. We estimate the risk of MM among females to be close to that in males. The absence of detailed exposure histories should be rectified in future studies involving women. As a matter of social justice, the ongoing failure to recognize asbestos as the cause of a majority of cases of MM in females does them, and their kin, a profound disservice.

KEYWORDS

asbestos, etiology, exposure history, mesothelioma, women

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Occupational, Environmental, and Life-Style Factors Associated With the Risk of Hematolymphopoietic Malignancies in Women

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TABLE III. ORs[a] and 95% CI for Non-Hodgkin's Lymphoma (ICD IX: 200, 202) and Chronic Lymphocytic Leukemia (ICD IX 204.1), for Leukemias (ICD IX: 204–208), for Multiple Myeloma (ICD IX: 203), for Hodgkin's Disease (ICD IX: 201); Women Employed as Professional, Clerical, Sales, and Service Workers, Italy

	Non-Hodgkin's lymphomas + chronic lymphocytic leukaemia			Leukemias			Multiple myeloma			Hodgkin's disease		
Occupational groups[b]	Exposed cases[c]	OR	95% CI	Exposed cases[c]	OR	95% CI	Exposed cases[c]	OR	95% CI	Exposed cases[c]	OR	95% CI
Medical, dental, veterinary, and related workers	18	1.4	0.7–2.7	8	1.7	0.7–4.2	—	—	—	—	—	—
Professional workers	6	0.7	0.2–2.0	—	—	—	—	—	—	—	—	—
Teachers	38	1.7	1.0–2.7	16	1.5	0.8–2.7	4	0.8	0.3–2.3	11	1.8	0.8–3.7
Sculptors, painters, and related artists	—	—	—	—	—	—	—	—	—	3	20.0	1.0–399.5
Managers	6	0.9	0.3–2.7	—	—	—	—	—	—	—	—	—
Clerical workers	86	1.1	0.8–1.6	27	0.8	0.5–1.4	11	0.8	0.4–1.6	17	0.7	0.4–1.2
Sales workers	62	0.9	0.6–1.3	25	1.1	0.7–1.8	11	0.9	0.4–1.8	13	1.0	0.5–2.0
Working proprietors (catering and lodging services)	8	0.7	0.3–1.6	5	1.5	0.5–4.5	—	—	—	—	—	—
Cooks, waiters, bartenders, and related workers	30	1.4	0.8–2.4	14	1.8	0.9–3.7	3	0.5	0.2–1.8	6	1.8	0.7–4.6
Maids and related housekeeping service workers	54	0.9	0.6–1.3	13	0.6	0.3–1.1	12	0.8	0.4–1.5	11	1.7	0.8–3.6
Building caretakers, charworkers, cleaners, and related workers	26	1.0	0.6–1.7	8	1.0	0.4–2.4	8	1.4	0.6–3.4	—	—	—
Launderers, dry cleaners, and pressers	10	0.7	0.3–1.5	5	1.1	0.4–3.2	3	1.0	0.3–3.8	7	3.5	1.5–8.2
Hairdressers, barbers, beauticians, and related workers	9	1.9	0.7–5.8	5	2.2	0.7–7.1	3	11.1	1.8–67.0	5	2.1	0.7–6.5

[a]Age-adjusted odds ratios.

Miligi et al. 1999

TABLE V. ORs[a] and 95% CI for Non-Hodgkin's Lymphoma (ICD IX: 200, 202) and Chronic Lymphocytic Leukemia (ICD IX: 204.1), for Leukemias (ICD IX: 204–208), for Multiple Myeloma (ICD IX: 203), for Hodgkin's Disease (ICD IX: 201); Selected Occupation (3- or 5-digit ILO code[b]), Women, Italy

Occupational groups	3- or 5-digit ILO code[b]	Non-Hodgkin's lymphomas + chronic lymphocytic leukaemia			Leukemias			Multiple myeloma			Hodgkin's disease		
		Exposed cases	OR	95% CI	Exposed cases	OR	95% CI	Exposed cases	OR	95% CI	Exposed cases	OR	95% CI
Secondary education teachers	132	16	1.6	0.8–3.2	3	0.6	0.2–2.0	0	—	—	5	2.1	0.7–6.2
Primary education teachers	133	14	1.4	0.6–3.2	6	1.3	0.5–3.4	0	—	—	3	0.9	0.2–2.9
Pre-primary education teachers	134	5	1.7	0.4–7.0	5	4.0	1.0–15.1	0	—	—	2	6.8	0.8–57.9
Women's hairdressers	57020	7	1.8	0.5–6.2	4	2.2	0.6–8.1	3	13.2	2.1–81.7	5	2.4	0.8–7.6
Orchard, vineyard, and related workers	623	22	0.7	0.4–1.2	16	1.5	0.8–2.8	15	1.8	0.9–3.5	2	0.7	0.2–3.0
Spinners and winders	752	23	1.0	0.6–1.9	3	0.9	0.2–3.6	0	—	—	3	0.9	0.2–3.4
Weavers and related workers	754	29	0.8	0.5–1.4	4	0.9	0.3–3.0	4	1.3	0.4–4.1	4	1.3	0.4–3.7
Knitters	755	24	2.0	1.0–3.9	6	1.5	0.5–4.2	5	3.3	0.9–11.8	4	1.8	0.6–5.3
Bleachers, dyers, and textile product finishers	756	6	2.1	0.5–8.2	0	—	—	0	—	—	0	—	—

[a]Age-adjusted odds ratios.
[b]International Standard Classification of Occupation, ILO, 1968.

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A Multicenter Case-Control Study in Italy on Hematolymphopoietic Neoplasms and Occupation

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(Epidemiology 2001;12:78–87)

TABLE 7. Odds Ratios* (OR) and 95% Confidence Intervals (95% CI) for Farmers and Agricultural and Husbandry Workers

	Women			Men		
Pathology	Exposed Cases	OR	95% CI	Exposed Cases	OR	95% CI
Farmers (ILO: 61)						
All malignancies	69	0.9	0.6–1.3	184	0.9	0.7–1.1
NHL, CLL	40	0.8	0.5–1.2	118	0.8	0.6–1.1
Small cell lymphomas	15	1.1	0.6–2.1	43	0.9	0.6–1.3
Hodgkin's disease	3	0.6	0.2–2.1	10	0.7	0.3–1.3
All leukemias	22	1.1	0.6–1.9	52	0.8	0.6–1.1
Multiple myeloma	12	0.7	0.4–1.4	22	0.7	0.5–1.2
Agricultural and animal husbandry workers (ILO: 62)						
All malignancies	155	0.9	0.7–1.2	237	1.1	0.8–1.3
NHL, CLL	89	0.8	0.6–1.1	161	1.1	0.8–1.4
Small cell lymphomas	29	1.0	0.6–1.5	65	1.4	1.0–1.9
Hodgkin's disease	15	1.6	0.9–2.9	11	0.6	0.3–1.2
All leukemias	37	1.1	0.7–1.7	63	1.0	0.7–1.4
Multiple myeloma	21	1.1	0.7–1.9	30	1.3	0.8–2.2

ILO = International Labour Office; NHL = non-Hodgkin's lymphoma; CLL = chronic lymphocyte leukemia.
* Adjusted by age.

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Gender Differences

Many of the apparent differences in occupational risks between men and women in this study can be explained by differences in employment patterns. For example, the elevated risks for all malignancies among managers were only observed among males. There were very few women who reported having these occupations, however, and insufficient numbers of exposed cases to provide any meaningful evidence about the magnitude of the risk among women in these occupations. Conversely, HD was elevated among several traditionally female occupations—laundry workers, maids, and hairdressers—for which the number of males was insufficient to estimate effect.

There was evidence for an elevated relative risk of MM among both female and male hairdressers, although in neither gender were the data numerous–there were three female and five male exposed cases.

There is perhaps some evidence of inconsistency in risk of NHL among teachers. Among women, the OR was 1.7 (95% CI = 1.0–2.0, based on 38 exposed cases), whereas among men the OR was 0.7 (95% CI = 0.3–1.3, based on 14 exposed cases). Female teachers appeared to have higher risks of NHL, HD, and to a lesser extent also of leukemia than men and women in other occupations.[59] Another gender difference appears in the results for textile workers and HD; the ORs were 1.1 for women and 2.4 for men, with equal numbers of exposed cases (11 women and 12 men). MM was elevated among male tailors (OR = 3.5, 95% CI = 1.3–9.6, based on 7 exposed cases), whereas among females it did not appear to be elevated (OR = 0.8, 95% CI = 0.4–1.4, based on 17 exposed cases).

A Section 508–conformant HTML version of this artic
is available at http://dx.doi.org/10.1289/ehp.140925

Occupation and Risk of Non-Hodgkin Lymphoma and Its Subtypes: A Pooled Analysis from the InterLymph Consortium

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2016

BACKGROUND: Various occupations have been associated with an elevated risk of non-Hodgkin lymphoma (NHL), but results have been inconsistent across studies.

OBJECTIVES: We investigated occupational risk of NHL and of four common NHL subtypes with particular focus on occupations of *a priori* interest.

METHODS: We conducted a pooled analysis of 10,046 cases and 12,025 controls from 10 NHL studies participating in the InterLymph Consortium. We harmonized the occupational coding using the 1968 International Standard Classification of Occupations (ISCO-1968) and grouped occupations previously associated with NHL into 25 *a priori* groups. Odds ratios (ORs) adjusted for center, age, and sex were determined for NHL overall and for the following four subtypes: diffuse large B-cell lymphoma (DLBCL), follicular lymphoma (FL), chronic lymphocytic leukemia/small lymphocytic lymphoma (CLL/SLL), and peripheral T-cell lymphoma (PTCL).

RESULTS: We confirmed previously reported positive associations between NHL and farming occupations [field crop/vegetable farm workers OR = 1.26; 95% confidence interval (CI): 1.05, 1.51; general farm workers OR = 1.19; 95% CI: 1.03, 1.37]; we also confirmed associations of NHL with specific occupations such as women's hairdressers (OR = 1.34; 95% CI: 1.02, 1.74), charworkers/cleaners (OR = 1.17; 95% CI: 1.01, 1.36), spray-painters (OR = 2.07; 95% CI: 1.30, 3.29), electrical wiremen (OR = 1.24; 95% CI: 1.00, 1.54), and carpenters (OR = 1.42; 95% CI: 1.04, 1.93). We observed subtype-specific associations for DLBCL and CLL/SLL in women's hairdressers and for DLBCL and PTCL in textile workers.

CONCLUSIONS: Our pooled analysis of 10 international studies adds to evidence suggesting that farming, hairdressing, and textile industry–related exposures may contribute to NHL risk. Associations with women's hairdresser and textile occupations may be specific for certain NHL subtypes.

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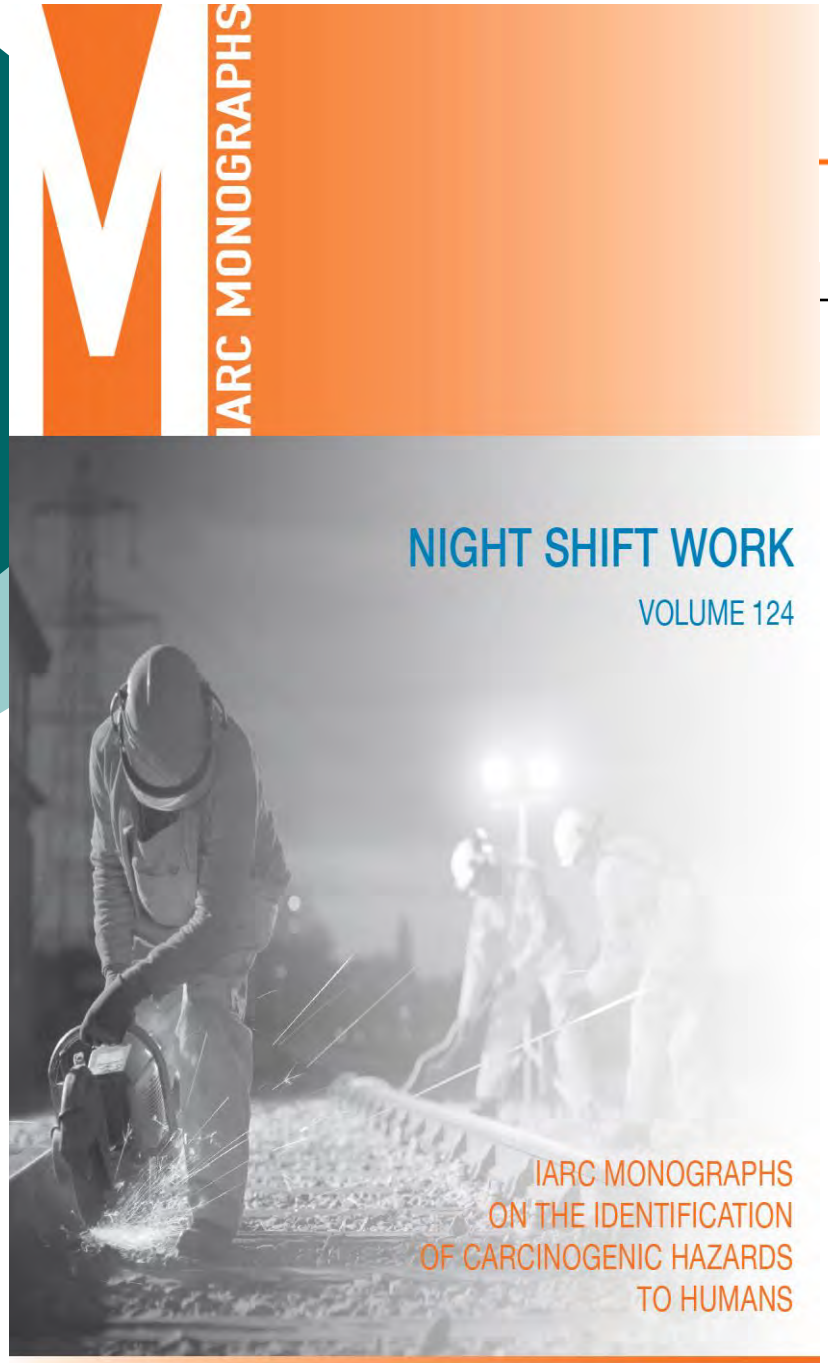
Carcinogenicity of night shift work

In June, 2019, a Working Group of 27 scientists from 16 countries met at the International Agency for Research on Cancer (IARC) in Lyon, France, to finalise their evaluation of the carcinogenicity of night shift work. This assessment will be published in volume 124 of the IARC Monographs.[1]

Night shift work involves work, including transmeridian air travel, during the regular sleeping hours of the general population. The misalignment or disruption of circadian rhythms of normal physiology is the most pronounced effect of night shift work.

Night shift work is essential for guaranteeing round-the-clock production and activities. It is commonly found in health care, manufacturing, transport, retail, and services sectors. About 1 in 5 workers worldwide are engaged in night shift work; however, definitions, quality, and extent of data vary globally. Regulatory approaches for night shift work and their degree of implementation also differ across regions and employment sectors.

The Working Group concluded there was limited evidence that night shift work causes breast, prostate, and colorectal cancer. This evaluation was based on comprehensive searches of the literature, screening of the studies using established inclusion criteria, and evaluation of study quality, including a standardised review of exposure assessment. Greater weight was given to the most informative human cancer studies based on methodologic considerations, including study size, potential selection bias, night work assessment quality (most notably, potential for misclassification), and control for potential confounding factors. The largest number of informative studies examined breast cancer, several examined prostate and colorectal cancer, while fewer were done on other cancers.



6. EVALUATION AND RATIONALE

6.1 Cancer in humans

There is *limited evidence* in humans for the carcinogenicity of night shift work. Positive associations have been observed between night shift work and cancers of the breast, prostate, colon, and rectum.

6.2 Cancer in experimental animals

There is *sufficient evidence* in experimental animals for the carcinogenicity of alteration in the light–dark schedule.

6.3 Mechanistic evidence

There is *strong evidence* in experimental systems that alteration in the light–dark schedule exhibits key characteristics of carcinogens, based on evidence of effects consistent with immunosuppression, chronic inflammation, and cell proliferation.

6.4 Overall evaluation

Night shift work is *probably carcinogenic to*

medicina

MDPI

Medicina 2020

Review

Relationship between Night Shifts and Risk of Breast Cancer among Nurses: A Systematic Review

Javier Fagundo-Rivera [1], Juan Gómez-Salgado [2,3,*], Juan Jesús García-Iglesias [2], Carlos Gómez-Salgado [1], Selena Camacho-Martín [4] and Carlos Ruiz-Frutos [2,3]

5. Conclusions

The different studies of this review showed a significant relation between breast cancer and prolonged rotating night shifts in the established time. In this way, cumulative years working at night, long shift length (12 h), and performing more than 6 night shifts per month for at least 5 years or more are found as a potential breast cancer risk factors, especially in hormone-dependent cancers and among nurses who started working at night in their early career. Similarly, there is a relationship between alterations in certain markers of circadian rhythm such as melatonin or in markers of epigenetic alteration such as telomeres length and breast cancer, that would require further studies in order to support these findings.

Today's world has an increasing and faster trend towards the so-called "24-h societies". To this we must add the need for continuous and necessary care that patients require, so it would be beneficial to apply preventive measures that minimize or avoid as much as possible these alterations in order to reduce the incidence of breast cancer among nurses.

Exposure to benzene and risk of breast cancer among shoe factory workers in Italy

Adele Seniori Costantini[1], Giuseppe Gorini[1], Dario Consonni[2], Lucia Miligi[1], Lucia Giovannetti[1], and Margaret Quinn[3]

Tumori, 95: 8-12, 2009

Aims and background. Evidence of the association between leukemia and benzene exposure has been provided by several epidemiological studies. An increased risk of breast cancer among women exposed to benzene has also been suggested. The aim of this study was to analyze breast cancer risk in a cohort of 1,002 women exposed to benzene in a shoe factory in Florence, Italy, where an excess of leukemia in men was reported.

Methods. The cohort of women at work on January 1st, 1950, was followed from 1950 to 2003 for mortality and from 1985 to 2000 for incidence of breast cancer. For a sub-cohort of 797 women, cumulative exposure to benzene was available.

Results. Standardized mortality ratios were obtained for the 797 women for whom information on cumulative exposure was available. For those with <30 years of latency the standardized mortality ratio was 58.5 (95% CI, 18.9-181.2, based on 3 deaths) and 151.1 (95% CI, 78.6-290.3, based on 9 deaths) for ≥30 years of latency. In the >40 ppm-year and ≥30 year latency period category, the standardized mortality ratio was 166.0 (95% CI, 62.3-442.2, based on 4 deaths). The standardized incidence ratio for women with a latency period <30 years was 140.9 (95% CI, 75.8-261.9, based on 10 cases) and 108.2 (95% CI, 64.1-182.7) for a latency period ≥30 years. For cumulative exposure >40 ppm-years and a latency period <30 years, the standardized incidence ratio was 211.9 (95% CI, 29.9-1504.1, based on 1 case).

Conclusions. The study moderately supports the hypothesis that benzene represents a risk factor for breast cancer.

Occupational Exposure to Solvents and Risk of Breast Cancer

Deborah C. Glass, MA, MSc, PhD,[1] **Jane Heyworth,** BAppSc, MPH, PhD,[2] **Allyson K. Thomson,** BSc, MSc, PhD,[3] **Susan Peters,** BSc, MSc, PhD,[2] **Christobel Saunders,** MBBS,[4] **and Lin Fritschi,** MBBS, PhD[3]

Background *Occupational exposure to some organic solvents may increase risk of breast cancer.*

Methods *In a population-based case-control study, 1,205 women diagnosed with primary breast cancer between 2009 and 2011 were drawn from the Western Australian Cancer Registry and matched to 1,789 controls from the electoral roll. Exposure to solvents was determined through telephone interviews using OccIDEAS.*

Results *About a third of women were occupationally exposed to solvents. Age adjusted breast cancer risks were elevated for women who had been exposed to aliphatic solvents odds ratio (OR) 1.21 (95%CI 0.99–1.48) and aromatic solvents OR 1.21 (95%CI 0.97–1.52). For most solvents the ORs were higher for those diagnosed before menopause.*

Conclusions *This study suggests that there may be an association between occupational exposure to aliphatic and aromatic solvents and the risk of breast cancer at the low levels of exposure experienced by women in this study.* Am. J. Ind. Med. 58:915–922, 2015. © 2015 Wiley Periodicals, Inc.

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Occupational Exposure to Solvents and Risk of Breast Cancer

2015

Deborah C. Glass, MA, MSc, PhD,[1] Jane Heyworth, BAppSc, MPH, PhD,[2] Allyson K. Thomson, BSc, MSc, PhD,[3] Susan Peters, BSc, MSc, PhD,[2] Christobel Saunders, MBBS,[4] and Lin Fritschi, MBBS, PhD[3]

TABLE II. Breast Cancer Odds Ratios, for all Women and Stratified by Menopausal Status at Time of Recruitment, Adjusted for Age, Comparing Cases and Controls With any Probable Solvent Exposure to Cases and Controls With no or Only Possible Exposure (Total Controls 1,785, total cases 1,202) (Seven Participants Were Missing Solvent Data)

		All participants			Premenopausal			Post menopausal			
	Solvent exposed?	Controls	Cases	OR (95%CI)	Controls	Cases	OR (95%CI)	Controls	Cases	OR (95%CI)	P-value for interaction
Benzene	No	1681	1127	1.00 (ref)	399	340	1.00	1282	787	1.00	0.188
	Yes	104	75	1.08 (0.80–1.47)	20	26	1.53 (0.84–2.80)	84	49	0.96 (0.67–1.38)	
Other aromatic	No	1587	1045	1.00	377	316	1.00	1210	729	1.00	0.392
	Yes	197	155	1.21 (0.97–1.52)	42	50	1.43 (0.92–2.21)	156	107	1.15 (0.88–1.49)	
Aliphatic	No	1731	1165	1.00	368	309	1.00	1157	690	1.00	0.582
	Yes	54	37	1.21 (0.99–1.48)	51	57	1.33 (0.89–2.00)	209	146	1.16 (0.92–1.46)	
Chlorinated	No	1525	999	1.00	409	354	1.00	1322	811	1.00	0.372
	Yes	260	203	1.05 (0.69–1.61)	10	12	1.47 (0.62–3.45)	44	25	0.94 (0.57–1.54)	
Alcohol	No	1402	920	1.00	333	289	1.00	1069	631	1.00	0.611
	Yes	382	282	1.15 (0.96–1.37)	86	77	1.05 (0.74–1.49)	297	205	1.16 (0.95–1.43)	
Any Solvent	No	1251	811	1.00	301	254	1.00	950	557	1.00	0.977
	Yes	534	391	1.15 (0.98–1.35)	118	112	1.14 (0.84–1.56)	416	279	1.14 (0.95–1.37)	

Carcinogenicity of polychlorinated biphenyls and polybrominated biphenyls

In February 2013, 26 experts from 12 countries met at the International Agency for Research on Cancer (IARC), Lyon, France, to reassess the carcinogenicity of polychlorinated biphenyls (PCBs) and polybrominated biphenyls (PBBs). These assessments will be published as volume 107 of the IARC Monographs.[1]

PCBs are a class of aromatic com-

On the basis of sufficient evidence of carcinogenicity in humans and experimental animals, the Working Group classified PCBs as carcinogenic to humans (Group 1). Additionally, dioxin-like PCBs were also classified in Group 1 on the basis of extensive evidence of an AhR-mediated mechanism of carcinogenesis that is identical to that of 2,3,7,8-tetrachlorodibenzo-para-dioxin, and sufficient evidence of carcinogenicity in experimental animals. However, the carcinogenicity of PCBs cannot be solely attributed to the carcinogenicity of the dioxin-like PCBs.

PCB causa in maniera certa il tumore nell'uomo, associazione certa con il melanoma maligno e con evidenza più limitata il tumore al seno

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Role of occupational exposures in lung cancer risk among women

Methods A population-based case–control study on lung cancer was conducted from 1996 to 2001 in Montreal, Canada. Cases were individuals diagnosed with incident lung cancer and population controls were randomly selected from electoral lists and frequency-matched to age and sex distributions of cases. Questionnaires on lifetime occupational history, smoking and demographic characteristics were collected during in-person interviews. As part of a comprehensive exposure assessment protocol, experts reviewed each subject's work history and assessed exposure to many agents. The current analysis, restricted to working women in the study, includes 361 cases and 521 controls. We examined the association between lung cancer and each of 22 occupational exposures, chosen because of their relatively high prevalences among these women. Each exposure was analysed in a separate multivariate logistic regression model, adjusted for smoking and other selected covariates.

Results There were few elevated OR estimates between lung cancer and any of the agents, and none were statistically significant, although the limited numbers of exposed women engendered wide CIs.

Conclusions There was little evidence to suggest that women in this population had experienced excess risks of lung cancer as a result of their work exposures. However, the wide CIs preclude any strong inferences in this regard.

[1,2]

Xu M, *et al*. *Occup Environ Med* 2020

Role of occupational exposures in lung cancer risk among women

Xu M, *et al*. *Occup Environ Med* 2020

1,2

Methods A population-based case–control study on lung cancer was conducted from 1996 to 2001 in Montreal, Canada. Cases were individuals diagnosed with incident lung cancer and population controls were randomly selected from electoral lists and frequency-matched to age and sex distributions of cases. Questionnaires on lifetime occupational history, smoking and demographic characteristics were collected during in-person interviews. As part of a comprehensive exposure assessment protocol, experts reviewed each subject's work history and assessed exposure to many agents. The current analysis, restricted to working women

Table 4 Exposure to three-digit ISCO-68 job titles* and lung cancer risk among women

Occupations	Any exposure† (ref: unexposed)					>10 years of exposure† (ref: unexposed)				
Three-digit ISCO-68 job titles	No of exposed cases	No of exposed controls	OR	LCI‡	UCI‡	No of exposed cases	No of exposed controls	OR	LCI‡	UCI‡
3.21_Stenographers, typists and teletypists	62	92	1.1	0.7	1.7	31	51	1.1	0.6	2.0
3.31_Bookkeepers and cashiers	59	98	0.8	0.5	1.2	25	43	0.8	0.4	1.5
3.93_Correspondence and reporting clerks	33	30	1.4	0.7	2.6	14	9	1.6	0.6	4.4
5.32_ Waitresses, bartenders and related workers	56	33	1.4	0.8	2.5	32	12	2.7	1.2	6.5
5.40_Maids and related housekeeping service workers not elsewhere classified	34	39	1.1	0.6	2.1	12	11	1.3	0.5	4.0
7.95_Sewers and embroiderers	43	65	1.2	0.7	2.1	14	34	0.9	0.4	2.0

*These occupations were selected because they were relatively prevalent in our study sample.
†All models were adjusted for: age (continuous), ethnicity (French Canadian, others) and Comprehensive Smoking Index.
‡LCL, lower 95% confidence limit; UCL, upper 95% confidence limit.
ISCO-68, International Standard Classification of Occupations, Rev. 1968.

Come studiare i tumori nelle donne? Il COR dei tumori a bassa frazione eziologica con il metodo OCCAM

Female Breast Cancer in Lombardy, Italy (2002–2009): A Case–Control Study on Occupational Risks

Enrico Oddone, MD,[1*] Valeria Edefonti, PhD,[2] Alessandra Scaburri, ScD,[3] Tiziana Vai, MD,[4] Paolo Crosignani, MD,[3] and Marcello Imbriani, MD[5]

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IN TOSCANA Prima sperimentazione

- 2001-2002

  successivamente

- Dati 2002-2005

  dati per la Toscana e

  Per provincia

- Terza fase 2003-2010 per tre ASL

- Quarta fase 2005-2015 tutta la TOSCANA in atto

ISPRO

2 a fase OCCAM 2002-2005, Tumori del polmone , laringe e vescica ORs significativi, Intervalli di confidenza al 90% , controlli e casi esposti per attività economica

sesso	attivita' economica	OR	IC 90%		cont.esp	casi esp.
	POLMONE					
F	CHIMICA	2,18	1,05	4,53	86	6
F	SANITA E SERVIZI VETERINARI	1,79	1,12	2,87	326	15
M	COSTRUZIONI NAVALI	1,62	1,02	2,56	105	18
M	EDILIZIA	1,24	1,07	1,44	1439	236
M	PESCA	3,91	2,04	7,49	23	11
M	SIDERURGIA E METALLURGIA	1,27	1,01	1,6	558	95
M	TRASPORTI	1,4	1,16	1,68	697	133
	LARINGE					
F	CUOIO E CALZATURE	2,54	1,02	6,33	1486	6
M	CUOIO E CALZATURE	1,54	1,01	2,36	509	22
M	EDILIZIA	2,04	1,57	2,64	1439	85
M	PLASTICA	2,02	1,04	3,95	127	7
	VESCICA					
F	TRASPORTI	3,4	1,41	8,19	99	4
F	VETRO	3,22	1,16	8,97	58	3
M	CHIMICA	1,4	1,06	1,86	323	49

Numerosi studi hanno indagato l'esposizione occupazionale per genere osservando sistematiche disparità:

Uomini e donne lavorano in comparti differenti sperimentando esposizioni diverse

- Per esempio le donne che lavorano come impiegate o nei servizi o nel vendite sono circa tre volte che gli uomini (Eng et al 2011) viceversa gli uomini lavorano in settori industriali sono circa un quinto di più delle donne.
- Gli uomini e le donne che fanno lo stesso lavoro percepiscono e/o riportano esposizioni differenti la posizione sociale può influenzare la modalità nel riportare
- Anche all'interno dello stesso lavoro possono avere esposizioni differenti e dal punto di vista epidemiologico questo potrebbe portare ad una misclassificazione dell'esposizione
- Differenti compiti all' interno dello stesso lavoro (es. donne in agricoltura non fanno per lo meno in Italia mansioni di irrorazione pesticidi ma sono maggiormente impiegate nelle mansioni di rientro che comunque possono comportare esposizioni a prodotti fitosanitari)

Nonostante alcuni gap la ricerca epidemiologica sui tumori e lavoro nelle donne sta aumentando

Anche se permangono limiti dovuti al basso numero di donne soprattutto quando si studiano alcuni tipi di tumori

Rimangono problemi legati a come gli studi vengono condotti e analizzati.

Quindi:

Aumentare la numerosità delle donne negli studi

Utilizzare una definizione dell' esposizione che tenga conto delle donne

E considerare confondenti sesso e genere specifici