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degli STUDI  
di CATANIA

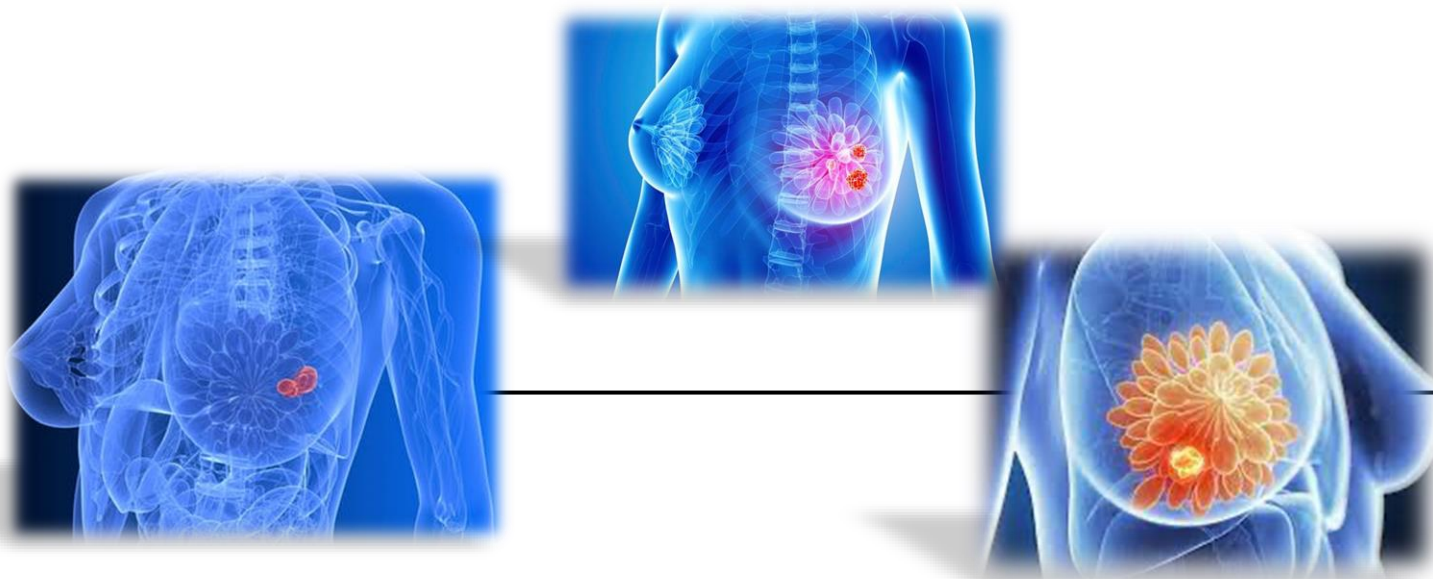


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***UNIVERSITY OF CATANIA (Italy)***  
***DEPARTMENT OF CLINICAL AND EXPERIMENTAL MEDICINE***

## **WORK ABILITY IN HEALTHCARE PERSONNEL AFTER BREAST CANCER**



**Prof. Venerando Rapisarda**



# Breast Cancer INCIDENCE

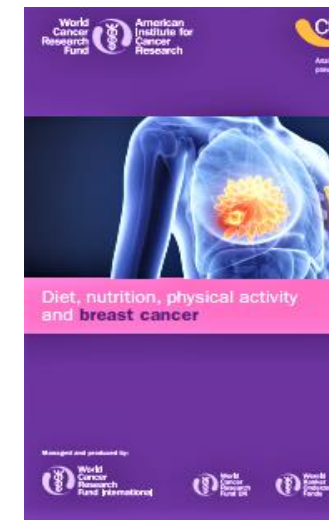


TABLE 1. New Cases and Deaths for 36 Cancers and All Cancers Combined in 2020

CANCER SITE	NO. OF NEW CASES (% OF ALL SITES)		NO. OF NEW DEATHS (% OF ALL SITES)	
Female breast	2,261,419	(11.7)	684,996	(6.9)
Lung	2,206,771	(11.4)	1,796,144	(18.0)
Prostate	1,414,259	(7.3)	375,304	(3.8)
Nonmelanoma of skin*	1,198,073	(6.2)	63,731	(0.6)
Colon	1,148,515	(6.0)	576,858	(5.8)
Stomach	1,089,103	(5.6)	768,793	(7.7)
Liver	905,677	(4.7)	830,180	(8.3)
Rectum	732,210	(3.8)	339,022	(3.4)
Cervix uteri	604,127	(3.1)	341,831	(3.4)
Esophagus	604,100	(3.1)	544,076	(5.5)
Thyroid	586,202	(3.0)	43,646	(0.4)
Bladder	573,278	(3.0)	212,536	(2.1)
Non-Hodgkin lymphoma	544,352	(2.8)	259,793	(2.6)
Pancreas	495,773	(2.6)	466,003	(4.7)
Leukemia	474,519	(2.5)	311,594	(3.1)
Kidney	431,288	(2.2)	179,368	(1.8)
Corpus uteri	417,367	(2.2)	97,370	(1.0)
Lip, oral cavity	377,713	(2.0)	177,757	(1.8)
Melanoma of skin	324,635	(1.7)	57,043	(0.6)
Ovary	313,959	(1.6)	207,252	(2.1)
Brain, nervous system	308,102	(1.6)	251,329	(2.5)
Larynx	184,615	(1.0)	99,840	(1.0)
Multiple myeloma	176,404	(0.9)	117,077	(1.2)
Nasopharynx	133,354	(0.7)	80,008	(0.8)
Gallbladder	115,949	(0.6)	84,695	(0.9)
Oropharynx	98,412	(0.5)	48,143	(0.5)
Hypopharynx	84,254	(0.4)	38,599	(0.4)
Hodgkin lymphoma	83,087	(0.4)	23,376	(0.2)
Testis	74,458	(0.4)	9334	(0.1)
Salivary glands	53,583	(0.3)	22,778	(0.2)
Anus	50,865	(0.3)	19,293	(0.2)
Vulva	45,240	(0.2)	17,427	(0.2)
Penis	36,068	(0.2)	13,211	(0.1)
Kaposi sarcoma	34,270	(0.2)	15,086	(0.2)
Mesothelioma	30,870	(0.2)	26,278	(0.3)
Vagina	17,908	(0.1)	7995	(0.1)
All sites excluding nonmelanoma skin	18,094,716		9,894,402	
All sites	19,292,789		9,958,133	

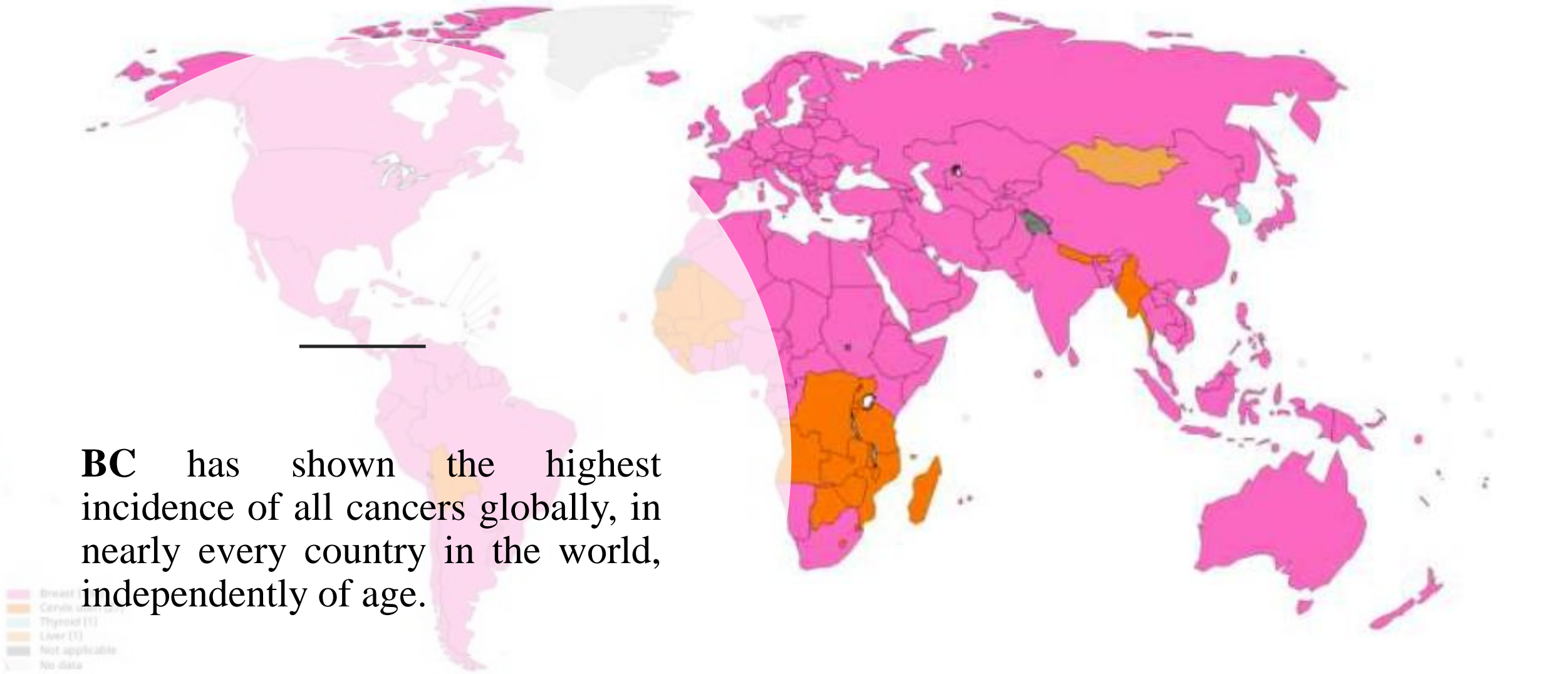
\*New cases exclude basal cell carcinoma, whereas deaths include all types of nonmelanoma skin cancer. Source: GLOBOCAN 2020.

An estimated 19.3 million new cancer cases (18.1 million excluding nonmelanoma skin cancer) and almost 10.0 million cancer deaths (9.9 million excluding nonmelanoma skin cancer) occurred in 2020. Female **breast cancer (BC)** has overcome lung cancer as most commonly diagnosed cancer, with an estimated 2.3 million new cases (11.7%) followed by lung (11.4%), colorectal (10.0%), prostate (7.3%), and stomach (5.6%) cancers.



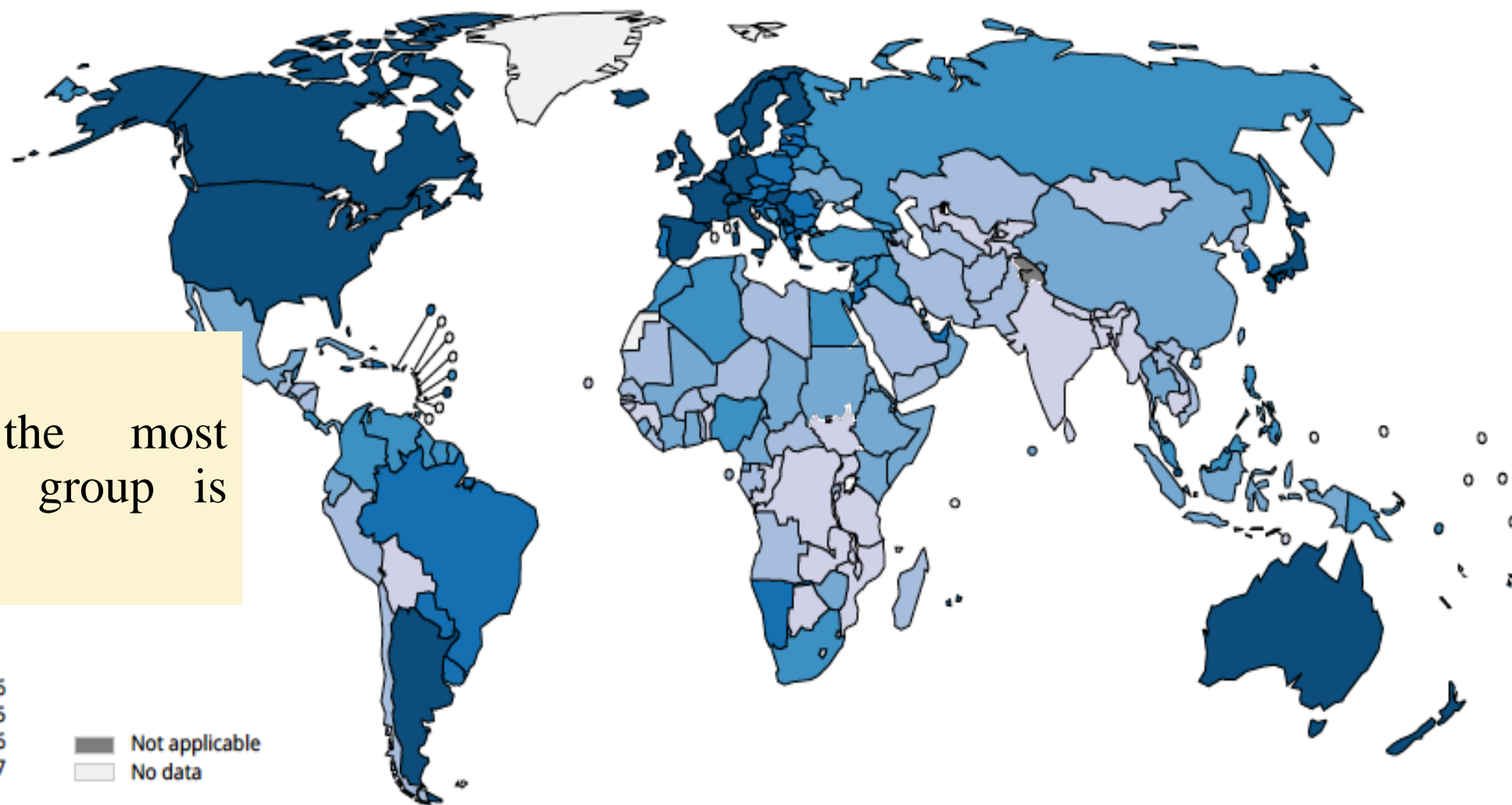
- Sung H et al. *Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries*. *CA Cancer J Clin*. 2021 May;71:209-249.
- *CA Cancer J Clin* 2021;71:209-249. © 2021 American Cancer Society

## Top cancer per country, estimated age-standardized incidence rates (World) in 2018, females, all ages





## Age standardized (World) incidence rates, breast, all ages





In Italy, the most affected age group is  $>72.6$  years.

Sede	Maschi	Femmine	Totale
	N. (%)	N. (%)	N. (%)
Vie Aero Digestive Superiori -VADS*	7.276 (3,7)	2.580 (1,4)	9.856 (2,62)
Esophago	1.710 (0,9)	684 (0,4)	2.394 (0,6)
Stomaco	8.458 (4,3)	6.098 (3,4)	14.556 (3,9)
Colon-Retto	23.420 (12,0)	20.282 (11,2)	43.702 (11,6)
Fegato	8.978 (4,6)	4.034 (2,2)	13.012 (3,5)
Pancreas	6.847 (3,5)	7.416 (4,1)	14.263 (3,8)
Colecisti e vie biliari	2400 (1,2)	3000 (1,7)	5400 (1,4)
Polmone	27.554 (14,1)	13.328 (7,3)	40.882 (10,9)
Melanomi	8.147 (4,2)	6.716 (3,7)	14.863 (4,0)
Mesotelioma	1.523 (0,8)	463 (0,3)	1.986 (0,5)
Mammella		54.976 (30,3)	54.976 (14,6)
Ovaio		5.177 (2,8)	5.177 (1,4)
Utero (cervice)		2.365 (1,3)	2.365 (0,6)
Utero (corpo)		8.335 (4,6)	8.335 (2,2)
Prostata	36.074 (18,5)		36.074 (9,6)
Testicolo	2.289 (1,2)		2.289 (0,6)
Rene, vie urinarie**	9.049 (4,6)	4.472 (2,5)	13.521 (3,6)
Vescica***	20.477 (10,5)	5.015 (2,8)	25.492 (6,8)
Sistema Nervoso Centrale	3.533 (1,8)	2.589 (1,4)	6.122 (1,6)
Tiroide	3.333 (1,7)	9.850 (5,4)	13.183 (3,5)
Linfomi di Hodgkin	1.222 (0,6)	929 (0,5)	2.151 (0,6)
Linfomi non Hodgkin	7.011 (3,6)	6.171 (3,4)	13.182 (3,5)
Mieloma multiplo	3.019 (1,6)	2.740 (1,5)	5.759 (1,5)
Leucemie, tutte	4.738 (2,4)	3.229 (1,8)	7.967 (2,1)
Totale	194.754	181.857	376.611

**TABELLA 6.** Numero di nuovi casi di tumore (e percentuali sul totale) stimati per il 2020 in base al sesso e per le sedi più frequenti<sup>§</sup>. Sono esclusi i carcinomi della cute non melanomi


Excluding non-melanoma skin cancers, in 2020 the number of new cases of **BC** registered in Italy was 54,976 (30.3% of all cancers affecting women). They represent 14.6% of the cancers affecting the entire population.




**Linee guida**  
**NEOPLASIE DELLA MAMMELLA**

Edizione 2020  
Aggiornata a 16/02/2021


In collaborazione con:




Associazione Italiana  
Radioterapia e Oncologia clinica




A.N.I.S.G.  
Associazione Nazionale Istituto Nazionale Tumori




SIAPEC - IAP

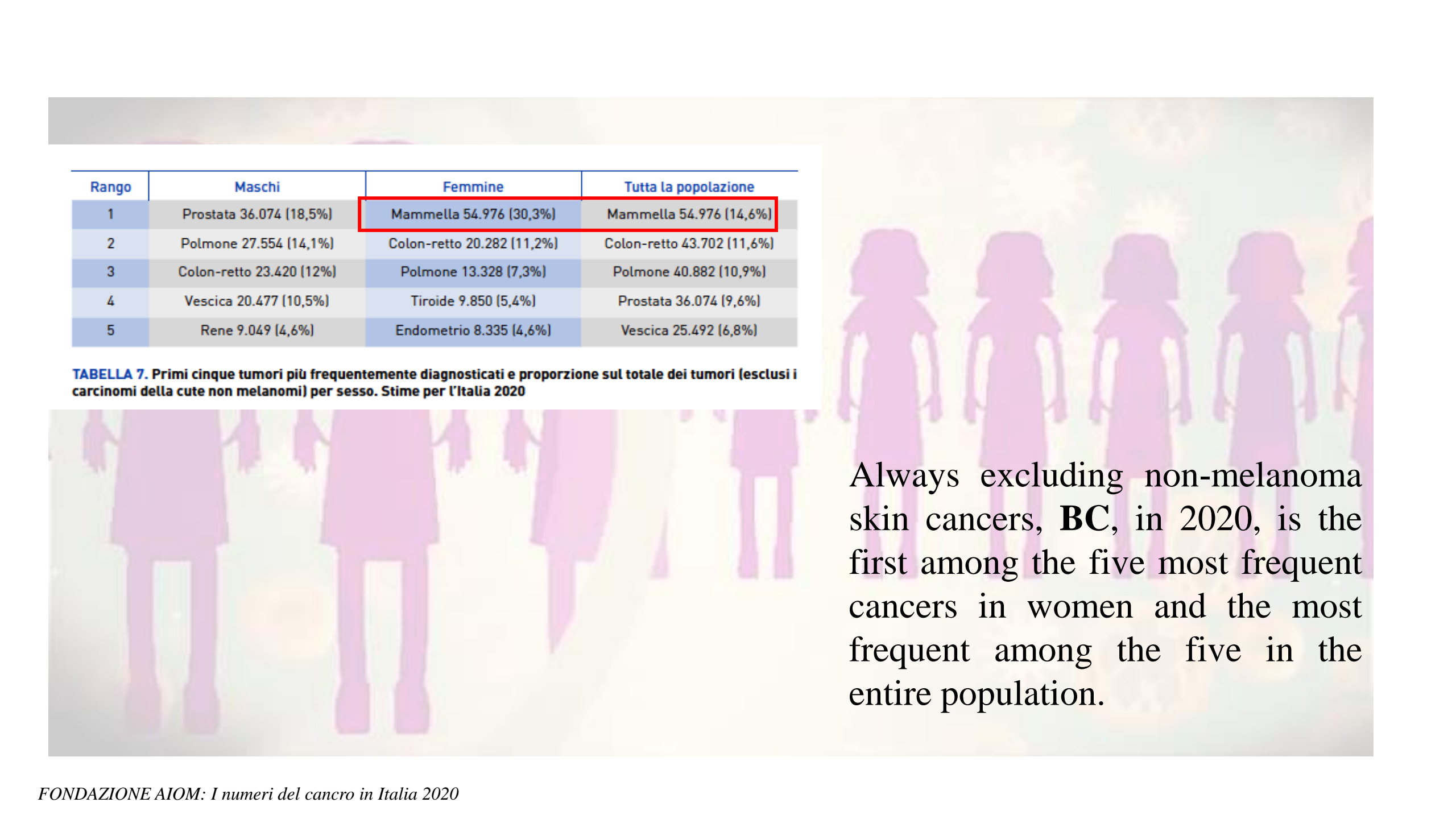


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DI ONCOLOGIA  
ONCOPEDIA



RSI  
Società Italiana di  
Radiologia Medica  
e Interventistica





Rango	Maschi	Femmine	Tutta la popolazione
1	Prostata 36.074 (18,5%)	Mammella 54.976 (30,3%)	Mammella 54.976 (14,6%)
2	Polmone 27.554 (14,1%)	Colon-retto 20.282 (11,2%)	Colon-retto 43.702 (11,6%)
3	Colon-retto 23.420 (12%)	Polmone 13.328 (7,3%)	Polmone 40.882 (10,9%)
4	Vescica 20.477 (10,5%)	Tiroide 9.850 (5,4%)	Prostata 36.074 (9,6%)
5	Rene 9.049 (4,6%)	Endometrio 8.335 (4,6%)	Vescica 25.492 (6,8%)

**TABELLA 7.** Primi cinque tumori più frequentemente diagnosticati e proporzione sul totale dei tumori (esclusi i carcinomi della cute non melanomi) per sesso. Stime per l'Italia 2020

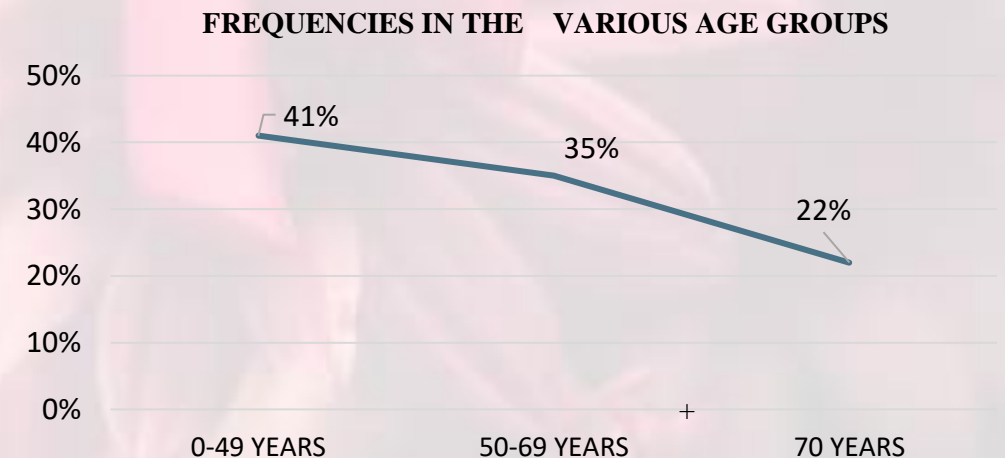
Always excluding non-melanoma skin cancers, **BC**, in 2020, is the first among the five most frequent cancers in women and the most frequent among the five in the entire population.



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%	Vie aerodig sup 5%	Stomaco 5%	Utero cervice 4%	Tiroide 5%	Stomaco 5%

**TABELLA 8.** 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

If we refer to age instead, **BC** represents 41% of cancers that affect women aged 0-49; 35% between 50-69 years, 22% over 70 years.



# BC SURVIVAL

The 5-year survival of women with **BC** in Italy is **87%**.

In many countries the five-year survival rate for women diagnosed, according to the TNM classification, with Stage I/II (small tumours or limited local spread to nodes under the arm) breast cancer is **80–90%**.

For stages III/IV (larger tumours or more distant spread beyond the breast or to distant organs), the survival rate falls to **24%**.

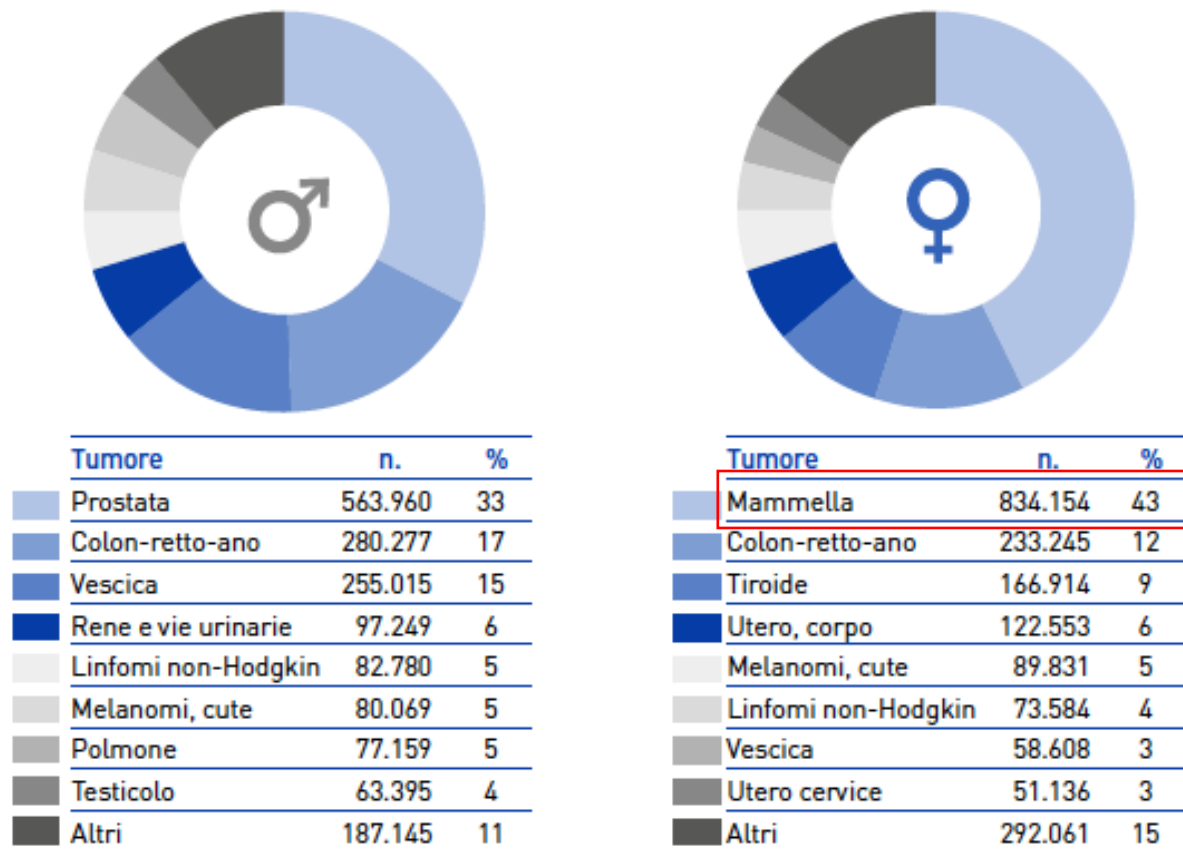


## Linee guida NEOPLASIE DELLA MAMMELLA

Edizione 2020  
Aggiornata a 16/02/2021

In collaborazione con





**FIGURA 13.** Proporzione di persone che vivono dopo una diagnosi di tumore in Italia nel 2020, per i tipi di tumore più frequenti e sesso

BC, in Italy, is the one with the highest survival rate.

43% of women with BC survive after diagnosis.

# **BC MORTALITY**

In women, **BC** was the leading cause of cancer death (16.1% of all cancer deaths), followed by lung cancer (12.5%) and colorectal and anus cancers (11.0%).

A decrease in **BC** mortality is confirmed (less than 6% from 2015 to 2020), attributable to the greater diffusion of early diagnosis programs and therapeutic advances.

	Maschi	Femmine	Tutta la popolazione
1	Polmone (23,9%)	Mammella (16,1%)	Polmone (18,8%)
2	Colon-retto e ano (10,6%)	Polmone (12,5%)	Colon-retto e ano (10,8%)
3	Prostata (7,7%)	Colon-retto e ano (11,0%)	Mammella (7,2%)
4	Pancreas (6,0%)	Pancreas (7,9%)	Pancreas (6,9%)
5	Stomaco (5,5%)	Stomaco (4,9%)	Fegato (5,1%)

**TABELLA 13 B.** Prime cinque cause di morte per tumore e proporzione sul totale dei decessi oncologici per sesso. Dati ISTAT 2017

# BC RISK FACTOR

- Age
- Reproductive Factors
- Hormonal Factors
- Dietary and Metabolic Factors
- Previous Thoracic Radiotherapy
- Previous Breast Dysplasia or Neoplasms
- Family History and Heredity (BRCA1, BRCA2, ATM, CHEK2, PALB2, p53, PTEN)



JNCI J Natl Cancer Inst (2020) 112(9): djz241

doi: 10.1093/jnci/djz241

First published online January 10, 2020

Article

## Genetic Factors, Adherence to Healthy Lifestyle Behavior, and Risk of Invasive Breast Cancer Among Women in the UK Biobank

Rhonda S. Arthur ,\* Tao Wang, Xiaonan Xue, Victor Kamensky, Thomas E. Rohan



Article

## Implications of Lifestyle and Occupational Factors on the Risk of Breast Cancer in Shiftwork Nurses

Javier Fagundo-Rivera <sup>1,2,3</sup> , Regina Allande-Cussó <sup>4</sup> , Mónica Ortega-Moreno <sup>5</sup> , Juan Jesús García-Iglesias <sup>6,\*</sup> , Adolfo Romero <sup>7,\*</sup>, Carlos Ruiz-Frutos <sup>6,8,†</sup> and Juan Gómez-Salgado <sup>6,8,†</sup>



Escala-García et al. *BMC Medicine* (2020) 18:327  
<https://doi.org/10.1186/s12916-020-01797-2>

BMC Medicine

RESEARCH ARTICLE

Open Access

## Breast cancer risk factors and their effects on survival: a Mendelian randomisation study

Maria Escala-García<sup>1</sup>, Anna Morra<sup>1</sup>, Sander Canisius<sup>1,2</sup>, Jenny Chang-Claude<sup>3,4</sup>, Siddhartha Kar<sup>5,6</sup>, Wei Zheng<sup>7</sup>, Stig E. Bojesen<sup>8,9,10</sup>, Doug Easton<sup>11,12</sup>, Paul D. P. Pharoah<sup>11,12</sup> and Marjanka K. Schmidt<sup>1,13\*</sup>





# WORK AND BREAST CANCER

> [Medicina \(Kaunas\)](#). 2020 Dec 10;56(12):680. doi: 10.3390/medicina56120680.

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

Javier Fagundo-Rivera <sup>1</sup>, Juan Gómez-Salgado <sup>2</sup> <sup>3</sup>, Juan Jesús García-Iglesias <sup>2</sup>,  
Carlos Gómez-Salgado <sup>1</sup>, Selena Camacho-Martín <sup>4</sup>, Carlos Ruiz-Frutos <sup>2</sup> <sup>3</sup>

Review

## Correlation of the risk of breast cancer and disruption of the circadian rhythm (Review)

Giulia Costanza Leonardi <sup>1</sup>, Venerando Rapisarda, Andrea Marconi, Aurora Scalisi,  
Francesca Catalano, Lidia Proietti, Salvo Travali, Massimo Libra, Concettina Fenga

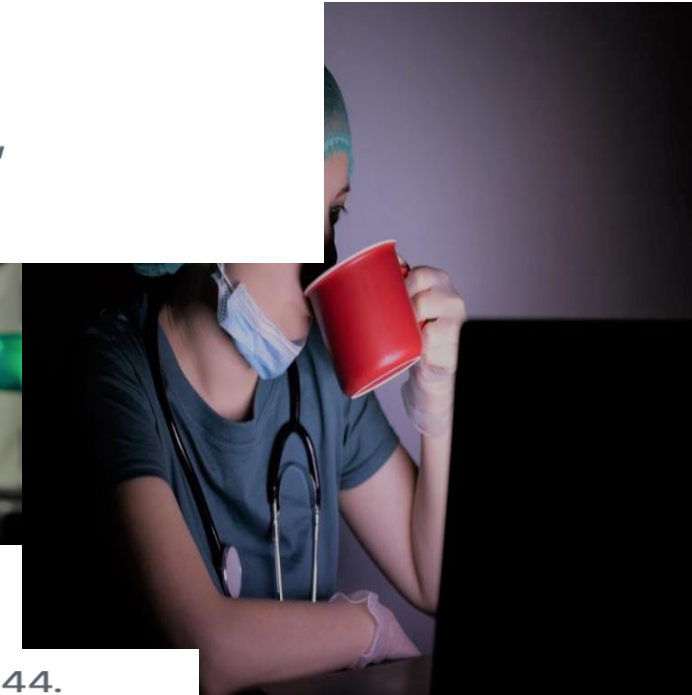
Review

> [Int J Environ Res Public Health](#). 2020 Dec 20;17(24):9544.  
doi: 10.3390/ijerph17249544.

## Shift Work and Breast Cancer

Sarah Gehlert <sup>1</sup>, Mark Clanton <sup>2</sup>,

On Behalf Of The Shift Work And Breast Cancer Strategic Advisory Group



# Work history and mortality risks in 90 268 US radiological Elo technologists

O Jason J Liu<sup>1</sup>, D Michal Freedman<sup>1</sup>, Mark P Little<sup>1</sup>, Michele M Doody<sup>1</sup>, Bruce H Alexander<sup>2</sup>, Cari M Kitahara<sup>1</sup>, Terrence  
N Lee<sup>1</sup>, Preetha Rajaraman<sup>1</sup>, Jeremy S Miller<sup>3</sup>, Diane M Kampa<sup>2</sup>, Steven L Simon<sup>1</sup>, Dale L Preston<sup>4</sup>, Martha S Linet<sup>1</sup>  
Correspondence to Dr Jason J Liu, Division of Cancer Epidemiology and Genetics, Radiation Epidemiology Branch, 9609 Medical Center  
harn Drive, Room 7E520, Rockville, MD 20850, USA; [jasonjliu.jjl@gmail.com](mailto:jasonjliu.jjl@gmail.com)

## •I Cellular Mechanisms for Low-Dose Ionizing Radiation–Induced Perturbation of the Breast ge Tissue Microenvironment

•I Kelvin K.C. Tsai, Eric Yao-Yu Chuang, John B. Little, and Zhi-Min Yuan

DOI: 10.1158/0008-5472.CAN-05-0703 Published August 2005  
CELLS.

•While [Review](#) > [J BUON](#). Oct-Dec 2008;13(4):487-94.

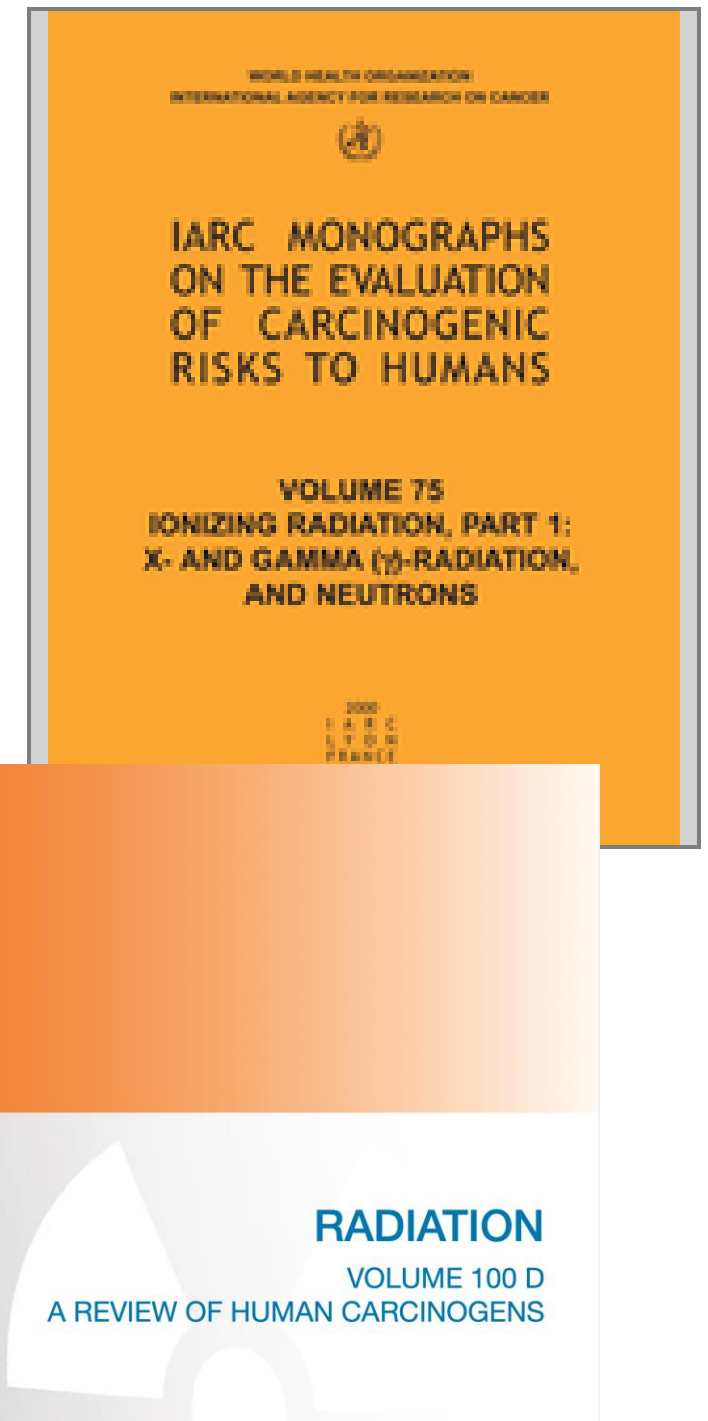
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re is

## Risk factors for breast cancer: is ionizing radiation among them?

All types of **ionizing radiation** are  
carcinogenic to humans (Group 1)”

*Ionizing radiation, part 1: X- and gamma-radiation, and neutrons. Overall introduction.  
IARC Monogr Eval Carcinog Risks Hum. 2000; 75 Pt 1():35-115.*



In 2008, the IARC classified **EtO as a group 1** carcinogen (carcinogenic to humans), even though they determined that

*“There is limited evidence in humans ethylene oxide with lymphatic and h and breast cancer.”* However, the I concluded: *“There is sufficient evidence for the carcinogenicity of ethylene oxide evidence that the carcinogen acting alkylating agent, The IARC evaluation concluded: overall evaluation, the W sufficient evidence for the experimental animals in support of the g*

*Cancer Causes and Control* 14: 531–539, 2003.  
© 2003 Kluwer Academic Publishers. Printed in the Netherlands.

## Ethylene oxide and breast cancer incidence in a cohort study of 7576 women (United States)

Kyle Steenland\*, Elizabeth Whelan, James Deddens, Leslie Stayner & Elizabeth Ward

*OSH), Cincinnati, Ohio*

### Ethylene Oxide: Cancer Evidence Integration and Dose-Response Implications

Melissa J. Vincent<sup>1</sup>, Jordan S. Kozal<sup>2</sup>, William J. Thompson<sup>3</sup>, Andrew Maier<sup>1</sup>, G. Scott Dotson<sup>1</sup>, Elizabeth A. Best<sup>4</sup>, and Kenneth A. Mundt<sup>3</sup>

Dose-Response:  
An International Journal  
October-December 2019:1-17  
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DOI: 10.1177/1559325819888317  
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*Environ Health.* 2017; 16: 94.

Published online 2017 Sep 2. doi: [10.1186/s12940-017-0287-4](https://doi.org/10.1186/s12940-017-0287-4)

PMCID: PMC5581466

PMID: [28865460](https://pubmed.ncbi.nlm.nih.gov/28865460/)

## State of the evidence 2017: an update on the connection between breast cancer and the environment

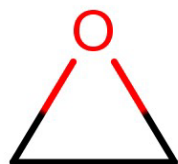
[Janet M. Gray](#),<sup>1</sup> [Sharima Rasanayagam](#),<sup>2</sup> [Connie Engel](#),<sup>2</sup> and [Jeanne Rizzo](#)<sup>2</sup>

International Agency for Research on Cancer  
Volume 100: A Review of Human Carcinogens  
International Agency for Research on Cancer

30 May 2021

Slovensko predsedovanje Svetu Evrope



**Substance identity****EC / List no.:** 200-849-9**CAS no.:** 75-21-8**Mol. formula:** C<sub>2</sub>H<sub>4</sub>O**About this substance**

This substance is registered under the REACH Economic Area, at ≥ 1 000 000 tonnes per an

This substance is used by consumers, in article packing, at industrial sites and in manufacturi

**Biocidal Uses**

This substance is being reviewed for use as a

**Consumer Uses**

This substance is used in the following product release to the environment ...

**LABELLING ACCORDING TO REGULATION EC NO 1272/2008 (CLP)****Signal word:** Danger**H-STATEMENTS****H220** Extremely flammable gas.**H280** Contains gas under pressure; may explode if heated.**H350** May cause cancer.**H340** May cause genetic defects.**H331** Toxic if inhaled.**H302** Harmful if swallowed.**H319** Causes serious eye irritation.**H335** May cause respiratory irritation.**H315** Causes skin irritation.**P-STATEMENTS****P210** Keep away from heat/sparks/open flames/hot surfaces. - No smoking.**P280** Wear protective gloves and eye protection/face protection.**P261** Avoid breathing.**P311** Call a POISON CENTER or doctor/physician.**P304 + P340** IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.**P302 + P352** IF ON SKIN: Wash with plenty of soap and water.**SUPPLEMENTAL INFORMATION**

Restricted to professional users.





The [International Agency for Research on Cancer](https://www.iarc.fr/) (IARC) published its decision to **maintain the classification of night shift work as being “probably carcinogenic to humans” (Group 2A)** in 2019.

This is the **second time that IARC has assessed the carcinogenicity of night shift work**. Following the first assessment in 2007, night work was classified as a group 2A agent. The new evaluation was undertaken to include the substantial amount of new evidence that has accumulated over the past 12 years.



## IARC MONOGRAPHS CLASSIFICATION OF NIGHT SHIFT WORK

Night shift work is **PROBABLY  
CARCINOGENIC TO HUMANS (Group 2A)**

Limited evidence in humans. Sufficient  
evidence in experimental animals.



The *IARC Monographs* classification indicates  
the level of certainty that an agent can  
cause cancer (*hazard identification*).



Positive associations  
have been observed  
between night shift  
work and cancers of  
the:



Breast



Prostate



Colon and  
rectum

Night shift work includes both working at night and  
working in a job that involves rapidly crossing many  
time zones.

### Specific types of workers



Nurses



Factory  
workers



Flight  
attendants



Airplane  
pilots

### Higher percentages of night shift workers are seen in



Health care

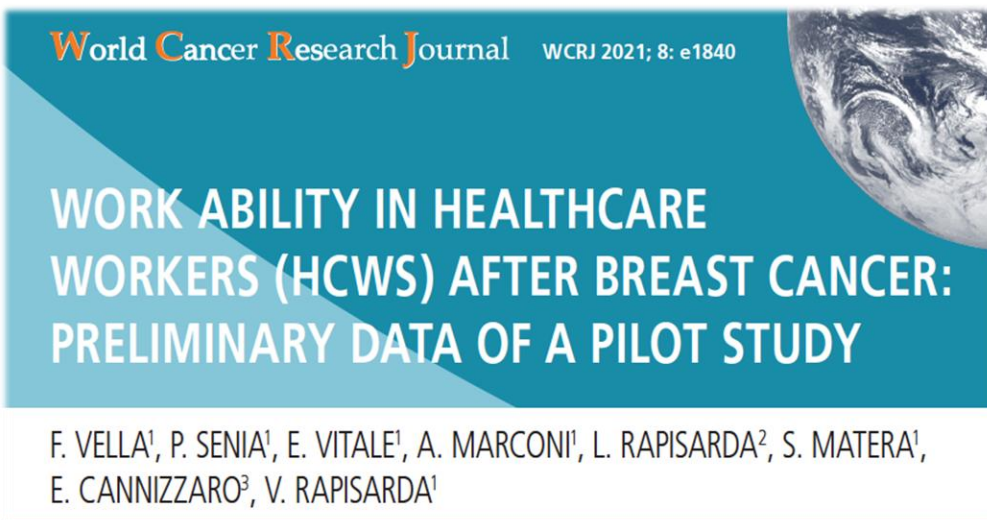
Manufacturing

Retail,  
service sector

Transport

# Pilot study recently conducted in Catania University Hospital

The purpose of this study was to analyze a cohort of HCW's, with previous BC, in order to assess **residual working abilities** in relation to age and pathology, considering the return to work as an important part of the recovery process.





The Policlinic University Hospital «Rodolico-San Marco» is a public health facility with 2,700 HCWs, including: medical doctors, biologists, pharmacists, physicists, chemists, nurses, technical-administrative and support staff.

This is an integrated structure with the University of Catania that encloses numerous: degree courses; university clinics, specialization schools professionalizing university courses in the health sector.

The University increases the staff of the hospital by over 2000 units.



# SUBJECTS

The study was conducted in 2018 (from May through October=8 months) and it involved female HCW's operating at the Policlinic-University Hospital of Catania (Sicily, Italy).

All HCWs invited to take part in the project were informed about the study's objectives and procedures.

Adherence to the study was on a voluntary basis. Each subject signed the informed consent.

Ethical approval was not necessary because all medical and instrumental examinations were performed according to Italian law concerning the protection of workers exposed to occupational risks (D.Lgs. 81/2008).







Inclusion criteria: women who had previously had BC and still in service.

Exclusion criteria: presence of systemic diseases such as heart disease, diabetes, etc., not being retired.

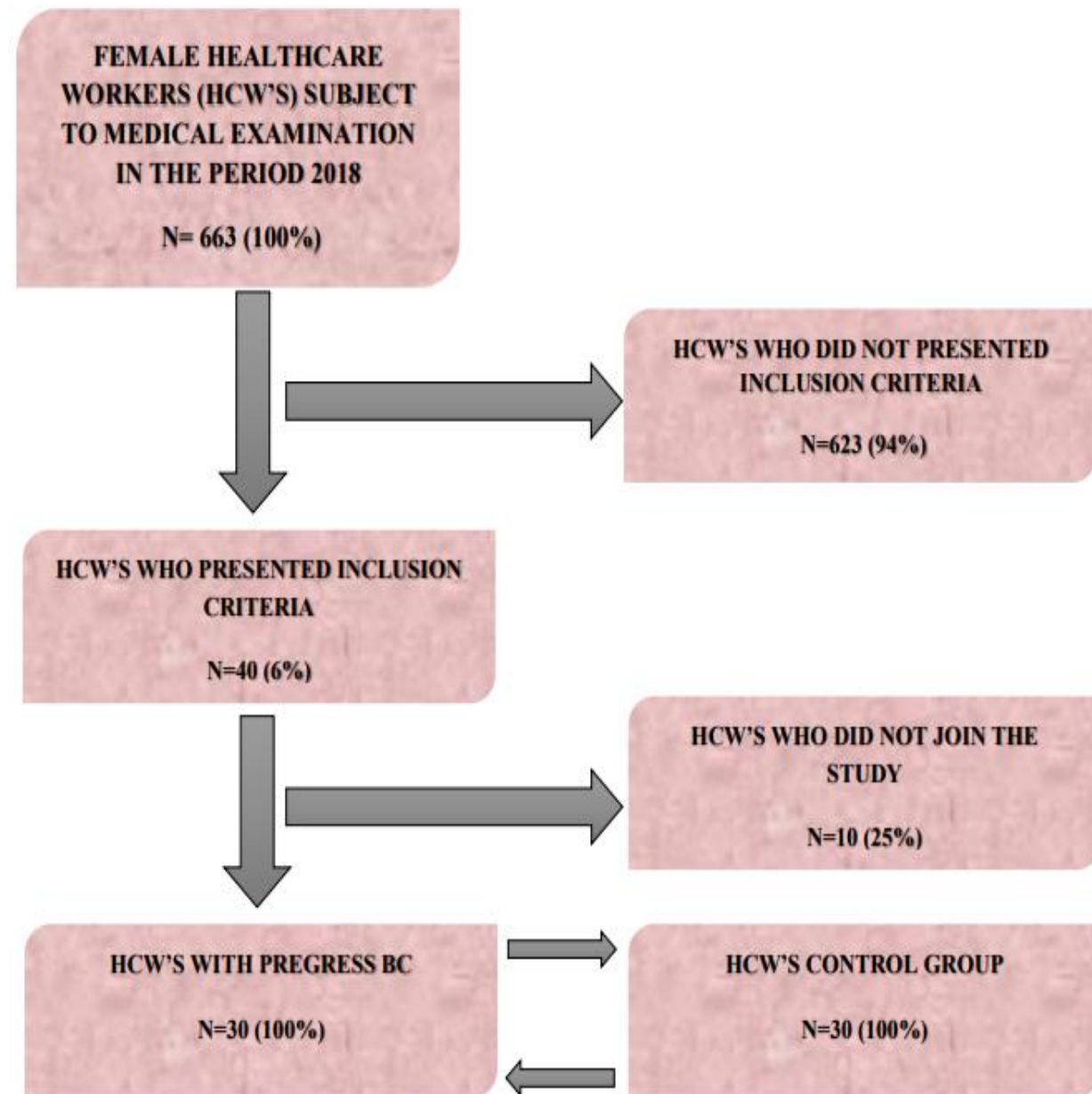


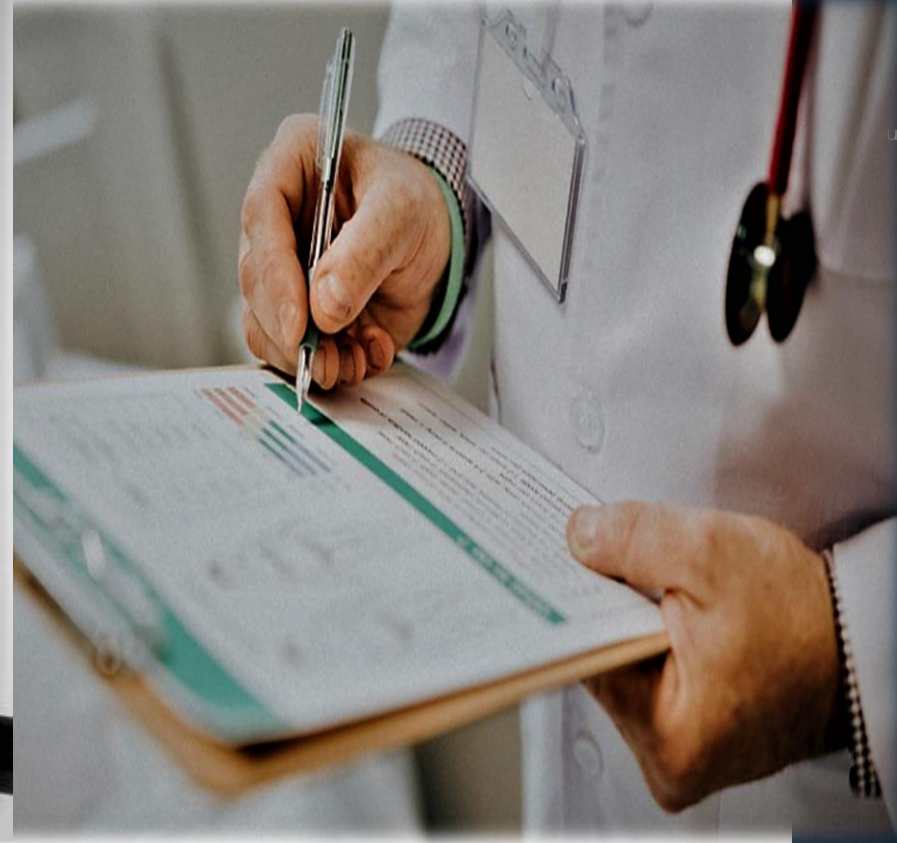
A homogeneous 1:1 matching control HCWs group was selected for anthropometric characteristics, work history, etc.



Of the 663 (100%) HCWs subject to mandatory (by law) health surveillance in in the period (8 months) studied, **6% (n=40)** had been affected by BC.

BC diagnoses were made in the period 2002-2017. Of the 40 HCWs, only 75% (n=30) agreed to join the study.





- Medical records: careful family history, pathological and work history;
- voluptuous habits (alcohol and smoking);
- free time activities;
- oncology diary updated about the latest therapies and monitoring performed;
- genetic, histological and diagnostic imaging tests already made.





# METHODS

Each HCW underwent medical examination and routine laboratory tests and a questionnaire on the Work Ability Index (WAI).



WORK ABILITY INDEX										
La invitiamo a fornire la propria opinione sulla Sua capacità di lavoro e sui fattori che potrebbero influenzarla. La preghiamo di rispondere attentamente a tutte le domande cercando il numero che riflette meglio la Sua opinione, oppure scrivendo la Sua risposta negli spazi										
<b>Tipo impegno richiesto per il lavoro:</b>										
- prevalentemente mentale	<input type="checkbox"/> 1									
- prevalentemente fisico	<input type="checkbox"/> 2									
- sia fisico che mentale	<input type="checkbox"/> 3									
<b>1. Capacità di lavoro al momento attuale in confronto a prima della malattia.</b>										
Supponendo che la Sua capacità di lavoro al suo livello massimo abbia un valore di 10, che punteggio darebbe alla Sua <u>attuale</u> capacità di lavoro?										
0	1	2	3	4	5	6	7	8	9	10
completamente non in grado di lavorare										
capacità di lavoro al massimo										
<b>2. Capacità di lavoro in relazione alle richieste del compito lavorativo.</b>										
Come valuta la Sua attuale capacità di lavoro in relazione alle richieste <u>fisiche</u> del Suo lavoro?										
- molto buona	<input type="checkbox"/> 5									
- abbastanza buona	<input type="checkbox"/> 4									
- mediocre	<input type="checkbox"/> 3									
- piuttosto scadente	<input type="checkbox"/> 2									
- molto scadente	<input type="checkbox"/> 1									
Come valuta la Sua attuale capacità di lavoro in relazione alle richieste <u>mentali</u> del Suo lavoro?										
- molto buona	<input type="checkbox"/> 5									
- abbastanza buona	<input type="checkbox"/> 4									
- mediocre	<input type="checkbox"/> 3									
- piuttosto scadente	<input type="checkbox"/> 2									
- molto scadente	<input type="checkbox"/> 1									



**WAI** is an index used to assess an operator's individual ability with the aim of identifying working skills according to pathologies, etc. WAI is calculated based on the method provided by the Institute of Occupational Health (FIOH).

Score	Work ability
7-27	poor
28-36	moderate
37-43	good
44-49	excellent

WORK ABILITY INDEX		
La invitiamo a fornire la propria opinione sulla Sua capacità di lavoro e sui fattori che potrebbero influenzarla. La preghiamo di rispondere attentamente a tutte le domande cerchiando il numero che esprime meglio la Sua opinione, oppure scrivendo la Sua risposta negli spazi previsti.		
Tipo impegno richiesto per il lavoro: <ul style="list-style-type: none"> <li>- prevalentemente mentale <input type="checkbox"/> 1</li> <li>- prevalentemente fisico <input type="checkbox"/> 2</li> <li>- sia fisico che mentale <input type="checkbox"/> 3</li> </ul>		
<b>1. Capacità di lavoro al momento attuale in confronto a prima della malattia.</b> <i>Supponendo che la Sua capacità di lavoro al suo livello massimo abbia un valore di 10, che punteggio attribuisce alla Sua attuale capacità di lavoro?</i>		
completamente non in grado di lavorare	0 1 2 3 4 5 6 7 8 9 10	capacità di lavoro al massimo
<b>2. Capacità di lavoro in relazione alle richieste del compito lavorativo.</b> <i>Come valuta la Sua attuale capacità di lavoro in relazione alle richieste <u>globali</u> del Suo lavoro?</i>		
- molto buona	<input type="checkbox"/> 5	
- abbastanza buona	<input type="checkbox"/> 4	
- mediocre	<input type="checkbox"/> 3	
- piuttosto scadente	<input type="checkbox"/> 2	
- molto scadente	<input type="checkbox"/> 1	
<i>Come valuta la Sua attuale capacità di lavoro in relazione alle richieste <u>mentali</u> del Suo lavoro?</i>		
- molto buona	<input type="checkbox"/> 5	
- abbastanza buona	<input type="checkbox"/> 4	
- mediocre	<input type="checkbox"/> 3	
- piuttosto scadente	<input type="checkbox"/> 2	
- molto scadente	<input type="checkbox"/> 1	
<b>3. Numero di malattie in anno diagnosticate, oltre al tumore al seno, da un medico.</b> <i>Nella lista seguente La preghiamo di segnare le malattie e/o traumi attualmente diagnosticati. Indichi anche se un medico ha diagnosticato e curato tali patologie (Per ogni voce segna la presenza con 1 o 2 o nessuna segnalazione)</i>		
		a mio arrivo
		diagnostica del medico
<b>Malattie infettive e lesioni</b>		
01 alla schiena	<input type="checkbox"/> 2	<input type="checkbox"/> 1
02 alle braccia o mani	<input type="checkbox"/> 2	<input type="checkbox"/> 1
03 alle gambe o piedi	<input type="checkbox"/> 2	<input type="checkbox"/> 1
04 ad altre parti del corpo	<input type="checkbox"/> 2	<input type="checkbox"/> 1
dove e che tipo di lesione: _____	<input type="checkbox"/> 2	<input type="checkbox"/> 1
<b>Malattie muscolo-scheletriche</b>		
05 disturbi della colonna cervicale, ripetuti episodi di dolore	<input type="checkbox"/> 2	<input type="checkbox"/> 1
06 disturbi della colonna lombare, ripetuti episodi di dolore	<input type="checkbox"/> 2	<input type="checkbox"/> 1
07 sciatica	<input type="checkbox"/> 2	<input type="checkbox"/> 1
08 disturbi agli arti (braccia, gambe), ripetuti episodi di dolore	<input type="checkbox"/> 2	<input type="checkbox"/> 1
09 artrite reumatoide	<input type="checkbox"/> 2	<input type="checkbox"/> 1
10 altre patologie muscolo-scheletriche	<input type="checkbox"/> 2	<input type="checkbox"/> 1
quali? _____	<input type="checkbox"/> 2	<input type="checkbox"/> 1
<b>Malattie cardiovascolari</b>		
11 ipertensione (pressione arteriosa alta)	<input type="checkbox"/> 2	<input type="checkbox"/> 1
12 malattia delle coronarie, dolore al petto sotto sforzo (angina pectoris)	<input type="checkbox"/> 2	<input type="checkbox"/> 1
13 trombolosi coronarica, infarto cardiaco	<input type="checkbox"/> 2	<input type="checkbox"/> 1
14 insufficienza cardiaca	<input type="checkbox"/> 2	<input type="checkbox"/> 1
15 altre malattie cardiovascolari	<input type="checkbox"/> 2	<input type="checkbox"/> 1
quali? _____	<input type="checkbox"/> 2	<input type="checkbox"/> 1
<b>Malattie respiratorie</b>		
16 frequenti infezioni respiratorie (tosse, asma, bronchite acuta)	<input type="checkbox"/> 2	<input type="checkbox"/> 1
17 bronchite cronica	<input type="checkbox"/> 2	<input type="checkbox"/> 1
18 asma cronica	<input type="checkbox"/> 2	<input type="checkbox"/> 1
19 asma bronchiale	<input type="checkbox"/> 2	<input type="checkbox"/> 1
20 enfisema	<input type="checkbox"/> 2	<input type="checkbox"/> 1
21 tubercolosi polmonare	<input type="checkbox"/> 2	<input type="checkbox"/> 1
22 altre malattie respiratorie	<input type="checkbox"/> 2	<input type="checkbox"/> 1
quali? _____	<input type="checkbox"/> 2	<input type="checkbox"/> 1

## ons:

working capacity compared with one's best life points);

work in relation to the job requirements (2-10

pathologies (1-7 points);

f working capacity due to illness, estimated dual (1-6 points);

over the past 12 months (1-6 points);

expectations of one's work skills two years

points);

cal conditions/resources (1-4 points).



# STATISTICAL ANALYSIS

Statistical analysis was carried out with SPSS software.

Normality was checked by the Kolmogorov-Smirnov test.

**Descriptive statistics**



CHARACTERIZATION OF THE GROUPS OF SUBJECTS IN THE STUDY

**Chi-square test (X<sup>2</sup>) or Fisher's exact test and Student's t test**



COMPARISON BETWEEN THE DIFFERENT VARIABLES

The appropriate association measures were estimated by means of the odds ratio (OR; 95% CI). Significant factors/variables to the univariate analysis and logistic regression models were applied. Statistical significance was set for  $p < 0.05$ .

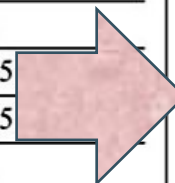


# RESULTS

## MAIN CHARACTERISTICS OF THE SAMPLE



	<i>HCW's with previous BC 30 (100%)</i>	<i>Control group 30 (100%)</i>	<i>p-value</i>
Average age (years)	53.7 ±7.07	52.9 ±6.9	n.s.
Menarche (years)	11.7±1.2	12.1±1.4	n.s.
Menopause (years)	44.7 ±4.9	45.2 ±4.7	n.s.
Length of service (years)	26.1±7.5	24.9±6.2	n.s.
Shift workers	23 (77%)	15 (50%)	n.s.
BMI (Kg/m <sup>2</sup> )	25.1 ±2.7	25.3 ± 2.4	n.s.
Smokers	3 (10%)	5 (16%)	n.s.
Packages/year	14.5 ±2.5	15.1 ±2.1	n.s.
Alcohol intake	2 (7%)	3 (10%)	n.s.
N° Doctors/biologists	13 (43%)	11 (37%)	n.s.
N° Nurses/technicians	17 (57%)	19 (63%)	n.s.
Surgical area	9 (30%)	8 (27%)	n.s.
Medical area	11 (37%)	13 (43%)	n.s.
Service area	10 (33%)	9 (30%)	n.s.
Nulliparous	10 (33%)	9 (30%)	n.s.
BC Familiarity	9 (30%)	1 (3%)	<i>p&lt;0.05</i>
Hormonal therapy	11 (36%)	0	<i>p&lt;0.05</i>
Breastfeeding	18 (60%)	16 (54%)	n.s.



Statistically significant **difference** in familiarity  
for BC and hormone therapy.

# RESULTS

## *MAIN CHARACTERISTICS OF HCWs' CASES WITH BC AT THE TIME OF DIAGNOSIS*

<i>HCW's with previous BC=30 (100%)</i>	
Age at diagnosis	45.1 $\pm$ 7.1
Length of service (years)	16.6 $\pm$ 8.7
Shift workers	23 (77%)
BMI (Kg/m <sup>2</sup> )	23.6 $\pm$ 5.1
Smokers	13 (43%)
Packages/year	16.1 $\pm$ 2.8
Alcohol intake	9 (30%)
Nulliparous	12 (40%)
Familiarity BC	9 (30%)
Hormonal contraception	16 (53%)
Breastfeeding	18 (60%)



From the analysis of the association between BC and risk factors, only a significant correlation with **shift work** was observed: **OR=1.51, CI 95% (1.47-1.56).**

# BC MOLECULAR CLASSIFICATION

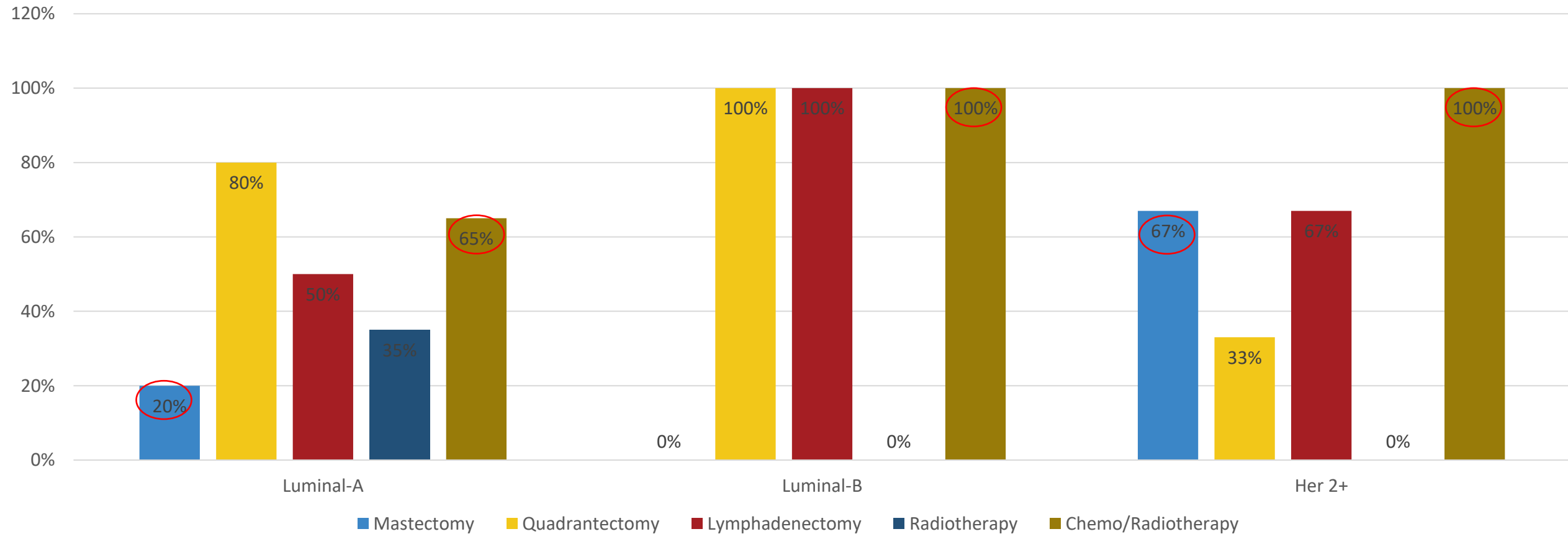
	ER / PR	HER2
Luminal A	ER (+) and/or PR (+)	(−)
Luminal B	ER (+) and/or PR (+)	(+)
HER2-enriched	(−)	(+)
Triple negative	(−)	(−)

*ER, estrogen receptor; PR, progesterone receptor.*

	Luminal-A	Luminal-B	Her2+
N° HCW's	20 (67%)	4 (13%)	6 (20%)

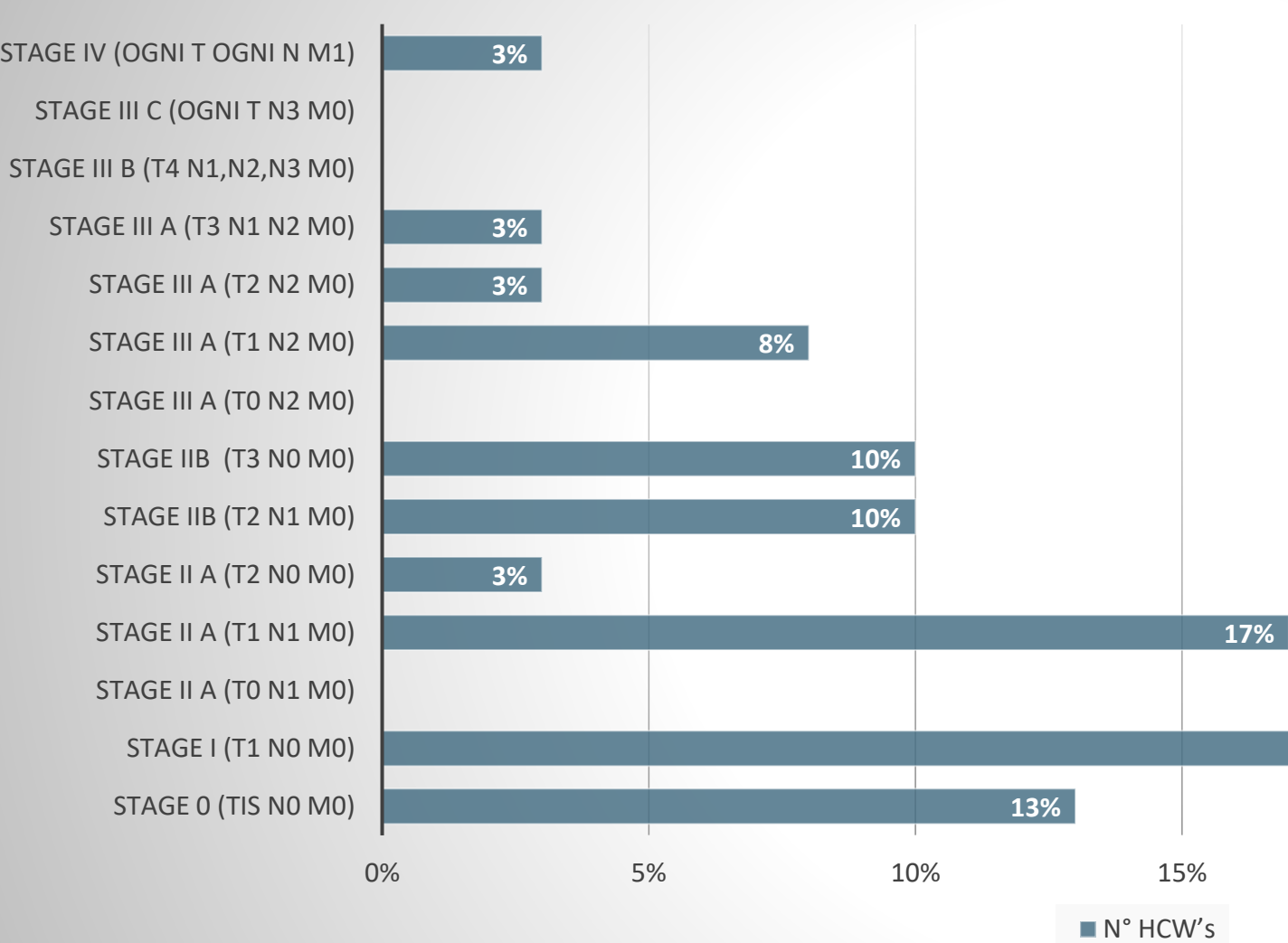


# Therapy adopted in relation to the molecular classification





# Subdivision of the sample according to the TNM Classification

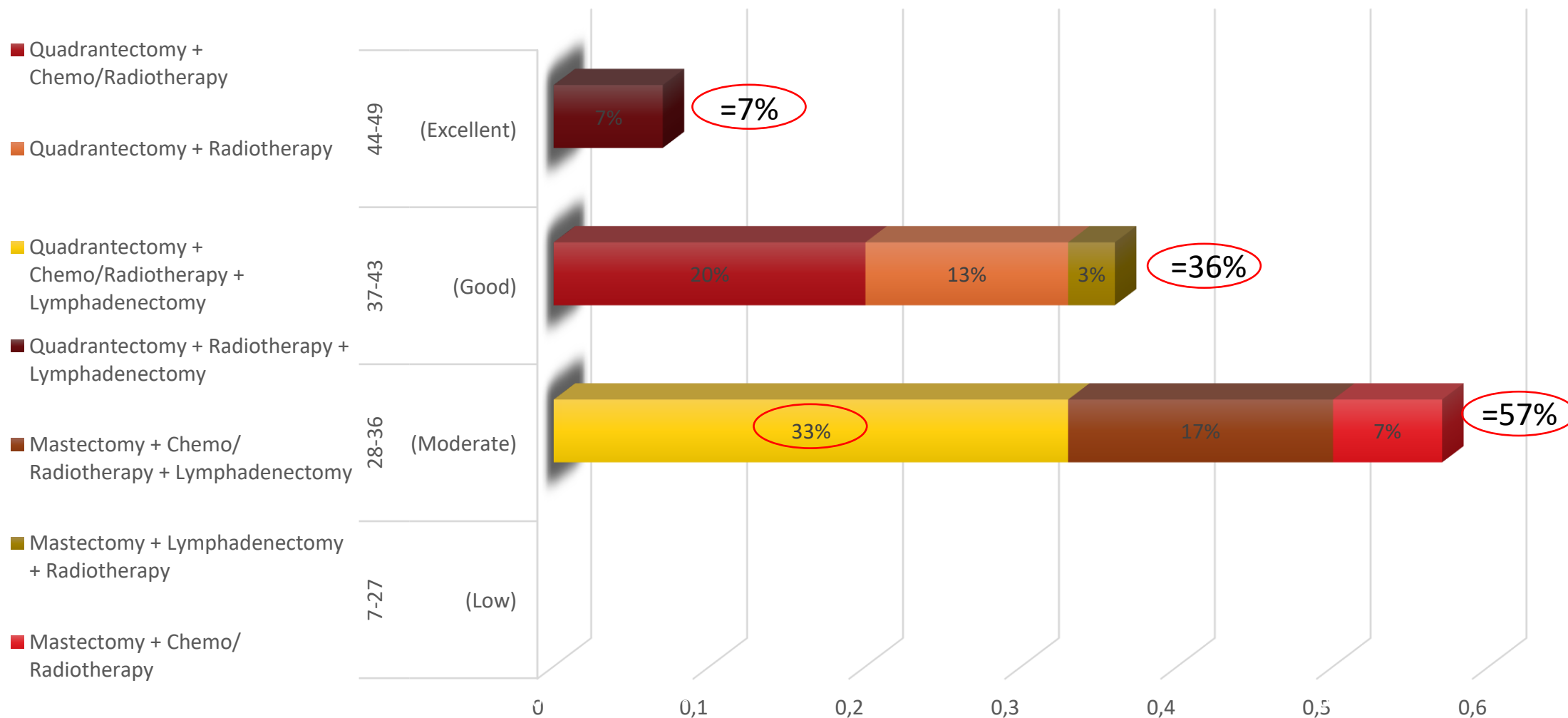


Stadio 0	Tis	N0	M0
Stadio I A	T1	N0	M0
Stadio IB	T0	N1 mi	M0
	T1	N1 mi	
Stadio II A	T0	N1 mi	M0
	T1	N1 mi	
	T2	N0	
Stadio II B	T2	N1	M0
	T3	N0	
Stadio III A	T0	N2	M0
	T1	N2	
	T2	N2	
	T3	N1	
	T3	N2	
Stadio III B	T4	N0	M0
	T4	N1	
	T4	N2	
Stadio III C	Ogni T	N3	M0
Stadio IV	Ogni T	Ogni T	M1

83%

17%

# Relation between WAI results and therapy adopted





**BC survival** has significantly increased due to scientific and technological evolution in both diagnostic and therapeutic fields.

However, BC treatments, often used in combination, have several side effects which, combined to the effects produced by the disease, may cause **temporary and/or permanent inabilities**.

The state of inability raises the question of **reintroducing BC patients to their job**, enhancing the residual working ability. The integration at work of this group of people causes sub/objective difficulties, often related to psychological block and insecurities which, at times, generate in the patient the idea of refusing to go back to work.

The results of this study are preliminary data. Indeed, the study is still in progress: the sample is expanding but above all, it is proceeding to evaluate not only the residual work ability but also the psychological status. Besides, in addition to the investigations already carried out, we will administer validated psychological tests (i.e. Work health balance and *Positive Affect and Negative Affect Scales-PANAS*) in order to investigate the psychic sphere and the emotional reactions that correlate the oncological disease and work of each HCW.

Ora le chiediamo di indicare quanto spesso nella sua vita quotidiana accade quanto riportato nelle seguenti affermazioni. Se attualmente non lavora risponda pensando alla sua esperienza lavorativa prima dell'interruzione.

Mai ①	Raramente ②	Talvolta ③	Spesso ④	Sempre ⑤
01) Il suo lavoro è un ostacolo alla salute				
02) Non può occuparsi adeguatamente della sua salute a causa del tempo che deve dedicare al lavoro				
03) Il lavoro che fa, le permette di occuparsi della sua salute				
04) Trova abbastanza facile bilanciare gli impegni lavorativi con le sue necessità di salute				
05) Trova difficile occuparsi della sua salute poiché pensa costantemente al suo lavoro				
06) Il suo lavoro le porta via del tempo che vorrebbe dedicare alla sua salute				

Le affermazioni che seguono riguardano la gestione della salute nella sua azienda. Risponda segnando l'opzione che più rispecchia il suo pensiero.

Fortemente in disaccordo ①	In disaccordo ②	Né d'accordo né in disaccordo ③	D'accordo ④	Fortemente d'accordo ⑤
07) L'azienda agisce immediatamente quando tra i lavoratori emergono preoccupazioni rispetto alla loro salute				
08) L'azienda considera la salute dei lavoratori importante quanto la produttività				
09) Nella sua azienda tutti i livelli sono coinvolti nella prevenzione della salute dei lavoratori				
10) L'azienda incoraggia i lavoratori ad avere un ruolo attivo nella tutela della propria salute				
11) Il suo responsabile le fornisce sempre tutte le informazioni rilevanti per la salvaguardia della sua salute				

Nella sua attività lavorativa quanto spesso può accadere quanto riportato nelle seguenti affermazioni

Mai ①	Raramente ②	Talvolta ③	Spesso ④	Sempre ⑤
12) Quando una persona ha problemi di salute può decidere come spendere le sue energie e il suo tempo al lavoro				
13) Il suo responsabile le dà la possibilità di entrare ed uscire dal lavoro quando vuole per motivi di salute				
14) Può scegliere di lavorare nelle ore della giornata in cui si sente meglio				

- mediocre ☐ 3
- piuttosto scadente ☐ 2
- molto scadente ☐ 1
- molto buona ☐ 5
- abbastanza buona ☐ 4
- mediocre ☐ 3
- piuttosto scadente ☐ 2
- molto scadente ☐ 1

Come valuta la Sua attuale capacità di lavoro in relazione alle richieste mentali del Suo lavoro?

ghiamo di rispondere  
a risposta negli spazi

1  
2  
3

alla Sua attuale

capacità  
di lavoro  
al massimo



Morbidity in the upper limbs is one of the main complications that can negatively affect one's working activity and the quality of life.





## Lymphedema



Normal



Lymphedema

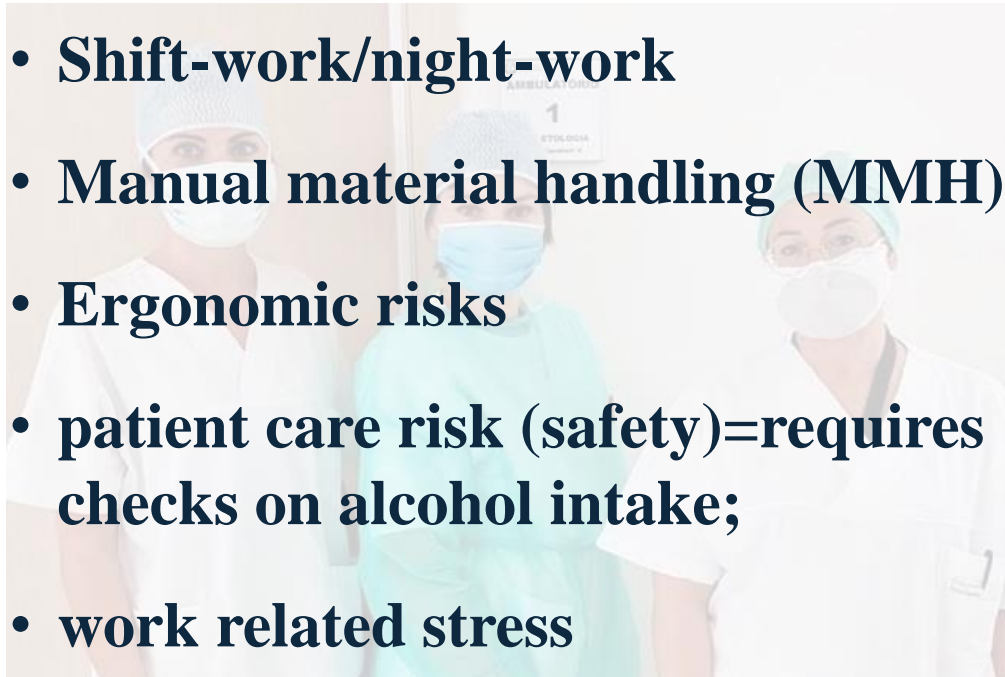


Arm/shoulder pain, numbness, limited mobility in the upper limbs and lymphedema are the main comorbidities detectable after therapy.

# OCCUPATIONAL RISKS in HCWs

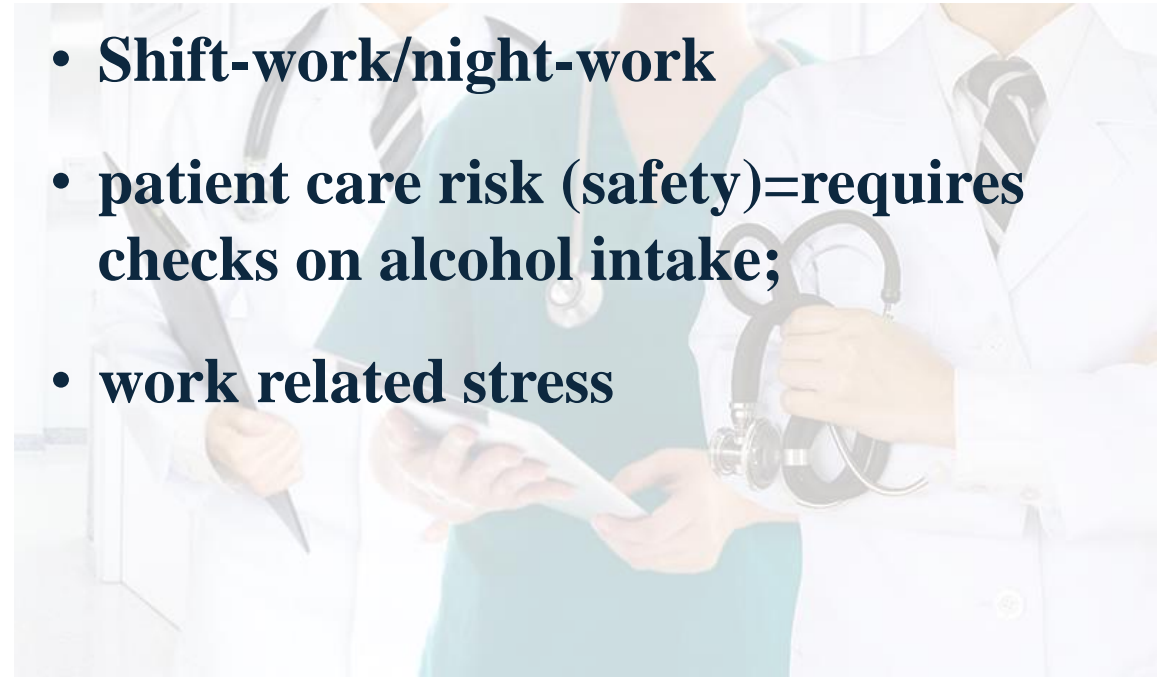
## NURSES/TECHNICIANS

- **Biological**
- **Shift-work/night-work**
- **Manual material handling (MMH)**
- **Ergonomic risks**
- **patient care risk (safety)=requires checks on alcohol intake;**
- **work related stress**



## MEDICAL DOCTORS/BIOLOGISTS

- **Biological**
- **Shift-work/night-work**
- **patient care risk (safety)=requires checks on alcohol intake;**
- **work related stress**



After BC, some HCWs may have difficulty in carrying out some activities.



# Work suitability for the specific task, assigned to HCWs with previous BC

- **Fully fit**=11 (37%)
- **Eligible with temporary restrictions**=19(63%):
  - 3 (10%) were absolutely forbidden to manually handle non-self-sufficient patients (or loads>10kg).
  - 14 (47%) were absolutely forbidden to manually handle non-self-sufficient patients (or loads>10kg) if not properly assisted;
  - 1 (3%) was forbidden to carry out activities with a high psycho-physical commitment (i.e. activities in the ward);
  - 1 (3%) was forbidden to carry out activities that required finger precision movements (i.e. surgical activities).





In the present study, **WAI** questionnaire showed lower scores in nurses/technicians than medical doctors/biologists.

In the same way, a greater **absence (number of days) from work** was observed in nurses/technicians compared to medical doctors/biologists, also justified by the different professional risks that see them perform a physically more demanding job, such as for example manual handling of loads and/or patients.



The results obtained must be considered in the light of the numerous limitations present in the study:

- reduced sample size;
  - study carried out on a single cohort of workers;
  - study carried out on highly frequently checked HCWs;
  - study conducted for a limited period of time;
- failure to investigate the psychological conditions of workers.

A more extensive analysis on risks, including non-professional ones, is therefore necessary.

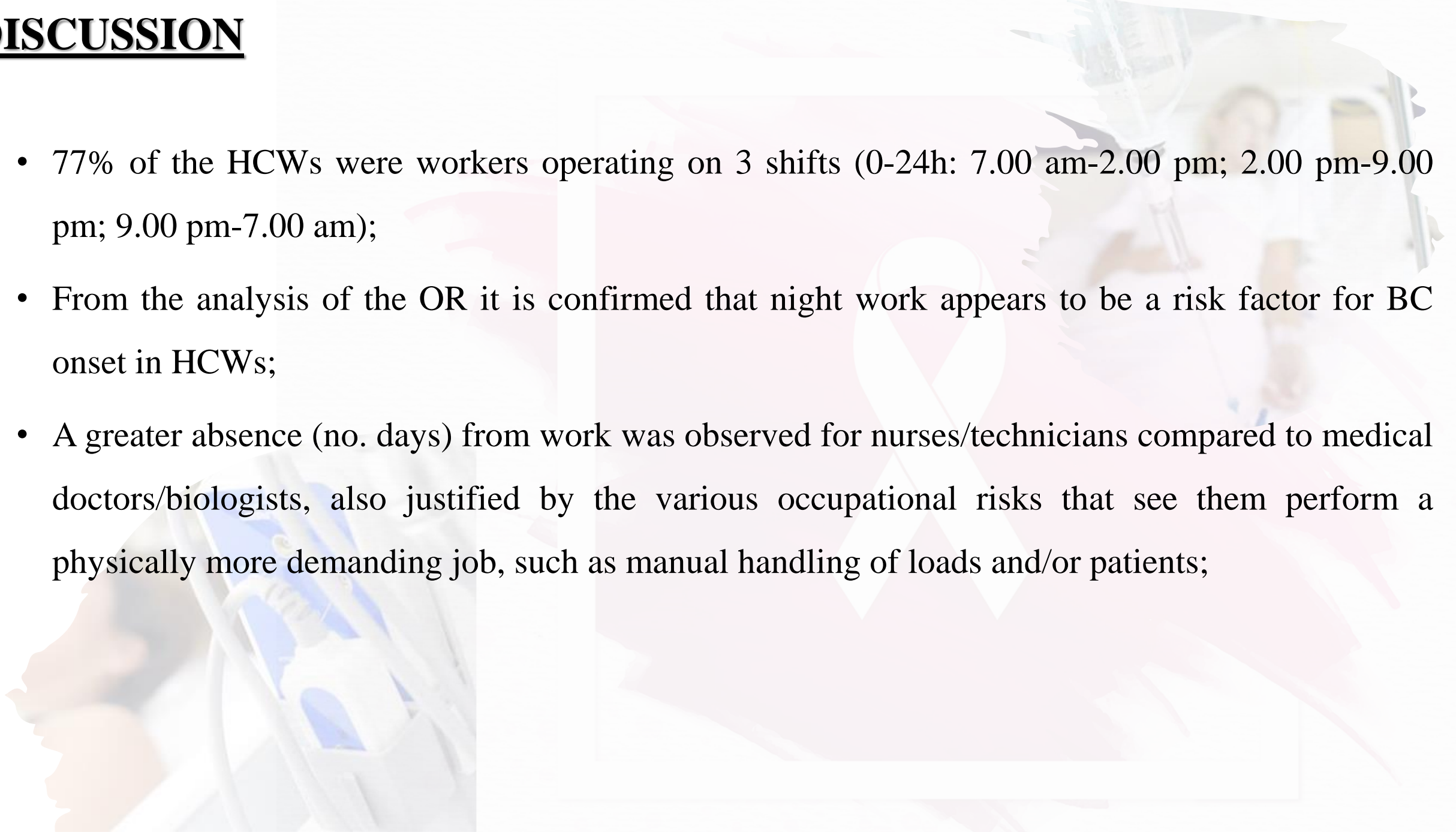
# DISCUSSION

- A significant variation was also observed in the WAI index score in relation to the type of treatment: the most disabling one (mastectomy+chemotherapy+radiotherapy) brought about such massive side effects as to affect working ability. The type of treatment (therapy) received, significantly influenced recovery times and their return to work.
- About 50% of HCWs at diagnosis had a tumor with a TMN stage in the range 0-1; this is attributable to the important screening programs implemented in our University Hospital that allow an increasingly early diagnosis of the disease.
- The sample average age was 54 years (first diagnosis at 45 years), in accordance with the data from the scientific literature that identifies the post-menopausal age as the most at risk (*Oprean et al.. Int J*

*Environ Res Public Health. 2020.);*

# **DISCUSSION**

- 77% of the HCWs were workers operating on 3 shifts (0-24h: 7.00 am-2.00 pm; 2.00 pm-9.00 pm; 9.00 pm-7.00 am);
- From the analysis of the OR it is confirmed that night work appears to be a risk factor for BC onset in HCWs;
- A greater absence (no. days) from work was observed for nurses/technicians compared to medical doctors/biologists, also justified by the various occupational risks that see them perform a physically more demanding job, such as manual handling of loads and/or patients;



# DISCUSSION

- From the analysis of the economic impact of the disease, it is highlighted that the average cost of lost working days amounts approximately to € 9,828.00; while a loss of productivity of about 30% was observed with an annual economic damage of € 32,830.15 which must be calculated for the remaining years of work.

*(The economic data were obtained taking into account the daily cost of a nurse/technician and a medical doctor/biologist and the percentage of disability assigned).*





In Italy, the National Institute of Social Assistance (INPS) recognizes civil invalidity for the cancer patient (at their request), regardless of the contributions paid and/or being insured.

In particular, according to the Ministerial tables there are **three categories**, distinguished by severity of the disease:

**11%** for neoplasms (malignant tumor) with a favorable prognosis with modest functional impairment;

**70%** for neoplasms with a favorable prognosis with severe functional impairment;

**100%** for malignancies with a negative or possibly poor prognosis despite treatments.

**In addition**, there is an economic support allowance for the period the patient undergoes chemotherapy.

# The National (Italy) Institute for Insurance against Accidents at Work (INAIL)

## MINISTERO DEL LAVORO E DELLE POLITICHE SOCIALI

Aggiornamento dell'elenco delle malattie per le quali è obbligatoria la denuncia ai sensi e per gli effetti dell'articolo 139 del testo unico approvato con decreto del Presidente della Repubblica 30 giugno 1965, n. 1124, e successive modifiche e integrazioni

### List 1: illness whose origin is of high probability

15	RADIAZIONI IONIZZANTI	TUMORI DEL SISTEMA EMOLINFOPOIETICO esclusa la LEUCEMIA LINFATICA CRONICA^	I.2.07.^	C82-C91.0 C91.2-C95^
		TUMORE DEL POLMONE^	I.6.15.^	C34^
		TUMORE DELLE GHIANDOLE SALIVARI^	I.6.15.^	C07-C08^
		TUMORE DELL'ESOFAGO^	I.6.15.^	C15^
		TUMORE DELLO STOMACO^	I.6.15.^	C16^
		TUMORE DEL COLON-RETTO^	I.6.15.^	C18-C20^
		TUMORE DELLE OSSA^	I.6.15.^	C40-C41^
		TUMORE DELL'ENCEFALO^	I.6.15.^	C71^
		TUMORE DELLA MAMMELLA^	I.6.15.^	C50^
		TUMORE DEL RENE^	I.6.15.^	C64^
		TUMORE DELLA VESCICA^	I.6.15.^	C67^
		TUMORE DELLA TIROIDE^	I.6.15.^	C73^

### List 2: illness whose origin is of limited probability

04	BIFENILI POLICLORURATI (PCB)	TUMORE DEL COLON-RETTO LINFOMA NON HODGKIN^	II.6.04.^	C18-C20 C82-C85^
		TUMORE DELLA MAMMELLA^	II.6.04.^	C50^
38	OSSIDO DI ETILENE ^	TUMORE DELL'ESOFAGO^	II.6.38.^	C15^
		LINFOMA NON HODGKIN^	II.6.38.^	C82-C85^
		MIELOMA MULTIPLO^	II.6.38.^	C90^
		LEUCEMIA LINEATICA CRONICA^	II.6.38.^	C91.1^
		TUMORE DELLA MAMMELLA^	II.6.38.^	C50^

A black and white photograph of a woman with long, dark hair, seen from the side. She is looking out over a body of water under a cloudy sky. She is holding a small, light-colored flower in her right hand, which is raised towards the sky. The background is a soft, out-of-focus landscape with water and distant hills.

**Return to work should symbolize a return to normal life and social reintegration.**

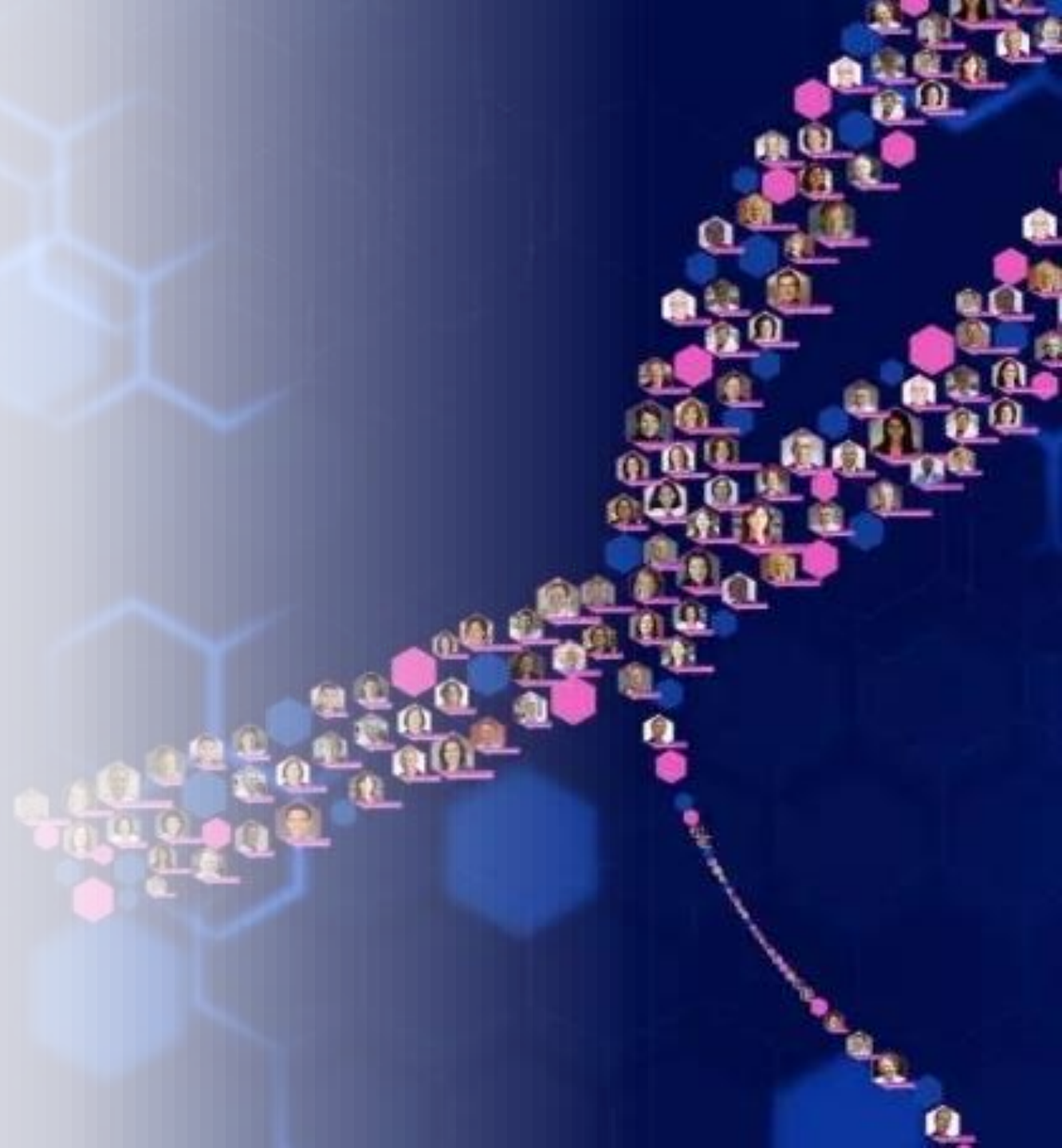
The **Occupational Physician** who knows the professional risks, the task performed and the workplace, is the only professional figure who can relate these aspects to the worker's illness, in order to assess the suitability of the individual worker.

Scientific evidence suggests that a multidisciplinary approach in managing this type of patient-worker would be preferable; in addition, occupational health professionals should promote a healthy lifestyle, encourage rehabilitation and propose solutions to improve interactions between employees and the workplace.



# Thank you for your attention!

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**HVALA**  
**THANK YOU**