Mortality analysis in a cohort of medical workers exposed to low dose of ionizing radiation in France (the ORICAMs cohort)

Julie Lopes, Clémence Baudin, Juliette Feuardent, Herve Roy, Sylvaine Caer-Lorho, Klervi Leuraud, Marie-Odile Bernier

RÉPUBLIQUE FRANÇAISE
Liberté
Égalité
Fraternité

ERPW2022

IRSN
INSTITUT DE RADIOPROTECTION ET DE SÛRETÉ NUCLÉAIRE

MORTALITY ANALYSIS IN A COHORT OF MEDICAL WORKERS EXPOSED TO LOW DOSE OF IONIZING RADIATION IN FRANCE (THE ORICAMs COHORT)

Julie Lopes[1*], Clémence Baudin[1], Juliette Feuardent[1], Hervé Roy[1], Sylvaine Caër-Lorho[1], Klervi Leuraud[1], Marie-Odile Bernier[1]

[1]Institute for Radiological Protection and Nuclear Safety (IRSN) – Fontenay-aux-Roses, France

CONTEXT, OBJECTIVE

Medical workers constitute the largest group of workers occupationally exposed to ionizing radiation (IR). The health risks associated with occupational exposure to low doses of IR in the medical field have been investigated in several national cohorts, but no study has been carried out in France to date.

The ORICAMs (Occupational Radiation Induced CAncer in Medical staff) cohort aims to assess the all-cause mortality in medical radiation workers.

MATERIAL, METHODS

Inclusion criteria

- To be a healthcare professional in France
- To have at least one dosimetric record in the national registry of monitored exposed workers (SISERI) over the period 2002-2012

Exclusion criteria

- Age < 18 years of > 70 at inclusion
- Workers with vital status not traceable

Statistical analysis

Descriptive analyses, and calculation of standardized mortality ratio (SMR) with 95% confidence interval (CI)

RESULTS

Covariables	All
Vital status[a]	
Alive	162,657 (99.2)
Dead	1,358 (0.8)
Occupation[a]	
Nurse	40,463 (41.9)
Physician	30,116 (31.3)
Radiologic technologist	21,563 (22.4)
Other professions	4,212 (4.4)
Follow-up	
Person-years[a]	1,382,456
Mean duration[b]	7.74 (3.5)
Mean age at end of follow-up[b]	43.2 (12.1)
TOTAL	164,015

[a] N(%); [b] mean (SD); other comprise: dental surgeon, pharmacist and midwife

Table 1: Description of the ORICAMs cohort

The cohort included **164,015 medical workers**, with a majority of women (60%). Two thirds of the cohort were nurses and physicians.
1,358 deaths (892 in men and 466 in women) were recorded (Table 1).

The observed numbers of deaths from all causes were **significantly lower** than national rates for both men and women (Table 2).

	All		
Causes of death (ICD-10)	**O**	**E**	**SMR (95% CI)**
All known causes (A00-Y89)	1,358	3,660.2	0.37 (0.35, 0.39)
Cancer sites			
All cancer combined (C00-C97)	532	1,521.6	0.35 (0.32, 0.38)
Lip, oral cavity and pharynx (C00-C14)	11	80.6	0.14 (0.08, 0.25)
Colon, rectum, and anus (C18-C21)	53	109.8	0.48 (0.37, 0.63)
Liver (C22)	21	70.8	0.30 (0.19, 0.46)
Pancreas (C25)	50	73.2	0.68 (0.52, 0.90)
Trachea, bronchi, and lung (C33-C34)	150	429.4	0.35 (0.30, 0.41)
Melanoma (C43)	12	23.5	0.51 (0.29, 0.89)
Breast (C50)	54	142.2	0.38 (0.29, 0.50)
Prostate (C61)	10	27.5	0.36 (0.17, 0.67)
Kidney (C64)	8	28.1	0.28 (0.14, 0.57)
Brain and central nervous system (C70-C72)	29	49.3	0.59 (0.41, 0.85)
Thyroid (C73)	2	39.7	0.05 (0.01, 0.20)
Hodgkin's diseases and lymphoma (C81-C86)	13	35.1	0.37 (0.22, 0.64)
Leukemia (C91-C95)	12	20.9	0.57 (0.33, 1.01)
Non-cancer			
Mental and behavioral disorders (F01-F99)	20	117.6	0.17 (0.11, 0.26)
Diseases of the nervous system and sense organs (G00-H95)	26	107.1	0.24 (0.17, 0.36)
Circulatory system diseases (I00-I99)	127	526.7	0.24 (0.20, 0.29)
Ischaemic heart diseases (I20-I25)	45	186.3	0.24 (0.18, 0.32)
Cerebrovascular diseases (I60-I69)	32	108.8	0.29 (0.21, 0.42)
Diseases of the respiratory system (J00-J99)	18	97.7	0.18 (0.12, 0.29)
Diseases of the digestive system (K00-K93)	38	230.8	0.16 (0.12, 0.23)
External causes (V01-Y89)	274	538.6	0.51 (0.45, 0.57)

Table 2: SMR for all causes of death in the ORICAMs cohort

DISCUSSION

- **Significant lower mortality** than in the general population ⟶ healthy worker effect
- **Results similar** to those obtained from the American (Boice *et al.* 2021), Korean (Lee *et al.* 2018) and Canadian (Zielinski *et al.* 2009) medical workers cohorts occupationally exposed to IR
- *Strenghts*: large cohort / exposure reflecting to the current conditions;
- *Limits*: short follow-up / no consideration of risk factors

CONCLUSION

This is **the first study conducted in France** about medical workers occupationally IR-exposed, allowing a basis for continued follow-up. In the future, **dose-response analyses will be performed.**
This cohort will **be part of the international BECOME project** (Brain CancEr risk in joint cOhort of Medical workers), aiming to carry out pooled analyses from three national cohorts of IR-exposed medical workers (France, Korea and the United States).

Acknowledgements: The authors are grateful to all health professionals and health care institutions for their involvement in this study.
Funding source: IRSN internal funding.
The authors declare no conflict of interest.
*Corresponding author's email: julie.lopes@irsn.fr