

LETTER

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Excess risk of male breast cancer in the Norwegian Offshore Petroleum Workers (NOPW) cohort: a possible link to extreme night shift work?

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LETTER-TO-THE-EDITOR

Male breast cancer (MBC) is a rare disease with some recognised risk factors, such as age, genetic disorders, family history, hormonal influence and radiation [1, 2]. Night shift work (NSW) disrupts the circadian rhythm and may lead to sleep disturbances and changes in sex hormone levels [3], which has been suggested to increase breast cancer risk in female nurses [4]. There is, however, a lack of knowledge regarding the relationship between NSW and MBC.

The Norwegian Offshore Petroleum Workers (NOPW) cohort was established in 1998 by recruiting 25,347 male workers who answered a questionnaire. Each such worker had at least one employment in oil and gas operations on the Norwegian continental shelf 1965–1998. All workers experienced a schedule with 12-h workdays for two weeks; consisting of either day work only, seven day and seven night shifts, or night shifts only; followed by a four-week off-duty period. Ever exposure to NSW was defined as having ever worked night shift during employment. We previously reported a twofold excess MBC incidence in the NOPW cohort compared to the general

Norwegian population (standardized incidence ratio [SIR] = 2.18, 95% confidence interval [CI] 1.13–3.81) [5]. By December 31st, 2019, the number of prospectively recorded MBC cases had increased from 12 to 14, giving SIRs of 2.10 (95% CI 1.15–3.53) overall, 2.49 (1.14–4.73) in ever exposed, and 1.77 (0.57–4.12) in those never exposed to NSW (Table 1). We conducted internal comparisons, using a Cox proportional hazards model adjusted for age (timescale) and education. Males ever exposed to NSW were at 33% increased risk compared to those never exposed, although the estimate was not statistically significant (Table 1). Analyses were performed with Stata version 17 (StataCorp, College Station, TX, USA).

We report this apparent occupational risk of MBC to inspire further research. In our cohort, cancers were prospectively recorded, and analyses were controlled for age and education. In separate analyses, we explored the association with exposure to benzene and chlorinated degreasers and found no sign of increased MBC risk. Lifestyle factors could possibly contribute to breast cancer risk among shift workers, though some of the effect would be adjusted for by education as a proxy variable. With these reservations, our data suggest that extreme NSW may contribute to MBC risk.

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Table 1 Male breast cancer risk by night shift work in the Norwegian Offshore Petroleum Workers cohort

	Obs	Exp	SIR (95% CI) ^a
<i>SIR analysis</i>			
Overall	14	6.66	2.10 (1.15–3.53)
Night shift work			
Never	5	2.83	1.77 (0.57–4.12)
Ever	9	3.61	2.49 (1.14–4.73)
Missing	0	0.22	-
Complete case (n = 24,438)			Multiple imputation^c (n = 25,284; 14 cases)
	No. of participants	No. of cases	HR (95% CI)
<i>Cox regression analysis^b</i>			
Night shift work			
Never	10,489	5	1.00 (reference)
Ever	13,949	8	1.18 (0.38, 3.63)

Follow-up period was from 1st July 1999 to 31st December 2019

Analyses were performed using Stata 17 (StataCorp, TX, USA)

Obs. observed, CI confidence interval, Exp. expected, No. number, HR hazard ratio, SIR standardized incidence ratio

^a SIRs calculated from sex-, age- (5-year) and time- (1-year) specific incidence rates for the Norwegian population, assuming a Poisson distribution of the observed cases

^b Cox proportional hazards model adjusted for age (timescale) and education

^c 3% of the cohort had missing information on education and night shift work, and 5 datasets were imputed

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Authors' contributions

JSS and TKG conceived the study. FCL, MBV, KK, TER, RG, RB, NKS, LAMB, TKG and JSS contributed to the project design. FCL and RB performed the data analyses. FCL, RB, and JSS performed the data management. FCL drafted the manuscript and all authors reviewed and revised it critically for important intellectual content and approved the final version for submission. FCL and JSS are the guarantors. All authors read and approved the final manuscript.

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Availability of data and materials

The data that support the findings of this study are available from the CRN (cohort data and cancer data) and the National Population Register (death and emigration data) but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Requests for data sharing/case pooling for projects with necessary approvals and legal basis according to the EU General Data Protection Regulation (GDPR) may be directed to principal investigator Dr. Tom K. Grimsrud; email: tom.k.grimsrud@krefregisteret.no.

Declarations

Ethics approval and consent to participate

This study was performed at the Cancer Registry of Norway (CRN) after legal and ethical approvals were obtained from the Norwegian Data Inspectorate, the Regional Committee for Medical Research Ethics South-East (2018/1162), and the Norwegian Directorate of Health. Each study participant signed an informed consent.

Consent for publication

Not applicable.

Competing interests

TKG and JSS note that the Research Council of Norway (governmental agency) awarded an industry-collaborative grant to the CRN (governmental agency) in 2019 to establish a cohort of offshore petroleum workers. A condition pertaining to such industry-collaborative grants is that 20% (US \$175,000) of the grant was provided by the petroleum industry and 80% (US \$700,000) by the Research Council itself with the intention of joining forces for the common interest of improved occupational health among petroleum workers. The grant-application process was governed by the Research Council without any involvement from the petroleum industry. TKG and JSS are affiliated and employed by the CRN, but the grant does not cover their salary. The remaining authors declare that there are no conflicts of interest.

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