NIGHT-SHIFTS, DNA METHYLATION AND TELOMERE LENGTH: PRELIMINARY RESULTS FROM A SURVEY ON A SAMPLE OF ITALIAN NURSES

Introduction

The IARC defined shift work as probably carcinogenic to humans (Group 2A), after investigations highlighted an increased breast cancer risk in night-shift female workers. The biological mechanisms underlying this association are still unclear. Hence, we evaluated the relationship between night-shift work and molecular alterations potentially related to increased cancer risk, in detail: DNA methylation of the oestrogen receptor gene (ER-Beta) and tumour suppressor genes (BRCA1, p53, p16), global DNA methylation estimated in repeated elements (LINE-1, Alu) and telomere length (TL).

Methods

46 female nurses (age: 35–45 years) who had been working in night-shifts for at least two years (length of service ≥ five years) were recruited at the Policlinico Hospital (Milan, Italy) and matched for age, sex and length of service to 51 colleagues not working in night-shifts. Each subject was administered a structured questionnaire and withdrawn a 12 mL blood sample. Linear regression models adjusted for age, BMI, parity, smoking habit and oral contraceptive use were then applied.

Results

Working in night-shifts (yes/no) was associated with BRCA1 hypomethylation (β: −0.512, 95% CI: −1.039 to 0.015). When considering also former night-shift workers, the number of years in night-shifts (NYNS) was associated with hypomethylation of BRCA1 (β: −0.084, 95% CI: −0.127 to −0.042), p53 (β: −0.072, 95% CI: −0.133 to −0.011) and LINE-1 (β: −0.043, 95% CI: −0.083 to −0.002). After graphically inspecting the NYNS-TL relationship, we stratified our study population by NYNS <15 vs ≥15 years. Among nurses with NYNS ≥15 years, NYNS was associated with telomere shortening (β: −0.065, 95% CI: −0.122 to −0.008) and hypermethylation of BRCA1, p53 and LINE-1.

Conclusion

Our results show epigenetic alterations that might play a role in cellular ageing, genomic instability and carcinogenesis. We are currently extending our study to other molecular targets involved in the cascade of events that might bring from night-shift exposure to cancer.

LONG WEEKLY WORKING HOURS AND RISK OF ISCHEMIC HEART DISEASE AND STROKE

Introduction

Studies have indicated that long working hours is associated with circulatory diseases. The aim of the present studies was to test if long working hours were prospectively associated with ischaemic heart disease (IHD), usage of anti-hypertensive drugs (AD) and stroke, in a large randomly selected sample from the general workforce of Denmark.

Methods

Self-reported data on weekly working hours from the Danish Labour Force Survey (1999–2013) was linked to national registers. Participants were followed until becoming a case, emigration/death due other causes or end of study period (2014).

Poisson regression was used to analyse incidence rates as a function of weekly working hours. The analyses were controlled for calendar time, time since start of follow-up, age, sex, SES, night and health care work (the latter two for IHD only).

Result

Around 1,450,000 persons were included with 3635 cases of IHD, 20,648 cases of AD and 1737 cases of stroke. With 32–40 hours/week serving as reference, the estimated rate ratios for IHD were 0.95 (95% CI: 0.85–1.06) for 41–48 and 1.07 (0.94–1.21) for ≥48 hours/week. The corresponding rate ratios for AD were 0.99 (0.95–1.04) and 1.02 (0.97–1.08).

In the study of stroke 35–40 working hours/week served as reference. The estimated rate ratios for overall stroke were 0.97 (95% CI: 0.83–1.13) for 41–48, 1.10 (0.86–1.39) for 49–54, and 0.89 (0.69–1.16) for ≥55 hours/week. The estimated rate ratios per one category increase in working hours were 0.99 (0.93–1.06) for overall stroke, 0.96 (0.88–1.05) for ischaemic stroke and 1.15 (1.02–1.31) for hemorrhagic stroke.

Discussion

The analyses cannot confirm long working hours to be associated with IHD, AD or overall stroke. Data suggest however, that long working hours might be associated with increased rates of hemorrhagic stroke.

CLOCKWISE AND COUNTER-CLOCKWISE JOB SHIFT ROTATION DIFFERENTLY IMPACTS ON WORK-LIFE BALANCE

Introduction

Rapidly rotating shiftwork schedule, is common in hospital nurses as it provides continuity to the patients’ care. It has been suggested that shift rotation in clockwise (CW) direction produces less disruption of circadian rhythms than counterclockwise (CCW) rotation. Little is known about the effects of different direction of shift rotation on work-life balance, particularly in women characterised by additional commitments and responsibilities in the home and outside of work.

Aim

To evaluate if CW and CCW shift rotation differently impacts on family and social relationships in female nurses.

Methods

One hundred healthy hospital nurses (F, 20–50 years) were enrolled. Fifty of them worked in CW (Morning, M; Afternoon, A; Night, N; two rest days) and 50 in CCW (A, M, M, N, three rest days) shift rotation direction. A daily
diary filled out by the nurses at the end of each work-shift provided information concerning family and social relationships during a typical working week. Habits on coffee, smoke, time of meal assumption and home management during working days were also collected.

**Result** Nurses working on CCW shift rotation reported more frequently difficulties in keeping adequate family and social relationships compared to nurses working on CW one (96% vs 73%, p=0.002).

No differences were reported in coffee (3-4 cups/day), smoking (61%) habits and time of meals assumption (irregular in about 33% of nurses) during working days in the two groups. No differences were reported in the time spent in home management by the two groups.

**Discussion** CCW shift rotation seemed to disrupt quality of family and social relationships of nurses more than CW one. The fact that CCW shift rotation is associated to higher sleep disturbances and more fatigue in the free-time might partially explain these results. These aspects should be taken into account in shift-work schedule organisation, particularly in women.

**Conclusion** Our results suggest recent rotational shiftwork may have an independent effect on hypertension risk not explained by night work.