Reduced Fertility Among Men exposed to RF fields in the Royal Norwegian Navy

Ole Jacob Møllerløkken1*, Bente E. Moen1, Valborg Baste1, Gunnhild Oftedal3, Leif Åge Strand4, Kjell Hansson Mild5
1Department of Public Health and Primary Health Care, Bergen, Norway, 2UniHealth, Bergen, Norway, 3Sør-Trøndelag University College (HiST), Trondheim, Norway, 4The Cancer Registry of Norway, Oslo, Norway, 5Department of Radiation Sciences, University of Umeå, Sweden
*Corresponding author e-mail: ole.mollerlokken@isf.uib.no

INTRODUCTION
The aim of the study was to examine the relationship between work with exposure to electromagnetic fields and male reproductive health, with special focus on workers exposed to radiofrequency fields.

MATERIAL AND METHODS
We obtained data using a questionnaire in a cross-sectional study of all employees in the Royal Norwegian Navy at the end of 2002. The overall response rate was 58% (n=2265). Only military men were selected for this study as many of these were known to be working with equipment causing exposure to electromagnetic fields. This group had a higher response rate, 63% (n=1487). We asked about lifestyle, reproductive health, previous or current diseases, education, exposure at work and at leisure and work history.

An expert group was established for determining work categories related to electromagnetic field exposure and they agreed that because of their work tasks the categories “tele/communication”, “electronics” and “radar/sonar” was related to electromagnetic field exposure. Other military men in the navy were considered as unexposed.

All three exposed groups were analyzed separately compared to the unexposed workers. SPSS 13.0 were used for analysis. Statistical significance level was set at P < 0.05.

RESULTS
The groups differed slightly in their background information and these differences were adjusted for in the analysis. The mean age was 36 years of age (range 20 – 62). The unexposed workers reported higher exposure to oil, gasoline or diesel vapour at work. Regarding exposure at leisure the groups did not differ except from radar/sonar, and they had a small difference in experienced demolition work. The exposed categories all reported higher exposures to radiofrequency fields than the unexposed, but only radar/sonar and tele/communication reported exposure to a high degree.
The analysis showed a higher risk of infertility among telecommunication (OR = 1.72, 95% confidence interval 1.04-2.85), and radar/sonar odds ratio (OR = 2.28, 95% confidence interval 1.27-4.09). The electronics group had no increased risk. There were no other reproductive outcomes that differed between the groups.

**DISCUSSION**

Some studies support our findings through reporting reduced semen quality among men exposed to such fields, but other studies have not seen this (Irgens et al 1999, Grajewski et al 2000, Schrader et al 1997).

Only two of the three groups we categorized as exposed did report high exposures, and only these two groups had findings on infertility. The expert group categorized based on electromagnetic fields in general and did not focus on radiofrequency fields. This might indicate that radiofrequency fields more adversely affect fertility than do other types of electromagnetic fields. This must be interpreted with caution as we did not measure exposure objectively and the description of exposure is rough.

Tele/communication and radar/sonar workers were older and had served longer. This could suggest a longer period of exposure and also lower fertility due to age (Paul 1993), but the groups did not differ in age at the time of their first biological child and the age difference was also adjusted for in the analysis.

We lack information about partner, like recurrent abortions which can influence the infertility, but there is unlikely that this should differ between the groups. We found no increased risk for anomalies, chromosomal errors, preterm births, stillbirths or infant deaths which correlates to other studies on the subject (Mjøen et al 2006).

**CONCLUSIONS**

This study shows a possible relationship between exposure to radiofrequency fields during work with radiofrequency equipment and radar and reduced fertility, but other studies are needed to confirm these findings.

**REFERENCES**


