Downloaded from http://oem.bmj.com/ on February 5, 2018 - Published by group.bmj.com

Response to: 'Does 'job' predict exposure to magnetic fields?' by Sorahan and Swanson

We take the opportunity to reply to the letter to the editor by Sorahan and Swanson[1] on our recent paper by Koeman *et al*.[2] where we described a positive association between amyotrophic lateral sclerosis (ALS) and exposure to extremely low-frequency magnetic fields (ELF-MF) within a general population cohort study in the Netherlands. We argued that the described results strengthened the evidence suggesting a positive association between exposure to ELF-MF and risk of ALS mortality.

Sorahan and Swanson are correct to point out the importance of the quality of the exposure assessment when assessing the health effects of magnetic fields. We agree that a job-exposure matrix (JEM) is an imperfect method in assessing exposure as per design, it is not able to incorporate between-subject differences within a job title or between companies/worksites without having additional data on tasks and worksites. This will inherently result in some level of exposure misclassification. However, under most scenarios, this would have led to an underestimation of the risk and is unlikely to have introduced an artificial risk among our highly exposed individuals. Nevertheless, industrial cohorts like the one described in Sorahan and Mohammed[3] (we cited the 2007 paper for which the results were essentially similar as in the 2014 paper)

Downloaded from http://oem.bmj.com/ on February 5, 2018 - Published by group.bmj.com

can indeed achieve a more accurate description of the exposure than a general population cohort. However, this requires additional information (like for instance, specific historical layouts of power plants) that might not always be available anymore let alone be remembered or known by a study participant.

Industrial cohorts on ALS do have some important drawbacks as well. First, as ALS is a rare disease, the number of cases is often limited in such cohorts. This is not different for the study by Sorahan and Mohammed[3] where only 86 cases occurred until 2010. Furthermore, in industrial cohorts, only the period that subjects work in the specific industry of interest is considered in the exposure assessment and therefore a large period of the occupational history of the subjects, and by extension a large part of their exposure time, may be unaccounted for. In the study by Sorahan and Mohammed,[3] the mean duration of employment within the cohort (based on the 2007 paper) was 16 years. Given that individuals performing the high-exposed jobs are highly specialised, there is a reasonable chance that these cohort members might have had significant exposures outside the cohort. The increased accuracy of the exposure assessment in an industrial cohort therefore can be offset by a less accurate or no assessment of exposure in the period for which individuals had jobs outside the industry and by reduced power due to limited case numbers.

Furthermore, general population JEMs may not perform quite as badly as Sorahan and Swanson indicate. In a study performed by Mee *et al*,[4] occupational codes explained between 20% and 27% of total variance in ELF-MF, in contrast to the 5% found by Kelsh *et al*[5] whose data set was almost entirely restricted to the utility industry. The result that only 5% of the variance was between jobs in the paper by Kelsh *et al* may in this case be good news as most of these jobs fall within a single International Standard Classification of Occupations (ISCO) code. In our analyses in the general population, high-exposed subjects came from multiple occupations more akin to the evaluation by Mee *et al*.[4] Therefore, we do have confidence in the results of our exposure assessment and, by extension, in the results of our study. We do agree with our colleagues that an improvement in the exposure assessment for studies assessing the health effects of magnetic fields is important. Possibly, this improvement can be achieved by using a combination of occupational and industrial codes, creating a combined industrial-exposure and JEM or by adding specific information on tasks performed.

Roel Vermeulen, Tom Koeman, Hans Kromhout

Division of Environmental Epidemiology, Institute for Risk Assessment Sciences, Utrecht University, Utrecht, The Netherlands

Correspondence to Dr Roel Vermeulen, Division of Environmental Epidemiology, Institute for Risk Assessment Sciences, Utrecht University, Utrecht 3538, The Netherlands; r.c.h.vermeulen@uu.nl

Contributors All authors contributed to the writing of the response.

Competing interests None declared.

Provenance and peer review Not commissioned; internally peer reviewed.

© Article author(s) (or their employer(s) unless otherwise stated in the text of the article) 2017. All rights reserved. No commercial use is permitted unless otherwise expressly granted.

To cite Vermeulen R, Koeman T, Kromhout H. *Occup Environ Med* 2017;**74**:925–926.

Received 7 September 2017
Accepted 7 October 2017
Published Online First 21 October 2017

► http://dx.doi.org/10.1136/oemed-2017-104494

Occup Environ Med 2017;**74**:925–926.
doi:10.1136/oemed-2017-104758

REFERENCES

1 Sorahan T, Swanson J. Does ' job' predict exposure to magnetic fields? *Occup Environ Med* 2017;74:925.
2 Koeman T, Slottje P, Schouten LJ, *et al*. Occupational exposure and amyotrophic lateral sclerosis in a prospective cohort. *Occup Environ Med* 2017;74:578–85.
3 Sorahan T, Mohammed N. Neurodegenerative disease and magnetic field exposure in UK electricity supply workers. *Occup Med* 2014;64:454–60.
4 Mee T, Whatmough P, Broad L, *et al*. Occupational exposure of UK adults to extremely low frequency magnetic fields. *Occup Environ Med* 2009;66:619–27.
5 Kelsh MA, Kheifets L, Smith R. The impact of work environment, utility, and sampling design on occupational magnetic field exposure summaries. *AIHAJ* 2000;61:174–82.