IJC
International Journal of Cancer

Author's reply to: Meta-analysis of cancer risks of professional firefighters

Hamed Jalilian[1], Mansour Ziaei[2], Elisabete Weiderpass[3], Yahya Khosravi[4], Kristina Kjaerheim[5] and Corina S. Rueegg[6]

[1]Department of Occupational Health and Safety, Faculty of Health, Hormozgan University of Medical Sciences, Bandar Abbas, Iran
[2]School of Health and Nutrition, Bushehr University of Medical Sciences, Bushehr, Iran
[3]International Agency for Research on Cancer, World Health Organization, Lyon, France
[4]Department of Occupational Health and Safety Engineering, Research Center for Health, Safety and Environment, Alborz University of Medical Sciences, Karaj, Iran
[5]Department of Research, Cancer Registry of Norway - Institute of Population-based Cancer Research, Oslo, Norway
[6]Oslo Centre for Biostatistics and Epidemiology, Research Support Services, Oslo University Hospital, Oslo, Norway

Dear Sir,

We would like to thank Dr Casjens and colleagues for their critical and thorough comments on our article: cancer incidence and mortality among firefighters.[1] We are happy to discuss all the points raised below.

The authors argue for stratification of the results by study design and disagree with the pooling of different risk estimates. We agree that pooling of different risk estimates can lead to biased results. However, if the outcome is rare (such as all cancers studied in our review) and the risk estimates are close to one (almost all cancers among firefighters) estimates from case–control and cohort studies can be pooled without bias.[2,3] Because of the few numbers of studies in some of the cancer types, we therefore preferred to not stratify by study design. Moreover, the proportion of case–control studies among all included studies was maximally 30% (for incidence/mortality of lung cancer).

It is true that using multiple estimates of specific cancer sites from one study would give more weight to this one study. However, since it was only two studies that reported two estimates based on the same number of cases, we do not think that this distorts our results. Because the estimates reported differed, we thought it was important to include both of them. For example, Ahn *et al.*[4] reported a significantly elevated standardized mortality ratio of 1.56 (95% confidence interval [95% CI] 1.01–2.41) for kidney cancer, with no significant elevation of standardized rate ratio (0.69; 95% CI 0.16–2.99) for this organ.

It is correct that the method by Hamling *et al.*[5] was originally developed to aggregate categories of exposure within one variable but also to aggregate estimates of different categories of disease. We therefore think that it can be used without bias to aggregate estimates of cancers of different ICD codes. The alternative would have been to combine them with fixed effects meta-analysis, but this approach treats each estimate as an independent measure, which we think is not correct. The method of Hamling *et al.* takes the correlation between the estimates into account and this is why we preferred this method. In any case, out of approximately 800 extracted risk estimates, only one standardized mortality ratio, five standardized incidence ratios and three odds ratios were calculated with the method of Hamling *et al.* We therefore think that using another method would not have changed the overall results of this meta-analysis.

We fully agree with Casjens and colleagues' comment on our criteria to assess the strength of association between firefighting occupation and cancer. The method uses arbitrary thresholds (similar to the widely used significance level of $p < 0.05$) to interpret findings. This is why we show all the individual estimates with confidence intervals and just add the interpretation by applying the method of LeMasters *et al.* This gives the reader an easily understandable idea on the strength of associations and makes the results comparable to the last meta-analysis of LeMasters *et al.*[6] In addition, we tried to enhance the method by separating incidence and mortality risk estimates.

We used the DerSimonian–Laird estimator to calculate the between-study variance. We agree that studies have shown that the Paule and Mandel estimator might be more accurate under some circumstances. We decided to use the DerSimonian–Laird estimator because it is most widely used and makes our results comparable. The DerSimonian–Laird estimator performs well with low mean squared errors when τ^2 is small.[7]

Although the Newcastle–Ottawa Scale (NOS) is not the best measure to assess the quality of studies in systematic reviews, it is widely used and accepted for this aim and has been suggested by several investigators.[8,9] However, evidence suggests that quality scales can be problematic and the conclusions of a meta-analysis can be affected by the choice of the quality scale.[9] We agree that the NOS was not sensitive to differentiate well between the studies included in our review. We have therefore also put little emphasis on the NOS rating when interpreting our results.

In our meta-analysis, we primarily extracted effect sizes of male firefighters but included studies were the estimates included both sexes combined. Casjenns and colleagues were concerned about this approach and suggested to add an analysis in men only. We agree that this approach could be problematic if there were many studies including men and women. However, we extracted more than 800 risk estimates through 48 studies and only six estimates included both sexes combined. Furthermore, the populations in the underlying studies included less than 5%

women. We therefore think that a bias because of some estimates including also women is unlikely.

We confirm that there is a problem with the graphical representation of the confidence intervals in two studied cancers (intestine and colon) of Figure 2. The underlying numbers for the calculations and reporting of these numbers in the text are, however, correct. Additionally, we spotted that in Figure 2, the number of studies for colon cancer must be rectified to 10.

Finally, we tried to find and include all relevant studies by using a broad search strategy including a wide range of words for the population (firefighters) and outcome (cancer) of interest in three important databases (see Supporting Information Table S2 of the article), identifying 2,630 records. In addition, we screened the reference lists of previous reviews on the same topic. However, we can of course not guarantee that we have not missed some publications. As described in Figure 1 of our article, we excluded seven publications that overlapped with other studies (based on the same data material). Moreover, we exclude additional nine studies, including Demers *et al.*,[10] because they reported risk estimates that include more than one occupation. For example, Demers *et al.*[10] reported an odds ratio of 1.90 (95% CI 0.50–9.40) for multiple myeloma among "firefighting and prevention occupations."

Yours sincerely,
Hamed Jalilian
Mansour Ziaei
Elisabete Weiderpass
Yahya Khosravi
Kristina Kjaerheim
Corina S. Rueegg

Disclaimer

Where authors are identified as personnel of the International Agency for Research on Cancer / World Health Organization, the authors alone are responsible for the views expressed in this article and they do not necessarily represent the decisions, policy or views of the International Agency for Research on Cancer / World Health Organization.

References

1. Jalilian H, Ziaei M, Weiderpass E, et al. Cancer incidence and mortality among firefighters. *Int J Cancer* 2019. https://doi.org/10.1002/ijc.32199. [Epub ahead of print].
2. Peat J, Barton B, Elliott E. *Statistics workbook for evidence-based health care*. Singapore: Wiley, 2009.
3. Jalilian H, Teshnizi SH, Röösli M, et al. Occupational exposure to extremely low frequency magnetic fields and risk of Alzheimer disease: a systematic review and meta-analysis. *Neurotoxicology* 2018;69:242–52.
4. Ahn YS, Jeong KS, Kim KS. Cancer morbidity of professional emergency responders in Korea. *Am J Ind Med* 2012;55:768–78.
5. Hamling J, Lee P, Weitkunat R, et al. Facilitating meta-analyses by deriving relative effect and precision estimates for alternative comparisons from a set of estimates presented by exposure level or disease category. *Stat Med* 2008;27: 954–70.
6. LeMasters GK, Genaidy AM, Succop P, et al. Cancer risk among firefighters: a review and meta-analysis of 32 studies. *J Occup Environ Med* 2006;48: 1189–202.
7. Viechtbauer W. Bias and efficiency of meta-analytic variance estimators in the random-effects model. *J Educ Behav Stat* 2005;30:261–93.
8. LoBiondo-Wood G, Haber J, Titler MG. *Evidence-Based Practice for Nursing and Healthcare Quality Improvement [E-book]*. St Louis, MO: Elsevier Health Sciences, 2018.
9. Bruce N, Pope D, Stanistreet D. *Quantitative Methods for Health Research: A Practical Interactive Guide to Epidemiology and Statistics*, 2nd edn. Hoboken, NJ: Wiley, 2018.
10. Demers PA, Vaughan TL, Koepsell TD, et al. A case-control study of multiple myeloma and occupation. *Am J Ind Med* 1993;23:629–39.

Conflict of interest: The authors declare no conflict of interest.
DOI: 10.1002/ijc.32403
History: Received 27 Apr 2019; Accepted 30 Apr 2019; Online 13 May 2019

Correspondence to: Yahya Khosravi, Department of Occupational Health and Safety Engineering, Research Center for Health, Safety and Environment, Alborz University of Medical Sciences, Karaj, Iran, Tel.: +98-26-34643922, Fax: +98-26-34643922, E-mail: yakhosravi@yahoo.com

Request PDF | On May 1, 2019, Hamed Jalilian and others published Reply to: Metaâ€Analysis of cancer risks of professional firefighters | Find, read and cite all the research you need on ResearchGate.Â To read the article of this research, you can request a copy directly from the authors. Request full-text. Download citation.Â We extracted risk estimates of cancers and calculated summary incidence risk estimates (SIRE), summary mortality risk estimates (SMRE), and their 95% confidence intervals (CI). Publication bias and risk of bias in individual studies were assessed using Begg's and Egger's tests and the Newcastleâ€Ottawa scale (NOS), respectively. We included 50 papers in the review and 48 in the metaâ€analysis. How to cite this paper: Zhao, R.C., Zhou, J., Liu, F., Wei, Y.G., Chen, K.F. and Li, B. (2016) The Association between miR-196a2 rs11614913 Polymorphism and Digestive Sys-tem Cancer Risk: A Meta-Analysis of 34 Stu-dies. Open Journal of Internal Medicine, 6, 112-127. http://dx.doi.org/10.4236/ojim.2016.64017. Publication Analysis. Top Keywords. risks professional. 4. professional firefighters. 4. cancer risks. 4. meta-analysis cancer. 4. author's reply. 4. reply meta-analysis. 4. firefighters. 4 Department of Occupational Health and Safety Engineering, Research Center for Health, Safety and Environment, Alborz University of Medical Sciences, Karaj, Iran. 5 Department of Research, Cancer Registry of Norway - Institute of Population-based Cancer Research, Oslo, Norway. 6 Oslo Centre for Biostatistics and Epidemiology, Research Support Services, Oslo University Hospital, Oslo, Norway. We conducted a meta-analysis to combine and analyze the results of previous studies that have investigated the association of dietary cadmium intake and cancer risk. MethodsWe searched PubMed, EMBASE, and MEDLINE database for case-control and cohort studies that assessed the association of dietary cadmium intake and cancer risk.Â ConclusionOur analysis found a positive association between dietary cadmium intake and cancer risk among studies conducted in Western countries, particularly with hormone-related cancers. Additional experimental and epidemiological studies are required to verify our findings.