Authors' response

In their letter,¹ Mastrangelo and colleagues argue that our analyses on occupational organic dust exposure and its specific constituents (eg, endotoxin) suffered from inadequacies that hampered their interpretation. They argue that, given that the effect of endotoxin might diminish after cessation of exposure, analyses of ever versus never exposed to endotoxin might fail to identify the protective effect of endotoxin. Furthermore, they argue that the failure to differentiate between livestock/dairy and crop/orchard farmers may have obscured the protective effect as some papers have argued that the effect is contained (largely) to livestock/dairy farmers only.

The main aim of our paper was to study the association between occupational exposure to organic dust and its constituents and lung cancer in the general population. For cumulative exposure to organic dust we observed a significantly increased risk of lung cancer. No associations were found between cumulative exposure to endotoxin and lung cancer. Exposures were estimated by applying a job-exposure matrix to the complete work histories of all subjects based on the International Standard Classification of Occupation (ISCO) 1968 job coding. This coding scheme has a very detailed job description. For agriculture workers, for example, there are 62 different five-digit ISCO codes. These job descriptions were sufficient to take into account the type of farming when assigning no, low or high exposure to organic dust and endotoxin as applied in the main analyses. As such, the suggestion that we did not take into account the type of farming or that we only analysed ever versus never exposed cases is wrong. The reason we provided the risk estimate for ever being a farmer in the Discussion section was to compare our results with earlier publications that have suggested lower lung cancer risks among farmers possibly due to exposure to endotoxin, although none of these studies actually quantified the endotoxin exposure. In addition, many of these studies were not able to correct for smoking.

Interestingly, a summary RR of 1.19 has been observed for the 3 studies out of 17 that did correct for smoking, while for the 14 studies that did not correct for smoking a clear deficit in lung cancer among farmers was observed (summary RR 0.55).² These results suggest that the possible reduced risk of lung cancer among farmers could be due to no or insufficient correction for smoking behaviour. We were able to correct our analyses for detailed information on smoking behaviour and other high risk occupations and found no evidence of a reduced risk for livestock/dairy farmers only (OR 1.22, 95% CI 0.96 to 1.54), even when we restricted our analyses to the group that was still actively farming in the last 15 years before diagnosis (OR 1.28, 95% CI 1.10 to 1.50), or for recent livestock/dairy farmers only (OR 1.62, 95% CI 1.12 to 2.34). As such, our analyses based on a large number of farmers (n=3970) do not confirm the results published by Mastrangelo *et al*³ and are not misleading as Mastrangelo concludes in his letter.

Using data from a very large pooled dataset comprising 11 case-control studies (13 300 cases and 16 273 controls), with correction for detailed information on smoking habits and high risk occupations, our study showed a clear increase in lung cancer risk with exposure to organic dust. Given the relatively high prevalence of exposure to organic dust, this finding is of importance and deserves more in-depth investigations with regard to the possible causing constituents.

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REFERENCES

1. **Mastrangelo G**, Rylander R, Cegolon L, *et al*. Lung cancer risk in subjects exposed to organic dust: an unexpected and surprising story. *Thorax* 2012;**67**:1112.
2. **Lenters V**, Basinas I, Beane-Freeman L, *et al*. Endotoxin exposure and lung cancer risk: a systematic review and meta-analysis of the published literature on agriculture and cotton textile workers. *Cancer Causes Control* 2010;**21**:523–55.
3. **Mastrangelo G**, Grange JM, Fadda E, *et al*. Lung cancer risk: effect of dairy farming and the consequence of removing that occupational exposure. *Am J Epidemiol* 2005;**161**:1037–46.