Reviewer’s report

Title: Environmental radon exposure and breast cancer risk in the Nurses' Health Study II

Version: 0 Date: 25 Apr 2017

Reviewer: Michelle Turner

Reviewer’s report:

* Could more information and discussion be presented regarding the dose to the lung vs the breast? Specific published estimates are available. It must be quite low for the breast.

* The authors assert that their study is the first epidemiologic study investigating radon exposure and breast cancer risk. This is incorrect. The prospective analysis by Turner et al. 2012 AJE using the same radon data should be cited and discussed

* Were county-level radon concentrations positively associated with lung cancer risk in this cohort?

* The EPA radon action level is incorrectly specified in the introduction as 400 Bq/m3. It should be 148 Bq/m3.

* I’m not sure the biological plausibility is high for radon, as stated in the introduction, if the breast doses are tiny

* Are there any studies of female underground miners?

* Were any participants omitted due to unreliable geocoding?

* The methods section states that a cumulative average was calculated. Is this correct? I think it was just average.

* Was any analysis conducted according to number of years lived in the home before enrollment? Or according to employment status? Were all registered nurses currently employed? Does never movers refer to never moving during follow-up?

* Could urban vs rural differences in radon concentrations be discussed? Did analysis examine urban vs rural differences?

* Results first paragraph, perhaps the description of women living in higher radon areas could be described as opposed to those in low radon areas

* The highest quintile of exposure is still relatively low. Could some results using a higher cutpoint of radon be presented?
* What is the correlation with air pollution concentrations overall and in the West?

* Are participant characteristics different in the West vs other regions? Are there differences by moving or years lived in the home? Housing type? More explanation and discussion surrounding the regional differences is needed. There were only 53 breast cancer cases in the highest radon tertile. Did analysis of interactions also use continuous radon or other cutpoints? The highest tertile is quite low.

* I believe data on well water usage is available in earlier versions of the Census

* It seems there are many differences in participant characteristics by radon quintile. Do you think residual confounding may play a role here?

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