Reviewer's report

Title: Effects of long-term low-level radiation exposure after the Chernobyl catastrophe on immunoglobulins in children residing in contaminated areas: cohort and cross-sectional studies

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Reviewer: Jamie C DeWitt

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Comments to editors and to authors

The manuscript “Effects of long-term low-level radiation exposure after the Chernobyl catastrophe on immunoglobulins in children residing in contaminated areas: cohort and cross-sectional studies” describes an epidemiological study to evaluate the impacts of cesium radiation on various classes of immunoglobulins in exposed children. The authors used residential soil contamination as well as cesium in cow milk samples to associate cesium exposure with immunoglobulin levels and were able to evaluate two cohort and two cross-sectional samples. The authors reported that putative cesium exposure was associated with changes in IgA, IgE, IgM and IgG antibodies, but that the changes were not necessarily indicative of adverse health effects.

The study described in the manuscript represents data collected over several decades and provides important findings about the impacts of nuclear-accident associated radiation on basic health parameters. Immunological impacts of environmental contamination can provide clues about current and potential later-life health concerns, including both immunosuppression (i.e., risk of infection or reduced tumor surveillance) and immune enhancement (i.e., allergy/asthma and autoimmune disease). Changes in immunoglobulin levels of humoral immunity, which is part of the adaptive immune response, generally can indicate if overall humoral immunity is impacted.

Overall, the manuscript is suitable for publication in Environmental Health as long as the authors suitably address the following comments and concerns listed below.

Minor Essential Revisions

1. The introduction is a bit lengthy. Much of the background material regarding immunoglobulin levels from people residing in nearby cities could be moved to the discussion and serve as a basis of comparison to the current study.

2. While reporting and evaluating absolute values of serum immunoglobulins can be somewhat informative, the analysis may be improved by evaluating relative amounts of immunoglobulin classes to each other. IgG comprises the greatest amount of immunoglobulin in serum, followed by IgA, then IgM, and then IgE. Shifts in the ratios of immunoglobulins can indicate shifts in cell populations and
in cytokine signaling. If it is possible, evaluating ratios might give the authors a better or more telling indication about shifts in adaptive immunity and therefore potential health risks.

3. Although the authors did not measure specific immune-related health outcomes (i.e., rates of infection such as otitis media, flu, etc.) other than allergy/asthma/eczema, the discussion would be greatly improved if the authors could comment on the particular role that each immunoglobulin class plays in adaptive immunity. This is done somewhat in the introduction, but if put into the context of the results, would enhance the discussion.

4. For some of the results, it may not be appropriate to say that cesium induced “immunosuppression”. For example, in looking at Figure 3, values for IgA range from a low of about 1.65 g/L to a high of just under 2 g/L. It is unlikely that this difference indicative of immunosuppression. Similar conclusions could be made by looking at the graphs of the other immunoglobulins.

5. The graphs in Figure 3 are challenging to read as they have gridlines as well as the cesium values printed on the graphs. It is recommended that the quintile values be included in a legend rather than printed on the graphs themselves. It is also recommended that the x-axis include years rather than the numbers 1-6.

Discretionary Revisions

1. Note: “data were” and “data are” technically are correct. “data is” and “data was” technically are incorrect.

2. Were the levels of IgG measured/reported total IgG or were different isotypes evaluated? Was IgM measured as a monomer or dimer or total?

3. Did the authors evaluate IgE in relation to pets in the home? Given that they found that IgE was decreased in relation to indoor allergens, the presence of pets could influence this response.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests.