Reviewer's report

Title: Incidence of cancer among residents of high temperature geothermal areas in Iceland: A census based study 1981 to 2010

Version: 2 Date: 5 September 2012

Reviewer: Suminori Akiba

Reviewer's report:

1) My original comment was as follows: “Authors suspects that pancreas cancer is increased by radon gas exposure. However, as already pointed out, the fact that lung cancer risk did not increase indicates a lack of significant exposure to radon gas and it decay products. It is also of note that a pooled analysis of 10 studies of underground miners exposed to radon showed an O/E of 1.05 for pancreatic cancer (IARC monograph 78).”

Authors replied as follows: “In the study we refer to the IARC monograph 78 (our ref. number 14). The O/E ratio 1.05 for pancreas mortality in the monograph is obtained from the study of Darby et al 1995 (our ref. number 20), that study we refer to in the section discussing the pancreas cancer incidence. To meet this point of the reviewer we have added this O/E ratio in Discussion, page 12.”

Actually, in the revised manuscript, authors wrote as follows: “Darby et al. found an O/E of 1.05 for pancreas cancer mortality.”

Authors should have added the 95%CI of the O/E, which was 0.85-1.29 as shown in the paper of Darby et al. in the monograph. Authors should have also pointed out that the O/E does not indicate a significant pancreatic cancer increase. In addition, authors should have pointed out that this study of Darby et al. analyzed the data obtained from underground miners, rather than residents, and the exposure levels of miners to radon and its progenies were much higher than residential radon exposure doses.

Authors should also mention the following statement made by Sarah Darby in the same report: “Mortality from non-lung cancer was examined in a collaborative analysis of data from 11 cohorts of underground miners in which radon-related excesses of lung cancer had been established.” Anyway, authors failed to explain why radon gas exposure did not increase lung cancer risk.

2) My comment was as follows: “Authors may suspect a radon exposure to the skin and the breast from radon daughters attached to the body surface when taking bath. In the case of the breast, however, it is unlikely that radon on the body surface give a significant dose to breast cancer stem cells since alpha particles are stopped by the skin (since it has a low permeability).”

Authors replied as follows: “We agree with the reviewer that it is unlikely that radon on the surface of the body would contribute to radiation dose to the breast tissue and we do not suggest that exposure mechanism in Methods or
Discussion. This comment is related to previous comment of the reviewer. “I am afraid authors did not understand my point. Anyway, if indoor air radon increased the risk of cancers of the skin and breast but not lung cancer risk, indoor air radon are expected to give larger doses to skin and breast than the lung. If authors suspect that indoor air radon is the cause of observed increase of those cancers, they should present a plausible mechanism as to how indoor radon gas gave larger doses to the breast and skin than to the lung. In addition, authors should show the indoor levels of radon and its decay products in their study subjects (at least for a sample of study subjects).

3) My comment was as follows: “Anyway, if authors suspect the involvement of radon exposure, they should present estimated radiation doses from such an exposure and discuss whether that dose is large enough to explain a 59% increase of breast cancer risk.”

Authors replied as follows: “In this point the reviewer highlights the lack of exposure surveys on indoor radon in the study like Peter Baxter in his first comment. We have because of these comments reworded and softened the conclusions in Abstract, page 2, and Discussion, page 18.”

The rewording and softening the conclusions made it ambiguous. I am afraid that authors failed to present sufficient evidence to suspect the involvement of indoor air radon in the observed increase of cancers among the study population in their study.

Level of interest: Too insignificant to warrant publication in any journal

Quality of written English: Acceptable

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