Author's response to reviews

Title: Radiation Exposure from CT Examinations in Japan

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Reply to the Reviewer’s comments

Dr. Cecile M Ronckers

1. Point of clarification on page 6 middle of page: why is the number 127 divided by 2?
   The population of Gunma prefecture is 2 million. To estimate the annual numbers in Japan, the annual numbers for Gunma prefecture were multiplied by (127 million/2 million).
   This part has been changed as below:
   “The population of Japan is approximately 127 million and that of Gunma prefecture is two million, so these annual numbers for Gunma prefecture were multiplied by 127/2 to estimate the annual numbers for those in Japan.”

2. page 11 and table 2b: in Dutch our country is called Nederland. In English it should be the Netherlands.
   Sorry. It has been corrected.

3. title figure 1: I would add population, ie: "(...) of the populations of Japan and Gunma prefecture".
   This has been changed according to the reviewer’s comment. Thank you.

4. for all other figures it should be clear in the title whether this applies to Japan as a whole or to Gunma prefecture.
   The title of Figure 3 has been changed as:
   “Distribution of effective dose for one scan for each anatomical location in Gunma prefecture.”
   Thank you.

Dr. Amy Derrington de Gonzalez

1. Abstract Background – the aim of the study was to assess (rather than demonstrate).
   It has been changed. Thank you.
2. Methods (p5) – “For each individual patient, organ doses were calculated” – this suggests that the dosimetry was patient specific where as it was generic for CT scanner rather than for a patient (ie actual technical parameters were not available for each CT scan taken neither was height and weight of the patient).

The organ doses for each patient were calculated using the standard CT scanning protocols. This limitation was discussed in the Discussion: “The study questionnaire surveyed only the standard CT protocols for each anatomical location, but radiologic technologists usually modify the protocol according to patient body size, affecting the radiation dose.”

This sentence in page 5 has been changed as below:
“For each individual patient, organ doses were calculated and the effective doses were obtained (using the standard CT scanning protocol of each institute).”

3. Methods (p5) – In the justification for extrapolating results from Gunma to the rest of Japan I would mention the other similarities in Table 3, not just the age distribution.

Table 3 has been moved to the Method section as Table 1. Thank you.

4. Methods (p7) – Although it was not possible to estimate organ doses for pediatric patients you could still present the data on CT scan frequency for this age-group. This is important data and if it was collected it should be published.

The data of the numbers of the pediatric patients and anatomical locations could be collected, but there was a difficulty in dose calculation. Thus, only the numbers of the pediatric patients and anatomical locations were provided in this paper.

5. Discussion – this section would benefit from some re-organization as the logic of the structure is not clear. For example on page 12 and on page 10 there are explanations given for why the estimates in the current study may be lower than in the previous study in 2000.

We discussed the difference between the current study in 2008 and previous study in 2000 in page 10. We do not think that this difference was not due to the limitation of our study. In page 12, the limitations of the current study
were discussed. These discussions should be separated.
   Thank you for your comment.

6. Discussion (p13) – The large variation in doses based on the CT scanner protocols is an interesting finding. Please specify what factors were not clearly correlated with the dose levels. A recent study in the US also found wide variation in CT dose for the same scan across patients in 4 hospitals (Smith-Bindman et al, 2010). It would be interesting to compare the levels of variation with the current study.
   As described in the Method section, hospital size (number of in-patient beds), the number of patients undergoing CT in one month, and the row number of the CT detector were compared with CT dose. However, these data did not significantly correlate with the estimated effective dose.

7. Figure 3 and 4 – Difficult to interpret. Perhaps just the tables would be better. Please add the totals to the tables. Were the number of scans overall similar in men and women?
   These figures have been eliminated, and changed to Tables. The numbers of CT examinations for women were smaller than those of men.
   Thank you for your comment.

8. Abstract Results – “It was estimated that in Japan,...” this should go in the conclusion or at the end of the results section as this is the implications of the survey results for Gunma rather than an actual result of the study.
   This has been moved. Thank you.

9. Results (p8) – “Thus, an estimated 29.9 million patients....” As in the abstract I would present the results of the extrapolation after you have presented all the results for Gunma.
   This has been changed. Thank you.