Reviewer's report

Title: Are passive smoking and air pollution a greater health risk than major radiation incidents?

Version: Date: 1 March 2007

Reviewer: Yasuhiro Yoshimoto

Reviewer's report:

General
The revised manuscript is still questionable on the purpose of author's demonstrations based on the hypothetical situations of major nuclear incidents. Three points beyond the scope of the paper which the author intended are more important for communicating unfamiliar risks to the public; 1) developing health detriments of a risk factor, 2) interpreting risks and making value judgments on risk acceptability and risk comparison, 3) a full review of many serious consequences of major nuclear incidents. ICRP has provided "nominal fatality probability coefficients" for cancer with effective doses only for radiological protection from daily practices using a LNT model. (Above 1) The dose limits recommended by ICRP are based on the "nominal probability coefficients including genetic effects" (Above 2) Chernobyl Forum provided an international consensus based on a full review of the consequences 20 years after the accident. (Above 3) There can be many different situations caused by a major nuclear incident. Author's demonstration seem to ignore those social psychological impacts, individual sufferings from nonfatal diseases (cancer, benign tumor, non-tumor diseases), and individual different doses from external and internal exposures to somatic cells including those in fetus and gametes in a community unreasonably involved in a major nuclear accident. On the other hand, it should be avoided to foment unnecessary social fears by the predicted health consequences based on hypothetical calculations of very large number of the populations and the small cumulative doses on average country- and region-specific doses.

Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

TITLE
Revise such as "Are passive smoking, air pollution, and obesity a greater mortality risk than radiation from major nuclear incidents"

ABSTRACT
p. 2 Background, second sentence: Revise such as "In response to such incidents, it is expected for the public to learn radiation health risks in the context of other common environmental and lifestyle risk factors and become conversant with language of risk and less swept away by the irresponsible risk information." Natural and medical radiations are also common in our daily life.

p. 2 Background, third sentence: Revise such as "This study compare the mortality risk from radiation in illustrative exposure situations using ICRP nominal fatal probability coefficients with risks arising from air pollution, obesity, and passive and active smoking."

p. 2 Methods: Revise such as "A comparative assessment of mortality risks from ionizing radiation was carried out by applying ICRP nominal fatal probability coefficients for realistic exposure scenarios such as daily life, atomic bomb survivors and Chernobyl accident and assessing those risks in comparison with risks from air pollution, obesity, and passive and active smoking."

p. 2 Results: Revise such as "The lifetime risk due to cancer deaths of illustrative populations exposed to radiation from the Chernobyl accident may be no higher than that exposed to other common risks factors in daily life, due to all causes of death from air pollution or heart diseases from passive smoking. Radiation exposures, their mean shielded kerma of 2.25 Gy, experienced by the most exposed group of atomic bomb survivors led to an average loss of life expectancy significantly lower than that caused by severe obesity or active smoking."

p. 2-3 Conclusions: Revise such as "The risk to a specific individual from exposures following major nuclear incidents can be clearly significant, but average risk of the population involved in the accidents may be no greater than that from other common environmental and lifestyle factors. This comparative analysis, whilst highlighting inevitable uncertainties in risk quantification and comparison, may help for the public to learn potential consequences of radiation exposures in the context of other common risk factors in their daily life."

BACKGROUND
Acute radiation injuries were seen among 23 Japanese fishermen exposed to heavy radioactive fallout from the 1954 Bikini Atoll Nuclear Test. The 1957 Windscale (now Sellafield) reactor accident reminded us of the view that short-lived 131-I was the most important radionuclide concerned. A cancer incidence study was conducted by the claim for "undetectable" radiological late effects from the residents involved in the 1979 nuclear power plant at Three Mile Island although the off-site release of radioactivity was very limited. The 1999 criticality accident at JCO Tokai uranium processing plant led to acute radiation syndromes in three JCO workers and two deaths of them. Exceptionally the 1986 Chernobyl accident led to acute radiation injuries in 134 emergency workers (over 20 workers died) as well as radiological late effects in the public; an excess of thyroid cancer due to childhood/adolescence exposure mainly from 131-I contaminated milk in the highly contaminated areas in three former USSR countries, far beyond the 30 km zone from the reactor.

This paper is expected to help the public to learn radiation health risks in the context of other common environmental and lifestyle risk factors and become conversant with language of risk and less swept away by the irresponsible risk information.

Radiological protection is not different from other fields concerned with the control of hazards and it should be considered without unduly limiting the desirable human endeavours and actions related to radiation exposures.

Health detriments, somatic and genetic effects instead of a health detriment.

Yet no evidence has been found on human for heritable genetic effects of radiation although they are conclusively established. Radiation is much less likely to have adverse genetic effects than had worried in the past. Among the somatic effects of radiation other than cancer, developmental effects on the unborn child due to in utero exposure are of greatest concern. But they depend on the stage of gestation at exposure, the dose and the dose rate. Doses below 100 mGy low LET of in utero exposure should not be considered a reason for terminating a pregnancy, especially prolonged exposures.

"cancer mortality risk and loss of life expectancy" instead of stochastic mortality risks.

It is obvious that health problems are different among selected issues. Air pollution and radiation exposure in daily life are basically controllable through the responsibility of government and industry risk management. The decisions to not-smoke or diet are based on the individual risk management. As this paper shown, the scientific evidence indicates that in most cases it is unlikely that radiation exposure from major nuclear accidents may be a substantial contributing causes to developing fatal cancer. But it is sometimes necessary in the case of an incident to provide both a medical service and a compensation program to the specific population.

"lifetime cancer risk" instead of lifetime fatal cancer risk. BEIR VII used both incidence and mortality of cancer.

Nominal fatality probability coefficients recommended by the International Commission on Radiological Protection (ICRP)[15] are ..."

Different radiation risks can be directly compared to each other since there is a common link between exposure and risk (if doses are enable to be summed from external and internal exposures and the linear no threshold, LNT, is assumed)."

Nominal fatality probability coefficients recommended by the ICRP [15] are for chronic exposures at relatively low dose rate extrapolating mainly from the experiences of high dose rate exposures to the atomic bomb survivors."

Major nuclear incidents clearly have many serious consequences and a full review of each incident should be reflected to improve emergency preparedness and response.

"other common public health risk factors" instead of more common public health risk factors.

The military combat uses of a nuclear weapon led to about 210,000 deaths in two cities. But ...

METHODS

RESULTS AND DISCUSSION

CONCLUSIONS

p. 3 After first sentence: Add the following sentences such as "The major nuclear incidents rarely occur."

"Acute radiation injuries were seen among 23 Japanese fishermen exposed to heavy radioactive fallout from the 1954 Bikini Atoll Nuclear Test. The 1957 Windscale (now Sellafield) reactor accident reminded us of the view that short-lived 131-I was the most important radionuclide concerned. A cancer incidence study was conducted by the claim for "undetectable" radiological late effects from the residents involved in the 1979 nuclear power plant at Three Mile Island although the off-site release of radioactivity was very limited. The 1999 criticality accident at JCO Tokai uranium processing plant led to acute radiation syndromes in three JCO workers and two deaths of them. Exceptionally the 1986 Chernobyl accident led to acute radiation injuries in 134 emergency workers (over 20 workers died) as well as radiological late effects in the public; an excess of thyroid cancer due to childhood/adolescence exposure mainly from 131-I contaminated milk in the highly contaminated areas in three former USSR countries, far beyond the 30 km zone from the reactor."

p. 3 Third sentence: Revise such as "This paper is expected to helpful for the public to learn radiation health risks in the context of other common environmental and lifestyle risk factors and become conversant with language of risk and less swept away by the irresponsible risk information."

p. 3-4 The sentence over two papas: Revise such as "Radiological protection is not different from other fields concerned with the control of hazards and it should be considered without unduly limiting the desirable human endeavours and actions related to radiation exposures."

p. 4 Last para, third sentence: Revise such as "health detriments, somatic and genetic effects" instead of a health detriment.

p. 4 Last para, before last sentence: Add the following sentences such as "Yet no evidence has been found on human for heritable genetic effects of radiation although they are conclusively established. Radiation is much less likely to have adverse genetic effects than had worried in the past. Among the somatic effects of radiation other than cancer, developmental effects on the unborn child due to in utero exposure are of greatest concern. But they depend on the stage of gestation at exposure, the dose and the dose rate. Doses below 100 mGy low LET of in utero exposure should not be considered a reason for terminating a pregnancy, especially prolonged exposures."

p. 4 last sentence: Revise such as "cancer mortality risk and loss of life expectancy" instead of stochastic mortality risks.

p. 5 before next section, last sentence: Revise such as "It is obvious that health problems are different among selected issues. Air pollution and radiation exposure in daily life are basically controllable through the responsibility of government and industry risk management. The decisions to not-smoke or diet are based on the individual risk management. As this paper shown, the scientific evidence indicates that in most cases it is unlikely that radiation exposure from major nuclear accidents may be a substantial contributing causes to developing fatal cancer. But it is sometimes necessary in the case of an incident to provide both a medical service and a compensation program to the specific population."

METHODS

p. 5 First sentence: Reivse such as "lifetime cancer risk" instead of lifetime fatal cancer risk. BEIR VII used both incidence and mortality of cancer.

p. 5 Second sentence: Revise such as "Nominal fatality probability coefficients recommend by the International Commission on Radiological Protection (ICRP)[15] are ...

RESULTS AND DISCUSSION

p. 11 Exposure and risk scenarios, first sentence: Revise such as "Different radiation risks can be directly compared to each other since there is a common link between exposure and risk (if doses are enable to be summed from external and internal exposures and the linear no threshold, LNT, is assumed)."

p. 13 Radiation risks, first sentence: Revise such as "Nominal fatality probability coefficients recommended by the ICRP [15] are for chronic exposures at relatively low dose rate extrapolating mainly from the experiences of high dose rate exposures to the atomic bomb survivors."

CONCLUSIONS

p. 18 Second sentence: Revise such as "Major nuclear incidents clearly have many serious consequences and a full review of each incident should be reflected to improve emergency preparedness and response."

p. 18 Fifth point: Revise such as "other common public health risk factors" instead of more common public health risk factors.

p. 19 fourth point: Add a sentence before such as "The military combat uses of a nuclear weapon led to about 210,000 deaths in two cities. But ...

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

Table 2: No explanation for *. 
Discretionary Revisions (which the author can choose to ignore)

What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

Level of interest: An article of limited interest

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.