

Comment for ICRP TG64 Draft Report:

Cancer Risk from Exposure to Plutonium and Uranium

From China Institute for Radiation Protection

I. GENERAL COMMENTS

1. The review of liver cancer from Pu is too simple (P38, Para122)

The purpose of this report is to improve the knowledge of the cancer risk from exposure to plutonium and uranium. The results of Mayak cohort studies indicate the lung, liver and bone cancer risk from plutonium exposure, as the description in the abstract. In the text, the review of lung cancer is very detailed. However, the review of liver cancer from plutonium-only contains only one reference (Sokolnikov, 2008), and the length of this part is even shorter than that of leukaemia and other cancers. It is too simple to draw attention from readers.

The liver is the most important target tissue after the plutonium uptake into blood. The baseline of liver cancer is much lower than lung cancer in Europe population, so cases of liver cancer in Mayak cohort are not enough to get detailed analysis of risk like lung cancer. However, still there are several references with available information on liver cancer from plutonium, eg. Gilbert et al.(2000) *Liver Cancers in Mayak Workers*, Labutina et al.(2013) *Radiation Risk of Malignant Neoplasms in Organs of Main Deposition for Plutonium in the Cohort of Mayak Workers with Regard to Histological Types,etc..* The paper of Labutina (2013), which is referred in the review of lung cancer, used latest dose system of Mayak(MWDS-2008).

It is suggested to increase the length of the review of liver cancer from plutonium.

2. The order of “plutonium” and “uranium” is confusing.

The report reviews the cancer risk from exposure to plutonium and uranium. In the *Contents*, plutonium is listed before uranium, just like the order in the title. However, some description in the text is not consistent with this order. As following:

- (1) L25, L410, L2786, “uranium and plutonium”
Change to “plutonium and uranium”
- (2) L30, “Keywords: Uranium, Plutonium,...”
Change to “Keywords: Plutonium, Uranium,...”
- (3) P4, MAIN POINTS, the second paragraph is about uranium.
Suggest to put it at the end of this part.
- (4) P9, Para6 is about uranium.

Suggest to put it after Para8.

3. The description and order of subsections are not consistent.

In 2.3 Epidemiological studies, the subsections of two parallel parts are as following:

2.3.1 Mayak Workers	2.3.2 Other Plutonium Worker Cohorts
2.3.1.3 Result by organ	2.3.2.2 Results by organ system
(a) Lung cancer	Lung cancer
(b) Liver cancer	Leukaemia, lymphatic and haematopoietic cancers
(c) Bone cancer	Liver cancer
(c) Leukaemia;	Bone cancer
(d) Other cancers	Cancers at other sites

It is suggested to keep the structure of parallel parts consistent. The order of cancer in 2.3.1.3 is better, because it is based on target organs of plutonium.

In addition, in the field of radiation protection, the term “leukaemia” means, except solid cancer, general malignant tumors, equals to “lymphatic and haematopoietic cancers”.

4. The description of uranium chemical toxicity is not clear. (P74, Para243-245)

The description of uranium chemical toxicity (except kidney) in Para244 is not clear. Especially the reference “Kurttio, 2005”, which studied natural uranium in drinking water, is the only reference in this paragraph and is not consistent with former point (Para239, “In contrast to the UNSCEAR Report 2016 (2017), the focus here is on studies of uranium workers...”). On the other hand, both Para243 and Para245 introduce the kidney toxicity separately.

It is suggested to adjust the contents of this part according to the general conclusion of annex D, UNSCEAR 2016 Report, especially Para322.

5. The structure of section 3.3.3 (Results by organ system) is not consistent with former description.

In Para253, described as “In this publication, we focus on studies that reported uranium-specific risks for the three most plausible cancer outcomes following uranium exposure: lung cancer (...), kidney cancer (...), and leukaemia and other lympho-haematopoietic malignancies (...).”

But in section 3.3.3, the order is 3.3.3.1 Lung cancer, 3.3.3.2 Lymphatic and

haemopoietic cancers, and 3.3.3.3 Kidney cancer.

It is suggested to move the review of kidney cancer ahead in section 3.3.3, according to the order in Para253.

II. COMMENTS ON LOCAL MISTAKES

No.	Page	Line/Table /Paragraph	Original information	Comment or change proposed
1	19	L644	“...dosewould...”	Change to “...dosewould...”
2	19	L646	“...apportionnement...”	Change to “...apportionment...”
3	33	Table 2.2	Labutina et al. (2013), last column: “Males: 9.1(6.0-13.6)”	The data cannot be found in the paper, but the overall ERR/Gy is 7.1(95% CI:4.5; 10.9) for males. If it is reassessed for age 60 , please be noted.
4	67	L2080	“Excess relative (ERR) and excess absolute (EAR) rate models...”	Change to “Excess relative rate (ERR) and excess absolute rate (EAR) models...”
5	69	L2149	“...Ozasa et al. (2012) presented in Table 2.7.”	Here should be Table 2.10. Please check it.
6	69	Table 2.11	The table header is “...from exposure to plutonium (4 exposure scenarios) ...”. In the column of Mayak ERR, lifetime excess risk of lung cancer death is “1351-1691”.	“1351-1691”does not cover 4 exposure scenarios. According to the Table 2.8, 4 exposure and excess risk of lung cancer include acute intake oxide (1425) and nitrate (1718), chronic intake oxide (1351) and nitrate (1691).
7	70	L2162	“...(section 2.6.1) ...”	There is no section 2.6.1 in this text. Please check it.
8	73	Para239	Twice “...UNSCEAR Report 2016 (2017) ...”	Change to “...UNSCEAR 2016 Report (2017) ...”
9	91	L2470-2472	“...plutonium exposure and risk of liver and bone cancer...deposition of plutonium on bone surfaces and in the liver.”	Change to “...plutonium exposure and risk of liver and bone cancer...deposition of plutonium in the liver and on bone surfaces.”

10	108	L3505	“...J/kg ⁻¹ ...”	Change to “...J kg ⁻¹ ...”
11	110	L3563	“Excess absolute rate: ...”	Suggest adding abbreviation, as “Excess absolute rate (EAR)”
12	110	L3566	“Excess relative rate: ...”	Suggest adding abbreviation, as “Excess relative rate (ERR)”