Title: Reanalysis of Site Specific Cancer Mortality Using Reconstructed Organ Absorbed Dose: A

Japanese Nuclear Facility Worker Cohort 1991-2010

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ABSTRACT

Background: Japanese Epidemiological Study on Low-Dose Radiation Effects (J-EPISODE) has

analyzed health effects in association with photon exposure assessed in $H_0(10)$ up to now. It is under

way to estimate cancer morbidity and mortality risk evaluated in organ absorbed dose in a newly

designed cohort, the features of which were 1) all participants have agreed to participate in the study,

2) had a baseline information including smoking, education, job, etc. from lifestyle survey, 3) were

able to follow-up vital status and underlying cause of death, 4) were able to obtain cancer incidence

data by linkage with National Cancer Registry, and 5) smoking confounding was suggested in

association between radiation and cancer death.

Aim: To describe reconstruction method of organ absorbed dose and to reanalyze site specific cancer

mortality risk for J-EPISODE with follow-up 1991-2010.

Materials and methods: The reconstruction method of organ dose principally followed the approach

adopted in the IARC 15-Country Collaborative Study. The recorded dose was converted to air kerma,

further converted to organ-absorbed dose. The method was modified considering recent usage practice

of dosimeters in Japan and body size of Japanese. Conversion coefficient was estimated for the

selected 14 tissues/organs: the colon, red born marrow (RBM), oesophagus, stomach, liver, gall

bladder, spleen, lungs, pancreas, prostate, bladder, kidneys, brain and heart. Following reconstruction

of organ absorbed dose for J-EPISODE during 1957 to 2010, Poisson regression method was applied

for estimating ERR (Excess Relative Risk) for cancer mortality.

Results: The conversion coefficients were approximately 0.8 Gy/Sv. The estimated ERRs/Gy for site

specific cancer mortality were compatible with the previous analysis using the recorded dose Hp(10).

Decreasing trends of risk estimates by adjustment of smoking did not change even when organ-

absorbed dose was used.

Conclusion: The main features concerning smoking confounding in the previous risk analysis were also found in the reanalysis results using the organ-absorbed dose. J-EPISODE risk analysis will mainly use the reconstructed organ-absorbed dose in the future.

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