

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 $H_p(10)$ 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 bone 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 $H_p(10)$. 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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