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Title: Advantages of Japanese nuclear workers cohort J-EPISODE

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Abstract:
OBJECTIVE: The aim of the study is to clarify advantages of the Japanese nuclear workers cohort study, J-EPISODE.

METHODS AND MATERIALS: J-EPISODE has been conducted between 1991 and 2010 with ~200,000 participants. Results of the last follow-up study suggested the confounding by smoking in the association between radiation and cancer mortality in a subset of ~70,000 lifestyle survey respondents in the entire cohort. Between 2015 and 2019, a re-set-up of a cohort was performed with ~80,000 participants, all of those consented to participation in the cohort and responded to the baseline survey on smoking, alcohol consumption, education, and work. It re-started the follow-up of mortality since 2015. Identification of the underlying cause of death was done by linkage with the death certificate of the vital survey. The follow-up of cancer incidence was made possible using newly established National Cancer Registry from 2016. Most exposure doses since 1957 have been from nuclear power plants, where photon exposure was dominant, and neutron dose and internal exposure were rare. A radiation risk assessment plan based on organ doses was determined.

RESULTS: Reconstruction of annual organ dose from the normal work doses during operation, maintenance and inspections was completed in 2020. Reanalysis results of the prior cohort showed that the ERR/Gy of 1.00 (90%CI: -0.55, 2.82) decreased to 0.25 (-1.16, 1.92) with smoking adjustment for deaths from all cancers excluding leukaemia among 72,000 males during the 1991-2010 follow-up, which was consistent with the previous results using recorded dose; ERR/Sv of 0.80 (90%CI: -0.49, 2.00) to 0.29 (-0.90, 1.40). J-EPISODE included ~4,000 emergency workers who were exposed to external and internal radiation as a result of working at the Fukushima Daiichi Nuclear Power Plant accident occurred in 2011. The conversion from the emergency work dose to organ dose will be completed soon. The risk analysis of mortality 2015-2020 and cancer incidence 2016-2020 will be conducted in 2024.

DISCUSSION:

The risk estimates to be conducted within a few years will have many uncertainties due to the small number of person-years and cases, however, further continued follow-up will contribute to the elucidation of dose-response relationships for low-dose and low-dose-rate exposures, and allow comparison with preceding studies. An advantage of J-EPISODE is having individual lifestyle information, including smoking. Less uncertainty in dosimetry is another advantage compared to preceding nuclear workers cohort studies including nuclear weapons manufacturing workers.

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