

SIMULATION OF SURVIVAL BIAS IN EPIDEMIOLOGICAL SURVEY BY REANALYZING J-EPISODE AND HANFORD WORKERS

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BACKGROUND: Japanese Epidemiological Study on Low-Dose Radiation Effects (J-EPISODE) has high-quality dose data and data on cause of death, as well as lifestyle data such as smoking for a part of it.

Although the inception of radiation exposures began in 1957, the follow-up period of the cohort was 1991 to 2010, which was one of the weaknesses. The average follow-up period was 14 years, the total observation was 3 million person-years, and the population was decreased by 10% at the end of follow-up, indicating that the statistical power was not sufficient. There was also the possibility of a survival bias due to the cohort setting in 1991.

In addition, the new cohort to be set in 2019, which employed opt-in method for informed consent, might have a selection bias, because the subjects are restricted to survivors and consentees might be in good health.

OBJECTIVES: To simulate survival bias by reanalysing J-EPISODE and Hanford workers and assess the possible impact of survival bias.

MATERIALS & METHODS: The micro data set of "Hanford Workers Cohort Study Follow-up Through 1994" at the Comprehensive Epidemiological Data Resources (CEDR) was used for comparison with J-EPISODE.

Mortality of all cancers excluding leukaemia was taken as an end point. Poisson regression was applied for the Hanford male workers and J-EPISODE by changing observation period, to clarify the effects of survival bias.

Also windows approach regarding dose rate and age at exposure was applied for both cohorts, in order to clarify the structure of each cohort and possible causes of survival bias.

RESULTS: The simulation results of estimated survival bias under several assumptions indicated that the directions of the bias were not constant. The possible causes of the differences were discussed in line with birth cohorts and trends of annual exposure dose.

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