

## A Risk Comparison between Lifestyle, Socioeconomic Status, and Radiation among Japanese Nuclear Workers (J-EPISODE)

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The Radiation Effects Association of Japan (REA) has been conducting epidemiological studies to investigate on the health effects of low-dose radiation using a cohort of nuclear workers since 1990. The aim of this study is to conduct a comparison of the cancer risk of mortality between lifestyle habits such as smoking, and socioeconomic status such as years of education, and radiation among Japanese nuclear workers.

The cohort was consisted by male nuclear workers in Japan who answered a lifestyle questionnaire survey conducted during 2003–2004. Workers' vital statuses were ascertained by workers' residence registration cards issued by local government offices. Causes of death were identified by data linkage with death records approved for use and provided by the Ministry of Health, Labor and Welfare. The dose records were supplied by Radiation Dose Registry Center within the REA. Personal dose equivalent  $H_p(10)$ , which is the operational quantity of effective dose obtained from dosimeter readings, was used in the analysis. To exclude systematic errors caused by missing values of questionnaire (from 1 to 12% by questions), multiple imputation was used to impute the missing values. Poisson regression was used to estimate relative risks and confidence intervals for smoking (pack-years), alcohol consumption (ethanol/day), health consciousness, frequency of medical examination, breakfast intake, sleep, body mass index, job category, position, years of education, and cumulative radiation dose.

The number of cohort member was 41,742. The mean age and 10-year-lagged cumulative dose were 54.9 y and 24.8 mSv, respectively. Significantly high relative risks were determined for smoking, alcohol consumption, frequency of medical examination, breakfast intake, sleep, and body mass index. Significantly high relative risks of radiation were not shown except for lung cancer and smoking related cancers of 5- and 50- mSv categories. Their point estimates were smaller than the RR for smoking—especially significantly lower than that for the 40 pack-year and over. The comparison of radiation and smoking risk is unit-dependent, but these results suggest that the low dose radiation risk, if any, is less than smoking and probably less than other lifestyle factors. This study was funded by Nuclear Regulation Authority, Japan.