

# Quantifying the adjusting effect for radiation risk estimate of mortality by adjustment for smoking among Japanese nuclear workers

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**Background:** Blue-collar workers have a higher tendency to smoke than white-collar workers. In the case of nuclear workers, it is likely that the group exposed to high doses of ionizing radiation show higher smoking rates than that exposed to low doses. This means the confounding to smoke exists in nuclear workers.

**Aim:** To quantify the adjusting effect for radiation risk estimate of mortality by adjustment for smoking among Japanese nuclear workers.

**Methods:** Vital statuses were obtained by application of subjects' residence registration cards. The causes of deaths were determined by record linkage with vital statistics death records and coded according to ICD10. To obtain the information of confounding factors, two lifestyle questionnaire surveys were performed in 1997 and 2003. Personal dose equivalent Hp(10) values were used for in the analysis. The excess relative risks per Sv (ERR/Sv) were obtained by Poisson regression. Doses were lagged two years for leukaemia and 10 years for other diseases.

**Results:** In the present study, 71733 male nuclear workers who had responded to the survey were assembled as a cohort. The mean cumulative dose was 25.5 mSv. Statistically significant ERRs/Sv were shown for all causes, all diseases (total amount of cancers and non-cancers), all non-cancer diseases, and liver cancer. However, they were not statistically significant after adjustment for smoking; for example, the ERR/Sv for all diseases declined from 1.32 (90% confidence interval: 0.40, 2.34) to 0.77 (-0.08, 1.72).

**Conclusions:** Thus, we could quantify the decreasing effect in ERR/Sv by adjusting for smoking. Our study shows that smoking is an important confounder in the assessment of radiation and the associated health risks, if a correlation between smoking and radiation dose is suggested. This work was fully funded by Japan's Nuclear Regulation Authority.