

# Comparison between radiation risk and smoking risk among nuclear industry workers in Japan, 1999–2010

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Since the March 2011 Fukushima nuclear power plant accident, the public has been deeply concerned about the risks of exposure to low-dose radiation. Are there any radiation risks? If so, to what extent does radiation affect human health? In an effort to address these concerns, comparisons in the health risks between radiation and other lifestyle-related risk factors, such as smoking, are supplied. However, these comparisons so far reported consist of combinations of health risks observed in different cohort studies. The Institute of Radiation Epidemiology of the Radiation Effects Association (IRE/REA) commenced an epidemiological study of Japanese radiation workers in 1990. To examine non-radiation factors among radiation workers, the IRE conducted lifestyle questionnaire surveys among a sample of workers twice in 1997 and 2003. The purpose of the present study is to assess and compare the mortality risks of radiation and smoking based on a follow-up study on one cohort of the respondents to the questionnaire surveys. The relative risks (RRs) of radiation at 100mSv and smoking at 20 cigarettes per day were calculated using the Poisson regression method. These RRs were adjusted under stratification of attained age, calendar year, resident area, and the survey indicator (first and second). Cumulative doses were lagged by 10 years.

Mortality follow-up was carried out on 72,037 male respondents, excluding those whose smoking status was unknown (mean age: 55.3 years) for an average of 8.2 years during the observation period of 1999 to 2010. The mean cumulative dose was 25.5 mSv at the end of follow-up. For mortality from all cancers excluding leukaemia, the RR of radiation was 1.03 (90%CI : 0.92, 1.16) and the RR of smoking was 1.78 (1.63, 1.93). This means that a radiation dose equivalent to smoking risk was 1850 mSv. For all cancers related to smoking, the RR of radiation was 1.05 (0.92, 1.20) and the RR of smoking was 1.98 (1.80, 2.19); the radiation dose comparable to smoking risks was 1360 mSv.

These results suggest that smoking risk (20 cigarettes per day) is comparable to more than 1000 mSv of radiation risk. Thus, IRE/REA has carried out a unique cohort study in terms of estimating radiation and smoking risks simultaneously in one cohort.

keywords : cohort study, cancer, radiation risk, smoking risk