

Third Analysis of Mortality of Nuclear Industry Workers in Japan: Updated for 1991-2002

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A cohort study on nuclear industry workers in Japan has been conducted using the records of the Radiation Dose Registration Center (RADREC) since 1990. After the Second analysis (1991-1997) was presented at AOCRP-1, the study cohort was enlarged and followed up further until 2002. About 277,000 radiation workers were chased to confirm their vital status by using their resident record cards which municipal officers issue. About 208,000 males were successfully followed up, and 10,489 deaths were ascertained during the observation period of 1986-2002, including both retrospective and prospective information.

A prospective follow-up during 1991-2002 was made for 200,583 males derived from the above-mentioned population, and there were 7,670 deaths from all causes, 3,093 deaths from all cancers. Their underlying causes of death were identified by record linkage with national vital statistics death records. The mean cumulative dose of prospective population was 12.2mSv. The statistical analyses consisted of external and internal comparisons, and were applied only to the prospective follow-up.

The SMR (95% CI) was 0.98 (0.96-1.00) for all causes and 0.90 (0.87-0.93) for non-malignant diseases, thus mortality for this population was found to be less than those expected from national rates for male. It was 1.02 (0.98-1.05) for all cancers, indicating that cancer mortality in this population was not different from national males. In the trend analyses, mortality for leukemia excluding CLL did not show a significant increase with radiation doses ($p=0.691$). However, mortality for all cancers excluding leukemia showed a significant increase with cumulative doses ($p=0.047$). For site-specific cancers, most cancers did not show a positive correlation with doses, but for cancers of the esophagus

($p=0.002$), liver ($p=0.040$), and multiple myeloma ($p=0.021$). The lifestyle survey with 45,000 workers conducted separately showed that the habits of heavier smoking and drinking and also the occupational engagement history with exposures to hazardous substance (dust, asbestos, etc.) were positively correlated with doses. These lifestyle characteristics may well be confounding in the present results.

Having such clear evidence for confounding factors taken into account, this study did not indicate that the mortality from cancer was affected by low doses of external ionizing radiation. This study should be continued further, possibly incorporating the information of relevant confounding factors.