Reconstruction of organ dose for Japanese nuclear workers and reanalysis of cancer mortality risk for J-EPISODE 1991-2010

Hiroshige Furuta[1], Akemi Nishide[1], Shin'ichi Kudo[1], Keiko Yoshimoto[1], Shin Saigusa[1]

[1] Institute of Radiation Epidemiology, Radiation Effects Association

furuta@rea.or.jp

Background

Japanese Epidemiological Study on Low-Dose Radiation Effects (J-EPISODE) has been conducted since 1990 and analysed health effects in association with photon exposure assessed in $H_p(10)$. However, it is under way to estimate cancer morbidity and mortality risk evaluated in organ absorbed dose.

Aim

To reconstruct organ dose during 1957 to 2010, and reanalyse cancer mortality risk of the fifth J-EPISODE analysis 1991-2010.

Materials and methods

The reconstruction method of organ dose principally followed the approach adopted in the IARC 15-Country Collaborative Study, which conducted experiments on dosimeter response to photon exposure for three types of dosimeter; old film dosimeter, multi-element film dosimeter and thermoluminescence dosimeter (TLD). Usage of dosimeters in Japan developed from those to glass badge (GB), electronic personal dosimeter (EPD) or optically stimulated luminescence (OSL) dosimeter in around 2000. Therefore, dosimeter response data under combinations of a specific photon energy (119 keV, 207 keV and 662 keV) and a specific geometry (antero-posterior geometry and isotropic geometry) were experimented in the same way of the IARC study for GB, EPD and OSL dosimeter. Conversion coefficients from recorded dose to organ dose were reconstructed using these data on dosimeter response as well as coefficients from kerma to organ dose for each year and site where workers were exposed to photon, followed by reconstruction of organ dose for colon, lung and red born marrow during 1957 to 2010.

Results

Organ absorbed dose for several tissue/organs were calculated for each participant during 1957 to 2010. Then, Poisson regression method was applied for estimating ERR (Excess Relative Risk) for cancer death.