Cancer Incidence and Risk Assessment Among Medical X-ray Workers in China, 1950-1995

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The cancer incidence (1950-1995) among 27,011 medical diagnostic X-ray workers was compared by means of O/E system with that of 25,782 other medical specialists employed between 1950 and 1980 to provide the evidence of human malignant tumors produced by prolonged exposure to low dose ionizing radiation and to assess resultant cancer risk. Significant cancer risk was seen among diagnostic x-ray workers (RR=1.2, 95%CI:1.1-1.3). Significantly elevated risks were found for leukemia and cancers of skin, female breast, lung, liver and esophagus, the RRs were 2.2, 4.1, 1.3, 1.2,1.2 and 2.7 respectively. The patterns of risk associated with years since started X-ray work and with age and calendar year of initial employment suggest that the excesses of leukemia, skin cancer and female breast cancer were due to occupational exposure to X-rays. Because a lack of individual dosimetry for the Chinese medical X-ray workers (CMXW) Before 1985 dose was reconstructed by physical and biological retrospective dosimetry methods. The cancer risk of CMXW was assessed based on the reconstructed dose. The average cumulative dose for the earlier cohort (employed before 1970) was 538 mGy and for the later cohort (employment began 1970 and after) 81 mGy. The RRs of leukemia and solid cancer were significantly high for the earlier cohort: 2.4 (95% CI: 1.6-3.3) for leukemia and 1.2 (95% CI: 1.1-1.3) for solid cancer. But no significant increase of RR was evident for the later cohort. The RR of leukemia was 1.7 (95% CI: 0.9-3.1) and 1.1 (95% CI: 0.9-1.2) for solid cancer. This means a significant cancer risk can be induced by prolonged exposure to low dose ionizing radiation when the cumulative dose reaches to a certain level, such as more than 500mGy for the earlier cohort. The excess relative risk coefficient (ERR) and excess absolute risk coefficient (EAR) of leukemia and total solid cancer were also roughly calculated for CMXW and compared with the data of Japanese Atomic Bomb Survivors (JABS) and International Nuclear Industry Workers (INIW). There was little difference in the values of ERR and EAR for leukemia and solid cancer among CMXW, JABS and INIW.