

## Biological Dose assessment of 15 Victims in Haerbin Radiation Accident

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- On July 5 and 8, 2005, Two patients with bone marrow suppression were successively hospitalized by the First Affiliated Hospital of Haerbin Medical University. Examination results showed that the patients seemed to get suspicious radiation disease. On July 13, 2005, a radioactive source was found in the patients' dwelling. The radiation source is Iridium-192 with 0.5 Ci ( $1.85 \times 10^{10}$  Bq) radioactivity. The radiation source is a metal bar which is a kind of radioactive industrial detection source for welding. The source is currently stored in the urban radioactive waste storehouse of Heilongjiang province. After finding the radioactive source on July 13, The Haerbin municipal government initiated an emergency response plan and developed medical rescue, radioactive source examination and case detection through organizing ministries involving health, environmental protection and public security. After receiving a report at 17:00 on July 14, 2005, Chinese Ministry of Health immediately sent experts to the spot for investigation, dose estimation and direction of patients' rescue. Health authority carried out physical examination twice on 113 residents within 30 meters to the source, among which 4 got radiation sickness, 5 showed abnormal hemotogram, and others showed no abnormal response. Of 4 patients with radiation sickness, one 81 year old patient has died of severe bone marrow form of sub acute radiation sickness coupled with lung infection and prostrate apparatus at 13:00 on Oct. 20. Two children have been treated in Beitaping Road Hospital in Beijing, another patient has been treated in local hospital.

- Biological dosimetry using conventional chromosome aberration analysis in human peripheral blood lymphocytes has been shown as a reliable and useful tool in medical management of radiation accident victims.

Peripheral blood lymphocytes of the victims were cultured using conventional culture medium with colchicine added at the beginning. Chromosome unstable aberrations were analyzed and biological dose was assessed according to the dose-effect curves built by our lab member. For micronucleus analysis, blood were added cytochalasin-B after culturing 40 hours. The doses were assessed according to the dose-effect curves built by our lab member. According to a human lymphocyte chromosome aberration and micronucleus analysis, the estimated maximum irradiation dose of 3 exposed patients is lower than 2 Gy, equal to the dose of once uneven total-body irradiation.

In vitro dose-response calibration curves for  $(60)\text{Co}$  gamma rays have been established for unstable chromosome aberrations in human peripheral blood lymphocytes. The observed dose-response data were fitted to a linear quadratic model. The calibration curve parameters were used to estimate the equivalent whole-body dose and dose to the irradiated region in partial body irradiation of cancer patients. The derived partial body doses and fractions of lymphocytes irradiated were in agreement with those estimated from the radiotherapy regimes.

Keywords: Victims, Chromosome aberration, Micronucleus, Biological dose assessment