Deterministic Effects of Occupational Exposures in the Mayak Nuclear Workers Cohort

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Body of Abstract: A wide spread and utilization of nuclear energy in the recent decade leads to a stable increasing of contingents exposed to ionizing radiation sources. In order to predict radiation risks it’s important to have and apply all the experience in assessment of health effects due to radiation exposures generated by now in different countries. The proposed report will present results of the long-term follow-up for a cohort of nuclear workers at the Mayak Production Association, which was the first nuclear facility in Russia. The established system of individual dosimetry of external exposure, monitoring of internal radiation and special system of medical follow-up of healthy nuclear workers during the last 50 years allowed collecting of the unique primary data to study radiation effects, their patterns and mechanisms specific of exposure dose. The study cohort includes 61 percent of males and 39 percent of females. The vital status is known for 90 percent of cases. 44 percent of workers are still alive and undergo regular medical examination in our Clinic. Unfortunately, by now 50 percent of workers have died. 6 percent of workers were lost for the follow-up. Total doses from chronic external gamma rays in the cohort ranged from 0.6 to 10.8 Gy (annual exposure doses were from 0.001 to 7.4 Gy), Pu body burden was from 0.3 to 72.3 kBq. Most intensive chronic exposure of workers was registered during 1948 to 1958. At this time, 19 radiation accidents occurred at the Mayak PA. Thus, the highest incidence of deterministic effects was observed right at this period. In the cohort of Mayak nuclear workers there were diagnosed 60 cases of acute radiation syndrome (I to IV degrees of severity); 2079 cases of chronic radiation sickness; 120 cases of plutonium pneumosclerosis; 5 cases of radiation cataracts; and over 400 cases of local radiation injuries. The report will present dependences of the observed effects on absorbed radiation dose and dose rate in terms of acute radiation syndrome, chronic radiation sickness and plutonium pneumosclerosis.