

The Mayak Worker Dosimetry System (MWDS-2013): Internal Dosimetry Results

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The distribution of calculated internal doses has been determined for 8043 Mayak Production Associate (Mayak PA) workers. This is a subset of the entire cohort of 25 757 workers, for whom monitoring data are available. Statistical characteristics of point estimates of accumulated doses to 17 different tissues and organs and the uncertainty ranges were calculated. Under the MWDS-2013 dosimetry system, the mean accumulated lung dose was 185 ± 594 mGy (geometric mean = 28 mGy; geometric standard deviation = 9.32; median value = 31 mGy; maximum value = 8980 mGy). The ranges of relative standard uncertainty were from 40 to 2200% for accumulated lung dose, from 25–90% to 2600–3000% for accumulated dose to different regions of respiratory tract, from 13–22% to 2300–2500% for systemic organs and tissues. The Mayak PA workers accumulated internal plutonium lung dose is shown to be close to log normal. The accumulated internal plutonium dose to systemic organs was close to a log triangle. The dependency of uncertainty of accumulated absorbed lung and liver doses on the dose estimates itself is also shown. The accumulated absorbed doses to lung, alveolar-interstitial region, liver, bone surface cells and red bone marrow calculated both with MWDS-2013 and MWDS-2008 have been compared. In general, the accumulated lung doses increased by a factor of 1.8 in median value, while the accumulated doses to systemic organs decreased by factor of 1.3–1.4 in median value. For the cases with identical initial data, accumulated lung doses increased by a factor of 2.1 in median value, while accumulated doses to systemic organs decreased by 8–13% in median value. For the cases with both identical initial data and all of plutonium activity in urine measurements above the decision threshold, accumulated lung doses increased by a factor of 2.7 in median value, while accumulated doses to systemic organs increased by 6–12% in median value.

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