

The Mayak Worker Dosimetry System (MWDS 2013): Soluble Plutonium Retention in the Lungs of an Occupationally Exposed USTUR Case

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For the first time, plutonium retention in human upper airways was investigated based on the dosimetric structure of the human respiratory tract proposed by the International Commission on Radiological Protection (ICRP). This paper describes analytical work methodology, case selection criteria, and summarizes findings on soluble (ICRP 68 Type M material) plutonium distribution in the lungs of a former nuclear worker occupationally exposed to plutonium nitrate [²³⁹Pu(NO₃)₄]. Thirty-eight years post-intake, plutonium was found to be uniformly distributed between bronchial (BB), bronchiolar (bb) and alveolar–interstitial (AI) dosimetric compartments as well as between the left and right lungs. ²³⁹⁺²⁴⁰Pu and ²³⁸Pu total body activity was estimated to be 2333 ± 23 and 42.1 ± 0.7 Bq, respectively. The results of this work provide key information on the extent of plutonium binding in the upper airways of the human respiratory tract.

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