

## USTUR Whole-Body Case 0212: Testing NCRP Wound Model

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The National Council of Radiation Protection and Measurements' (NCRP) wound model was applied to the data from United States Transuranium and Uranium Registries' whole-body donor (Registrant). The Registrant (Case 0212) was exposed to plutonium nitrate as a result of occupational wound injury. Chelation treatment with intravenous injection of Ca-DTPA was administered on a bi-weekly basis over about six months. Two hundred and five urine samples were collected over about 3.5 years post-accident and analyzed for plutonium activity. A total of 916 Bq of plutonium was excreted in urine during the treatment period with maximum excretion rate of 73 Bq d<sup>-1</sup> on the first day post-intake. The average post-treatment urinary excretion rate was 0.02 ± 0.01 Bq d<sup>-1</sup>.

The individual died 17 years post-accident, at age 56, from severe pulmonary emphysema. At autopsy, all major soft tissues and bones were collected for radiochemical analyses of <sup>238</sup>Pu, <sup>239/240</sup>Pu and <sup>241</sup>Am. From tissue radiochemical analyses, <sup>239/240</sup>Pu retention in liver, skeleton and wound was estimated at 80.3 Bq, 114.5 Bq and 2.3 Bq, respectively. Total systemic <sup>239/240</sup>Pu activity at the time of death was calculated at a magnitude of 229.4 Bq.

Application of the NCRP wound model for strongly retained material resulted in a credible fit to the post-treatment ('baseline') urine data based on Chi-Square statistics (p = 0.246) and predicted plutonium liver and skeletal activity within 25% of the post-mortem activities. Using IMBA Professional Plus, the fraction of plutonium wound deposition not removed by DTPA therapy was estimated at 364 Bq. This resulted in the residual committed effective dose of 177 mSv. Accounting for plutonium eliminated with urine during the chelation therapy, a total 'untreated' intake of 1,280 Bq and the projected committed effective dose of 622 mSv were calculated.

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