MPS Hanford Cohort Dosimetry: Internal Dose Reconstruction Approaches

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The Hanford site began operations in 1943 as part of the Manhattan Project. The site was first used to produce plutonium for the bomb that helped end WWII. After the war, production of plutonium was ramped up to meet the challenges of the Cold War. Research and development efforts were gradually expanded to include non-defense projects such as development of heat sources and production of medical isotopes. Over the years, large quantities of many different radionuclides were handled in site laboratories, and large volumes of radioactive wastes were produced in reactor operations. Bioassay data indicate relatively high intakes of a variety of radionuclides by Hanford workers. As part of the Million Person Study (MPS), ORNL is performing internal dose reconstructions for workers at the Hanford Site. Dose reconstructions are based on the latest biokinetic models of the International Commission of Radiological Protection (ICRP) or site-specific variations of those models. The Hanford database includes over 300,000 bioassay measurements for over 20,000 workers, and over 2,000 incident reports. Additional information comes from bioassay data and post-mortem tissue analyses of plutonium and americium for 28 individuals who worked at Hanford and voluntarily donated their bodies (partially or entirely) to the United States Transuranium and Uranium Registries (USTUR). The early stages of the dose reconstructions have been aimed at identifying the most important internal emitters to which the workers were exposed, and performing scoping exercises to identify workers with highest intakes of those radionuclides. Conclusions regarding the dosimetrically dominant internal emitters at Hanford will be discussed, and our methods of reconstructing doses from those radionuclides will be described.

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