

## **Toward Improved Biokinetic Models for Actinides: The United States Transuranium and Uranium Registries, A Twenty-five Year Report**

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The origins and current activities of the United States Transuranium and Uranium Registries are traced with emphasis on biokinetic modeling, and new biokinetic models, for plutonium and americium, are proposed suitable for operational applications. Although started more than 25 years ago, the Registries remain the only formally organized human tissue research programme devoted to the study of actinides in man. Using radiochemical techniques, the Registries determine the amount of actinide elements in the tissues of volunteer donors at autopsy, using this information alone with the individual's exposure and medical history, to evaluate the distribution, translocation, excretion and dose from Th, U, Pu, Am and other actinides in the body. The results of the Registries studies indicate that in addition to skeleton and liver, muscle constitutes an appreciable reservoir for both Pu and Am, although the dose to muscle is relatively low because of its large mass. The systemic biokinetics of Pu and Am are well represented by three-compartment model representing skeleton, liver, and other soft tissue (primarily muscle) with different biokinetic constant for the two nuclide. For Pu, the initial uptake fractions are 0.4, 0.4, and 0.2 with residence half times of 50, 20 and 10 years, respectively for the skeleton, liver, and muscle. For Am, the comparable uptake fractions are 0.45, 0.25, and 0.3 with residence half times of 50, 2.5 and 10 years for the three compartments. Further to encourage radiobiology studies as well as to provide unique materials for research in other areas such as biomarkers and oncogenes, the Registries have established the National Human Radiobiology Tissue Repository, which includes more than 20,000 tissues samples and extracts, histopathology slides, and related materials from persons with internal depositions. Including radium dial painters, plus a group of tissue solutions form the general American population. On request, these materials are available to other investigators for collaborative or individual research purposes.

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