

The U.S. Transuranium and Uranium Registries: Forty Years' Experience and New Directions in the Analysis of Actinides in Human Tissues

Sergei Y. Tolmachev¹, Michael E. Ketterer, Dominic Hare³, Philip Doble³, Anthony C. James¹

¹*U.S. Transuranium & Uranium Registries, Richland, WA, USA;* ²*Department of Chemistry and Biochemistry, Northern Arizona University, Flagstaff, AZ, USA;* ³*Bio-imaging Facility, University of Technology Sydney, Broadway, NSW.*

The US Transuranium and Uranium Registries (USTUR) studies the distribution, biokinetics and tissue dosimetry of actinide elements through radiochemical analysis of autopsy tissues voluntarily donated by occupationally exposed persons.

The paper provides an overview of the analytical methods for plutonium (Pu), americium (Am) and uranium (U) isotopic determination in human tissues currently applied at USTUR. The results of inter-comparing $^{239+240}\text{Pu}$, ^{241}Am and $^{234,235,238}\text{U}$ determinations by sector field inductively coupled mass spectrometry (SF-ICP-MS), α -spectrometry (AS) and kinetic phosphorescence analysis (KPA) are discussed. SFICP-MS is a major advance over AS and KPA in enabling the measurement of the $^{240}\text{Pu}/^{239}\text{Pu}$ atom ratio, the short-lived β -emitter ^{241}Pu , and long-lived ^{236}U . For the first time, ^{241}Am and ^{241}Pu were measured in human tissues using SF-ICP-MS.

The paper also presents a new avenue of USTUR research in the application of laser ablation inductively coupled plasma mass spectrometry (LA-ICP-MS) to elemental bio-imaging (EBI) of the actinides in human tissues.

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