

Study of the Distribution of Actinides in Human Tissues Using Synchrotron Radiation Micro X-Ray Fluorescence Spectrometry.

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This study aims at evaluating the capabilities of synchrotron radiation micro X-ray fluorescence spectrometry (SR micro-XRF) for qualitative and semi-quantitative elemental mapping of the distribution of actinides in human tissues originating from individuals with documented occupational exposure. The investigated lymph node tissues were provided by the United States Transuranium and Uranium Registries (USTUR) and were analyzed following appropriate sample pre-treatment. Semi-quantitative results were obtained via calibration by external standards and demonstrated that the uranium concentration level in the detected actinide hot spots reaches more than 100 µg/g. For the plutonium hot spots, concentration levels up to 31 µg/g were found. As illustrated by this case study on these unique samples, SR micro-XRF has a high potential for this type of elemental bio-imaging owing to its high sensitivity, high spatial resolution, and non-destructive character.

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