

Uranium Distribution and Concentrations in the Tissues of Whole-Body Donations to the USTUR

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This paper reports the distribution and concentration of measured uranium concentrations in the several hundred samples of soft tissues and bones from two whole-body donations to the United States Transuranium and Uranium Registries with no known occupational or other than natural chronic environmental (i.e. 'background') exposure to uranium. Both cases were Caucasian males aged 68 and 78 y, respectively, and long-time residents of the same geographic area, and thus likely to be representative of equilibrium levels of environmental uranium from chronic intake. The primary depot and highest concentrations of uranium were in the skeleton with the remaining uranium widely distributed throughout the soft tissues as a whole. Measured concentrations in bone averaged about 4 ng U g⁻¹ wet weight with considerable variation among individual bones and bone samples with indication that uranium was a bone volume seeker. Soft tissue concentrations ranged over about an order of magnitude and averaged about 0.5 ng g⁻¹ wet weight with the exception of the thoracic lymph nodes, which showed concentrations more than an order of magnitude greater than most of the other soft tissues. Uranium concentrations in the thoracic lymph nodes of the case with a smoking history were somewhat lower than those of the nonsmoking cohort, possibly suggestive of impaired particle clearance. The latter case also showed a possible anomalously high concentration of uranium in thyroid. The tissue distributions of the two background cases were compared with those in a previously reported third USTUR whole body donation with a documented occupational intake of uranium; the relatively recent study of element content in adult Chinese males; and the more limited data from empirical measurements of a few tissues reported in the open peer reviewed literature. Implications of the results from these measured postmortem cases were also examined with respect to the validity and applicability of the ICRP models and other biokinetic models and Reference Man data, and indicated refinements and significant differences noted.

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