

DISTRIBUTION OF URANIUM IN HUMAN TISSUE

Dr. James T. Elliston

Washington State University

Chair: Royston H. Filby

The environmental intake of uranium has been determined in the tissues of a whole human body donor to the United States Transuranium and Uranium Registries (Case 0425) using a newly developed recovery corrected kinetic phosphorescence analysis method which combines alpha spectrometry with kinetic phosphorescence analysis. This case had an occupational exposure to plutonium and americium but no known occupational exposure to uranium. The distribution for uranium from this investigation was compared to previous studies of natural uranium in human tissues, to the current International Commission on Radiological Protection models, and to the distributions of plutonium and americium in the same tissue of this case. The differences in the distributions of U, $^{239+240}\text{Pu}$, and ^{241}Am lend validity to the different assumed biokinetic distributions U, $^{239+240}\text{Pu}$, and ^{241}Am in human tissue. Recovery corrected KPA showed improve precision and accuracy for the low-level determination of U compared to direct KPA and offer an optimized method for the determination of low levels of U in human tissue especially when the original sample solutions are very dilute or have matrix problems. The hypothesis that served as the basis for this research was that the current ICRP model does not accurately depict the distribution of uranium in the human body. This researched shows that the skeletal system from USTUR case 0425 has a non-uniform distribution for the concentrations of U and conflicts with ICRP 23 (1975); ICRP 30 (1979); Harley and Fisenne (1990); Fisenne et al., (1988); and Igarashi et al., (1987).

USTUR-0175-01