Distribution of Terminal Lung and Liver Dose Rates in United States Transuranium and Uranium Registries Registrants

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Initiated in the 1960's with the mission of acquiring and providing precise information about the effects of plutonium and other transuranic elements in man, the United States Transuranium Registries (USTUR) have followed up over 400 volunteer Registrants who worked at weapons sites and received measurable internal doses from actinide elements. Samples of body organs are donated by our deceased Registrants. The activity concentrations of ^{241}Am, ^{238}Pu, $^{239/240}$Pu, ^{241}Pu, ^{234}U, ^{235}U, and/or ^{238}U have been radiochemically measured in post-mortem lung specimens from 295 of our 332 donors. Actinide activities have also been measured in liver samples from 287 of our donors. The average alpha absorbed dose rates at the time of death – terminal dose rates (TDRs) – to the liver and lungs from actinides have been calculated from these activity concentrations. The lung TDRs overlap with those in beagle dogs from PNNL/ITRI's lifespan inhalation studies and vary from a minimum of 2.4×10^{-6} mGy/y to a maximum of 242 mGy/y. The geometric mean of the lung TDRs is 5.0×10^{-2} mGy/y with a geometric standard deviation (GSD) of 29 mGy/y. Liver TDRs vary from 1.3×10^{-5} to 690 mGy/y. The geometric mean of the liver TDRs is 3.5×10^{-2} with a GSD of 12 mGy/y. No increase in the incidence of lung or liver cancer with increasing lung TDR or liver TDR, respectively, is apparent.

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