

Estimate of the Time-Zero Lung Burden of Depleted Uranium in the US Military Personnel at Samawah, Iraq after Operation Iraqi Freedom (OIF) by the Mass Spectrometry Analysis of the 24-Hour Urine Excretion and Exponential Decay

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The aim of this study was to estimate the amount of depleted uranium (DU) in the respiratory system of Allied Forces Gulf War Veterans. Mass spectrometry (thermal ionization mass spectrometry) analysis of 24-hour urinary excretion of DU isotopes in five positive ($^{238}\text{U}:^{235}\text{U} > 191.00$) and six negative ($^{238}\text{U}:^{235}\text{U} > 138.25$) veterans was utilized in the mathematical estimation of the pulmonary burden at the time of exposure. A minimum value for the biological half-life of ceramic DU oxide in the lungs was derived from the Battelle report of the minimum dissolution half-time in simulated interstitial lung fluid corresponding to 3.85 years. The average DU concentration was 3.27×10^{-5} mg per 24 hours in DU positive veterans and 1.46×10^{-8} mg in DU-negative veterans. The estimated lung burden was 0.34 mg in the DU-positive and 0.00015 mg in the DU-negative veterans. Our results provide evidence that the pulmonary concentration of DU at time zero can be quantified as late as nine years after inhalational exposure.

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