A POLONIUM-210 RAPID EMERGENCY RESPONSE BIOASSAY METHOD: UPDATE

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In a polonium-210 (Po-210) emergency response, rapid analysis of up to tens of thousands of samples may be required to assess individual and population exposures and doses for medical management decisions. We previously presented details on our method development of an emergency response analytical method for determining Po-210 in urine. The method we developed worked well for human urine spiked with polonium-210 using polonium-209 as the tracer. However, there were indications in the literature, and concerns expressed by some radiobioassay experts, that our procedures would not recover an acceptable fraction of the polonium bound to proteins (e.g. metallothioneins) or other constituents in urine. The literature indicated that use of historical methods that only autoplated Po-210 from urine, with no pre-dissolution, on urine excreted by dosed, non-human primates, or on urine from people involved in a polonium incident, resulted in only 10 to 20% of the Po-210 in the urine being plated on the planchets. Review of this literature and discussions with the experts led us to question whether our dissolutions were robust enough. Considering this, we proposed a project to obtain Po-210 incorporated, in vivo, into animal urine. We initiated a project with Lovelace Respiratory Research Institute to dose three, six month old male minipigs, with Po-210 and collect their urine. We received the polonium-laced urine in mid-June of this year. Initial experiments have shown that the method we developed did not provide adequate dissolution of the urine, resulting in incomplete recovery (about 20%) of the Po-210. We are now exploring various methods to rapidly free Po-210 bound in this urine for use as a preparatory addition to our method. We will present details of the polonium/urine acquisition and up-to-date experimental results, including failures and successes, on rapid dissolution methods for these samples and our revised analytical method.