The Analysis of Uranium Isotopes in Gaza by Alpha Spectrometry

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Purpose:

The presence of the isotopes with enriched uranium signature from the recent military conflicts in Lebanon (2006) and Gaza (2009) has been reported (ECRR 2010 No2 Brussels 2010). The aim of our study was to analyze a possible contamination in the civilian population of Gaza Strip in 2009.

Materials and Methods:

The Uranium Medical Research Center (UMRC) team was deployed in Gaza in February 2009 for the collection of urine samples of the population exposed to the dust following Operation Cast Lead (December 27, 2008 – January 18, 2009). A total of 12 subjects from Jabaliya, Beit Lahia, Rafah, and Gaza City were selected on the basis of their history of exposure and the symptoms. The samples were analyzed for the uranium isotopes at the Harwell Science and Innovation Centre, England, by the method described in HS/GWI/2055. The urine samples were digested with nitric acid. The uranium was co-precipitated, filtered and ashed in a muffle furnace. The residue was hydrolysed to orthophosphates, passed through anion exchange column, washed with hydrochloric and nitric acid, uranium eluted with nitric acid and evaporated. The residue was dissolved in sulphuric acid, the pH adjusted and the uranium electrodeposited onto a stainless steel discs for alpha spectrometry.

Results:

The minimum reporting levels by this method are 2MBQ/24 hours. The measured peaks for U-234, U-235, and U-238 were 4.776, 4.395, and 4.196 MeV respectively. The analysis was carried out with reagent blank, spiked with U-232 tracer solution. U-236 (4.494 MeV) could not be accurately measured because of the proximity of U-234 and U-235 peaks. Our results indicate the ranges of <1 - <7 for U-234, U-235, and U-238 $mBqL^{-1}$, with mass-metric equivalents of U-234=$437*10^{-3}$ ng/L. U-235=12.6ng/L. U-238 =81.1ng/L as an estimated value.

Conclusions:

Our results demonstrate that neither depleted uranium nor man-man uranium isotopes are detectable in Gaza civilians by the radio-chemical separation and alpha spectrometry analysis. This method does not provide an alternative to sensitivity and specificity of inductively coupled plasma mass spectrometry (ICP-MS).