Radiochemical and Alpha Spectrometry Analysis of Uranium Isotopes in the Civilians of Gaza.

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Purpose:

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

Materials and Methods:

The team of the Uranium Medical Research Center (UMRC) collected the urine samples of the civilians in Gaza Strip exposed to the dust following Operation Cast Lead (December 2008 – January 2009). Twelve subjects from Jabaliya, Beit Lahia, Rafah, and Gaza City, selected on the basis of their history of exposure and the standard profile symptoms, had their 24 hour samples of urine analyzed for the uranium isotopes at the Laboratories of the Harwell Science and Innovation Centre, England, by the method described in HS/GWI/2055. The urine samples were digested for three hours after addition of nitric acid, calcium chloride carrier and a yield tracer. The uranium was co-precipitated on a Calcium/Magnesium phosphate precipitate which was filtered and ashed in a muffle furnace. The residue was dissolved in hydrochloric acid, aluminum nitrate and hydrolysed to orthophosphates, passed through anion exchange column as a chloride. The column was washed with hydrochloric and nitric acid, uranium eluted with nitric acid and evaporated to dry. The residue was dissolved in sulphuric acid, the pH adjusted and the uranium electrodeposited onto a stainless steel discs for alpha spectrometry.

Results:

The results were expressed in Bq/ L^{-1}. The minimum reporting levels 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 by this method 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 (mBq/L^{-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:

Neither depleted uranium nor man-made uranium isotopes were detectable in the urine samples of Gaza civilians following the recent military conflict of 2008/2009.This method provides no alternative to detection accuracy of inductively coupled plasma mass spectrometry (ICP-MS).