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Radioactive Warfare: Impact on the Civilian Population and Environment of Iraq

Asaf Durakovic, Tedd Weyman
Uranium Medical Research Centre

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Names

Tedd Weyman, Asaf Durakovic

Institution

Uranium Medical Research Centre, Toronto, Ontario, Canada, Washington, DC, USA

Introduction

The last two decades witnessed the introduction of a new concept of warfare by radioactive weapons, used in Iraq in the first Gulf War, 1991. It changed the modern battlefield concept from NBC (Nuclear Biological Chemical) to the current concept of CBRN (Chemical Biological Radioactive Nuclear). It introduced not only contamination of the human population with the products of nuclear fission and the radioactive waste from the nuclear fuel cycle, but also has an impact on the general environment with possible, irreversible alterations of the biosphere. Among the direct risks to the human population are multidimensional damage to organs and tissues. As well, malignant tumors at the site of retention have been identified. This abstract addresses questions of the effects of uranium isotopes on the civilian population and environment of Iraq.

Purpose

Among over 400 radioactive isotopes, resulting from nuclear fission, about forty are of immediate concern for the human health, with alpha, beta and gamma emissions as well accompanied by neutron emissions in nuclear warfare and fuel processing. In contrast, radioactive warfare is based on the use of the isotopes of uranium as armor-piercing and bunker-busting munitions, which is superior to other metals. In addition to uranium's kinetic and thermal effects, reaching the temperatures of thousands of degrees centigrade, uranium's pyrophoric features release a large number of particles forming radioactive, atmospheric dust. These particles are in the respirable range (< 5 microns), transferable from the peri-alveolar to the blood vessels and distributed throughout the body. Once retained

in the target organ they produce somatic and genetic changes, including malignant alterations.

Materials and Methods

Upon the conclusion of the military conflict (OIF 2003), the Uranium Medical Research Centre conducted field work in Iraq. We collected biological samples from 22 symptomatic civilians in Baghdad, Basra, Nasiriyah, Samawa and Kerbala. Symptoms included headaches, fatigue, intermittent fever, urinary tract disorders, musculoskeletal dysfunction, respiratory symptoms, central and peripheral nervous systems and affective disorders. The urine specimens were collected under strict guidelines of a standard protocol for a 24-hour sample and subject confidentiality. Urine samples were also collected from three members of the UMRC Iraq field team.

The samples were analyzed in the Johann Wolfgang Goethe-University, Frankfurt, Germany, Institute of Mineralogy for 4 uranium isotopes by the use of double-focusing, thermo Finnegan Neptune multi-collector, ICP (Inductively Coupled Plasma) mass spectrometry (MS).

In addition to the human specimens, the environmental impact of radioactive warfare was studied. External monitoring was conducted by the use of a digital Victoreen ASM-990 GM survey meter and an Exploranium GR-135 Identifier (portable multi-channel analyzer). Eighty samples of soil, fall-out dust and water were collected for laboratory analysis.

Results

Fourteen subjects' uranium isotope analysis showed natural 238U:235U ratios of an average of 138.05+/-1.24. Eight subjects's had a 238U:235U average ratio of 141.73+/-1.00, indicating contamination with depleted uranium (DU). The average 234U:238U ratio was 6.72 x 10-5+/-3.65 x 10-6 in the DU positive subjects and 7.09 x 10-5+/-8.45 x 10-6 in the non-DU subjects.

In the DU positive subjects, the artificial uranium isotope 236U was present in an average 236U:238U ratio of 7.39 x 10-7+/-4.39 x 10-7. In three of the non-DU subjects, 236U was found in a 236U:238U ratio of 2.30 x 10-7+/-2.20 x 10-7.

The mean concentration of total uranium in the study group was 30.68+/-19.67 ng/L in DU positive subjects and 22.08+/-13.35 ng/L in the non-DU subjects. The mean concentration of uranium in the civilians of Baghdad was 20.8+/- 2.9 ng/L, in Basra 31.1+/-9.1 ng/L and in Nasiriyah 26.2 +/- 6.7 ng/L.

Uranium isotope analysis of the UMRC field team members had an average total concentration of uranium of 21.02 ng/L and isotopic ratios for 238U:235U of 140.10 +/-1.48. Two were positive for DU and 236U.

Conclusions

Our results demonstrate the presence of DU and non-DU containing the manmade isotope 236U in the civilians of Baghdad, Basra, and Nasiriyah. In addition, all DU and non-DU civilian samples have average concentrations of 300 - 500 per cent above normal populations. These data are in agreement with the Uranium Medical Research Centre's previous findings in military personnel in Gulf War I (Operations Desert Storm and Desert Fox) and Gulf War II (Operation Iraqi Freedom) in Iraq (from 1995-2007) and field and laboratory studies of Afghan civilians from Operation Enduring Freedom (2002-2005).

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