



**A Review of
“Epidemiologic Studies of Veterans Exposed to Depleted Uranium:
Feasibility and Design Issues”,
Committee on Gulf War and Health: Updated Literature Review of
Depleted Uranium, Institute of Medicine
The National Academies Press, 2008 (58 pages)
<http://www.nap.edu/catalog/12200.html>**

The U.S. Department of Defense (DOD) asked the Institute of Medicine to determine the feasibility and design of an epidemiological study that would indicate a link between depleted uranium (DU) exposure in veterans and a health or health outcomes. This was part of the comprehensive study of health effects of DU required by Section 716 of the 2007 John Warner National Defense Authorization Act. The paper deals with elements needed in high-quality epidemiologic studies, DOD databases and research efforts and recommendations for future studies.

A well-designed epidemiologic study includes an exposure assessment, an exposed population and an unexposed population.¹ “Accurate exposure information is critical”.² The exposure information is then made part of a prospective³ or retrospective study where a health outcome such as lung cancer is assessed in the study populations through statistical analysis. “Adequate sample size is critical in conducting a well-designed epidemiologic study.”⁴

To get an idea of sample size that would be needed for a good epidemiologic study, the Committee developed sample size estimates for lung cancer and a renal-function outcome (serum creatinine concentration) for the kidney. Lung cancer is a relatively common disease. However to obtain a statistically significant increased risk of lung cancer between DU-exposed military personnel and a non-exposed control group, there would have to be more than one million DU-exposed veterans.⁵ Renal disease on the other hand

¹ Committee on Gulf War and Health: Updated Literature Review of Depleted Uranium, Institute of Medicine, “Epidemiologic Studies of Veterans Exposed to Depleted Uranium: Feasibility and Design Issues”, Washington, D.C.: The National Academies Press, 2008 (40 pages, prepublication copy). (Herein referred to as “Epidemiologic Studies”), p. 5.

² *Ibid*, pp. 6,11

³ A prospective study is one that follows subjects forward in time. A retrospective study looks at past data or events.

⁴ *Epidemiologic Studies*, p. 7.

⁵ *Ibid*, pp. 9, 38.

which is more common than lung cancer would require from 500 to preferably 9,000 DU-exposed veterans.⁶

Participants in the Millenium Cohort Study (a DOD study begun in 2001) were asked about possible exposure to DU. 2,823 military personnel out of the 77,047 who had enrolled in 2001, stated that they had been exposed to DU in the past three years.⁷ This included soldiers from the 1991 Gulf War and Operation Iraqi Freedom.

The Millenium Cohort Study, a large prospective health study that looks at long-term health, is not designed as a program that can monitor military personnel who have been exposed to DU. A small number of the military personnel in the program overall have reported a DU exposure.⁸

The Depleted Uranium Follow Up Program for Gulf War veterans and more recently Operation Iraqi Freedom veterans who have embedded DU shrapnel or have inhaled or ingested DU has about 100 veterans in its program although surveillance studies have usually contained 70 or fewer participants.⁹

Although the Committee found this program to be “a well-designed surveillance program”, they stated that “it does not constitute a comprehensive epidemiologic study of veterans exposed to DU in that the study population is small (so statistical power is low) and includes only those who were determined to have level I exposure”.¹⁰ Level I exposure applies to soldiers inside a tank when it is impacted by a DU shell or shells or to soldiers who go into a tank directly after the tank has been hit.¹¹

The DOD Birth and Infant Health Registry is a program for military service members who are in a DOD health-care program. Infants are followed for a year. DU as an issue has not been studied through this registry. Rate of birth defects is 3-4 percent of births, which is similar to that of the civilian population.¹²

⁶ *Ibid*, p. 10. See text and table.

⁷ *Ibid*, p. 29.

⁸ *Ibid*

⁹ The majority of these studies have under 40 participants.

¹⁰ *Epidemiological Studies*, p.26.

¹¹ Melissa McDiarmid and her team in the Depleted Uranium Follow Up Program (Baltimore Veterans Medical Center) did not include level II exposure veterans. A level II exposure affects soldiers and civilians who have spent time in hours usually cleaning up or working in DU-destroyed tanks and vehicles. Level III exposure occurs when a soldier is downwind of a fire in which DU munitions are burning, or downwind of a battle, or the soldier who enters a destroyed tank looking for souvenirs.

¹² *Epidemiologic Studies*, p. 30.

Overall, the limitations of these databases and studies included “inadequate sample size and statistical power, inadequate exposure assessment and substantial potential for recall bias and exposure misclassification.”¹³

The Committee determined that a prospective cohort (group) epidemiologic study would be the best study design. It would add military personnel with and without DU exposure to an already existing database. However, limitations of a prospective cohort study include a small study population of DU-exposed military personnel, a long time-frame and considerable expense.¹⁴

The Committee also stated that the determination of “a small increased risk for a given health outcome (perhaps like leukemia or Hodgkin lymphoma) of DU exposure in military and veteran populations is not feasible in an epidemiologic study”.¹⁵

They concluded saying that the feasibility of doing a good epidemiologic study will rest largely on “the ability to define sufficient numbers of people exposed to DU”.¹⁶

The Committee’s recommendations for “Improving Future Epidemiologic Studies” include:

1. Better testing for DU exposure including possible use of in vivo assay techniques above and beyond urinary analysis for DU.
2. The DOD “should consider assessing uranium concentrations in lung, kidney, and brain tissues from military personnel who were potentially exposed to DU and died while on active duty”.¹⁷
3. DOD should continue to link and integrate available databases.
4. DOD should investigate the “feasibility” of testing soldiers who were at Camp Doha in Kuwait in 1991 during a prolonged fire that burned quantities of DU ammunition; “this work could provide exposure information on level II expose and level III exposure during the Gulf War”.¹⁸
5. There should be “further study of the potential reproductive and developmental toxicity of DU with animal models...”.¹⁹

There appear to be challenges of different sorts towards the structuring and implementation of an epidemiologic study that would find an association between DU exposure and a health outcome such as cancer or other negative health outcomes.

ICBUW Science Team October 2008. Contact for this paper: Gretel Munroe, zgmunroe@earthlink.net

¹³ *Ibid*, p. 31.

¹⁴ *Ibid*, p. 37.

¹⁵ *Ibid*, p. 38.

¹⁶ *Ibid*

¹⁷ *Ibid*, p.39.

¹⁸ *Ibid*.

¹⁹ *Ibid*.