Depleted Uranium
Information for Clinicians

A Collaborative Effort of DHCC, USACHPPM, AFIOH & NEHC

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Depleted Uranium is a very dense metal (1.7 times as dense as lead) and is a by-product of producing reactor fuel and nuclear weapons components. The leftover uranium, 40% less radioactive than natural uranium, is called "depleted uranium," or DU. It is used to make weapons and ammunition that are strong enough to pierce through heavy armor. DU is currently the most effective metal to use in armor or armor-piercing weapons. It is also used as counterweights for some aircraft, to focus radiation in medical machines, and in containers used to transport radioactive material safely. Some patients may be concerned about exposure to radiation from DU. From a clinical perspective, however, the concern is the potential for heavy metal renal toxicity from embedded fragments, although this has not appeared in wounded veterans.

PATIENTS' CONCERN ABOUT RADIATION

While radiation from DU may not be a health issue from a scientific or clinical viewpoint, it is likely to be one of the patient's first concerns. It can be particularly disconcerting to the patient because someone exposed to radiation does not know how much exposure is occurring or what adverse health effects may occur as a result of the exposure. People cannot see it, feel it, smell it, hear it, or taste it.

SCIENTIFIC CONCLUSIONS ABOUT THE RADIATION RISK FROM DEPLETED URANIUM

DOD assurances about DU may not have much credibility with your patients. Others have examined DU for many purposes, however, and their conclusions are shown below.

RAND, 1999. "(N)o evidence is documented in the literature of cancer or any other negative health effect related to the radiation received from exposure to natural uranium, whether inhaled or ingested, even at very high doses." As noted above, depleted uranium is 40 percent less radioactive than natural uranium and poses less of a radioactive risk.

Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR) in 1999 Toxicological Profile for Uranium. "No human cancer of any type has ever been seen as a result of exposure to natural or depleted uranium."

United Kingdom Royal Society, May 2001. "Even if the estimates of risk are one hundred times too low, it is unlikely that any excess of fatal cancer would be detected within a group of 10,000 soldiers followed over 50 years."

European Commission, March, 2001 report. "Taking into account the pathways and realistic scenarios of human exposure, radiological exposure to depleted uranium could not cause a detectable effect on human health (e.g. cancer)."

World Health Organization, April, 2001 report. "The radiological hazard is likely to be very small. No increase of leukemia or other cancers has been established following exposure to uranium or DU."

European Parliament, April, 2001 report. "The fact that there is no evidence of an association between exposures – sometimes high and lasting since the beginning of the uranium industry – and health damages such as bone cancer, lymphatic or other forms of leukemia shows that these diseases as a consequence of an uranium exposure are either not present or very exceptional."

HEAVY METAL HEALTH RISKS FROM DEPLETED URANIUM

Uranium is a very common heavy metal that we are exposed to every day. We breathe it in as dust, eat it with our food, and drink it in our water. We each take in, on average, about 1.9 micrograms (about two millionths of a gram) of uranium every day through ingestion and 0.007 micrograms through inhalation. It is not a rare or unusual exposure. The Agency for Toxic Substances and Disease Registry estimates that there is an average of four tons of naturally occurring uranium in every square mile of earth one foot deep.

Soldiers with known exposure to DU in the past were exposed through DU fragments from shrapnel. These fragments released DU into the blood which was then filtered by the kidneys. The levels of uranium excreted by these soldiers have not been very different from levels of naturally occurring uranium excreted by the general population, even by those who have retained DU fragments in their bodies. In some cases, however, the levels are significantly higher and this reflects an additional burden to the kidneys. It is unclear, at this time, if this higher level over an extended period for those individuals will impact their renal function.

Where can I get more information?

DU Library
http://www.deploymentlink.osd.mil/du_library/

Depleted Uranium - FAQ Sheet
http://www.va.gov/gulfwar/docs/DepletedUraniumFAQSheet.doc

Environmental Exposure Report
http://www.gulflink.osd.mil/du_ii/TAB%20P%20–%20DoD%20and%20VA%20Medical%20Surveillance

Second National Report on Human Exposure to Environmental Chemicals
http://www.cdc.gov/exposurereport/metals/pdf/uranium.pdf

Toxicological Profile for Uranium (Update) and Public Health Statement
http://www.atsdr.cdc.gov/toxprofiles/tp150.html

Depleted Uranium in the Gulf (II) Environmental Exposure Report
http://deploymentlink.osd.mil/du_library/reports/medical_us.shtml

Health Risk Assessment Consultation -- Depleted Uranium in the Gulf
http://deploymentlink.osd.mil/du_library/reports/medical_us.shtml

USACHPPM Fact Sheet, Depleted Uranium - Medical
http://chppm-www.apgea.army.mil/documents/FACT/65-051-0503.pdf

USACHPPM Fact Sheet, Depleted Uranium - Individual
http://chppm-www.apgea.army.mil/documents/FACT/65-050-0503.pdf

Deployment Health Clinical Center
www.pdhealth.mil

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MEDICAL FOLLOW-UP AND FINDINGS

The VA and the DoD thought that embedded DU fragments could dissolve over time, potentially leading to harmful effects in the kidneys and other organs. Therefore, the Department of Veterans Affairs has evaluated 70 veterans of the 1991 Gulf War who are survivors of friendly fire incidents involving depleted uranium munitions. About half of these veterans had or currently have documented embedded fragments still in their bodies and urine samples with elevated uranium.

Findings have shown no kidney damage, leukemia, bone or lung cancer, or other uranium-related adverse health outcomes. Babies born to this group have had no birth defects. Participants with embedded fragments still show elevated urine uranium levels, however.

Veterans of Operation Iraqi Freedom with confirmed elevated DU levels will also be followed medically. If they wish to participate in the VA program, they will be referred to the DU Follow-Up Program in Baltimore, MD. This program offers long term medical monitoring and follow-up.

COMMUNICATING WITH PATIENTS ABOUT DEPLETED URANIUM

Patients are often the most worried about the unknown. Rather than minimizing or avoiding the concern, clinicians are encouraged to address it forthrightly with information that is available. We are constantly exposed to radiation from many sources such as cosmic rays and uranium and that radiation is part of our natural environment. On average, people in the United States are exposed to about 0.3 rem of radiation annually. The rem is a unit of measure of human exposure to radiation. In a few other areas of the world, such as specific

locations in India and Brazil, people are routinely exposed to up to 0.7 rem because of the geology of those areas. The question is not whether we are exposed to radiation, but to how much we are exposed. It is the dose that is important.

The clinician may also point out that DU is roughly 40 percent less radioactive than naturally occurring uranium. Even so, intake of depleted uranium into the body will provide an internal radiation dose that is cumulative over the patient's lifetime. An ongoing study of veterans by the Department of Veterans Affairs found that veterans with DU embedded in wounds had additional radiation exposure ranging from 0.01 to 0.1 rem depending upon how much DU remained in their bodies. By comparison, scientific studies have not conclusively shown any health effects from radiation exposure below 10 rem. The VA study has followed these veterans for over a decade and has shown no clinically significant effects from their exposure to DU (either from radiation or from heavy metals, and this group has had no increase in birth defects either).

Heavy metals can be toxic in high amounts. It is helpful to remind patients that it is the dose -- the concentration, duration, and frequency of exposure -- that is important. We are all exposed to a certain amount of heavy metals, such as lead and uranium, every day without apparent harmful effect.

You may also refer patients to fact sheets on DU at www.pdhealth.mil.

Key Points:

- We are exposed to radiation and uranium every day.
- Uranium is very common in the earth.
- DU is less radioactive than naturally occurring uranium.
- Even those with embedded DU fragments have shown no long-term health or reproductive effects – either from radiation or heavy metal toxicity.