HQ ACC/SG

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE

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JAN 07 1999

MEMORANDUM FOR ALMAJCOM/SG

FROM: AFMOA/CC
110 Luke Avenue, Room 405
Bolling AFB DC 20332-7050

SUBJECT: Clarification of Depleted Uranium (DU) Awareness Training Requirements

It has come to my attention that there is much confusion concerning medical DU training requirements. This memorandum will clarify what training is needed and when it needs to be completed.

a. Comprehensive Clinical Evaluation Program (CCEP) providers should have either attended the US Army's 17 Apr 98 satellite broadcast or viewed the 116 minute, two cassette videotapes. This training was designed to educate CCEP providers on the hazards of embedded or internalized (inhalation/ingestion) DU. The CCEP training is specifically for providers managing Gulf War veterans potentially exposed to DU. If your CCEP office does not have these tapes, they can be obtained free of charge at ***http://dodimagery.afis.osd.mil***. They can be ordered under PIN 711134, DU Training for CCEP Healthcare Providers, Part I, RT 61:212 and PIN 711135, Part 2, RT 54:35.

b. All physicians, nurses, nurse practitioners, dentists, physician assistants, medical technicians, surgical technicians and aeromedical technicians assigned to a UTC are required to complete DU training by one of the following options:

(1) Complete web-based Gulf War Illness (GWI) training through the Veterans Administration (see 14 Oct 98 AFMOA/CC Memo to ALMAJCOM/SG). This training consists of reading a 100 plus page VA pamphlet on all aspects of GWI to include DU. Providers can receive 6 CME credits for successful completion of this training.

(2) View the US Army's 3 Dec 98 satellite broadcast of a 42 minute videotape. This training provided a current status of DU bioeffects research and proposed DoD medical treatment policy. Some facilities may have taped this satellite broadcast for future viewing by applicable personnel.

(3) Read the attached treatment guidance.

I would like all DU awareness training completed by 31 May 99. MAJCOMs should compile figures of CCEP providers completing the CCEP training and the applicable UTC personnel completing any one of the DU treatment training options. A status report providing the number of medical personnel requiring training and number trained should be provided by each MAJCOM to AFMOA/SGOR, 110 Luke Avenue, Room 405, Bolling AFB, DC 20332-7050, on 31 Mar, 30 Apr, and finally 31 May 99.

Request you e-mail the name, phone number, fax number and e-mail address of your MAJCOM POC for this effort to Lt Col Don Jordan, AFMOA/SGOR (don.jordan@usafsg.bolling.af.mil). If you have any questions, please contact Lt Col Jordan at DSN 297-4309 or (202) 767-4309.

Earl W. Mabry

EARL W. MABRY II, Maj Gen, USAF, MC
Commander
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Attachment:
Air Force Guidance on Medical Treatment of
Personnel Contaminated with Depleted Uranium
(DU) or Having Embedded DU Fragments

- counter balance
a C-141

Air Force Guidance on Medical Treatment of Personnel Wounded or Contaminated by Depleted Uranium (DU) Munitions

1. PURPOSE. US forces extensively used DU containing munitions during the Gulf War. Air Force use was limited to 30 MM GAU-8 munitions fired by the A-10 for purposes of close air support and interdiction. The Army uses DU munitions in several weapons platforms and also as shielding on certain armored vehicles. Following the Gulf War, and with the rise of concern over Gulf War Illness (GWI), the Services were criticized for failing to make their members aware of hazards presented by DU in both the operational and medical settings. This guidance is intended to provide this awareness training to the Air Force medical community.

2. BACKGROUND.

a. DU kinetic energy (KE) munitions and armor proved their effectiveness during Operation Desert Storm (ODS). This success has led to a dramatic increase in the number of nations who use DU in their munitions and as a part of the armor in armored vehicles.

b. Depleted uranium is uranium that has been depleted of the most radioactive isotopes of uranium. Chemically and toxicologically it is the same as natural uranium.

(1) Radiologically, DU is 40% less radioactive than the natural uranium found in the air, water, soil, and food products.

(2) DU is a heavy metal and, like other heavy metals (tungsten, lead, etc.), it is toxic when internalized in large quantities.

c. When a DU munition strikes an armored target, the penetration process generates high concentrations of airborne, breathable, DU oxides and high velocity shards of the metal that can cause serious wounds.

d. Personnel in, on, or near (less than 50 meters) an armored vehicle struck by a DU munition may internalize DU through inhalation, ingestion, wound contamination, or fragmentation (if hit by high velocity depleted uranium shards).

ATCH 1

(1) The military experience with DU in ODS showed that personnel surviving friendly-fire incidents may have a wide range of injuries. These range from only minor cuts and abrasions, to severe lacerations, burns, broken bones, and puncture wounds.

(2) Radiographic examination of personnel wounded during ODS showed that, as with personnel wounded by tungsten KE munitions, personnel may have from one to over 10 or more DU fragments embedded in localized regions of the body.

(3) Fragment sizes can vary from very small (several millimeters) to large (1 to 2 cm) and are readily discernible by x-ray examination. Fragments may be embedded at any depth and in any location in the body. One patient had a 1.5-cm fragment embedded deep in his thigh and several smaller (10's of millimeters) fragments in his ankle. In another patient, over 20 fragments of varying sizes (millimeters to centimeters) were localized in his calf.

(4) As with dirt or any other wound contaminates, the DU in wounds ranges from millimeter size particles to particles that are readily visible.

3. Health Effects.

a. The major health concerns associated with DU relate to its chemical properties as a heavy metal rather than to its radioactivity, which is very low. As with all heavy metals, the hazard depends mainly upon the amount taken into the body. Very high exposure and absorption of uranium can cause kidney damage.

b. Since 1993, the Department of Veterans Affairs has been following 33 veterans who were seriously injured in friendly fire incidents involving DU. These veterans are being monitored at the Baltimore VA Medical Center. Many of these veterans continue to have medical problems relating to the physical injuries they received during these incidents. About half of this group still have DU metal fragments in their bodies.

c. Those with retained DU fragments have shown higher than normal levels of uranium in their urine since monitoring began in 1993. These veterans are being followed very carefully and numerous medical tests are being done to determine if the DU fragments are causing any health problems.

d. The veterans being followed who were in friendly-fire incidents but who do not have retained DU fragments, generally speaking, have not shown higher than normal levels of uranium in their urine.

e. For all 33 veterans in the program (including those with retained DU fragments), all tests for kidney function have been normal. In addition, the reproductive health of this group appears to be normal in that all offspring fathered by these veterans between 1991 and 1997 had no birth defects.

4. Clinical Treatment of Personnel Wounded by DU Munitions.

a. Patients may have DU contamination on their clothing and skin. Neither the patient nor the contamination is hazardous to medical personnel. **Under no circumstances should patient extraction, treatment, or evacuation be delayed due to the presence of DU.** Normal "standard precautions" (surgical gloves, surgical mask, and throwaway surgical gowns) are more than adequate to protect medical personnel from accidental contamination with DU.

b. Wounds and burns should be cleaned and debrided using standard surgical procedures. The use of a sensitive radiation meter may assist in wound debridement and cleaning. The ADM-300 or AN/VDR-2 RADIAC meter with the beta window open may assist in locating DU contamination in the wound or burn. **Under no circumstances should required treatment be delayed to perform this monitoring.**

c. Management of embedded surgical fragments should be the same as for any shrapnel wound, with the exception that DU fragments greater than 1.0 cm should be removed from the patient unless the surgeon assesses the medical risk to be too great. **Under no circumstances should an extremity be amputated because there are retained DU fragments.**

d. Monitoring of kidney function is recommended for patients who were wounded by DU munitions.

(1) As with all heavy metals, the kidney is one of the organs most sensitive to uranium toxicity. Recommended tests include urinalysis, urine uranium, serum BUN, creatinine, beta-2-microglobulin and creatinine clearance.

(2) Chelation therapy is not recommended based upon current estimates of DU exposure. In addition, FDA approved chelation medications currently available have not been shown to help in animals exposed to natural uranium. Plus, they are associated with significant side effects.

5. Determining the Presence of DU.

a. Suspected wounding with DU or inhalation of aerosolized depleted uranium should always be recorded on the patient's field medical card. Indicators that may be obtained from the patient and/or documented on the patient's field medical card include:

(1) Patient's vehicle was struck by a Kinetic Energy (KE) munition. KE munitions are made from either tungsten or DU.

(2) Patient's vehicle was struck by friendly-fire either from US tanks or aircraft.

(3) Patient saw burning fragments (like a Fourth of July sparkler) while the vehicle was struck. DU is pyrophoric and will ignite under high pressure and temperatures.

b. Because of DU's high density, fragments are readily visible radiographically and will appear similar to steel, tungsten or lead fragments in the body.

(1) Radiography alone, however, is not sufficient to determine the presence or absence of DU. ODS experience found that there were soldiers in vehicles struck by DU munitions that had retained fragments that were not DU.

(2) In addition, KE penetrators made out of tungsten will also cause similar wounds and will appear radiographically the same. A large number of countries are using tungsten penetrators.

c. If readily available, a RADIAC meter (ADM-300 or AN/VDR-2 with the beta shield open or equivalent) may be used to monitor wounds, burns, or suspected sites with embedded fragments. This can assist in wound cleaning and will confirm the presence of DU. **Under no circumstances should treatment be delayed to obtain a suitable RADIAC instrument.**

d. **The most sensitive indicator for the internalization of depleted uranium is a uranium urine bioassay.** This is discussed below.

e. In general, patients with retained DU fragments will excrete uranium in the urine. ODS experience showed that, like lead, DU from the fragments will dissolve and be transported into the blood.

(1) The fragments serve as a source of uranium and the level of excretion will remain constant for long periods of time. Once in the blood stream, the DU will be metabolized the same as natural uranium is by the body. DU is subsequently excreted in the urine.

(2) Results of the medical monitoring of patients from ODS indicate that the highest uranium urine levels were on the order of 30 to 40 micrograms of total uranium per liter of urine. This monitoring was initiated in 1993 and the levels have remained more or less constant. In all likelihood, the levels were higher at the time the soldiers were wounded. How much higher is not known.

f. **The presence of DU fragments in the service member's body presents no risks to family members. As with other heavy metals retained in the body, the DU in all bodily fluids (urine, feces, sweat, saliva, and semen) present absolutely no hazard to the soldier or the people he has contact with. No special precautions are required for anyone having contact with the patient.**

6. Health Service Support (HSS).

a. Forward medical support characterizes the role of HSS in the Theater of Operations (TO). There are four levels of HSS that have a direct impact on patients as they are treated, returned to duty (RTD), or evacuated from the forward line of own troops (FLOT) to the CONUS base.

(1) Level I. Designated individuals or elements organic to combat and combat support units provide medical care. This may include self-aid and buddy care, the combat lifesaver, the combat medic, and the battalion aid station.

(2) Level II. The division or corps clearing station provides medical care.

(3) Level III. A Medical Treatment Facility (MTF) staffed and equipped to provide resuscitation, initial wound surgery, and post-operative treatment provides the care.

(4) Level IV. A hospital staffed for general and specialized medical and surgical care and rehabilitation for RTD provides the care.

b. If DU contamination is suspected, attending medical personnel at HSS Levels I and II should annotate the soldier's Field Medical Card [DD Form 1380, Block 14 (DIAGNOSIS)], or patient clinical record [SF Form 504 or other], with the statement "SUSPECTED DEPLETED URANIUM (DU) EXPOSURE", the date/time of exposure and any other pertinent exposure information. A simple description of the exposure scenario could be described in Block 19 ("WHAT WAS HE DOING WHEN INJURED"). If field survey monitoring indicates the presence of DU on the patient, then the monitoring results, the date/time of the monitoring, and the type/SN of RADIAC meter and detection probe used should also be recorded.

c. Urine bioassay procedures should be considered for these personnel. The decision to collect urine specimens for DU bioassay would first be made at the TO hospitals (HSS Levels III and IV). Requests for DU bioassays should be treated like any other clinical laboratory test. A physician or other authorized care provider should order bioassays and laboratory tests. Handle and record speciments using standard procedures.

7. Bioassay for DU.

a. DU Urine Bioassay Procedures.

(1) DU Urine Specimens. The primary bioassay technique to assess and document DU internalization is the collection of 24-hour urine specimens at specified times. If a 24-hour collection is not feasible for either clinical or operational reasons, a spot urine sample with 120 ml of urine or as much urine as can be collected should be taken.

(a) Urine uranium data from a spot sample collection, **WITH NORMALIZATION TO CREATININE**, while not optimal, can provide useful information about DU intake. If urine creatinine levels are to be measured, the patient's age, height, and weight must be provided on the laboratory request, Miscellaneous Standard Form 577.

(b) The 24-hour total urine sample provides for more accurate uranium determinations, positive

identification of DU in the urine, and data for direct dose assessment.

(2) Collection Procedure, 24-Hour Urine Sample. Unlike standard procedures, do not discard the urine from the first void. Collect 120 milliliters of the first void (or as much as is possible) as a spot sample and submit the sample for analysis. Document the date and time of the spot sample,and the beginning and ending times of the 24-hour collection and whether or not it was a complete 24-hour collection.

b. Urine uranium bioassays should be taken when operationally feasible and when the patient's clinical condition permits. **Under no circumstances should required treatment or evacuations be delayed for bioassay.** Optimal collection procedures are as follows:

(1) **Baseline 24-Hour Urine Specimen.** This is not an essential sample. The purpose for this specimen is to determine the natural level of uranium in the patient's urine that will aid in the specificity and accuracy of the measurement.

(a) Under normal conditions, DU will not appear in the urine for 24 hours after internalization. A baseline sample should not be taken if more than 24 hours has passed since the exposure or if the patient has had an intravenous infusion (IV)or a significant blood volume loss or replacement since the sample volume collected may not represent normal excretion rates and DU may appear in the urine before the 24-hour point thereby skewing assay of normal dietary uranium excretion.

(b) If the sample is taken, it should be started as soon as possible and stopped 24 hours after the internalization.

(2) **Initial DU Urine Specimen.** The purpose for this specimen is to obtain data for use in estimating the amount of soluble DU internalized. Collection should begin **not earlier** than 24 hours after the exposure event and continue for a full 24 hours. This specimen is needed in order to calculate the intake estimate and the radiation dose estimation. If a hospital's resources cannot support the logistics of an optimal 24-hour urine collection, then a spot-sample should be taken.

(3) **Seven to Ten Day Urine Specimen.** This specimen (and subsequent specimens, if required) provides the data required for isotopic analysis for positive DU identification. It is also used to estimate the amount of insoluble DU internalized. If the patient is returned to duty from a Level III or IV MTF, at least a urine spot sample should be obtained from the patient before his leaving.

(4) **Subsequent Bioassay Procedures.** The need for further bioassay will be based upon the levels found in the specimens noted above. Guidance from appropriate bioassay consultants (see paragraph 7) may be used to assist in patient assessment.

c. Other Bioassay Media. Other procedures (fecal and nasal samples) are available and may be used based upon the advice of competent medical consultation.

8. Bioassay Laboratory and Health Physics Support.

a. Contact the Institute for Environment, Safety, Occupation Health and Risk Assessment/Radioanalytical Branch (IERA/SDRR), 2402 E. Drive, San Antonio, TX 78235, DSN 240-3486 or (210) 536-3486 for instructions on how to package and ship bioassay samples or to obtain additional assistance in assessing DU risks.

b. During non-duty hours, IERA/SDR assistance may be obtained by contacting the Brooks AFB Command Post at DSN 240-3278.