Just the Facts...

Depleted Uranium - Medical

DEPLETED URANIUM IS A DENSE, SLIGHTLY RADIOACTIVE HEAVY METAL USED IN AMMUNITION, ARMOR AND AIRCRAFT. IT HAS 40% LESS RADIOACTIVITY THAN NATURAL URANIUM.

GENERAL INFORMATION	Uranium is an element found naturally in soil, water, and mineral deposits. It is a slightly radioactive substance composed of 3 naturally occurring isotopes (isotopes are atoms that differ only in their number of neutrons; they have similar physical properties), ^{238}U, ^{235}U, and ^{234}U. All three isotopes are found together in Uranium ore. Depleted uranium is what remains after the more radioactive isotopes, ^{234}U and ^{235}U, are removed from uranium ore in order to make enriched uranium. Enriched uranium, which contains the more radioactive isotopes, is primarily used as fuel in nuclear reactors. All uranium, not just DU, is made up of almost all ^{238}U. Natural and depleted uranium differ only in their radioactivity. Depleted uranium is roughly half (60%) as radioactive as natural uranium because there are less of the more radioactive isotopes (^{234}U and ^{235}U). The chemical properties of the isotopes are the same. It is the chemical properties that are responsible for many of the health effects of concern, such as possible kidney effects. Depleted uranium also contains trace amounts of ^{236}U and other trace substances such as plutonium, americium and technetium. These amounts are so small that they are very difficult to measure and have no affect on health or the environment.
ROUTINE USES IN THE DEPLOYED SETTING	The United States Armed Forces have used DU in the manufacture of munitions, armor and armor-piercing projectiles. DU's high density, self-sharpening qualities, and the fact that it is easily combustible make its projectiles capable of readily penetrating armor made with less dense metals. Due to its density, armor constructed with DU provides a high degree of shielding and resistance to penetration. During the 1991 Gulf War (GW), depleted uranium containing munitions were used on a large scale for the first time. In the manufacture of projectiles and armor, depleted uranium is alloyed with small amounts of other metals.
EXPOSURE LEVELS HISTORICALLY ENCOUNTERED	When a vehicle is impacted and perforated by a DU projectile, the projectile splits into small shards, many of the small shards burst into flames, and fills the insides of the vehicle with flying metal, fumes, and particulates. The bulk of a DU projectile may pass directly through the vehicle. The inside of the damaged vehicle remains contaminated with particles of DU and its oxides after the impact. In the event of a vehicular fire, the heat of the fire can cause any onboard DU ammunition to oxidize. Personnel in, on, or near (less than 50 meters) an armored vehicle when the vehicle is being penetrated by a depleted uranium munition are considered at risk for exposure to DU that should be evaluated by bioassay. They are considered Category I. This is based on modeled comparison of exposure dose to acceptable exposure doses and background level. They may internalize depleted uranium through inhalation, ingestion, wound contamination, and fragmentation (if hit by high velocity depleted uranium shards). Some crew members may be left with multiple tiny fragments of uranium scattered through their muscle and soft tissue. Other soldiers may be exposed to DU during operations to salvage combat vehicles that have been disabled by DU rounds may resuspend DU dust from the vehicles surfaces, Those who routinely enter damaged vehicles in recovery operations or fight fires involving DU are considered to be in exposure Category II and also should have a bioassay for DU performed. Simply riding in a vehicle with intact DU munitions or DU shielding will not result in significant intakes of DU. Exposure by breathing fumes of burning DU metal only occurs if the vehicle is hit or if the soldier is near a target hit by DU munitions.
AVAILABLE EXPOSURE DATA	Replication of airborne exposure levels of DU when a penetrating round pierces a vehicle has been modeled and serves as the basis of the screening guidance. This is based on the modeled internal dose. This forms the basis of Category I and II for bioassay.

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SIGNS AND SYMPTOMS OF ACUTE AND CHRONIC EXPOSURE	There are no acute health effects related to the DU exposures under discussion. The major health concerns about internalized depleted uranium 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 chemical form, the amount taken into the body, and the solubility of the DU particles within the body fluids. It has been recognized that very high uranium intakes can cause kidney damage. Chronic exposure by inhalation represents potential radiological hazard to the lung and uranium miners have an increased risk of lung cancer after long term exposures. This is thought to be due to radon, however, and not the radioactivity of uranium. DU is less radioactive than uranium.
MEDICAL TREATMENT	Casualties may have depleted uranium contamination on their clothing and skin. Under no circumstances should casualty extraction, treatment, or evacuation be delayed due to the presence of depleted uranium. Standard aidman procedures for treating wounded personnel should be followed. Wounds and burns should be cleaned and debrided using standard surgical procedures. Normal "universal precautions" (surgical gloves, surgical mask, and throwaway surgical gowns) are more than adequate to protect medical personnel from accidental contamination with depleted uranium. Items contaminated with depleted uranium should be disposed of using standard universal precaution procedures. Embedded depleted uranium fragments should be removed using standard surgical criteria except that large fragments (greater than 1 cm) should be more aggressively removed unless the medical risk to the patient is too great. The short-term consequences of retained DU fragments do not justify an aggressive approach during the early treatment of wounds. Appropriate treatment of the wound with removal of any easily accessible fragments should be performed. In the care of acute wounds, surgical judgment should avoid the risk of harm in removal of other fragments -even when known to be DU. DU fragments may always be removed at a later date. Fragment sizes can vary from very small (several millimeters) to large (1 to 2 cm) and are readily discernible by x-ray examination. Individuals who have been potentially exposed to DU by inhalation should not have any acute symptoms and should be treated only if injured. Urine bioassay to assess exposure should be performed if feasible, but no later than 180 days post incident.
LONG TERM MEDICAL SURVEILLANCE REQUIREMENTS OF HEALTH EFFECTS MONITORING	Since 1993, the Department of Veterans Affairs has been following 35 Gulf War veterans who were seriously injured in friendly fire incidents involving depleted uranium. These veterans are being monitored at the Baltimore VA Medical Center. About half of this group still has depleted uranium metal fragments in their bodies. Those veterans with retained depleted uranium 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 depleted uranium fragments are causing any health problems. For all 35 veterans in the program (including those with retained depleted uranium fragments), all tests for kidney function have been normal. In addition, the reproductive health of this group appears to be normal in that all babies fathered by these veterans between 1991 and 1997 had no birth defects. Continued follow-up of individuals in Categories I and II will be based on the levels of uranium found in the bioassay.
SPECIAL RISK COMMUNICATION INFORMATION	Depleted uranium aerosols are only one of many potentially hazardous substances that soldiers may be exposed to during deployment and combat operations. There are two potential hazards associated with exposure to large amounts of DU aerosols. The primary concern is the effects associated with heavy metal toxicity, much like that seen with tungsten, lead, and cadmium. The second area of concern is with DU's low-level radioactivity. Follow-up of individuals with retained DU fragments have not shown health effects of concern related to internalized DU. Those individuals who show elevated DU in the screening urine bioassay will be followed as a precaution.