



*Just the Facts...*

## Depleted Uranium - Individual

GENERAL INFORMATION	<p>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), 238U, 235U, and 234U. All three isotopes are found together in Uranium ore. Depleted uranium is what remains after the more radioactive isotopes, 234U and 235U, 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 238U. 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 (234U and 235U). 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 236U 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. Everyone has some exposure to natural uranium that can be measured in the urine.</p>
ROUTINE USES IN THE DEPLOYED SETTING	<p>The United States Armed Forces have used DU in the manufacture of munitions, armor, and armor-piercing projectiles. DU projectiles are capable of readily penetrating armor. 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.</p>
EXPOSURE SCENARIOS	<p>When a vehicle is impacted and perforated by a DU projectile, the projectile forms particles of various sizes down to very fine aerosols. 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 may have exposures to DU and are categorized as Level (Category) I. In addition to breathing or swallowing DU, some crew members may be left with multiple tiny fragments of DU or DU-containing fragments in their bodies. Other Soldiers may be exposed to DU during operations to salvage combat vehicles that have been disabled by DU rounds or fight fires involving DU; these Soldiers are categorized as Level II. Level II personnel are expected to have lower exposures to DU than personnel in Level I. While Soldiers followed from the first Gulf War with retained DU or DU-containing fragments have not shown ill health effects, DOD and Army policies requires that any Soldier in either of these categories submit a urine specimen for analysis so that exposure to DU can be determined. Depending on the amount measured, these Soldiers may be followed over time. Simply riding in a vehicle with intact DU munitions or DU shielding will not result in significant intakes of DU. These and other similar scenarios are categorized as exposure Level (Category) III. For personnel in Level III, submitting a urine specimen for analysis is optional based on health care provider and patient concerns. If you are in this category and have concerns, please discuss them with your health care provider. DU Awareness Training explains how to avoid unnecessary exposure to DU in damaged vehicles.</p>

<p>SIGNS AND SYMPTOMS OF ACUTE AND CHRONIC EXPOSURE</p>	<p>DU is a heavy metal, like lead and others, and when there are large amounts in the body; heavy metals can damage the kidneys. The kidneys filter the blood, and waste products from the blood are passed to the urine and eliminated from the body. If DU is found in the urine, this is a signal that DU has been taken in to the body. In all but very rare cases, there will be no immediate noticeable effects from DU. However, the concern is that over time filtering the DU could damage the kidneys. For this reason, if the Soldier has a higher chance for DU exposure (Level I or II), then we measure the amount of DU in the urine. Based on the amount measured, it is then decided whether to recommend referral of the soldier to the VA long term monitoring program. This Soldier doesn't need to get any special treatment. Fragments containing DU retained in the body slowly release DU. This DU continues to pass in to the urine at amounts that can be easily measured. Soldiers who have retained fragments are followed because their exposures (and amounts of DU in the urine) are representative of continued internal exposure and require long term monitoring of the kidneys. Since the amount of radioactivity in DU is low, it is not thought that there is any concern for cancer from radiation. All people have some exposure to naturally occurring radioactive materials, including uranium.</p>
<p>MEDICAL TREATMENT</p>	<p>If you are wounded with a DU or DU-containing fragment, the treatment will be based on removal of the fragment, just as if the wound was from a bullet. Some bullets are stuck in places that make it hard to remove and the surgeons decide to leave them in place rather than damage tissue trying to dig them out. If that happens, we do look at how much DU is leaving the body to decide if the kidneys should be watched closely. DU fragments will show up on X-rays just like bullets. Someone with a retained DU or DU-containing fragment is not "radioactive" and does not pose a risk to others. Individuals who have only breathed in or swallowed DU should not have any acute symptoms and could be required to submit a urine specimen depending on how they were exposed. If you have a chronic DU exposure, your health care providers will refer you to the Department of Veterans Affairs (VA) for additional follow up.</p>
<p>LONG TERM MEDICAL SURVEILLANCE REQUIREMENTS OF HEALTH EFFECTS MONITORING</p>	<p>Since 1993, the VA has been following a number of Gulf War veterans who were seriously injured in fratricide incidents involving depleted uranium. The current cohort of Gulf War veterans contains 77 individuals. These veterans are being monitored at the Baltimore VA Medical Center. About half of this group still has fragments containing depleted uranium 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 veterans in the program (including those with retained depleted uranium fragments), all tests for kidney function have been normal (though small differences in some urinary biomarkers have been detected in the higher urinary DU group). 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.</p>
<p>SPECIAL RISK COMMUNICATION INFORMATION</p>	<p>Exposure to DU (as an aerosol or as part of an embedded fragment) is only one of many potentially hazardous substances that Soldiers may be exposed to during deployment and combat operations. There are two potential hazards when large amounts of DU are taken in to the body. The first concern is related to the effects associated with heavy metal toxicity, much like that seen with tungsten, lead, and cadmium on the kidney. The second area of concern is related to the possible long-term effects related to DU's low-level radioactivity. Follow up of individuals with retained DU fragments has not shown evidence of adverse health effects related to internalized DU. Those individuals who show elevated DU in the screening urine bioassay are being followed as a precaution.</p>