What are Natural and Depleted Uranium? (Fact Sheets)

Depleted Uranium (DU) - For Clinicians

Depleted Uranium (DU) - For Service members and their Families

Urine Testing for Depleted Uranium

U.S. Army Capstone Depleted Uranium Aerosols Study & Human Health Risk Assessment

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Radiation Effects of Uranium

The section addresses the issue of the radiation effects of uranium. Unlike the situation with the chemical effects, the amount of radiation to which the body is exposed is different for the various forms of uranium. Natural uranium is only mildly radioactive, and depleted uranium is 40% less radioactive. However, **disease** due to radiation effects of uranium, whether natural or depleted, has not been observed in either animals or humans. Therefore, this section focuses more on radiation **exposure** than actual disease. Although the radiation dose from a particular uranium exposure can be estimated, it is small. Because disease from the radiation has not been observed, the radiation effect is usually less of a concern than the chemical effect: natural and depleted uranium are much more likely to be chemical than radiation hazards.

What types of radiation exposure are associated with DU?

As they decay, uranium atoms, whether natural or depleted, give off small amounts of radiation, like sources of natural background radiation in the environment. DU and its decay products give off radiation that could potentially cause exposure inside the body as well as externally. While DU gives off *alpha* particles, the decay products give off *beta* and *gamma* particles as they decay even more. However, the *alpha* radiation does not penetrate the outer, dead layer of skin, and so uranium must be first taken into the body for *alpha* particles to be a concern. *Beta* radiation is screened out by normal military clothing, but could be a concern if uranium were first taken into the body, or protective clothing (such as gloves) was not worn. *Gamma* radiation, which is penetrating, must be considered even without internal exposure to uranium, but the doses of it from DU are small. Research indicates that exposures to *alpha* and *beta* particles would be below occupational guidelines.

Can exposure to depleted uranium (DU) cause cancer?

There is no solid evidence from human studies that internal uranium exposure is associated with an increased cancer risk. Although cancer is a well known effect of ionizing radiation exposure, it has never been associated with exposure to uranium. A small fraction of the uranium taken into the body becomes deposited in the skeleton, but scientific observations have not shown any increase in bone cancer in persons exposed to uranium, including enriched uranium, which is about 100 times as radioactive as DU.

People are constantly bombarded by radiation from many sources. Radiation comes from space, from radioactive materials in the soil, including natural uranium, and also radioactive isotopes of other more common metals, such as potassium. There is radiation in the air, and the food that we eat. In addition, people receive radiation from routine x-rays to diagnose disease, or with radiation therapy to treat disease. In some areas of the world, people are exposed to levels of background radiation that is three times higher than in the U.S. These people, exposed only to high levels of background radiation, have some alterations in chromosomes due to the higher radiation exposures, but do not show any increase in rates of cancer or other diseases that may be linked to radiation exposure.

Has radiation risk in DU-armored vehicles been evaluated?

Inhalation of particles of uranium too small to be expelled from the airways in the mucus, and not soluble enough to be absorbed and eliminated through the kidneys, is taken into consideration when looking at risk due to radiation from DU exposure. These particles can remain in the lungs for years, and were considered in the Capstone Study in arriving at estimates of maximum possible radiation exposures to Service members inhaling DU dust. The Capstone Study used mathematical models designed by the International Commission on Radiation Protection to perform the human health risk assessment, and concluded that the majority of scenarios with armored tanks and vehicles being struck by DU munitions would result in radiation exposures that did not exceed routine occupational exposure limits established by regulatory agencies. Occupying an unventilated Abrams tank for 2 hours after penetration of the tank by DU munitions through DU armor exceeded those limits, but still increased the lifetime fatal cancer risk from radiation to only 0.44%.

How significant is the radiation risk to civilians residing in areas of former conflict?

Similar mathematical models to those used in the Capstone Study were used by other governments and organizations, including the World Health Organization and the United Nations Environmental Program, to conclude that DU remaining in former areas of conflict did not create a current environmental hazard to the occupants of those areas. Those researchers examined the risk created by DU particles in the soil that could be resuspended in the air through the action of the wind or human activities. Many of these reports may be accessed directly through the section on Environmental Effects and Exposures, in this website.