Depleted Uranium: What we know, what we don't know, and what we must find out

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Properties of Depleted Uranium

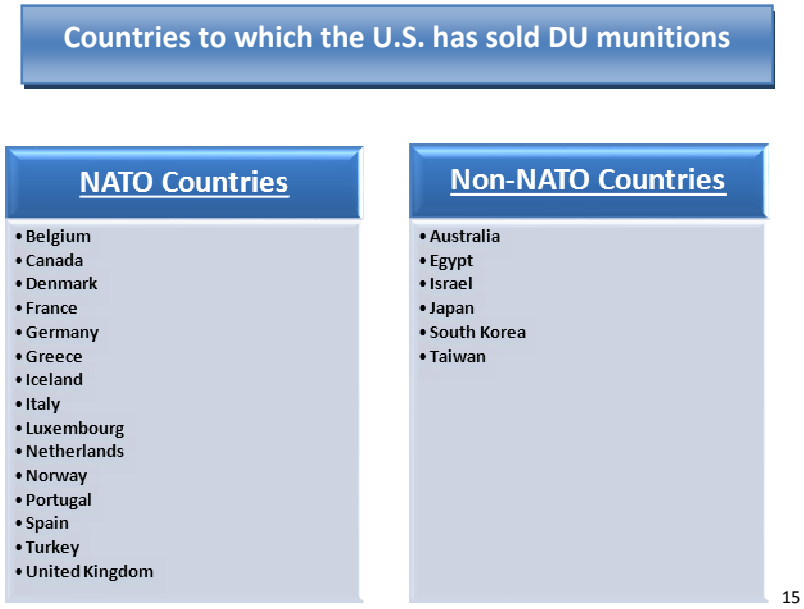
Depleted Uranium (DU) is the term used for uranium that contains a very low amount of the 235U isotope – more than three times less than is found in natural uranium. Depleted Uranium is what remains after the element is enriched, usually for use in nuclear power plants or in nuclear arms.[1] Depleted Uranium is radioactive. A radiation dose from DU would be 60% as strong as the same dose from purified natural uranium.[2] Uranium is the heaviest naturally occurring element and is about twice as dense as lead. While DU is lower in radioactive toxicity, it remains highly chemically toxic.

DU is used to make containers for radioactive materials, as counterweights in aircrafts and in the production of radiation shields used in medical facilities. The United States Armed Forces have used DU in the manufacture of munitions, armor, and armor-piercing projectiles. Depleted uranium has several military applications because of its high density, its pyrophoric nature (DU self-ignites when exposed to temperatures between 600° and 700° and high pressures), and its property of becoming sharper, through adiabatic shearing, when it penetrates armor plating.[3] When a vehicle is impacted and perforated by a DU projectile, the projectile forms particles of various sizes, ranging from larger particulates down to very fine aerosols.[4]The individuals most likely to receive the highest doses from DU ammunitions are those near a target at the time of impact, and those who examine a target (or enter a tank) in the aftermath of the impact.[5] The three main routes of human exposure to DU on the battlefield are inhalation, ingestion and wounding.[6]

Use of Depleted Uranium in Military Arsenals

The use of depleted uranium in military arsenals is consistently growing. At least 18 countries are suspected of using DU in their arsenals.[7] Among these countries are the United States, the United Kingdom, Russia, Turkey, Saudi Arabia, Pakistan, Thailand, Israel and France. The U.S. and U.K. are the only countries that have admitted to military use of DU.[8] The U.S. derives profit from the sale of DU munitions to other countries.

Depleted uranium munitions have been used in multiple conflicts. In the Persian Gulf War in 1991, 300 Metric tons of DU ammunitions were used in Iraq and Kuwait.[9] Approximately 944,000 depleted uranium bullets were used by American military during the 1991 Gulf War.[10] In Bosnia and Herzegovina 3.3 metric tons of DU ammunition was used between 1994 and 1995.[11] In Kosovo, 10 metric tons of DU ammunition was used during the NATO bombing campaign that lasted for three months in 1999.[12] During the 2003 Iraq invasion from March to May approximately 100-200 metric tons of DU ammunition was used by U.S and U.K forces.[13] In Afghanistan, over a 1 year period between October 2001 and October 2002, an estimated 500 to 600 metric tons of DU ammunition was used by the U.S military.[14] Although this war is ongoing, more recent estimates are difficult to ascertain.



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Problems with Depleted Uranium Use

When a DU projectile impacts and explodes, the projectile disintegrates into particles of various sizes. The uranium particles can be inhaled and can contaminate the surrounding environment. The fraction of similar sized uranium particles absorbed into the blood is generally greater following inhalation than following ingestion. Different uranium compounds possess different rates of water solubility and absorption rates can vary during exposure. The fraction of depleted uranium absorbed by an individual will also depend on the particle size and environmental distribution of the DU. Inhaling more water soluble compounds of DU could lead to more than 20% absorption into the blood.[16]
Small children could receive greater exposure to DU when playing in or near DU impact sites. Their typical hand-to-mouth activity could lead to a high rate of DU ingestion from contaminated soil.[17]

The symptoms of uranium contamination are called 'non-specific'. This classification indicates that the symptoms can easily be linked to several different diseases. As such, proving a direct connection between the symptoms and depleted uranium exposure is challenging.

Research on Health Effects of Exposure to Depleted Uranium

Research discussing the health effects of exposure to depleted uranium includes analyses of rates of cancer, renal damage, brain damage, chromosomal aberrations and congenital defects. In Southern Iraq, **34** people died of cancer in 1988; **450** died in 1998; and in 2001 there were **603** cancer deaths.[18] In a study of 39,450 Italian military personnel previously stationed in Kosovo and Bosnia, they found a significant increase in observed cases of lymphoma. Individuals in the study showed that the rate of lymphoma was 8 times higher than the expected rate of lymphoma in average Italian citizens.[19] Studies done on U.S and U.K war veterans do not corroborate the findings above. In most of the studies there was no observable increase in cancer rates in U.S. and U.K. war veterans. Gulf War veterans with DU metal fragments embedded in their bodies showed elevated levels of Uranium in their urine. This

elevation in Uranium levels continued to be present for over 7 years after possible first exposure.[20] Rats with chronic exposure to depleted uranium showed renal deterioration and renal anemia which typically led to kidney disease.[21] A direct connection with exposure to depleted uranium and renal damage in humans has not yet been made.

Gulf War veterans with elevated levels of uranium in their urine were found to have lower performances on neuro-cognitive tests when emotional traumas and physical capability variables were controlled.[22] That study showed a possible connection between DU exposure and brain damage. Despite this possible connection, there are several limitations of such studies due to the presence of confounding variables such as variance in the lifestyle of veterans, genetic predispositions, and natural cognitive abilities. In addition, it can be difficult to obtain a representative sample of veterans, due to the fact that the sample would have to include individuals from different geographical locations and individuals of representative ethnic diversity. It may also be challenging to obtain a large enough sample size to ensure that the data is sound and the results can be generalized to the population.

Rates of chromosomal aberrations in individuals working at a depleted-uranium-contaminated tank repair facility in Sarajevo were significantly higher than that of the control group.[23] Few studies have been conducted in other possibly contaminated areas to test for chromosomal aberrations. Congenital malformations in births in Basra increased from a rate of 3.04 per 1,000 births in 1999, to 17.6 per 1,000 births in 2000.[24] Over a three week period in 2009, at one hospital in Falluja, a pediatrician recorded 37 babies born with congenital abnormalities.[25] The rate of congenital defects has increased significantly in areas that were bombed in Iraq. However, there is little evidence to prove conclusively that the rise in congenital defects is directly caused by depleted uranium contamination. The congenital defects could also be influenced by malnutrition, various other chemical contaminations and/or other environmental factors.

There have not been any conclusive long-term studies that confirm a positive correlation between increased rates of health problems and exposure to depleted uranium in U.S or U.K veterans. In addition, there have been few studies conducted and financed by U.S. researchers that assess the health of Iraqi citizens who live in zones where the depleted uranium munitions were used. Most research concludes that there is a strong need for long-term, continued monitoring and research in veterans and civilians exposed, due to the possibility of depleted uranium's negative long term health effects.

National and International Efforts to Address the DU Problem

In 2001, former democratic Congresswoman Cynthia McKinney introduced the Depleted Uranium Munitions Suspension and Study bill into Congress. The bill called for the suspension of DU use in munitions and export, until studies definitively indicate that depleted uranium does not pose a health risk to military personnel and civilians. In 2003, democratic representative James McDermott introduced a similar bill, which solicited a comprehensive study investigating the health effects of exposure to depleted uranium. The study was focused on the health of veterans and their children, as well as persons exposed to DU during the arms production process. Representatives McKinney and McDermott were unsuccessful at passing either of these bills as laws. The bills never made it past referral to subcommittees, despite efforts by both representatives to reintroduce the bills. The last attempt to create a policy that imposes a moratorium on DU use, or that commissioned studies, was made in 2006 by McKinney.

On March 24, 1995, the U.S. ratified the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons Which May Be Deemed to Be Excessively Injurious or to Have Indiscriminate Effects (Geneva, 10 October 1980). If a connection between the increased cancer and birth defect rates in Iraq and DU munitions use is proved, the U.S could be found in violation of the UN Convention on Certain Conventional Weapons, an annex to the Geneva Convention. This law prohibits the use of any weapons that pose a significant threat to unintended targets and civilians. On May 9, 1902, The U.S. ratified the Hague Regulations concerning the Laws and Customs of War on Land (The Hague Regulations, 29 July 1899). If airborne depleted uranium does, in fact, contribute to dangerous levels of radiation within the body, then the use of Depleted Uranium violates international law: Article 23 paragraphs (a) and (e) of the Hague Regulations prohibit states "to employ poison or poisoned arms" or "to employ arms, projectiles, or material of a nature to cause superfluous injury". At the 63rd session of the UN General Assembly in 2008, member states discussed their positions and views of the use of depleted Uranium in ammunitions and armament. The differences in views expressed mirrored the dichotomous nature of the existing research on the health effects of exposure to depleted uranium in the environment.[26]

Conclusion

There is considerable research that suggests that there are harmful effects of exposure to depleted uranium. However, in actual studies of U.S veterans who are presumed to be among those most exposed to depleted uranium in aerosol form, there are clear discrepancies between the expected negative health effects and the observed health effects. The research surrounding depleted uranium is bizarrely contradictory in nature. What we *do* know is that there has been an observed and documented increase in cancer and congenital birth defect rates in areas where depleted uranium ammunitions have been used. The flagrant lack of research investigating reasons for the increase in cases of debilitating diseases following U.S. military intervention raises the possibility of a deliberate attempt to suppress the relevant information. The lack of western sponsored studies points to the U.S. military's careful self-protection and self-preservation, maintained by ensuring the deniability of culpability. U.S. Government sponsored research findings tend to corroborate a convenient presupposition that DU poses no significant threat to soldiers or civilians who have higher amounts of uranium in their blood. Other studies seem to categorically prove that there is a significant connection between depleted uranium exposure and deteriorating health of test subjects.

The lack of conclusive evidence linking DU exposure to the negative health effects experienced in locations where the U.S. military utilized ammunitions, creates a challenge for national and international policies that aim to address the DU problem. The skyrocketing cancer rates and cases of congenital defects cannot be ignored for the simple reason that they unequivocally coincide with international military intervention. It is very likely that there is a causal relationship. Investigating reasons for this causal relationship should be the duty of the intervening militaries and such studies should be commissioned by international regulating bodies.

Human rights are being violated. Iraqi and Afghan lives are being stripped and pillaged by a sinister unknown entity brought in with the arrival of foreign militaries. The question as to what that entity is still remains. Actions aimed at uncovering truth seem to be plagued by inertia motivated by a fear of exposing incriminating information. This fear must be overcome in the interest of fulfilling a duty to protect lives and human rights. Developed countries cannot simply close their eyes and hope the problem disappears. Instead they must set an example, take responsibility, and actively seek an answer to a serious problem to which they have clearly contributed.

Endnotes

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