Status of Health Concerns about Military Use of Depleted Uranium and Surrogate Metals in Armor-Penetrating Munitions

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Abstract: The use of **depleted uranium** in armor-penetrating munitions remains a source of controversy because of the numerous unanswered questions about its long-term health effects. Although there are no conclusive epidemiological data correlating **depleted uranium** exposure to specific health effects, studies using cultured cells and laboratory rodents continue to suggest the possibility of genetic, reproductive, and neurological effects from chronic exposure. Until issues of concern are resolved with further research, the use of **depleted uranium** by the military will continue to be controversial. Meanwhile, there are military programs to find substitutes for **depleted uranium** in munitions. Although a wide variety of alloys are being evaluated by munitions developers, certain alloys of tungsten have been developed that demonstrate properties very close to the ones that make **depleted uranium** useful in armor-penetrating munitions. One hundred and fifty years of industrial experience suggest that tungsten and tungsten alloys are not a significant health risk except in certain industrial exposure scenarios. However, recent research has shown that some of the most promising militarily relevant alloys of tungsten exhibit unexpected long-term toxicities as embedded shrapnel. Rats implanted in their leg muscles with pellets made from a particular alloy of tungsten, nickel, and cobalt, considered a promising surrogate for **depleted uranium** in munitions, develop aggressive rhabdomyosarcomas within 6 months of implantation that metastasize to the lung and necessitate euthanasia of the animals. One hundred percent of the tungsten alloy-implanted rats were affected. Immune system changes independent of tumor development were also observed. These findings amplify the need to investigate substances of questionable toxicity early in munitions development, especially with regards to the unusual kinds and levels of exposure that might be expected by the military.

Limitations:	APPROVED FOR PUBLIC RELEASE
Description:	Conference paper
Pages:	21
Report Date:	2005
Report Number:	A837834

Keywords relating to this report:
- AMMUNITION FRAGMENTS
- ARMOR PIERCING AMMUNITION
- COMPONENT REPORTS
- DEPLETED URANIUM
- EXPOSURE(PHYSIOLOGY)
- HEALTH
- METALS
- NATO FURNISHED
- SYMPOSIA
- TOXICITY
- TUNGSTEN ALLOYS

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