

Update on Severe Damage to Human Health From Depleted Uranium

Dr. Rosalie Bertel!, 3 May 2005

1. I have been concerned for many years over the bitter disputes between researchers who study radiation exposure in uranium mines, hospitals or laboratories, and those who experience the real world exposures of the atomic veterans, down winders, and Gulf War veterans. Finally I have come to understand that the physical characteristics of the particles carrying the radiation, the debris they raise and the surrounding abnormal situation can explain this difference. Our first picture shows a DU Penetrator. Note that the DU is in a solid form. When used in war it is hurled through the air at great speed - the friction tearing off small particles of uranium. When it hits a hardened target, more small pieces of uranium are slivered off, keeping the point sharp so that it can penetrate into the interior of the tank, car or building.

Those small pieces of uranium are pyrophoric - these spontaneously burst into a fire which is called a "metal fume". It is invisible and deadly!

2. This is a comparison of the degrees Centigrade of various fires: TNT 575; Domestic Waste Incinerator 600; Commercial Incinerator 870; Hazardous Waste Incinerator 1,000; and the Twin Tower disaster on 9/11, 2000.
3. Note that in this scale, one line represents 100,000 Degrees Centigrade, while in the previous slide it was 500 Degrees Centigrade. The heat of the Twin Tower disaster of 9/11 and DU metal fumes look small compared with the atomic explosion.
4. The DU metal fume is, however, just below the intensity of the heat on the surface of the sun. The nuclear bomb mimics the heat of the core of the sun.
5. At this intense heat all of the ordinary materials of human living will melt and sublimate into a gaseous form. They will rise from the fire and then when they cool down for a ceramic like aerosol. What was rough becomes a smooth surface; what was a large solid is now a microscopic fragment, hollow in the larger pieces.
6. In order to understand the size of these aerosol particles, we need to understand the terminology: 1 meter (yard stick), 1 cm.(a leaf is about ten cm long); 1 mm.(the needle's eye is 1.2 mm); 1 μ m (micron)(the thickness of human hair is 40 to 300 micron); 1 μ m.(a virus is 1 μ m a large molecule is 0.5 μ m)
7. Human cells are about 6 microns in diameter. This is how a clump of nanometer size particles looks in a mouse lung.
8. There are two considerations which determine the dose received from a radiation exposure. The first is distance from the source. Dose decreases with distance. However, an internal exposure to a particle gives the maximum contact dose.
9. The second consideration is time or duration of exposure. The longer the time of exposure, the stronger is the sun's burn. These internal exposures maximize the dose by contact and the time by long residence in the body when they are insoluble in body fluid.

10. An aerosol enters the body through the lungs. The lungs have no filter for unwanted particles (as has the gastro-intestinal tract). An aerosol is so small that it can travel into the deepest part of the lung and can imbed itself in the tissue.
11. Although experts claim that we eat more uranium than someone received from DU in a battlefield experience, the gastro-intestinal tract eliminates 99% of what we eat without it ever entering into the body. Because of the body's ability to reject uranium, uranium in the environment is 1000 times more available than it is in the human body. There is no way to screen out uranium from the lungs.
12. Uranium which does get into the body from the lungs or gut (the 1% not excreted in feces), is excreted through the urine. Natural uranium is excreted at about 3 to 310 nanograms daily (this keeps the body in equilibrium). GWV in addition to natural uranium, were excreting DU at 252 to 1,340 nanograms daily. Indicating a higher than normal body burden. One microgram of U238, whether from natural or depleted uranium, would release 1,071,000 alpha particles daily into a sphere of cells, each one impacting about 6 to 7 cells. The more finely the particle is divided, the more centers of emitting alpha particles (in a clump, the alpha particle can be absorbed).
13. One mg (1000 microns) U238 will experience 1 or 2 fissions per year, releasing 40 times the energy of one alpha emission. An alpha emission is greater than 4 MeV (million electron volts). Only 3 to 6 eV are needed to break the bonds of the DNA.
14. Symptoms of chronic exposure to uranium: pulmonary fibrosis, pneumoconiosis, blood changes with a fall in red blood cell count; reduced haemoglobin, erythrocytes and reticulocytes in peripheral blood; leucopenia.
15. (Symptoms continued) damage to nervous system; morphological changes (changes in form or structure) in the lungs, liver, spleen, intestines and other organs and tissues; reproductive disorders and developmental problems in the offspring embryo or fetus.
16. Another characteristic of DU in a metal fume, which we have not yet mentioned, is that it becomes almost impossible to dissolve in body fluid (ceramic). Insoluble compounds can be retained in tissues and organs for longer periods. Another problem is the small size of the particles. They can easily pass through the lung-blood barrier, the blood-brain barrier and the placenta. They also avoid being expelled from the body through sweat or urine. Nano particles of any substance (remember the debris we talked about) will cause irritation, which if it becomes chronic, can lead to granulomatosis, fibrosis and later, in some cases, cancer.
17. In granulomatosis, the tissue always contains minute particles encapsulated, or even within a cell of nucleus, surrounded by inflammatory tissue. These particles can be any inorganic debris.
18. Some compounds never seen before can form in the heat of the metal fume.
19. The symptoms of the DU exposed veterans are similar to the symptoms expressed by the atomic bomb survivors, and are different from veterans not deployed to Iraq in 1991.
20. We are leaving a long term hazard in Iraq, Afghanistan, Bosnia and Kosovo. It is both illegal and immoral.