MARCHING HOME

a conference on the Iraq war and its consequences for veterans

Rutgers University - October 5-7, 2007

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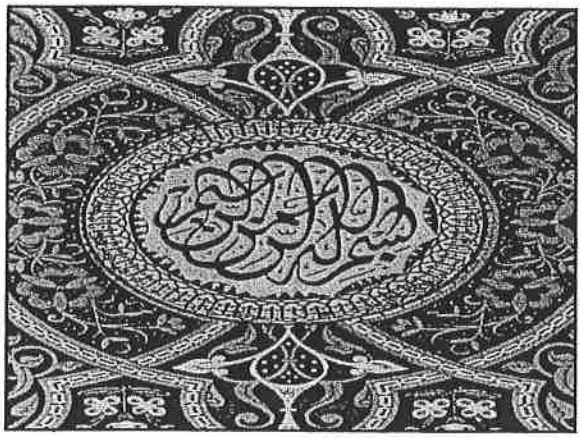
The schedule has events for veterans, students, community members and activists. Please consult the speakers page for brief biographies of the artists, speakers, and workshop coordinators.

EFFECTS OF DEPLETED URANIUM EXPOSURE with **Dr. Thomas Fasy**, Mt. Sinai School of Medicine, an expert on depleted uranium who has studied its effects inside Iraq.

DR. FASY PRESENTATION
10-6-07



URANIUM TOXICOLOGY

The IRAQ WAR and Its Consequences
RUTGERS University
October 6, 2007

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Toxic Effects of Inhalational Exposure to Uranium Oxide Dust Particles derived from Depleted Uranium Munitions

URANIUM HISTORY

1789 Klaproth discovers Uranium
1824 Gmelin describes Uranium toxicity
1888 Renal Toxicity of Uranium established
1896 Becquerel discovers radioactivity
1943 largescale Uranium Toxicology Research Program begins under Manhattan Project
1945 ^{235}U Fission bomb dropped on Hiroshima
1950s DU weapons research begins
1991 1st largescale use of DU weapons in battle

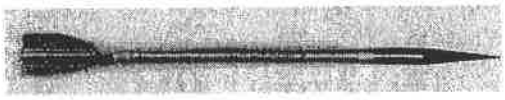
URANIUM TOXICITY

Before Becquerel discovered radioactivity in 1896, Uranium was known to be TOXIC.

URANIUM TOXICITY

- Radiation-mediated toxicity
- Chemically-mediated toxicity

- Uranium is a KIDNEY TOXIN
- Uranium is a NEUROTOXIN
- Uranium is an IMMUNOTOXIN
- Uranium is a MUTAGEN
- Uranium is a CARCINOGEN
- Uranium is a TERATOGEN



Following impact with hard targets, uranium metal undergoes combustion releasing large quantities of very small uranium oxide dust particles into the environment.

The dust formed from the combustion of Depleted Uranium Munitions

contains extremely high concentrations of uranium oxides

includes many sub-micron particles

is readily inhaled into and retained by the lungs

Compared to the uranium naturally present in the environment, DU dust contains uranium which is vastly more bioavailable that is, more readily internalized.

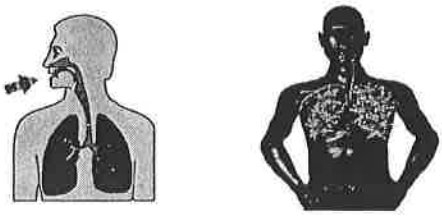
The route of exposure to a toxic substance is critically important in determining the extent of its toxic effects

e.g. an intravenous exposure to a toxic substance causes far more TOXICITY than a transdermal exposure.

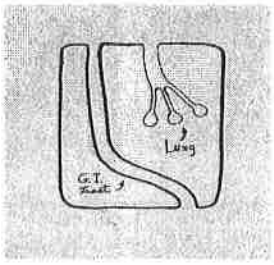
Routes of Exposure to Uranium Oxides

- Intravenous
- Inhalational
- Conjunctival
- Gastrointestinal
- Shrapnel
- Transdermal

Inhalational Exposure to Uranium Oxides is far more TOXIC than Exposure by Ingestion



Exposure to Uranium Oxides by Inhalation causes far more TOXICITY than Exposure by Ingestion



D.U. dust is dangerous because

- It is an extremely concentrated form of Uranium.
- Many of the dust particles are very small and readily inhaled.
- Uranium has multiple toxicities.

- Uranium is a KIDNEY TOXIN
- Uranium is a NEUROTOXIN
- Uranium is an IMMUNOTOXIN
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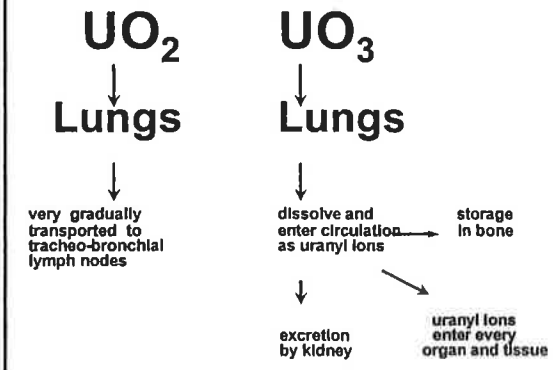
- Uranium is a CARCINOGEN
- Uranium is a TERATOGEN

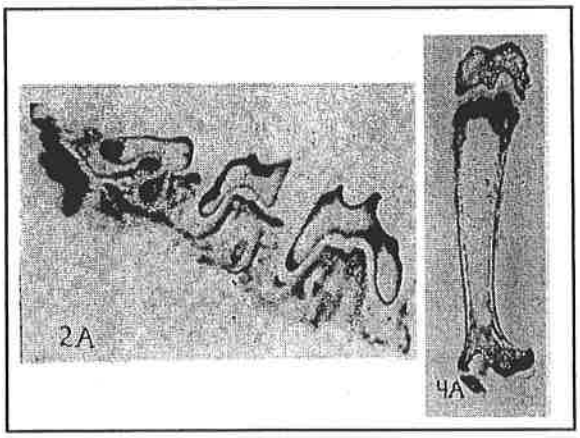
MAJOR URANIUM OXIDES

UO_2	U_3O_8	UO_3
very insoluble	slightly soluble	moderately soluble (smaller particles dissolve faster)
(tetravalent)		(hexavalent)



Organs of Uranium Oxide Uptake following Inhalational Exposure

- Lungs
- Kidneys
- Bones and Teeth
- Pulmonary Lymph Nodes



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Symptoms of Uranium Exposure

- •R espiratory
- •K idney
- •N eurologic
- •S kin
- •A llergic / Autoimmune
- •M iscellaneous

RENAL SYMPTOMS OF ACUTE URANIUM TOXICITY

- Occult or Gross Hematuria (Proteinuria)
- Polyuria
- Kidney Stones
- Flank pain
- Urethritis

Common Neurologic Symptoms

- visual disturbances
- migraine headaches, photophobia
- cognitive dysfunction
- short-term memory loss
- difficulty concentrating
- erectile dysfunction
- sensory neuropathy, numbness
- vertigo

ALLERGIC / AUTOIMMUNE SYMPTOMS

Cutaneous rash
(atopic dermatitis, chronic urticaria)

Angioedema
(localized swelling, often asymmetric)

Arthralgia

Myalgia

COMMON SYMPTOMS (cont'd)

Chronic Fatigue Syndrome

Sleep disorders

Mood disorders
(depression, irritability, anxiety, panic attacks)

Fibromyalgia Syndrome
(chronic widespread pain, allodynia, hyperalgesia)

Individuals with a likely exposure to uranium and symptoms consistent with uranium toxicity may be plausibly considered to suffer from uranium toxicity.

DU has a unique isotope signature consequently, DU can be traced.

The presence of DU in human urine or in tissues such as lung, lymph node, kidney, bone or teeth can be documented by Mass Spectroscopy.

See R.R.Parrish et al.:
Health Physics 90: 127-138, 2006 Feb.

Most studies documenting exposure to D.U. have analyzed human urine.

But it is also possible to analyze tissues and organs in which Uranium concentrates.

Organs of Uranium Oxide Uptake following Inhalational Exposure

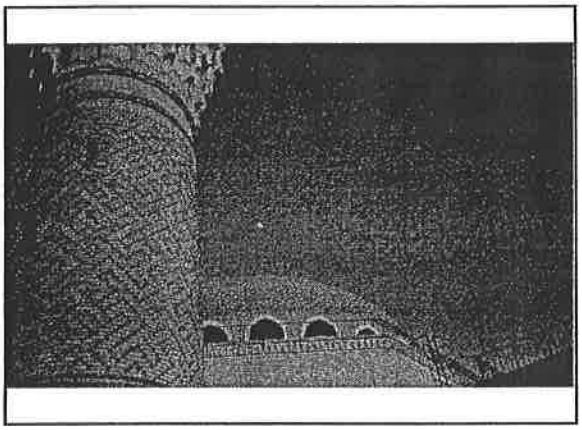
Lungs
Kidneys
Bones and Teeth
Pulmonary Lymph Nodes

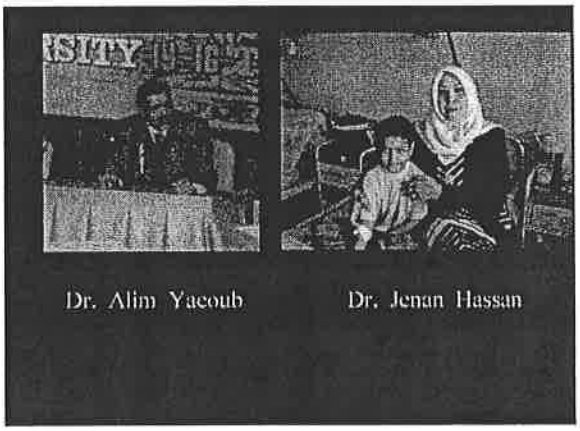
The primary teeth that children lose spontaneously between age 5 and 13 can serve as very useful samples to assess the child's exposure to D.U.

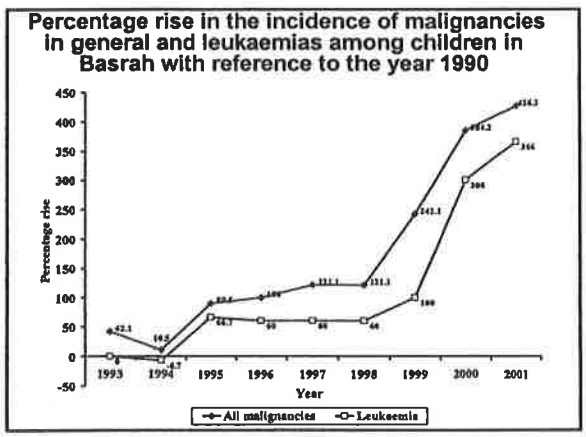
Children's teeth are readily collected and easily stored and transported.

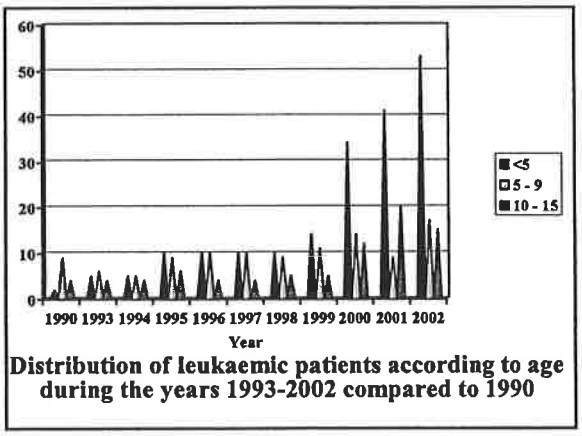
Measuring Uranium isotopes by mass spectrometry is expensive and not yet widely available.

Nonetheless, mass spectrometry studies are essential for confirming exposure to D.U. in scientific reports.

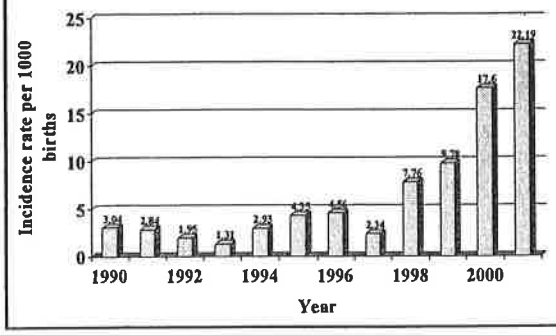








Incidence rates of congenital malformations in Basrah 1990 – 2001



Since 1996, the U.N. Sub-Commission on the Promotion and Protection of Human Rights has consistently ruled that Depleted Uranium weapons are incompatible with existing international humanitarian and human rights laws.

Uranium Oxide Dust

derived from DU weapons:

- is inherentl y toxic
- is int rinsically indiscriminate
- damages the env ironment
- persists on the bat tlefield
- is not confined to the battlefield
- causes superfluous injur y

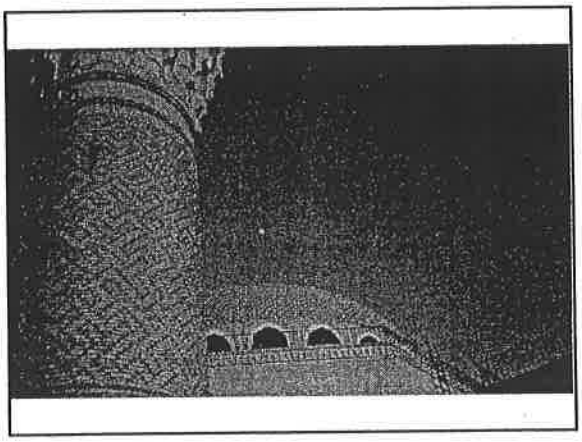
U.N. Sub-Commision on the Promotion and Protection of Human Rights:

Weapons Incompatible with existing International Law

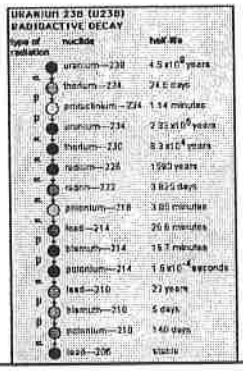
- DU weapons
- Cluster bombs
- Fuel-air bombs
- Chemical weapons
- Bacteriological weapons
- Biological weapons

Will DU dust in contaminated areas remain toxic for billions of years OR Will the toxicity of DU dust gradually dissipate?

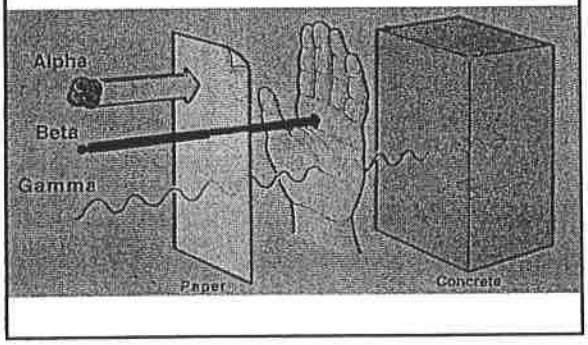
When DU dust is converted into a form that is no longer concentrated and no longer respirable, it becomes dramatically less toxic. This conversion process will take place by oxidation and by melting; but this process may take many years or decades.

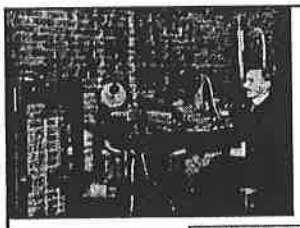


U-238 decay Chain



Alpha particles have very little ability to penetrate though matter





Ernest Rutherford 1898-99