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# History of Depleted Uranium Research at AFRRI

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## ***Disclaimer***

The views expressed in this presentation are those of the author and do not reflect the official policy or position of the Armed Forces Radiobiology Research Institute, the Uniformed Services University, the Department of Defense, or the United States Government.

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## ***History of AFRRI Embedded Fragment Research***

- Concern by wounded Gulf War veterans and medical personnel about health effects from embedded DU shrapnel (1991-92)
- Request from US Army Surgeon General for literature assessment of health risks from DU fragments (Feb 92)
- Provisional AFRRI recommendations (Mar 93)
  - No evidence that required changes in fragment removal policy
  - Suggested patient follow up and further research

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## ***AFRRI Technical Reports***

- **AFRRI TR 93-1:** Assessment of the Risks from Imbedded Fragments of Depleted Uranium (Eric G. Daxon and Jeffery H. Musk)
- **AFRRI TR 93-2:** Protocol for Monitoring Gulf War Veterans with Imbedded Fragments of Depleted Uranium (Eric G. Daxon)
- **AFRRI TR 93-3:** Depleted Uranium: Questions and Answers (Eric E. Kearsley and Eric G. Daxon)

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## ***AFRRI DU Research Mission***

*Are existing fragment removal guidelines  
appropriate for a metal with the unique  
chemical and radiological properties of DU?*

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# ***History of AFRRI Embedded Fragment Research***

- Pilot study for adequacy of rat model for studies of embedded DU (PM TMAS funding, Apr 94)  
**AFRRI TR 96-3:** Establishment of an Animal Model to Evaluate the Biological Effects of Intramuscularly Embedded Depleted Uranium Fragments.
- Study of redistribution and toxicity of embedded DU fragments (USAMRMC grant, Jan 95-Jan 99)  
First demonstration that DU fragments rapidly degrade after implantation.

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# ***History of AFRRI Embedded Fragment Research***

- AFRRI Workshop: 15 November 1996

*Health Effects of Embedded Depleted Uranium Fragments*  
**AFRRI Special Publication 98-3** (David R. Livengood)

This workshop brought together researchers from AFRRI, Lovelace Respiratory Research Institute (Inhalation Toxicology Research Institute), Baltimore VA Medical Center/University of Maryland, and McMaster University to discuss current investigations.

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## ***History of AFRRI Embedded Fragment Research***

- Embedded depleted uranium effects on the developing fetus (USAMRMC Women's Health Issues Program grant, Oct 97-Apr 01)
- Carcinogenicity and immunotoxicity of embedded DU and WA (USAMRMC grant, Nov 01-Nov 06)
- Preconceptional paternal exposure to embedded depleted uranium fragments: transmission of genetic damage to offspring (USAMRMC grant, Mar 04-Dec 05)
- Carcinogenicity of embedded tungsten alloys in the mouse (PRMRP grant, Feb 06-Feb 11)

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# ***History of AFRRRI Embedded Fragment Research***

- A number of projects investigating the effect of militarily-relevant metals, including DU, in a variety of model systems have recently funded.
  - Effect of militarily-relevant metals on muscle wound repair (USAMRMC Core Research Program, War Supplemental Funding)
  - Epigenetic mechanisms and internal contamination with militarily-relevant heavy metals *in vivo* (DMRDP)
  - Effect of militarily-relevant metals on macrophage function (DMRDP)
  - A field method to measure uranium in water (USU / HJF JOTT, Technology IP Development Award)

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# ***History of AFRRI Embedded Fragment Research***

- Over 45 peer-reviewed publications
- Multiple book chapters
- Book (Depleted uranium: properties, uses, and health consequences (Alexandra Miller, ed.))
- U.S. Patent #6,107,098 (John Kalinich)
- Representation on committees and input to organizations dealing with DU- and embedded fragment-related issues (DoD, DVA, WHO, NATO, etc)

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## ***Collaborators***

- Columbia University
- National Institutes of Health / National Cancer Institute
- University of Paris
- United Kingdom Medical Research Council
- French Institute of Nuclear Security
- Memorial Sloan Kettering Cancer Center
- New York University
- University of Maine
- Armed Forces Institute of Pathology
- Army Research Laboratory
- University of Maryland School of Medicine
- Baltimore Veterans Administration
- Uniformed Services University School of Medicine and  
Graduate School of Nursing

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# ***AFRRI***

***a***

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***Embedded Fragment Research***

