

National Institute of Allergy and Infectious Diseases (NIAID)

“Preparations for Mitigation and Treatment of Injuries from a Radiation Incident”

Dr. Andrea L. DiCarlo-Cohen

World events over the last two decades have highlighted the growing threat of terrorism and its many forms. Acts of radiological or nuclear terrorism could involve the use of stolen or improvised nuclear devices, attacks on nuclear power plants or reactors, the detonation of a dirty bomb, or the placement of radiation sources in public locations or in food or water supplies. In addition, natural disasters could result in the release of radiation into the environment. The U. S. Government must be prepared with drugs and treatments for administration to large numbers of civilian casualties injured in the wake of a radiation incident. Radiation injury is directly proportional to the dose absorbed by the body and the effects may appear within minutes or develop many years after exposure. Depending on the dose of whole-body exposure to external radiation, the effects can range from an increased risk of cancer years after exposure to more acute effects, including nausea and vomiting; significant hematopoietic and gastrointestinal injury, leading to immunosuppression, infection and hemorrhage; metabolic abnormalities; damage to the cardiovascular, pulmonary, and central nervous systems; and death.

The National Institute of Allergy and Infectious Diseases (NIAID), within the National Institutes of Health (NIH), has been charged by HHS with building and managing a program to develop products for the mitigation or treatment of radiation bodily injury resulting from a radiological/nuclear incident. A second emphasis of the program is to accelerate the development of methods and devices to triage large populations of individuals who may have been exposed to radiation (Biodosimetry).

In 2012, NIAID updated its Strategic Plan & Research Agenda for Countermeasures against Radiological and Nuclear Threats (<http://www.niaid.nih.gov/topics/radnuc/Documents/radnucprogressreport.pdf>). This update describes a multifaceted program promoting the development of biodosimetry methods for and medical countermeasures (MCM) against radiological and nuclear threats. Since program inception, NIAID has sponsored early-stage research, product development programs on drugs to treat injuries including hematopoietic, gastrointestinal, pulmonary, cutaneous, and combined injury, and radionuclide decorporation. This has been accomplished by coordination with HHS sister agencies (FDA, CDC, BARDA) and other government agencies, including the Department of Defense (AFRRI, DTRA, DARPA, JPEO) and the National Aeronautics and Space Administration (NASA).

NIAID's involvement with NASA and the National Space Biomedical Research Institute dates back to 2006, when leaders of NIAID, NASA and NSBRI initiated discussion concerning areas of common interest between the programs. In June, 2007, the NIAID signed a Memorandum of Understanding (MOU) with the NSBRI.

It is the desire of the NIAID to work with NASA, in a similar way, to promote development of scientific, technical, and academic relations, foster collaboration and the exchange of scientific information; and seek to coordinate research initiatives in areas of mutual interest. Defined areas of mutual interest might include prodromal syndrome mechanisms and chronic metabolic/oxidative stress resulting from acute exposure to ionizing radiation; effects of radiation exposure on the skin; development of animal

models, which closely resemble human responses, for testing countermeasures to radiation exposure; development of biodosimetric techniques and devices; late-effects resulting from ionizing radiation that are triggered by acute exposure effects; radiation effects on the central nervous system and development of behavioral test models, and joint and/or coordinated education and outreach. To this end, NIAID is currently seeking a partnership with NASA, and has already implemented transparency between the two programs through programmatic teleconferences, and invitations to NIAID and NASA staff to agency-sponsored scientific meetings.