Crisis in Context: Minding the Gaps in Medical Preparedness for a Rad/Nuke Incident

The RITN is a cooperative effort of the National Marrow Donor Program® (NMDP)/Be The Match and the American Society for Blood and Marrow Transplantation (ASBMT).

Provided by:

RITN Key Partners:

Supported by:

This project is supported by a funding from the National Marrow Donor Program and the Department of the Navy; Office of Naval Research Grant #N00014-17-1-2388 to the NMDP.
Workshop Overview

Title: Crisis in Context: Minding the Gaps in Medical Preparedness for a Rad/Nuke Incident

Workshop Description:
The Radiation Injury Treatment Network seeks to increase the understanding of and preparedness for the tremendous medical, environmental, and psychological consequences of a mass casualty radiological/nuclear incident for healthcare professionals. The 2019 RITN workshop will highlight recent developments in resource-constrained environments: (1) optimizing ARS initial assessment and triage, (2) ensuring the availability and appropriate use of medical and psycho-social supportive care, (3) disseminating the latest research in radiation-specific medical countermeasures, (4) applying technology as a force multiplier for care and education, and (5) enhancing collaboration among burn surgeons and RITN professionals. Additionally, the workshop will encourage open sharing of lessons learned from past efforts.

Target Audience:
Physicians and other healthcare providers, support staff, hospital and hospital system administrators, emergency managers, research scientists, and appropriate federal agency staff involved in radiation response and treatment of patients with radiation-induced bone marrow injury are invited.

Learning Objectives:
At the completion of this workshop, attendees will be able to:
1. Explain the challenges and new developments concerning patient transport, assessment and triage in resource constrained environments.
2. Discuss progress in research on radiation-specific countermeasures, individual bio-dosimetry, and supportive care during mass casualty radiation emergencies.
3. Describe the importance and key challenges of providing medical and psycho-social supportive care following a Rad/Nuke incident.
4. Understand the emergency response role of RITN hospitals to a Rad/Nuke incident and implement appropriate utilization of resources at these hospitals.
5. Describe methods for disseminating radiation expertise across the spectrum of health care and allied health workers.
6. Describe key lessons learned from 20 years of preparedness activities.

National Marrow Donor Program (NMDP):
The NMDP facilitates unrelated marrow, PBSC and cord blood transplants. The NMDP also provides research, medical education and patient advocacy to extend and improve lives through innovations in transplantation.

Non-Endorsement of Products:
The opinions expressed in this workshop are those of the participating faculty. Approval of this workshop does not imply endorsement by the workshop providers or ACCME and ANCC of any commercial products discussed.

Speaker/Planner Disclosures
It is the policy of the providers of this program to ensure balance, independence, objectivity, scientific rigor and content that is free of commercial bias and outside the control of persons or organizations with an economic interest in influencing the content in all of its sponsored educational activities. Therefore, all planning committee members and speakers are required to disclose their relevant financial relationships and any or apparent conflicts of interest to the content of their presentations have been identified and resolved. The audience shall be informed of all relevant financial relationships, including the source of any commercial support for this forum.
# RITN Workshop Planning Committee

**Cullen Case, Jr.**  
Workshop Committee Chair  
RITN Program Manager | NMDP/BTM

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td>Clinton Andersen</td>
<td>University of Colorado Hospital</td>
</tr>
<tr>
<td>Wendy Arinder</td>
<td>University of Mississippi Medical Center</td>
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<tr>
<td>Judith Bader, MD</td>
<td>US DHHS/ASPR/BARDA</td>
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<tr>
<td>Nicholas Dainiak, MD</td>
<td>Yale University School of Medicine</td>
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<tr>
<td>Patricia Hankins</td>
<td>Children’s Hospital of Philadelphia</td>
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<tr>
<td>Joshua Hickman</td>
<td>Dartmouth-Hitchcock Medical Center</td>
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<tr>
<td>Mary Homer, PhD</td>
<td>US DHHS/ASPR/BARDA</td>
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<tr>
<td>Merle Kolk</td>
<td>UH Seidman Cancer Center</td>
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<tr>
<td>Kenneth Nollet, MD</td>
<td>Fukushima Medical University</td>
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<tr>
<td>Lewis Rubinson, MD</td>
<td>University of Maryland Medical Center</td>
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<tr>
<td>Jill Tierney</td>
<td>Dana-Farber Center Institute</td>
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<tr>
<td>Mark VanDyke</td>
<td>Spectrum Health Systems</td>
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<tr>
<td>Jen Aldrich, MA</td>
<td>RITN Program Coordinator</td>
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<tr>
<td>Lynne Wathen, PhD</td>
<td>US DHHS/ASPR/BARDA</td>
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<tr>
<td>Stephanie Williams, MD</td>
<td>Spectrum Health Systems</td>
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</table>
RITN Executive Committee

Nelson Chao, MD  
RITN Executive Committee Co-Chair  
Duke University

Dennis Confer, MD  
RITN Executive Committee Co-Chair  
National Marrow Donor Program/Be The Match

Cullen Case, Jr.  
RITN Program Manager  
National Marrow Donor Program/Be The Match

John Chute, MD  
University of California, Los Angeles

Angie Dahl  
American Society for Transplantation and Cellular Therapy (ASTCT)

Ann Jakubowski, MD  
RITN Medical Director  
Memorial Sloan Kettering Cancer Center

John Koerner  
U.S. Department of Health and Human Services, Assistant Secretary for Preparedness and Response

Samuel Shartar, RN, CEN  
Emory University

David Weinstock, MD  
Dana-Farber Cancer Institute

Julie Wilhauk, DNP  
American Society for Transplantation and Cellular Therapy (ASTCT)
## Day 1 | Salons A & B

### The Situation | Session Chair: Cullen Case
---|---
**11:00-1:00** | Registration Opens - Lunch On Own

### The Situation

<table>
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<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker/Location</th>
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<tbody>
<tr>
<td><strong>12:00-12:10</strong></td>
<td>Welcome</td>
<td>Cullen Case</td>
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<tr>
<td><strong>12:40-1:00</strong></td>
<td>Higher yield IND scenarios impact on response planning</td>
<td>John Crapo (NNSA)</td>
</tr>
</tbody>
</table>
| **1:00-2:30** | Integrated Practice Panel: how trauma, burn, blood supply and hematology/oncology teams will collaborate to care for complex ARS cases | Moderator: Nelson Chao (Duke)    
Trauma: David Dries (Univ. MN)  
Burn: Colleen Ryan (ABA, Harvard)  
Hem/Onc: David Weinstock (Dana-Farber, Harvard)  
Blood supply: Jed Gorlin (HCMC) |

### The Future | Session Chair: Dennis Confer
---|---
**2:30-3:00** | Break                                                                        |

### The Future

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td><strong>3:00-3:15</strong></td>
<td>Implementing Deployable Radiation Response Teams in an RDHRS</td>
<td>Frank Rutar (Nebraska Medicine)</td>
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<tr>
<td><strong>3:15-3:30</strong></td>
<td>Be The Match BioBank: An Expedited Pathway to Transplant and Improved Service for Recipients</td>
<td>Jeff Wren (BTM)</td>
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<tr>
<td><strong>3:30-3:45</strong></td>
<td>Optimizing ARS Initial Assessment and Triage</td>
<td>William Blakely (AFRRI)</td>
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<tr>
<td><strong>3:45-4:00</strong></td>
<td>Future of Dosimetry: What Does the Pipeline Hold?</td>
<td>Lynne Wathen (BARDA)</td>
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<tr>
<td><strong>4:00-4:15</strong></td>
<td>Practical Implementation of Crisis Standards of Care to Increase Logistical Capacity</td>
<td>Angela Leek (Iowa Dept. PH)</td>
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<tr>
<td><strong>4:15-4:30</strong></td>
<td>Technology as a Force Multiplier: Call Center Management</td>
<td>Kevin Schlosser (Avera)</td>
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<tr>
<td><strong>4:30-4:45</strong></td>
<td>Technology as a Force Multiplier: Single Practitioner</td>
<td>Christian Otto (MSKCC)</td>
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<tr>
<td><strong>4:45-5:00</strong></td>
<td>Conclusion of Day 1</td>
<td>Cullen Case</td>
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<tr>
<td><strong>5:00-7:00</strong></td>
<td><strong>Networking Reception</strong> - Cash Bar and Hors d'oeuvres</td>
<td>Monument Room, 14th Floor</td>
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<tr>
<td>Time</td>
<td>Session</td>
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<tr>
<td>8:00-9:00</td>
<td>Breakfast – in Hallway</td>
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<tr>
<td>9:00-12:00</td>
<td>**Track 1: Research Updates</td>
<td>Salon A</td>
</tr>
<tr>
<td><strong>Topic &amp; Session Chair:</strong> Ken Nollet</td>
<td><strong>Topic &amp; Session Chair:</strong> Mark Van Dyke</td>
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<tr>
<td>9:00-9:15</td>
<td>Andrea DiCarlo: An Overview of Promising Radiation Medical Countermeasures Funded by the NIAID</td>
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<tr>
<td>9:15-9:30</td>
<td>Michael Abend: Diagnostic triage after a mass radiation exposure event using early gene expression changes</td>
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<tr>
<td>9:30-9:45</td>
<td>Gregory Holmes-Hampton: BBT-059, a novel prophylactic radiation countermeasure as well as a mitigator for acute radiation injury</td>
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<tr>
<td>9:45-10:00</td>
<td>Neel Sharma: Delayed effects of acute radiation exposure in a hematopoietic acute radiation syndrome mouse model</td>
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<tr>
<td>10:00-10:15</td>
<td>Racheli Ofir: Prophylactic administration of placenta-derived PLX-R18 stromal cells mitigates H-ARS death and promotes BM and peripheral blood lineage recovery in a murine model</td>
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<td>10:15-10:30</td>
<td>Paul Okunieff: Circulating Cell-Free DNA (cfDNA) Correlates with Integral Dose and Identifies Subjects Who Develop Gastrointestinal Toxicity</td>
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<td><strong>10:30-11:00</strong></td>
<td><strong>Break</strong></td>
<td><strong>11:00-11:22</strong></td>
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<tr>
<td><strong>11:00-11:15</strong></td>
<td><strong>Steven G. Swarts:</strong> Fibroblast growth factors as mitigation agents of acute gastrointestinal syndrome</td>
<td><strong>11:15-11:30</strong></td>
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<tr>
<td><strong>11:15-11:30</strong></td>
<td><strong>Shawen Hu:</strong> Acute Radiation Syndrome Modeling and Application in Human Space Exploration and Rad/Nuclear Incidents</td>
<td><strong>11:30-11:45</strong></td>
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<td><strong>12:00-12:15</strong></td>
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<tr>
<td><strong>12:00-12:30</strong></td>
<td><strong>Stacey Arnesen:</strong> Resources for Disaster Research and Medical Management of Radiation Incidents</td>
<td><strong>12:15-12:30</strong></td>
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<tr>
<td>**12:30-1:30 – Lunch</td>
<td>Salons CDE**</td>
<td>**12:30-1:30 – Lunch</td>
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## Crisis in Context: Minding the gaps in medical preparedness for a Rad/Nuke Incident

**July 30-31, 2019 | DoubleTree, Crystal City, VA**

### Rejoin as One Group | Salons A & B

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<tr>
<th>Industry Sessions</th>
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<tr>
<td>1:30-1:40</td>
<td>Point-of-Care Biodosimeter for Triage Following a Nuclear Event (SRI): Kathryn Todd</td>
</tr>
<tr>
<td>1:40-1:50</td>
<td>Sargramostim Improves Survival at Day 60 in a Non-Human Primate, Hematopoietic Acute Radiation Syndrome Model When Administered 48h after High Dose Total Body Irradiation (PartnerTx): Debasish Roychowdhury</td>
</tr>
<tr>
<td>1:50-2:00</td>
<td>REDI-Dx: High Throughput Biodosimetry Test System (DxTerity): Bob Terbrueggen</td>
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### Education | Session Chair: Ann Jakubowski

<table>
<thead>
<tr>
<th>2:00-2:20</th>
<th>Generations to Guide and Borders to Bridge: The Evolution of Radiation (Disaster) Education in Japan</th>
<th>Kenneth Nollet (FMU)</th>
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<tbody>
<tr>
<td>2:20-2:40</td>
<td>The role of Hiroshima University as the new radiation/nuclear emergency medical support center for the next disaster.</td>
<td>Professor Nobuyuki Hirohashi (Hiroshima University)</td>
</tr>
<tr>
<td>2:40-3:00</td>
<td>If You Teach Them, They Will Come: A REAC/TS Survey of Emergency Response Personnel</td>
<td>Angie Bowen (REAC/TS)</td>
</tr>
<tr>
<td>3:00-3:20</td>
<td>The Medical and Nursing Workforce Radiation Knowledge and Attitude Assessment - Initial Findings</td>
<td>Tener Veenema (JHU)</td>
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<tr>
<td>3:20-3:40</td>
<td>Break</td>
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</table>

### Community Resiliency | Session Chair: Nelson Chao

<table>
<thead>
<tr>
<th>3:40-4:00</th>
<th>Unexpected Public Responses to Disasters (Flint &amp; Gulf Coasts)</th>
<th>Capt. Renee Funk (CDC)</th>
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<tbody>
<tr>
<td>4:00-4:20</td>
<td>When You Become the Radiation Disaster Expert, Like It or Not!</td>
<td>Jessica Wieder (EPA)</td>
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<tr>
<td>4:20-4:50</td>
<td>The Value of Rebuilding a Resilient Community</td>
<td>Dan Dodgen (DHHS-ASPR)</td>
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<tr>
<td>4:50-5:00</td>
<td>Recap, Summary and Conclusion</td>
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**www.RITN.net**

7/29/2019
Keynote: The ASPR Vision: Readiness for and Response to 21st Century Threats

Jonathan Greene
Director, Emergency Management and Medical Operations
U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response

The United States Government (USG) and partners have made significant progress in preparing the Nation for response to a nuclear detonation and have charted a course for future development and improvement. Since 2006, the Radiation Injury Treatment Network (RITN) has been an important partner with ASPR in solving complex problems associated with managing patients for this response and has been integrated into the National response. RITN’s work with ASPR at the strategic level provides critical knowledge and thinking in development of medical countermeasures through the Public Health Emergency Medical Countermeasures Enterprise (PHEMCE), the Biomedical Advanced Research and Development Authority (BARDA), and the National Preparedness and Response Science Board (NPRSB). These collaborations have Dr. Roychowdhury focused on triage challenges, biodosimetry and diagnostics, patient transport, and patient care and medical management guidance for use across the Nation (Radiation Emergency Medical Management: REMM – https://www.remm.nlm.gov/).

Mr. Greene’s keynote address will examine the role of ASPR as coordinator of Emergency Support Function (ESF) #8 – “Public Health and Medical Services” under the National Response Framework and how ASPR has evolved under recent strategic leadership with the primary goals of saving lives and protecting Americans from 21st century health threats. The roles and current capabilities of various HHS agencies will be discussed as they may apply to medical response to nuclear detonation. Additionally, the roles of the ASPR-supported HPP coalitions and the Regional Disaster Health Response System (RDHRS) will be discussed as constructs that apply a systematic approach to leveraging and enhancing day-to-day capabilities to better respond to catastrophic incidents. Just as in the past, filling gaps in medical care for nuclear detonations will require collaboration through the entirety of the US public health and medical infrastructures at all levels from health care facilities, localities, and States through to organizations, networks, the Federal government and we seek to establish a trajectory for how this may be accomplished. The goal is to articulate ASPR’s overall strategic vision and to lay groundwork for continuing collaboration to close existing gaps in the medical response to nuclear detonation.
Higher Yield IND Scenarios Impact on Response Planning

John Crapo, ScM, MS
National Nuclear Security Administration

A hypothesized scenario in which a 10-kiloton improvised nuclear device is detonated in a major metropolitan center at or near ground level has served as the foundation for homeland security preparedness activities at the local, territorial, tribal, State and Federal levels for the past fifteen years. Planning efforts and capability development/sustainment have been based on the projected consequences of such a scenario. The purpose of this presentation is to highlight differences in projected consequences between this planning scenario and scenarios involving higher yield devices.

Integrated Practice Panel: How Trauma, Burn, Blood Supply and Hematology/Oncology Teams Will Collaborate to Care for Complex ARS Cases

Moderator: Nelson Chao, MD: Duke University
Panel: David Dries, MD: University of Minnesota
Colleen Ryan, MD: Harvard Medical School
David Weinstock, MD: Dana-Farber Cancer Institute, Harvard Medical School
Jed Gorlin, MD: University of Minnesota, HCMC

In the aftermath of a nuclear detonation, coordination of patients with combined injuries will be necessary if there is to be hope for survival of some of the patients. The interplay between radiation, burns and wounds make this care more complicated. Pure radiation effects can be managed by hematologists/oncologists, burns are managed by specialized burn teams and wounds are cared for by surgical colleagues. Commonly, there is little overlap in the routine care of such patients. The purpose of this session is to begin to address needs that could be unique in this setting. For example, is there a threshold for which care would be futile? At what level would surgery be an option for irradiated patients, and would these patients heal? Is there a good way to coordinate care among these varied subspecialties?
Implementing Deployable Radiation Response Teams in an RDHRS

Frank Rutar, MSc
University of Nebraska Medical Center

In a disaster, thousands of Americans may require immediate medical specialty care, surpassing the care available in the community. The U.S. Department of Health and Human Services’ Office of the Assistant Secretary for Preparedness and Response (ASPR) has awarded two $3 million grants to demonstrate how a new Regional Disaster Health Response System could meet these needs, including trauma, burn or other specialty care, during a national emergency and save more lives. The Regional Disaster Health Response System will build on local health care coalitions and trauma centers, creating a tiered system of disaster care. The system will integrate local medical response capabilities with emergency medical services, burn centers, pediatric hospitals, labs, and outpatient services, to meet the overwhelming health care needs created by disasters. As part of this effort, Nebraska Medicine is developing a deployable Radiation Response Teams to respond to radiation-related incidents. In such an event, the team will provide expertise via tele-health and/or by sending individuals to the location.
Be The Match BioBank: An Expedited Pathway to Transplant and Improved Service for Recipients

Jeff Wren, MBA
Be The Match

Every day National Marrow Donor Program/Be The Match facilitates hematopoietic stem cell transplants using bone marrow, mobilized peripheral blood, or umbilical cord blood to treat patients with life-threatening blood cancers and other serious blood or marrow disorders. Often transplant is the only potential cure for these patients. The healthy hematopoietic stem cells for these transplants are provided by volunteer donors from the Be The Match Registry®.

Traditionally, adult donor hematopoietic stem cells are collected after a suitable donor is identified for a specific patient. This results in a lengthy time to transplant, with a median of 75 days from the time a physician starts a donor search to when the selected donor is ready to donate. This delay is detrimental to patients and some even lose the option of transplant because healthy hematopoietic stem cells cannot be provided fast enough.

To address the need for improving transplant timelines for patients, NMDP/Be The Match has begun development of the Be The Match BioBank (BioBank), which will store pre-collected and cryopreserved healthy bone marrow from donors who display the most commonly sought-after donor characteristics. Once added to inventory, BioBank marrow will be immediately available to any patient searching for a transplant. This will reduce the delay currently experienced when physicians search for a donor to provide fresh marrow for transplant.

If a radiological incident occurred in the U.S., casualties with radiation exposure who develop hematopoietic syndrome will require transplant as part of their treatment. BioBank marrow will be made readily available and distributed through already established channels to provide timely and predictable delivery to those who would require transplant.
Optimizing ARS Initial Assessment and Triage

William F. Blakely, PhD, MSc
Armed Forces Radiobiology Research Institute/Uniformed Services University of the Health Sciences

Early emergency response for a radiological accident involves a multiple-parameter biodosimetry diagnostic strategy, since no single assay is sufficient to address all potential radiation scenarios including partial-body exposures. The accepted generic multiple-parameter approach includes: measuring for radioactivity associated with the exposed individual; observing and recording prodromal signs and symptoms; obtaining serial complete blood counts with white blood cell differential; sampling blood for the chromosome-aberration cytogenetic bioassay using the “gold standard” dicentric assay (or other suitable cytogenetic chromosome aberration assay) for dose assessment; bioassay sampling from various sources (i.e., urine, fecal, blood, nasal, oral, etc.), if appropriate, to determine radionuclide contamination; biosampling blood for measurement of proteomic and gene expression radiation responsive biomarkers; biosampling nail clippings for measurement of free radicals by electron paramagnetic resonance (EPR) for dose assessment; and using other available dosimetry approaches. Life-saving procedures in the medical management of the radiation accident patient take precedent to biodosimetry assessments. Radioactivity assessment and decontamination procedures are then typically followed by the generic early-phase biodosimetry procedures as described above.

In the case of Rad/Nuke incident, a diagnostic triage system should be setup where rapid sentinel biodosimetry tests are used to prioritize casualties for subsequent confirmatory radiation injury and dose diagnostic tests to develop guidance for medical management treatment decisions. Readiness for a potential Rad/Nuke incident dictate that local resources need to have prior established and exercised medical-triage competency including radiation injury and dose assessment capability. Portable blood cell counters will soon be available in the U.S. to obtain a complete CBC with differential. Additional available resources include smart phone apps (i.e., mobile First-responder Radiological Assessment Triage or mFRAT, mobile REMM, H-module) and worksheets (i.e., AFRRI’s Biodosimetry Worksheet, Exposure and Symptom Triage (EAST) tool) that enables first-responders to estimate: a) radiation dose based on onset of vomiting, a constellation of clinical signs and symptoms, lymphocyte counts and depletion, and dose based-on location), and b) risk of hematopoietic acute radiation syndrome severity. Note that this suite of software tools was used by multiple NATO Biodosimetry Teams to effectively triage radiological casualties in an exercise, confirming this approach using real-case radiation accident histories. Research efforts to provide early assessment of partial-body exposures are needed, since this is critical for early-phase medical management treatment decisions.

"The views expressed do not necessarily represent the Armed Forces Radiobiology Research Institute, the Uniformed Services University of the Health Sciences, or the Department of Defense."
Future of Disimetry: What Does the Pipeline Hold?

Lynne Wathen, PhD
U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response, Biomedical Advanced Research and Development Authority

In the aftermath of an improvised nuclear device (IND) detonation or a nuclear accident, having rapid and accurate measurements of absorbed doses in exposed persons can inform life-saving medical decisions. Effective decision-making may require triage and definitive radiation biodosimetry tests to measure absorbed dose. A qualitative point-of-care test is designed to quickly determine whether an individual has absorbed a minimum threshold radiation dose and needs further medical care. Quantitative high-throughput laboratory-based tests that estimate the actual absorbed dose a person has received to enable more accurate clinical management are under development.

Four promising biodosimetry tests are currently funded by BARDA to identify the most relevant proteomic, genomic, and cytological radiation biomarkers and validate their utility using animal models and humans. Algorithms integrate multiple individual biomarker results into a single test result. The point-of-care test in development uses immune-capture technology with multiple test lines on a nitrocellulose lateral flow device with up-converting phosphor signal output. This test uses a capillary (finger stick) blood sample to detect host protein biomarker levels that increase following ionizing radiation exposure. Of the three high-throughput tests under development, two use changes in gene expression patterns to determine the extent of radiation damage, and the third measures chromosomal damage and micronucleus generation to predict absorbed dose. Second generation biodosimetry tests may include less complex biomarker panels on commercially available instrumentation that uses more advanced fluorescence and imaging technology or uses innovative DNA damage detection to provide individualized absorbed dose results. The BARDA Biodosimetry Program’s continued success will help the United States prepare for and respond more effectively to a nuclear incident.

Practical Implementation of Crisis Standards of Care to Increase Logistical Capacity

Angela Leek, MS
Iowa Department of Public Health

A large-scale radiation incident such as a nuclear detonation presents large numbers of individuals needing medical care coupled with the potential for severely constrained resource conditions that may require implementation of crisis standards of care. Response organizations and the medical community will need to implement triage and other patient assessment techniques with the added complexity of dose assessment for populations with no other apparent health impacts, as well as to determine appropriate treatment for those with combined injuries. Pre-planning to consider methods to efficiently handle these crisis standards of care considerations is important to ensure that critical resources are not further constrained or overwhelmed in an incident. This presentation will explore critical questions and planning considerations related to early and rapid assessment of radiation dose to effectively manage medical triage and care under crisis situations.
Technology as a Force Multiplier: Call Center Management

Kevin Schlosser
Avera McKennan Hospital

Through the use of eCARE, Avera is working to enhance the capability of bringing E.D. Physicians to the scene, to work through the triage process, offer additional medical assessments on patients involved in various Multi-casualty Incidents (MCI’s); whether it be Motor Vehicle Crashes, Aircraft incidents, Haz-Mat incidents, or other MCI’s. Through its expanded eCARE program (which includes: eICS, ePharmacy, eLTCC, eBehavioral Health, eCorrections, eSchool, and eEmergency); Avera eCARE is now expanding and working with EMS agencies across South Dakota to bring advanced care to many rural areas that don’t have the ability to provide Physicians to the out-of-hospital setting. In many smaller communities and rural settings, it doesn’t make sense to take a very limited and finite number of Physicians and bring them to an MCI. eCARE brings the Physician to the scene using a camera that connects the Physician to the patient or EMS Crew to help begin the process of triaging patients and providing additional medical assessments; many times in areas that have never had an event to this scope or magnitude.

Technology as a Force Multiplier-Single Practitioner

Christian Otto, MD, MMSc
Memorial Sloan Kettering Cancer Center

Virtual care and digital technologies are force multipliers that broaden the care capabilities of individual healthcare practitioners through expert consultation. Dr. Otto will illustrate how virtual technologies have extended individual practitioner capabilities from work he has conducted on Mt. Everest, in Antarctica, and to the International Space Station. Furthermore, Dr. Otto will show how virtual technologies are extending the care capabilities of Memorial Sloan Kettering, a specialty Cancer Care Center, and discuss the importance of a virtual care hub to coordinate delivery of services to the onsite provider. These examples will underscore the ability of virtual care technology to deliver nuclear and radiation accident medical expertise to the onsite healthcare providers to aid in the diagnosis, triage and treatment of contaminated radiation victims with acute radiological injury.
RESEARCH UPDATES

An Overview of Promising Radiation Medical Countermeasures Funded by the NIAID

Andrea DiCarlo, MSc, PhD
National Institutes of Health, National Institute of Allergy and Infectious Diseases

With the goal to accelerate discovery and development of biodosimetry tools and medical countermeasures (MCMs) for use during a radiation/nuclear incident, the NIAID Radiation and Nuclear Countermeasures Program (RNCP) has built a portfolio of basic, translational and pre-clinical research awards. RNCP funding supports approaches to treat acute radiation syndrome (ARS) and delayed effects of acute radiation exposure (DEARE), including growth factors, cellular therapies, fusion proteins and small molecules. In addition, the RNCP has funded discovery and validation of biomarkers/bioassays for assessment of exposure to inform medical intervention, as well as biomarkers of tissue/organ injury to predict outcomes of radiation exposure. The Centers for Medical Countermeasures against Radiation Consortium (CMCRC) and cooperative grants sustain the drug development pipeline, by orchestrating basic research to understand the pathology of radiation injuries and mechanisms of action of promising treatments.

Contracts and interagency agreements allow for efficacy screening and animal model development encompassing research in mouse, minipig and NHPs; including hematopoietic, and gastrointestinal ARS, DEARE and combined injuries. A Product Development Support Services contract supports advanced development, through non-clinical studies and investigational new drug application-enabling activities. Using technology readiness levels, the RNCP assesses the maturity of products under study to advise on further development. The program focuses on guiding MCMs testing along the US Food and Drug Administration “Animal Rule” pathway, designed to enable approval or product licensure of drugs or biologics when clinical efficacy studies are unethical or unfeasible. Together with government partners, the RNCP seeks to accelerate the development of MCMs and biodosimetry devices for inclusion in the Strategic National Stockpile, with an emphasis on repurposing drugs that are being pursued for other clinical indications.
Diagnostic triage after a mass radiation exposure event using early gene expression changes

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Radiologic exposure scenarios of a large number of people require a rapid and high through-put method to identify the unexposed, and low and high exposed individuals. Those with high exposure (give a dose range here) will develop severe hematological acute radiation syndrome (HARS), requiring hospitalization and treatment. Previously we identified a set of genes that discriminated these clinically relevant groups. Here we examined the utility of gene expression changes to classify 1000 split blood samples into unexposed, 0.5 and 5 Gy. These radiation doses correspond to HARS severity scores H0, H1 and H2-4, respectively, with the latter indicating likely hospitalization. In addition, we assessed the ability to rapidly process these samples. Peripheral blood samples from two healthy donors were X-irradiated in vitro and incubated at 37°C for 24 hours. The 1000 samples were generated with laboratory personnel blinded to the radiation dose. Changes in gene expression of FDXR, DDB2, POU2AF1 and WNT3 were examined with qRT-PCR and 18S rRNA was a positive control. Targeted next generation sequencing (TREX, Illumina) was used on all samples for the same four genes. Agreement using both methods was almost 78%. All 1,000 samples were processed within 30 hours. Classifying the HARS severity categories corresponding to the irradiation dose had an overall agreement ranging between 90-97%. Depending on the endpoint either a combination of all genes or FDXR alone (H0 HARS or unexposed) provided the best classification. Using this optimized automated methodology, we assessed 100 times more samples about three times faster compared to standard cytogenetic studies. We showed that a small set of genes, rather than a complex constellation of genes, provided robust positive (97%) and negative (97%) predictive values for doses of zero, 0.5 and 5 Gy suggesting the utility of identifying those irradiated persons in need of hospitalization and, as importantly, those who may not need clinical care.
BBT-059, a novel prophylactic radiation countermeasure as well as a mitigator for acute radiation injury

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Background: BBT-059, developed by Bolder Biotechnology (BBT), is a long acting PEGylated IL-11 analog created using site-specific PEGylation technology. A single branched 40 kDa-PEG was added to the C-terminus of the protein at a cysteine residue (PEG-*179C). BBT-059 is being developed as a potential treatment for thrombocytopenia, myelodysplastic syndromes, bleeding disorders and acute kidney injury. In this study, we demonstrate, for the first time, that BBT-059 is effective as a radiation countermeasure in CD2F1 mice exposed to total body radiation (TBI). Method: A single dose (0.3 mg/kg) of BBT-059 was tested in mice, injected at several time points from 24 h pre- to 24 h post-TBI. CBC, cytokines, bone marrow progenitor cells and gastrointestinal crypt cells were evaluated in irradiated mice. Results: The drug shows significantly higher efficacy in mice compared to control administered either pre- or post-TBI. A DRF of 1.3 was calculated for BBT-059 compared to saline.

There was significantly accelerated recovery from radiation-induced peripheral blood cytopenia in animals treated with BBT-059 prior to irradiation. The drug also increased bone marrow cellularity and megakaryocytes and multi-lineage hematopoietic recovery. In addition, BBT-059 inhibited the induction of radiation-induced hematopoietic biomarkers, thrombopoietin, and erythropoietin and Flt-3 ligand. A single dose of the drug was found to protect jejunal crypt cells, modulated serum amylase A, citrulline and procalcitonin levels in serum to safeguard the gastrointestinal from radiation injury. Conclusion: Significant survival benefit with BBT-059 suggests that the drug could be developed as a novel radiation countermeasure for soldiers and civilians, which can be used either before or after radiation in the aftermath of a radiation event.
Delayed effects of acute radiation exposure in a hematopoietic acute radiation syndrome mouse model

Neel Sharma, PhD
Armed Forces Radiobiology Research Institute

Introduction: BBT-059, developed by Bolder Biotechnology (BBT), is a long acting PEGylated IL-11 analog. Previously, we demonstrated that BBT-059 is effective as a radiation countermeasure in CD2F1 male mice when a single dose was administered either at -24 h pre- or 24 h post-total body irradiation (TBI). In this study, we analyzed the delayed effects up to 1 year post-TBI. Methods: Twelve to fourteen-week-old CD2F1/ male mice were used in these studies. BBT-059 was prepared in formulation buffer (10mM sodium phosphate, 4% mannitol, 1% sucrose, pH 6.2) at the specific dose used in studies. Formulation buffer (FB) was used as a control. Drug and control were injected as a single dose (0.1 mL) subcutaneously (SC) at the nape of the neck. The experimental animals received a single exposure of 60Co gamma TBI at an estimated dose rate of 0.6 Gy/min in the AFRRI radiation facility. Survived animals 30-days after radiation were monitored up to one year. Blood was analyzed for CBC counts, serum chemistry, and bone marrow cells for colony forming units (CFU) to understand the longterm effects of the survivors at 1, 6 and 12 months post-TBI. Histopathological and immunohistochemistry of major organs were performed.

Results: There was a decrease in the CBC counts of FB treated groups up to 5 months however accelerated recovery was observed in the drug group. CFU counts were similar in surviving mice at different time points except at 6 months in 12 Gy drug treated group. Histology of kidney, lung and liver did not show any significant differences. Immunohistochemistry revealed an increase in the β-Catenin expression in FB treated group of kidney. After one year, serum biochemistry for alkaline phosphatase and AST showed significantly higher levels in FB treated group, however in drug treated groups the levels were normal.

Conclusion: We have shown that the animals irradiated up to 11.5 Gy and treated with BBT-059 drug survived up to 12 months post-TBI. Significant delayed survival benefit with BBT-059 and as well as its long-term effect suggests that the drug could be developed as a novel radiation countermeasure for military personnel and first responders that are exposed to radiation following a nuclear event. Disclaimer: The opinions and assertions expressed herein are those of the author(s) and do not necessarily reflect the official policy or position of the Uniformed Services University or the Department of Defense. This work was supported by the AFRRI Intramural grant.
Prophylactic administration of placenta-derived PLX-R18 stromal cells mitigates H-ARS death and promotes BM and peripheral blood lineage recovery in a murine model

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Pluristem

Acute Radiation Syndrome (ARS) is a syndrome involving damage to multiple organs caused by exposure to a high dose of ionizing radiation over a short period of time; even low doses of radiation damage the radiosensitive hematopoietic system (causing H-ARS). PLacenta eXpanded (PLX)-R18 is a 3D-expanded placenta-derived stromal cell product designated for the treatment of hematological disorders. These cells have been shown in vitro to secrete hematopoietic proteins, to stimulate colony formation, and to induce bone marrow migration. Previous mice studies showed that PLX-R18 cells responded to radiation-induced hematopoietic failure by transiently secreting hematopoiesis related proteins to enhance reconstitution of the hematopoietic system. We assessed the potential effect of prophylactic PLX-R18 treatment on H-ARS. PLX-R18 cells were administered intramuscularly to C57BL/6 mice, -1 and 3 days after (LD70/30) total body irradiation. PLX R18 treatment significantly increased survival after irradiation (P<0.0005). In addition, peripheral blood and bone marrow (BM) cellularity were monitored at several time points up to 30 days. PLX-R18 treatment significantly increased the number of colony forming hematopoietic progenitors in the femoral BM and significantly raised peripheral blood cellularity. Taken together, prophylactic PLX-R18 administration may serve as protection measure, mitigating bone marrow failure symptoms in the HARS model. The opinions and assertions expressed herein are those of the author(s) and do not necessarily reflect the official policy or position of the Uniformed Services University or the Department of Defense. The study was funded by the AFRRI Intramural grant.
Circulating Cell-Free DNA (cfDNA) Correlates with Integral Dose and Identifies Subjects Who Develop Gastrointestinal Toxicity

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Background: Predicting radiotoxicity is critical for a Rad/Nuc event and for radiotherapy (RT) patients. Toxicity from radiation is related to physical factors and unknown biological factors (e.g., concurrent disease, trauma, infection). Although physicians employ dose-volume histograms (DVH) to predict toxicity, there is no method of identifying subgroups that will experience toxicity. To augment the DVH, we developed a method for personalized radiotoxicity detection.

Methods: Plasma was collected from prostate cancer patients (n=54) to measure their cfDNA levels before photon or proton RT and after each of the first 5 treatments. Patients were followed to determine acute (during RT) and late (>90 days after RT) gastrointestinal (GI), genitourinary (GU), and general toxicity using CTCAE v4. The correlation between cfDNA levels at time points with acute and late toxicity was analyzed by Chi-square test. cfDNA was measured using a proprietary bDNA-based method (RadTox®, DiaCarta Inc.).

Results: Average, peak, and day-2 cfDNA concentrations were significantly elevated in photon-treated compared to proton-treated patients (p<0.05). Increases of cfDNA were categorized as low (<15 ng/ml or ratio <1.5), medium (15-30 ng/ml or ratio 1.5 to 3), or high (>45 ng/ml or ratio >3). Integral dose showed a significant correlation with these categorizations (both p<0.05). Five (9%) and 3 patients (6%) experienced acute and late grade 2+ GI toxicity, respectively; 16 (29%) and 18 patients (35%) experienced acute and late grade 2+ GU toxicity, respectively. Acute grade 2+ GI toxicity was significantly correlated with cfDNA levels obtained on days 1, 2, 3, 4, and 5 of RT (p<0.005). Grade 2+ late GI toxicity was significantly correlated with cfDNA levels obtained on day 5 of RT (p=0.017 concentration, p=0.034 ratio). Bladder toxicity was not significantly correlated with cfDNA levels, perhaps due to low bladder mass.

Conclusions: We believe this is the first assay that has shown potential to detect individual subjects who go on to develop GI toxicity after receiving otherwise similar RT. We also believe that it could have utility in a rad/nuc event. A test of this hypothesis is in evaluation through an NCI-funded SBIR phase 2 trial.

*Dr. Okunieff is a founder of and a stockholder in DiaCarta, Inc., and a patent holder for the RadTox assay.
Fibroblast growth factors as mitigation agents of acute gastrointestinal syndrome

Steven G. Swarts, PhD
University of Florida

The session will provide an overview of the use of fibroblast growth factors in mitigation of radiation syndromes. This will include an overview of how basic fibroblast growth factor (FGF-2) and small peptide FGF mimetics act as mitigators of the acute and later effects of gastrointestinal radiation syndrome (GI ARS). We will show how FGF-2 and FGF peptide lead to GI histological changes (increase crypt counts, villus height and recovery of function within the villus), as well as acute and late functional enhancements (for example enhanced mitochondrial function and telomere length preservation) that last out to at least 30 days post-radiation. These results will provide support of FGF peptides as potential mitigator of GI ARS and other radiation syndromes.

Protection from targeted radiation injury to lungs by Gamma tocotrienol (GT3) treatment

Vidya Kumar, PhD
Armed Forces Radiobiology Research Institute

Radiation injury will result in multiorgan dysfunction leading to multiorgan failure. In addition to many factors such as radiation dose, dose rate, the severity of the injury will also depend on organ systems which are exposed. Here, we describe one such effort of partial body irradiation (PBI) by targeting thoracic region (lung-PBI) using Small Animal Radiation Research Platform (SARRP), an X-ray irradiator with capabilities of an image guided irradiation with a variable collimator with minimized exposure to non-targeted tissues and organs. We also have shown efficacy of gamma-tocotrienol (GT3), a vitamin E isomer, in protecting mice from radiation-induced lung injury. We propose that the possible mode of action for protection by GT3 could be Ang2-Tie2 pathway leading to AKT/ERK pathways resulting in disruption in cell survival/ angiogenesis. In conclusion, a single dose of GT3 was able to protect targeted radiation-induced lung injury in mice.
Acute radiation syndrome modeling and application in human space exploration and radiological/nuclear incidents

Shaowen Hu, PhD
NASA Johnson Space Center, Houston

Biomathematical modeling of Acute Radiation Syndrome (ARS) in humans has been explored by many research groups for several decades. Such models can be used to analyze experimental/empirical data, and to illustrate mechanisms of physiological changes due to radiation exposure. In cases of nuclear warfare or radiological accidents, these models are particularly useful for military, civil, and medical stakeholders to predict the incidence of performance incapacitation and health effects, and to estimate time-phased casualties, patient streams, and medical care requirements. For future exploration of deep space, ground-based operational flight control teams and flight surgeons have similar interests in ARS management to prepare for severe Solar Particle Events (SPEs). In this talk, various ARS models, relevant to NASA short-term radiation dose limits, will be reviewed, and demonstrated, focusing on their important roles in monitoring and mitigating the possible health risks due to SPEs. Among these a HemoDose algorithm will be highlighted, which can estimate the absorbed dose of radiation in adults by using either single or serial counts of granulocyte, lymphocyte, leukocyte, or platelet after exposure. Some patient data in historical accidents are incorporated to demonstrate that multi-type of blood cell counts taken at early (1-2 days) or late (up to 4 weeks) time points following exposure can be robust inputs to rapidly calculate the absorbed doses. A recent update of this algorithm can predict the time course of severity of hematopoietic injury for known doses in the range of 0.15 - 9 Gy. This algorithm can be implemented as an easy-to-use and deployable biodosimetry tool for predicting clinical severity, treatment, and survivability of exposed individuals and triaging those with minimum or no exposure, especially in a large scale nuclear/radiological disaster scenario involving mass casualties.

Resources for Disaster Research and Medical Management of Radiation Incidents

Stacey Arnesen, MS
National Institutes of Health

This session will briefly describe the NIH Disaster Research Response Program (DR2), a national framework for research on the medical and public health aspects of disasters and public health emergencies, as well as demonstrate the Radiation Emergency Medical Management (REMM) and Wireless Information System for Emergency Responders (WISER) web and mobile tools. DR2 provides access to data collection tools, research protocols, and news on disaster research. REMM provides guidance on the diagnosis and treatment of radiation injuries for healthcare providers and WISER is a tool to assist in the management of hazmat and CBRN incidents.
Implications of Neutron Exposures in IND Scenarios

Daniela Stricklin, PhD, MPH
Department of Energy

Casualty estimates for IND scenario analyses generally combine neutron and gamma doses, assuming the same biological effect for each. However, depending on the dose and energy of the neutrons encountered, neutrons can have a higher relative biological effectiveness (RBE) than gamma radiation. To better understand the implication of neutron exposures in IND scenarios, urban radiation transport studies were conducted to characterize neutron energies and doses that might be received in potentially survivable regions. Based on the results that identify relevant neutron characteristics together with current radiobiological evidence, an estimate for the appropriate RBE for acute injury for neutron exposures from an IND will be discussed. The impact of neutrons when accounting for their RBE on casualty estimates will be presented along with current information gaps on anticipated health effects. Approaches for filling information gaps as identified in a recent interagency workshop will also be presented.

Preclinical models of ARS: A species comparison

Simon Authier, DVM, MSc, MBA, PhD, DSP
University of Montreal

Species selection during medical countermeasure development involves a broad range of considerations with the primary goal to model human response. Clinical manifestations, clinical pathology and probit from total body radiation models in mice, rabbits, Göttingen minipigs and Rhesus monkeys were compared and will be discussed in the context of MCM program development.
OPERATIONS

Weathering the Storm: Hurricane Harvey and Texas Children’s Hospital
Brent Kaziny, MD, MA, FAAP
Texas Children’s Hospital

Hurricane Harvey has been regarded as one of the worst natural disasters in our Nation’s history. With a large-scale impact throughout the gulf coast, the storm dropped over fifty inches of rain on Harris County. In the middle of this storm, stands Texas Children’s Hospital System (TCH). Texas Children’s includes three freestanding children’s hospitals; over a dozen urgent care clinics, and a number of pediatric offices. Through the creation of a Hazard Vulnerability Assessment (HVA), TCH has historically identified hurricanes as the number one threat to our institution. As such, a great deal of planning and an annual high-level administrative drill has been conducted over the years. This planning was highlighted during the days preceding a following Hurricane Harvey. Unique planning considerations for staffing ensured continuation of inpatient services at all three locations during and after the storm. By highlighting the importance of the HVA as a planning tool, and by reviewing a timeline of the storm from the preceding days through the aftermath and recovery. We hope to share the success of our institution in weathering the storm.

Triage of Pediatric RITN Patients at NDMS Receiving Center: Hospital vs. Ambulatory Admission-A Pediatric Physician Perspective

Ibrahim Ahmed, MD
Children’s Mercy Hospital

Utilizing Pediatric Physicians to triage pediatric RITN/Trauma patients for direct hospital admission or ambulatory care assignment prior to transport from the NDMS Receiving Center may facilitate admission by eliminating the need for triage in the Emergency Department and then re-transporting ambulatory patients. Because NDMS/VA physicians typically care for adults, Pediatric Physicians offer age and medically sensitive assessment. There may be a benefit to having both Pediatric ED and BMT Physicians co-triaging children who may have trauma in addition to radiation exposure/contamination. A designated Pediatric Radiation Safety Officer screening children during DNMS triage may help to relieve anxiety of hospital employees/staff. The use of telemedicine was not practical in the triage setting but may be useful in ambulatory settings.
Triage of Pediatric RITN Patients at NDMS Receiving Center: Remote Admission, Hospital Evacuation Tags and Camps-An Emergency Preparedness Perspective

Robin Carroll, MSc
Children’s Mercy Hospital

Staging an Admissions team with remote access at the NDMS Receiving Center for Pediatric RITN patients allowed for activation of electronic medical records and consult orders prior to hospital arrival. For ambulatory patients, appointments could be scheduled from the Receiving Center and instructions for care provided. The use of a Hospital Evacuation Triage Tag was superior to a trauma triage tag, allowing for tagging of belongings including luggage, pets, and family accompanying the children. The color of evacuation priority may be used for transport priority-red: pediatric specialty transport to the hospital, yellow: EMS transport to the hospital, and green: bus to ambulatory setting. Children (family, pets) not requiring hospitalization may be housed at Ronald McDonald Houses or camp settings to keep families together, not overwhelm inpatient and ED settings, and build on existing community relationships. Home health and telemedicine may be utilized in ambulatory lodging settings to facilitate treatment and minimize unnecessary transport to clinic appointments.

Optimization, Risk, and Escalating Consequence; Aligning Efficiency and Risk Tolerance

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Mayo Clinic Rochester

The point of the discussion is to explore how optimization (the effort to achieve maximal efficiency) in the healthcare environment can result in an escalation in the negative consequences of undesirable events, disasters, unplanned and/or unexpected events and incidents. The primary point of concern is that as we increase efficiency we decrease the capacity of systems, organizations, and individuals to tolerate variation. Without careful and intentional preparation an inhibited ability to tolerate variation can lead to the exponential expansion of negative outcomes when encountered. An additional potential consequence is that the potential for positive outcomes to go unrecognized and/or unrealized may also increase.
Quantitative Studies Supporting Predication, Diagnosis, and Treatment of Acute Radiation Syndrome

Timothy Adams, MS  
Gryphon Scientific

Over the last two years, Gryphon Scientific has conducted several studies regarding the injury, diagnosis, and treatment of radiation injuries. These studies highlight important considerations for the public response to a radiological incident, accidental or intentional. Four studies will be discussed:

1) A study on the relative radio sensitivity of the hematopoietic system in children and adults. This aspect of radiation injury is crucial to understand in order to rapidly triage children based on estimated dose and to estimate potential pediatric casualties following an incident.

2) The factors contributing to diagnosis of ‘occult’ radiation injuries – that is, radiation injuries where exposure to radiation is not suspected. An example of this type of incident was the accidental release of Cs-137 in Goiania, Brazil. Following these types of incidents, radiation injury takes an average of 23 days to be correctly diagnosed which means patients miss critical windows for lifesaving intervention. Understanding what factors lead to a correct diagnosis could allow more rapid diagnosis in the future.

3) Ability of handheld GM detectors to detect internal contamination of radioactive material. Quantification of internal contamination via bioassay can be a time-consuming and expensive process, especially if a large population was potentially exposed. By contrast, handheld survey meters are often recommended for mass screening of potentially exposed population for external contamination. The utility of survey meters to detect internal contamination at levels which treatment is recommended will allow more rapid screening for internal contamination and improve triaging of bioassays.

4) The optimal use of Prussian blue (PB) in the treatment of internal contamination with Cs-137 depends on the on number of people contaminated and whether dose is sufficient to cause acute radiation syndrome. Currently, a 14-day course of PB is recommended following ingestion or inhalation of Cs-137. This study examined how different PB treatment lengths and starting times post-contamination might affect dose and outcomes for acute radiation syndrome. Additional analysis was performed to determine optimal life-saving strategies if insufficient PB is available to treat the entire affected population.
Texas Children’s Hospital Radiation Injury Functional Exercise: Lessons Learned

Miracle Okoye, MSc
Texas Children’s Hospital

Introduction: On July 10, 2018, Texas Children’s Hospital (TCH) Radiation Injury Treatment Network (RITN), comprised of Bone Marrow Transplant (BMT) and Emergency Management (EM) staff, orchestrated the first institutional radiation injury preparedness multidisciplinary triage functional exercise (FE). Participants from auxiliary healthcare departments (pathology, radiation safety, social work, emergency department (ED), chaplaincy) overseen by BMT and EM, were organized to conduct exercise objectives, including but were not limited to testing Patient Reception Area (PRA) capabilities, testing treatment actions for Acute Radiation Syndrome (ARS).

Method: Following a hypothetical radiological nuclear event, TCH was activated to receive exposed pediatric survivors. The FE took place at main campus (Houston, Texas) as well as two satellite locations (Woodlands and Katy, Texas) serving as overflow for less critical patients (estimated exposure dosages of less than 3 Gy). Satellite locations took part in smaller scale exercises with the same objectives as main campus. N=42 participants went through our simulated PRA in effort to minimize impact on the ED during a patient surge. Participating departments and volunteers gathered in the PRA, arranged in formation for triage/registration, medical evaluation and psychosocial follow-up of patients with various levels of radiation exposure. BMT coordinators created fictitious patient cards (n=42) including; patient identifiers, anthropometrics, hemoglobin, comorbidities, estimated exposure dose (Gy), symptoms, external laboratory values and clinical background. Patient toxicity ranged from minor (nervousness/anxiety) to critical/severe (absolute lymphocyte count (ALC) 0). Trained BMT providers (physicians, advanced practice providers, clinical pharmacists) evaluated and placed appropriate orders (medications, irradiated blood products/infusions, labs, admission, follow-up, etc.) using streamlined and focused medical chart systems. Clinicians calculated radiation exposure dosages based on ALC values, date and time of exposure. Following patient evaluation and labs, each patient saw auxiliary departments focusing on radiation, BMT education and child life services. Participants and observers provided feedback for evaluation purposes.

Results: The most common observations and suggestions from providers and auxiliary departments included the need to clarify roles of support services for PRA and further education regarding radiological incidents/exposure. Providers proposed modifications to TCH specific medical forms with intention to further expedite the clinical evaluation processes. It was stated the flow between departments of the PRA was smooth, however participants and exhibitors stressed the need for a larger PRA, stating insufficient room for efficient and comfortable patient flow.

Discussion: The FE resulted in a valuable institutional learned experience. Feedback from participating departments and exhibitor agencies are being integrated into SOPs and the upcoming full-scale FE, currently scheduled for April 2019. This full-scale FE will reflect the improvements in patient triage, provider support and multidisciplinary synergy. The exercise allowed for the development, implementation and testing of the TCH intended PRA and ancillary services. As a result of the planning processes and the execution of the FE, TCH has continued its efforts in the education of its faculty and staff, with intent to ensure safety and knowledge on radiation nuclear incident, contamination and exposure; using mechanisms such as mixed media communication, online trainings and emergency notifications.
Radiation Biodosimetry: A Mass Screening Tool for Radiological/Nuclear Events

Mary Sproull, PhD
Radiation Oncology Branch, Center for Cancer Research, National Cancer Institute

There has been great advancement within the field of radiation biodosimetry in the last decade in response to the need for development of new medical countermeasures for radiological and nuclear events. Our work has centered on development of new dose prediction models for unknown received radiation dose using a proteomic approach. Using a murine model, to characterize novel biomarkers of radiation exposure, we have also developed models for dose prediction using both total body and partial body radiation exposures. Our current work expands on these previously characterized models to test their application for mass screening utility using a variety of murine strains. Our findings indicate that these dose prediction models have potential utility for mass population screening.

From Runway to Our Front Door -- Lessons Learned from Multiple Exercises

Doug De Vries
Spectrum Health

Early in the RITN planning Spectrum Health realized that a large amount of assistance would be needed from community partners in the acceptance of RITN patients. This included work done to change the NDMS arrival locations, assistance by state and county governments, community resources like Red Cross, Health Departments, and many other partners to create a RITN response plan that will fulfill the needs of incoming patients to the best of our ability. Beginning with a community table top exercises and ending with a transport exercise with NDMS Spectrum Health has developed an annex to our plan with the assist of the Gerald R. Ford International Airport to address the reception of those impacted. The process increased our collaboration with community partners in creating a MARC (Multi-Agency Reception Center) process to house, support, and equip those impacted and displaced. Reception of those impacted at the airport showed us the value and benefit of separating those that need transport directly to the emergency department versus those that can be transported to the MARC.
NDMS Version 2.0

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U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response

NDMS was created in 1986 for the primary purpose to provide support to DoD in the event of another major conflict. Since that time, NDMS the “program” has not changed discernably, right down to the funding appropriated by Congress. Yet, there has been significant momentum to change NDMS the program as well as the “system” to be more relevant to the times, more efficient and effective, and more supportive to local and regional disaster response capabilities. In this discussion, more details of NDMS version 2.0 will be described and where the RITN fits into that conversation.

The National Nuclear Security Administration’s Office of Secure Transportation (OST)

Ryan Buckner, MEd
Department of Energy, National Nuclear Security Administration

The National Nuclear Security Administration’s Office of Secure Transportation (OST) is responsible for the safe and secure transport of government-owned special nuclear materials in the contiguous United States. These classified shipments can contain nuclear weapons or components, enriched uranium, or plutonium. Cargo is transported in highly modified secure tractor-trailers and escorted by armed Federal agents in other vehicles who provide security and national incident command system response in the event of emergencies.
INDUSTRY SESSIONS

Point-of-Care Radiation Biodosimeter for Triage Following a Nuclear Event

Kathryn Todd, PhD
SRI International

SRI International (SRI) has been funded by the Biomedical Advanced Research and Development Authority (BARDA), under contract HHSO100201700030C, to develop a point-of-care (POC) radiation biodosimeter for use as a triage medical device in the case of a nuclear event in an urban setting, where approximately 1M individuals may be exposed to ionizing radiation. This POC medical device uses a capillary blood sample, a quantitative measurement of a panel of three host-response protein biomarkers, and a statistical classification algorithm to calculate a qualitative (positive / negative) result around the accepted human radiation medical treatment cutoff value of 2 Gy. The intended use for this device is to allow first responders and field personnel to quickly triage patients so that those demonstrating an absorbed dose of $\geq 2$ Gy of radiation (positive result) are assigned priority for additional quantitative testing. Without this triage function, the emergency medical care system is likely to be overwhelmed by the large number of potentially exposed patients. As an example, in a realistic exposure model of Washington DC, of 1M potentially exposed individuals, over 660K are exposed to $< 2$ Gy. A triage system with a low false positive rate (FPR) / high negative predictive value (NPV) can redirect most of those 660K individuals away from higher levels of medical care, permitting care to be directed to those who truly need it.
Sargramostim Improves Survival at Day 60 in a Non-Human Primate, Hematopoietic Acute Radiation Syndrome Model When Administered 48h after High Dose Total Body Irradiation

Debasish Roy Chowdhury, MD
PartnerTX

Background: Hematopoietic acute radiation syndrome (H-ARS) occurs in individuals that are exposed to high levels of radiation over a short period of time. Radiation-induced pancytopenia increases the incidence of infections and hemorrhages and accounts for the majority of morbidity and mortality. Sargramostim (yeast-derived rhGM-CSF) is a leukocyte growth factor that promotes differentiation, maturation and activation of granulocytes, monocytes, macrophages and platelets. Sargramostim (7 μg/kg/day) initiated 48h post irradiation has been shown to increase survival at day 60 by 36% in non-human primates (NHP) exposed to ionizing radiation dose lethal in 50-60% of NHPs (LD50-60/60), in an NHP total-body irradiation model with limited supportive care (e.g., no blood products or individualized antibiotics). In the same study, in an exploratory cohort (N=36) of NHPs exposed to high dose irradiation lethal in 70-80% of NHPs, sargramostim increased survival at day 60.

Methods: To confirm the effects of sargramostim on mortality in NHPs exposed to high dose radiation (713 cGy), we evaluated the effect of sargramostim (7 μg/kg/day) on mortality when administered daily starting at 48h post-irradiation until absolute neutrophil count returns to ≥ 1000/μL with limited supportive care (e.g., no blood products or individualized antibiotics). The primary objective was to assess the efficacy of sargramostim with or without azithromycin versus vehicle with or without azithromycin on mortality rate at Day 60 in irradiated male and female NHPs at LD70-80/60 (n=44/group, 4 groups total). Secondary objectives included the efficacy of sargramostim on overall survival and its effect on hematology parameters. A separate objective of the study was to assess the impact of delay in sargramostim administration initiated at 72h, 96h, and 120h post-irradiation.

Results: Sargramostim initiated 48 hours after irradiation significantly decreased the mortality rate at Day 60 by 18% (logistic regression, overall significant dose level effect on pooled groups with and without azithromycin, t-test p=0.0029 and p=0.0032 for males and pooled sexes, respectively). Additionally, neutrophil, platelet, lymphocyte, and white blood cell levels in survivors demonstrated accelerated recovery in the sargramostim-treated NHPs.

Conclusion: This study confirms treatment with sargramostim (7 μg/kg/day) beginning at 48 h after irradiation, in the absence of blood products and individualized antibiotics, improves survival following exposure to a lethal radiation dose. The addition of azithromycin did not have a beneficial effect on survival. This data adds to the body of evidence and confirms that administration of sargramostim at 48 hours post-exposure is a viable therapeutic strategy for H-ARS in a mass casualty event. Funding: This project has been funded in whole or in part with Federal funds from the Office of the Assistant Secretary for Preparedness and Response, Biomedical Advanced Research and Development Authority, under Contract No. HHSO100201300005I.
REDI-Dx: High Throughput Biodosimetry Test System

Bob Terbrueggen, PhD
DxTerity

REDI-Dx is a direct from stabilized blood, gene expression-based high throughput biodosimetry test system. The system consists of a 1.0 ml draw blood collection tube, a multiplex gene expression assay kit, and the Thermo Fisher ABI3500xL Dx Genetic Analyzer equipped with a custom software program. The blood samples are stable for 14-days at ambient, and the testing process takes as little as 6 hours with a throughput of up to 1100 samples per 24 hour day. The system is currently undergoing clinical validation in preparation for a 2020 FDA submission. This program is funded in full or in-part by the Biomedical Advanced Research and Development Authority (BARDA), a division of the U.S. Department of Health and Human Services’ Office of the Assistant Secretary for Preparedness and Response under contract HHSO100201600003.
EDUCATION

Generations to Guide and Borders to Bridge: The Evolution of Radiation (Disaster) Education in Japan

Kenneth Nollet, MD, PhD
Fukushima Medical University

Radiation education has evolved with Japan’s history: The World War II target of two atomic bombs, a Cold War recipient of fallout that tainted its food supply, a lethal criticality accident at Tokaimura, and the most recent nation to deal with a nuclear power plant meltdown.

Economic growth in postwar Japan required energy resources beyond what was available within its borders. Nuclear power was seen as a clean source of electricity, but public perceptions were informed by Hiroshima and Nagasaki. Education – and, some would say, propaganda – led to the acceptance of 54 nuclear reactors, often with economic benefits accruing to areas far from where electricity demand was greatest.

Tokaimura’s 1999 criticality accident resulted in three exposure-related fatalities, after which radiation emergency facilities were added to institutions around the country. Nominally, such facilities came with mandates for local expertise along with continuing medical education and training, but valiant responders to Japan’s 2011 earthquake, tsunami, and nuclear crisis subsequently acknowledged feelings of unpreparedness.

The acute nuclear crisis in 2011 consisted of core meltdowns at Fukushima Daiichi, but with no fatalities associated with radiation. On the other hand, urgent evacuation, especially of elderly and/or institutionalized residents, precipitated a sub-acute crisis to which many non-radiation deaths have been attributed. Our chronic crisis includes social problems that resemble, in some respects, those of atomic bomb hibakusha, further confounded by different degrees of compensation and care provided to those specifically affected by Fukushima Daiichi versus those generally affected by the earthquake and/or tsunami. Thus, shortcomings of radiation disaster education were exposed, broader needs in radiation education were identified, and a “science, technology, and society” (STS) approach was advocated.

In response, high school curricula are being revised generally and - in the context of a pre-existing “Super Science High School” initiative - specifically. Medical school curricula now include four modules: (1) Living organisms and radiation, (2) Medical radiation and biological effects, (3) Risk communication for radiation, and (4) Medical practice in radiation disaster. The radiation disaster curriculum at Fukushima Medical University (FMU) expanded from 6 to 82.5 hours. FMU and Nagasaki University now co-administer a Disaster and Radiation Medical Sciences Joint Major, conferring Master of Medical Science and Master of Nursing degrees. Hiroshima University’s Phoenix Leader Education Program confers master’s and doctorate degrees in three tracks: (1) Radiation Disaster Medicine, (2) Radioactivity Environmental Protection, and (3) Radioactivity Social Recovery. The FMU-Nagasaki and Hiroshima graduate programs welcome international students.
The role of Hiroshima University as the new radiation/nuclear emergency medical support center for the next disaster.

Professor Nobuyuki Hirohashi, MD, PhD
Hiroshima University

Based on reflections of the deficiency of nuclear/radiation disaster medical care systems in Fukushima-Daiichi nuclear power plant accident, the nuclear regulation agency established the new nuclear disaster medical system in 2015. Nuclear emergency core hospitals in each nuclear power plant-located prefecture were designated for the improvement of local nuclear disaster medical system. As the advanced radiation emergency medical support center and the nuclear emergency medical support center, Hiroshima University continues to support many prefectures which have nuclear power plants. Nuclear emergency medical assistance teams in these hospitals are expected not only to care the casualties but also to play a central role in communicating radiation/nuclear emergencies to the public. We perform public open lectures and active media information dispatches from HIROSHIMA prefecture which has not a nuclear power plant, and we will act to push forward the preparation to coming nuclear/radiation disaster in the whole country.

If You Teach Them, They Will Come: A REAC/TS Survey of Emergency Response Personnel

Angie Bowen, MPS, RN, CPEN, NRP IC
Radiation Emergency Assistance Center and Training Site (REAC/TS)

Medical and public safety professional face many work-related pressures, one of which is the ability to effectively respond to low frequency/high risk events. The increasing threat of a radiological or nuclear incident occurring somewhere in the world has highlighted the need for increased education and understanding for all emergency responders, including healthcare providers, public health professionals, and emergency managers and planners. Targeted education that addresses the most common emergency provider and responder concerns will enhance patient and public safety response in a radiological/nuclear incident.

This session will provide an overview and findings of participant surveys conducted during on-site courses at the Radiation Emergency Assistance Center/Training Site (REAC/TS) throughout fiscal year 2018. Conclusions drawn from this survey suggest a plan for curriculum development and delivery in order to better prepare emergency medical providers to care for patients involved in a radiological or nuclear event. Previous studies have indicated that healthcare providers, both pre-hospital and in-hospital, are quite willing to be activated for a biological or chemical incident but are not as willing to respond to an event related to radiation (Cone, 2006 and Dimaggio, 2005). This position was based on several cited factors, including fear for their own safety and concern about lack of knowledge related to how to best care for patients with radiation injuries or illnesses (Veneema, 2008). While several educational offerings already exist in various incarnations, this survey suggests that a multi-tiered targeted course curriculum be developed in order to build provider competence and confidence related to this subject matter.
Medical and Nursing Workforce Radiation Knowledge and Attitude Assessment - Initial Findings

Tener Veenema, PhD, MPH, MS, RN, FAAN
Johns Hopkins University

The Radiation Injury Treatment Network (RITN) health care workforce (HCW) is expected to be prepared to respond to a national disaster that results in mass casualties with marrow toxic injuries (such as Acute Radiation Syndrome from exposure to ionizing radiation). The symptoms and care required for such victims is very similar to what health centers provide each day but in the event of a radiation disaster, a sudden surge of patients will present requiring more highly specialized care. Physicians and nurses will play a critical role in the effectiveness of a disaster medical response to any public health emergency resulting from the release of radiation into the environment. In fact, the clinical care of radiation contaminated patients (e.g. thermal/radiation burns, fluid management, infection control), community screening for radiation exposure, triage, decontamination, administration of medical countermeasures and the provision of supportive emotional and mental health care will be overwhelmingly nurse intensive. It is unclear how broad and effective existing staff development education and training is at the RITN centers, and the possibility exists that some members of the HCW currently employed at these centers may not possess the knowledge and skills they need to care for and protect patients following a radiation emergency. The Medical and Nursing Workforce Radiation Knowledge and Attitude Assessment project seeks to obtain baseline information that will be used to inform the development of future RITN education and training programs.
COMMUNITY RESILIENCY

Unexpected Public Responses to Disasters (Flint & Gulf Coast)

Renée Funk, MD
U.S. Public Health Service

CAPT Funk will be describing the Flint Water Crisis response and how they ended up needing to emergently screen approximately 9,000 children ≤6 years of age for lead exposure. This may provide some insights for a radiation response of similar magnitude.

When You Become the Radiation Disaster Expert, Like It or Not!

Jessica Wieder
U.S. Environmental Protection Agency

Practical communication strategies for use after a radiological or nuclear disaster when speaking to the public, your family and even your neighbors; because when the disaster happens you become the radiation disaster expert. People are going to come to you for information, like it or not!

The Value of Rebuilding a Resilient Community

Dan Dodgen, PhD
Senior Advisor for Strategy, Policy, Plans and Requirements
U.S. Department of Health and Human Services, Office of the Assistant Secretary for Preparedness and Response

Natural and man-made hazards are impacting our world with increasing frequency and severity, creating a threat to the health, mental health, and wellbeing of individuals and communities across the nation. Instead of just preparing for these disasters, nations can reduce the damage by creating a culture of prevention and resilience. Building social capital, lessening the vulnerability of people and property, and improving preparedness are examples of building resilience and disaster risk reduction. This presentation will focus on how leaders in public health, mental health, and emergency management can apply our unique knowledge at the intersection of public health and disaster management to improve individual and community resilience and promote long-term recovery.
RITN WORKSHOP | SPEAKER BIOS

Michael Abend, MD, MSc
Dr. Michael Abend earned several professions such as a medical doctor degree at the University Cologne, a professorship in radiobiology at the Technical University Munich, and studied Epidemiology (master’s degree) at the Gutenberg University in Mainz, Germany. He worked at different international scientific institutions, such as the Armed Forces Radiobiology Research Institute, Bethesda, Md., or the National Cancer Institute (Radiation Epidemiology Branch), Rockville, USA. Dr. Abend did win several scientific awards, published about 100 peer-reviewed scientific papers, holds offices at NATO groups, and is currently in the position of a Deputy Director and Leader of the Genomic Department of the Bundeswehr Institute of Radiobiology.

Timothy Adams, MS
Timothy Adams, M.S., is an experienced health physicist with an expertise in developing models of radioactive and nuclear effects to inform national security and emergency response plans. Adams received his B.S. in nuclear engineering from Rensselaer Polytechnic Institute and his M.S. in Radiation Health Physics from Oregon State University.

Upon joining Gryphon Scientific in 2013, he designed and executed quantitative risk assessments to measure the human health effects of improvised nuclear and radiological devices. The results were used to inform the contents of CDC’s Strategic National Stockpile, the nation’s largest repository of medicines and supplies for use in responding to public health emergencies. For DHHS (BARDA), he developed new models to assess the inhalation risk of radionuclides; he also estimated the consequences of a nuclear detonation to persons taking shelter in a variety of environments, thus informing planning for the severity of injuries in these populations.

All these projects gave Adams a wealth of expertise developing novel tools and models for assessing the risks to national security of radiological and nuclear devices. Frequently serving as a subject matter expert, he contributed advice and support to a FEMA tool for planning response to an improvised nuclear device and served as a writer and technical expert for the USDA Red Book for the response to radiological emergencies affecting agriculture. Adams has become a leader and frequently-requested expert with a reputation for developing key insights to improve the nation’s preparedness and response to radiological and nuclear events.

Ibrahim Ahmed, MD
Dr. Ibrahim Ahmed is a Pediatric Bone Marrow Transplant Physician at Children's Mercy Hospital in Kansas City, Mo. He is the RITN Medical Director at Children's Mercy and an Associate Professor at the University of Missouri-Kansas City, Department of Pediatrics. Dr. Ahmed’s memberships include: AAP Fellow, ASBMT, American Society of Hematology, and Children's Oncology Groups. He is actively engaged in BMT research and education.
Stacey J. Arnesen, MS
Stacey Arnesen is the Acting Chief of the Public Services Division and formerly the Chief of the Disaster Information Management Research Center (DIMRC) at the National Library of Medicine, NIH. She has worked at NLM for more than 30 years, the last 15 years in disaster information management. Currently her work includes managing the NLM collection, interlibrary loan, as well as the development of a variety of information tools and resources. As Chief of DIMRC, she coordinated several tools and resources to improve access to disaster medicine and public health information including disaster health literature, tools and apps for hazmat and CBRN incidents (WISER, CHEMM, REMM) as well as disaster information management research (https://disasterinfo.nlm.nih.gov). Arnesen also works on the NIH Disaster Research Response program with the National Institute of Environmental Health Sciences (https://dr2.nlm.nih.gov). She received her M.S. in Neurobiology and Behavior from Cornell University and her A.B. from Smith College.

Simon Authier, DVM, MSc, MBA, PhD, DSP
Dr. Simon Authier obtained a Doctor in Veterinary Medicine degree from the University of Montreal and specialized in non-clinical studies after completing a PhD in Preclinical Pharmacology. He then completed an MBA in Corporate Finances and Management. Over the past years, Dr. Authier investigated methodologies in non-clinical regulatory safety pharmacology studies with the objective of improving study designs for optimal sensitivity and decision making in this field. He oversees the work of a team of scientists and veterinarians specialized preclinical research. Dr. Authier is Associate Professor at University of Montreal, Canada where he is involved with clinical immunology and pharmacology and he has authored more than 85 peer reviewed articles and book chapters. Dr. Authier provided scientific overview for more than 850 preclinical drug safety and efficacy studies. He has been involved with the conduct of non-clinical acute radiation syndrome studies for the last 16 years.

William F. Blakely, PhD, MSc
William Blakely received his PhD in 1980 at the University of Illinois-Urbana-Champaign in radiation biology; his doctoral advisor was Dr. Howard S. Ducoff. He completed his post-doctorate study on DNA radiation chemistry in Dr. John F. Ward's laboratory at the University of California, San Diego. In 1983, he joined the Armed Forces Radiobiology Research Institute (AFRRI) – Uniformed Services University of the Health Sciences (USUHS), his present affiliation. Blakely's research activities have focused on molecular mechanisms of radiation sensitivity, cell-cycle effects, DNA damage and repair, and biological dosimetry. He served as a guest editor for several issues of journals associated with international meetings, an associate editor for the Radiation Research journal, and Chairman of the NATO Research Study Group-Radiation Bioeffects and Countermeasures (RTG-033).

He presently is the course director of the Radiation Biology graduate course at USUHS. He also serves as a U.S. representative on the ISO TC85/SC2 (Radiation Protection) Working Group 18 (Performance Criteria for Service Laboratories Performing Biological Dosimetry by Cytogenetics), Council member for the National Council on Radiation Protection and Measurements (NCRP), an assistant professor in the USUHS Preventive Medicine and Biometrics Department, and a senior associate faculty at Radiation Emergency Assistance Center/Training Site (REAC/TS).
Angie Bowen, MPS, RN, CPEN, NRP IC

Angie Bowen is a Nurse/Paramedic with the Radiation Emergency Assistance Center/Training Site (REAC/TS). She has 28 years of emergency nursing experience and has served in the roles of Emergency Department Charge Nurse, Emergency Department Nurse Manager, Pediatric Critical Care Transport Nurse, Regional Coordinator for Emergency Medical Services for Children (EMSC), and Trauma Program Manager. She has also worked in the pre-hospital setting for 31 years, serving in both emergency medical service (EMS) and rescue capacities.

Angie has spoken at numerous conferences on emergency/trauma/disaster care and managing radiological illnesses/injuries. Angie holds instructorships and regional/affiliate faculty status in multiple courses, including those hosted through the American Heart Association (AHA), the Emergency Nurses Association (ENA), the Society of Trauma Nurses (STN), and the National Association of Emergency Medical Technicians (NAEMT). She has served as chapter author and content editor for both pre-hospital and emergency nursing textbooks, and has co-authored journal articles related to disaster triage.

Angie holds a Master of Professional Studies with a concentration in Public Safety from Tennessee Technological University. She also holds a Bachelor of Science in Nursing and a Bachelor of Science in Communications, with a Public Relations focus, both from the University of Tennessee, Knoxville. She received her paramedic education at Creighton University in Omaha.

At REAC/TS, Angie specializes in the pre-hospital and nursing aspects of radiological illnesses and injuries, decontamination, and the psychological effects of disaster. Angie has worked closely with emergency response entities and healthcare coalitions to integrate this knowledge into daily operations and emergency procedures.

Ryan Buckner, MEd

Ryan Buckner is the Senior Operations Planner for the National Nuclear Security Administration’s Office of Nuclear Incident Response Consequence Management Program within NNSA’s Office of Counterterrorism and Counterproliferation. In this position, he supports a team of radiological and nuclear experts throughout DOE and NNSA to provide actionable decision support to authorities responsible for protection of the public, responders and the environment affected by a nuclear or radiological incident. Prior to this position, Ryan served as a Senior Intelligence Analyst to NNSAs Office of Defense Nuclear Security and NNSAs Office of Secure Transportation. He has supported DOE and NNSA in roles for more than 20 years.

Ryan is a past fellow at the National Counterterrorism Center in Washington, DC, where he collaborated with the Intelligence Community to research, produce, and disseminate counterterrorism intelligence products for federal, state, local, and tribal government agencies and the private sector with the goal of getting the most valuable information to the widest audience of operational personnel. In 2013, Ryan retired from the Albuquerque Police Department’s Criminal Intelligence Unit. As a Detective Sergeant, he served with the FBIs Joint Terrorism Task Force as well as the FBIs Safe streets Task Force. Most of his law enforcement career was spent as a special investigations detective.

Ryan has an Advanced Nuclear Weapons Certificate from the Defense Threat Reduction Agency’s Defense Nuclear Weapons School. He holds a Master’s in Education and a Bachelor of Criminal Justice from New Mexico State University.
Robin Carroll, MSc
Robin Carroll has been the Director of Clinical Emergency Preparedness at Children's Mercy Hospital for the past five years. Her previous positions included the Director of Nutrition Services and the Director of Neonatal Nutrition Research. She holds a Certificate in Pediatric Bioethics, an MS in Nutrition and a Master's in Theological Studies. Robin's amateur radio call sign is KEOQKR.

Cullen Case Jr., EMPA, CEM, CBCP, CHEP
As the Program Manager of the Radiation Injury Treatment Network, Case coordinates the preparedness activities for a group of 74 hospitals preparing for a mass casualty radiological disaster. These efforts include coalition development, contract management, task completion, educational material development, exercise development and execution, as well as special projects to improve related national preparedness for a radiological disaster. Additionally, he is the Senior Manager of Business Continuity for the National Marrow Donor Program/Be The Match marrow registry, where he is responsible for ensuring timely delivery of all product worldwide during contingency situations, as well as organizational preparedness, crisis management and response, business continuity planning, and the exercising of all related plans.

John Crapo, ScM, MS
John Crapo is a Deputy Program Manager within the Office of Nuclear Incident Response at the National Nuclear Security Administration. In that capacity, he manages the atmospheric modeling, aerial radiation measurements and radiation emergency medicine portfolios for the Office. He also serves as a Federal Team Leader for teams deployed in response to a radiological or nuclear incident. Prior to this, he was the Associate Director for National Security at Oak Ridge Institute for Science and Education. John is a retired Naval Officer and is certified in the comprehensive practice of Health Physics by the American Board of Health Physics.

Nelson Chao, MD, MBA
Dr. Nelson Chao, M.D., MBA serves as Professor of Medicine and Immunology and Chief of Division of Cellular Therapy/BMT (Bone Marrow Transplantation) of Duke University. Dr. Chao has been Director of the Bone Marrow Transplant Program at Duke University Medical Center since 1996. He joined at Duke University in 1996. He serves as Director of Comprehensive Cancer Center at Duke University Medical Center. He serves as the Center Director for the newly formed Duke Center for Translational Research. He co-founded Aldagen, Inc. (formerly STEMCO Biomedical, Inc.) and served as its Secretary and Member of Medical Advisory Board. He served as an Assistant Professor of medicine and Assistant Director of BMT program at Stanford University Medical Center.

Dr. Chao has experience in the clinical care of stem cell transplant patients and management of graft versus host disease and anti-tumor strategies. serves as He serves as Member of Advisory Board of Gamida Cell Ltd. He serves as a Member of Scientific Advisory Board for Cytonome, Inc. He served as a Member of Advisory Board of NeoStem, Inc. since May 2004. He is recognized as a leader in the field of stem cell transplantation with over 100 medical journal articles. He is the author of over 100 peer-reviewed papers, 25 book chapters and one book. He served as President of American Society For Blood And Marrow Transplant. He was a faculty at Stanford University. Dr. Chao received an Undergraduate Degree from Harvard University; MD from Yale University; and his Post-Graduate Training at Stanford University. He obtained his MBA from the Fuqua School of Business at Duke University in 2000.
Douglas De Vries
Douglas De Vries came to Spectrum Health in December of 2016. As an Emergency Preparedness Specialist, he is responsible for two hospitals, 14 ambulatory sites, and interfaces with RITN, as well as the National Disaster Medical System (NDMS). De Vries came to Spectrum Health after retiring from the Ionia Department of Public Safety, where he served as a police officer, fire fighter and medical first responder. The last 13 years with the department, he served as the Emergency Management Director for the City of Ionia and then Ionia County. De Vries is married to his wife of 25 years and has three grown children.

Andrea DiCarlo-Cohen, MSc, PhD
DiCarlo completed her Masters of Science in immunology in 1992 and her Doctorate in cell and molecular biology in 1998. She went on to a post-doctoral fellowship in bioelectromagnetics and radiation normal tissue injury at The Catholic University of America in Washington, DC, and joined their research staff in the Department of Biology in 2002. In 2004, DiCarlo joined NIAID's RNCP as a Program Officer, and has held that position for more than 14 years. She also serves as the scientific lead for several NIAID contracts and is currently the project scientist for the NIAID Centers for Medical Countermeasures against Radiation Consortium.

She has authored many meeting reports and original research publications, and has served as a radiation subject matter expert, reviewing for and consulting with many US government agencies, including the National Cancer Institute, the Food and Drug Administration, the Department of Defense, and the Biomedical Advanced Research and Development Authority. She also currently serves as an Associate Editor for the Journal of the Radiation Research Society.

Daniel Dodgen, PhD
Daniel Dodgen is the Senior Advisor for Strategy, Policy, Plans and Requirements with the Assistant Secretary for Preparedness and Response at the U.S. Department of Health and Human Services (HHS). His portfolio includes national health security, health system policy, mental health, community resilience, opioids and at-risk individuals. Dodgen served as the Executive Director of the White House directed national advisory group on disaster mental health and led the nation’s mental health response to Hurricanes Harvey, Irma, Maria, Katrina, Sandy, and others; the H1N1 epidemic, the BP oil spill, the Boston Marathon bombing, multiple mass shootings, and other natural and manmade disasters. He was one of the lead authors for The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment. Dodgen also served as an advisor to the government of Greece and the State Department for the 2004 Olympics in Athens.

Before joining HHS, Dodgen was Senior Federal Affairs Officer at the American Psychological Association following his AAAS Fellowship with the U.S. House of Representatives. With the Red Cross, he responded to the Los Angeles riots, the Northridge earthquake, the Oklahoma City bombings, and the September 11 Pentagon attack. He received the American Psychological Association 2005 Early Career Award and was elected a Fellow of APA in 2012. He is on the Board of Directors of the International Association of Applied Psychology and is a Harvard Senior Executive Fellow. He is also a licensed clinical psychologist in Washington, DC.
David J. Dries, MD
Dr. David Dries entered Purdue University in 1972 and completed earned both his bachelor’s and master’s degrees in electrical engineering. He then attended medical school at the University of Chicago and completed postgraduate training as a general surgeon. He added qualifications in surgical critical care through training and work at Duke University, the University of California at Irvine, and Loyola University Medical Center in Chicago.

Dr. Dries joined HealthPartners in 1999 and is the Assistant Medical Director for Surgery in HealthPartners Medical Group. At the University of Minnesota, he is the John F. Perry, Jr. Professor of Surgery, Professor of Anesthesiology, and Clinical Adjunct Professor of Emergency Medicine. Dr. Dries serves on multiple editorial boards, including "Shock," "Critical Care Medicine," "The Journal of Trauma Injury, Infection, and Critical Care," and "The Year Book of Critical Care Medicine."

Catastrophic illness or injury confronts patients and their family members with difficult conditions demanding crucial decisions. Even simple surgical procedures require careful explanation in these times of rapid technical change and growth in our treatment capabilities. He communicates care options and implications in a collaborative setting that includes a variety of medical and nursing specialties.

Renée Funk, MD
CAPT Renée Funk, US Public Health Service, is the Associate Director for Emergency Management, Office of the Director, National Center for Environmental Health (NCEH) and Agency for Toxic Substances and Disease Registry (ATSDR), Centers for Disease Control and Prevention (CDC). Dr. Funk received her Doctorate of Veterinary Medicine from Iowa State University and her Masters of Public Health and Tropical Medicine from Tulane University. She completed her Masters of Business Administration from Georgia State University. She is a Diplomate of the American College of Veterinary Preventive Medicine. Dr. Funk was the CDC Field Team Lead for the Flint Water Crisis response and will be speaking with you about that response in her presentation.

Jed Gorlin, MD
Dr. Jed Gorlin is board certified in pediatrics and blood banking and transfusion medicine. He is the VP of Medical and Quality Affairs for Innovative Blood Resources and Medical Director, Community Blood Center of Greater Kansas City. His education includes a BS-Stanford, MD Yale, and MBA from University of Minnesota Carlson School of Business. He trained in Pediatrics and Pediatric Hematology/Oncology at Boston Children’s hospital and completed research fellowships at Dana-Farber Cancer Institute, Mass. General, Brigham & Women’s Hospital, and the Puget Sound Blood Center.

Dr. Gorlin served on the boards of AABB and the National Blood Foundation. He is associate clinical professor of laboratory medicine at University of Minnesota. He is currently the co-director of Transfusion Medicine at Hennepin County Medical Center, a level one trauma hospital in Minneapolis, and Children’s Hospitals and Clinics in Minneapolis and St. Paul, MN. He is a consultant to AABB, CDC and NIH for projects in Rwanda, Tanzania and Central Asia including Kazakhstan and Kyrgyzstan. He was the AABB liaison to ACOG, AWHONN and CMQCC for obstetric hemorrhage and ABC liaison to AABB TTD committee.
Jonathan Greene
Jonathan Greene is the Director of the Office of Emergency Management and Medical Operations (EMMO). His responsibilities include oversight and management of national programs designed to prepare for, respond to, and recover from 21st Century health security threats. Greene’s ASPR portfolio includes the divisions of Readiness, Field Operations and Response, and Recovery. These divisions support and strengthen health care systems resilience to 21st Century threats through leadership, public/private partnerships, and technical and medical support to state, local, territorial, and tribal partners.

Prior to his work with HHS, Greene served as Deputy Assistant Secretary for Operational Medicine and Health Support within the newly formed United States Department of Homeland Security Office of Countering Weapons of Mass Destruction (CWMD) as well as Deputy Assistant Secretary and Deputy Director of the DHS Office of Health Affairs, where his work focused on bio-detection, biosurveillance, as well as chemical defense and food and agriculture security.

Before joining federal service in 2008, Greene spent more than 20 years serving in public safety response and preparedness roles at the local level. His career includes line and executive level positions with fire service, law enforcement and emergency medical service agencies. He received his appointment to the Federal Senior Executive Service in 2013. Greene holds a Bachelor of Science degree from Charter Oak State College and attended the University of Connecticut Graduate School, as well as Keene State College in New Hampshire. More recently, he attended Harvard University’s National Preparedness Leadership Initiative and received a certificate in public leadership from the Brookings Institution/Washington University at St. Louis. Greene is a graduate of the Connecticut Municipal Police Academy and has maintained licensure as a paramedic in that state since 1990.

Nobuyuki Hirohashi, MD, PhD
Professor Nobuyuki Hirohashi earned his MD (1989) and PhD (1993) degrees from Kurume University School of Medicine, Kurume City, Japan. He was working at the Department of Microbiology, Immunology and Molecular Genetics, University of Kansas Medical Center, Kansas City, Kansas, USA, as a post-doctoral fellow from 1993-1995. After that, Professor Hirohashi belonged to Department of Emergency and Critical Care Medicine, Kurume University Hospital (1995-2006) and Hiroshima University Hospital (2007-2017). He was working at the Advanced Emergency and Critical Care Center as an Emergency and Critical Care physician, a Doctor Helicopter (Helicopter Emergency Medical Service) flight staff, a Doctor Car (ambulance with a doctor onboard) staff and a DMAT (Disaster Medical Assistance Team) staff.

Professor Hirohashi became a professor of Department of Radiation Disaster Medicine, Research Center for Radiation Casualty Medicine, Research Institute for Radiation Biology and Medicine, Hiroshima University in February 2017. He is an active member of the special committee for Nuclear Disaster Medical Responses in Japan Association of Acute Medicine. He has a central role of the training courses for Nuclear Emergency Medical Assistance Team at many Nuclear Disaster Core Hospitals as the associate director of Radiation Emergency Medicine Promotion Center, Hiroshima University.

Gregory Holmes-Hampton, PhD
Shaowen Hu, PhD
Shaowen Hu is a Senior Scientist at KBR and NASA Johnson Space Center, Houston. He has conducted research at NASA’s Space Radiation Program Element during 2006-2017 and at Space Radiation Analysis Group since 2017. His research interests include theoretical analysis, data analysis, numerical modeling, large-scale scientific computation, research programming and software development in chemical, physical, biological and other related systems. His recent research projects include multi-scale modeling of skin homeostasis and radiation damage, molecular dynamics simulations of Ku-DNA binding system, biomathematical modeling of acute radiation risk and hematopoiesis alteration, real time modeling of space radiation exposure and health risk assessment, space radiation environment modeling for SPEs and GCR, and software development of ARRBOD, NSCR, HemoDose, WASPE, and ARRT.

Jay M. Johnson, EdD, CEM, CRMP, MEP
Jay Johnson is an Emergency Management and Business Continuity Coordinator for Mayo Clinic. He has been appointed as an Assistant Profession of Healthcare Administration in the Mayo Clinic College of Medicine and Science. With years of experience in Healthcare Emergency Management, Fire-Rescue and Emergency Medical Services (EMS), Johnson brings a broad range of knowledge to the Clinical Business Continuity and Emergency Management Team. Having extensive involvement in multi-agency coordination and through leadership roles in Regional Healthcare Preparedness Coalition implementation, he brings a collaborative community-based perspective to the team. Johnson has Bachelor of Science in Public Safety Administration and Master of Science in Leadership with a concentration in Crisis Management and Emergency Preparedness from Grand Canyon University and a Doctor of Education in Organizational Development with a concentration in Healthcare Administration from Grand Canyon University.

Brent D. Kaziny, MD, MA, FAAP
Dr. Brent Kaziny completed his medical degree at the University of Texas – Houston, School of Medicine. He started his pediatric intern year at Tulane University, where he received the Hurricane Katrina Code Grey Hero Award for his efforts caring for patients and assisting with the evacuation of Tulane Hospital during the aftermath of Hurricane Katrina. His experience during Hurricane Katrina ignited his interest in pediatric disaster preparedness.

After completing his intern year, Dr. Kaziny transferred to Baylor College of Medicine, where he completed his residency training in general pediatrics. He completed his fellowship in Pediatric Emergency Medicine at the University of Utah in Salt Lake City. He was also able to complete a variety of training programs in topics ranging from incident command to radiation emergencies and toxic chemical treatment. Upon completing fellowship, Dr. Kaziny took a position as an assistant professor at Baylor College of Medicine and Texas Children’s Hospital. On a national level, he serves as the Director of the Disaster Domain for the Emergency Medical Services for Children – Innovations and Improvement Center.

At Texas Children’s Hospital, he works in the Emergency Center, is Director of All Hazards Preparedness and Response for the Section of Emergency Medicine, and serves as the Medical Director of Emergency Management and Co-Chair of the Emergency Management Committee. Most recently, Dr. Kaziny was actively involved in Texas Children’s Hospital’s response to Hurricane Harvey.
Vidya P. Kumar, PhD
Vidya Kumar is a staff scientist at AFRRI with the Henry M Jackson Foundation, Bethesda, MD. She is a reviewer for journals: Photochemistry and Photobiology, Oxidative Medicine and Cellular Longevity, International Immunopharmacology and Radiation Research. Her work experience includes AstraZeneca India, Bangalore, India (June 1990-July 2007), drug development of antimalarials, broad spectrum antibacterials and drugs/ combinations against MDR Mycobacterium tuberculosis.

Kumar was at University of Oklahoma, Norman, Okla. (Aug 2007-Jan 2012) where she studied mechanistic enzymology. While at Yale University School of Medicine, New Haven, Conn. (Feb 2012-Jan 2015), she studied pre-steady state kinetics and protein crystallography with inhibitors of TS-DHFR. She was also an instructor for Structure based drug-design course and developed flow cytometric assays as an alternative to traditional microscopy for detection of Babesia in blood. She also developed a murine model to screen new drugs against Babesia infection. She is currently a staff scientist at AFRRI, Bethesda, Md. (Feb 2015-present) where she is actively involved as a PI working on development of a partial radiation model in mice. She is also a co-PI on IACUC protocols and handles day to day planning and work related to screening of radiation countermeasures.

Joe Lamana, MPA, BSN
Joe Lamana is the Director of the Readiness Division in the Office of Emergency Management and Medical Operations within the Office of the Assistant Secretary for Preparedness and Response (ASPR), where he oversees the National Disaster Medical System, the National Hospital Preparedness Program, and the Medical Reserve Corps. He was most recently assigned as the Director of the Operations Division in the Office of Emergency Management, for the ASPR, responsible for the department’s responses to disasters and emergency operations.

Additionally, Lamana served as the National Patient Movement Coordinator in ASPR for more than eight years. Recent major disaster response operations that he has been involved include the H1N1 Pandemic (2009), Haiti Earthquake and Gulf Oil Spill (2010), the Japan Earthquake and Joplin Tornado (2011), Hurricane Sandy (2012) and the Sandy Hook Shooting (2012), Ebola Outbreak (2014), Zika Outbreak (2015), Hurricanes Harvey, Irma and Maria (2017), and Hurricanes Michael and Yutu (2018).

Lamana also services as the U.S. Government medical representative and the Co-Vice Chair to NATO’s Joint Health Agriculture and Food Group, a committee committed to developing emergency preparedness and response activities within member nations. His international experience led him to being one of the key architects/writers of an international planners’ course provided the Defense Institute of Medical Operations. Lamana has extensive background as a clinician to include serving as Service Director for critical care at a community hospital in western North Carolina. He has thorough knowledge of military health support and international medical engagements because of more than 21 years of military experience in the Air Force and Navy, serving in the United States and abroad.
Angela Leek, MS
Angela Leek is the bureau chief for Radiological Health at the Iowa Department of Public Health, where she is responsible for the licensing and inspection activities for all aspects of radiation producing machines and radioactive materials within Iowa. Leek is also responsible for coordinating dose assessment and technical advice throughout radiation emergency response, including coordination of dose monitoring and tracking for responders and the public. In addition to her responsibilities in Iowa, Leek is also active in supporting the development and implementation of the Radiological Operations Support Specialist (ROSS) program. She maintains active membership with the Health Physics Society, and currently serves as Iowa’s State Liaison Officer to the Nuclear Regulatory Commission, as Council Chair for Suggested State Regulations on the CRCPD Board of Directors and is Councilor for the North Central Chapter of the Health Physics Society. Leek earned her MS in Radiation Health Physics from Oregon State University.

Kenneth Nollet, MD, PhD
Dr. Kenneth Nollet earned MD and PhD degrees from the Mayo Clinic and stayed at Mayo to specialize in pathology and transfusion medicine. After Mayo, he joined the American Red Cross in St. Paul. There, he also served as blood bank medical director of the Minneapolis Veteran’s Affairs Medical Center and became an assistant professor at the University of Minnesota.

Dr. Paul Holland invited Dr. Nollet to be an associate medical director at BloodSource in Sacramento, a position held until Dr. Holland’s retirement. Thereafter, Dr. Nollet was recruited to be the Australian Red Cross Blood Service’s National Medical Education Program Manager and to work as a transfusion medicine specialist in Queensland.

By invitation of Professor Hitoshi Ohto, Dr. Nollet joined Fukushima Medical University’s Department of Blood Transfusion and Transplantation Immunology in 2008. Contrary to evacuation advice given to American citizens after the Great East Japan Earthquake, Dr. Nollet stayed at Fukushima Medical University to participate in disaster relief and, for the long term, Fukushima Prefecture’s revitalization.

Racheli Ofir, PhD
Racheli Ofir, VP of Research of Pluristem Ltd., holds a PhD from the Technion, Israel institute of technology. Ofir is responsible for the development and characterization of PLX cells, Pluristem’s leading placenta derived cell product candidate, including pre-clinical evaluation of the biological activity of the cells, determining the safety profile and PK of PLX cells, and all pre-clinical aspects of the PLX regulatory process, including the communications with the relevant regulatory authorities worldwide. Ofir has extensive research experience in molecular cell biology, embryology and cytogenetics as well as broad professional experience in the field of human cell therapy. Ofir is the co-author of numerous peer reviewed articles and a co-inventor on numerous patents and patent applications in the field of cellular therapy.
Miracle Okoye, MSc
Miracle Okoye is a graduate of Concordia University, where she earned her master’s degree in public health with emphasis on epidemiological studies. Having served in a research role with the University of Texas MD Anderson Cancer Center for three years post graduate school, she started with Texas Children’s Hospital (TCH) in the Bone Marrow Transplant Department. Taking an active role as part of the institution’s RITN preparedness efforts, Okoye has taken a primary coordination role. In 2018, she assisted in the planning, development and execution of TCH’s first functional exercise. With the success of the functional exercise and tabletop, Okoye and team are preparing for the full-scale exercise, cur conducted in April 2019. She continues toward her PhD in Public Health choosing to focus on epidemiology, however she notes that her involvement in RITN has introduced her to research possibilities related to radiation injury data mining as it relates to epidemiological incidences.

Paul Okunieff, MD
Dr. Paul Okunieff’s research is focused on the mechanisms of radiation toxicity. Over the years, he has primarily emphasized the lungs, soft tissues, bone marrow, and gastrointestinal tracts. Dr. Okunieff is actively involved in the creation and commercial development of several biomarkers for radiation and drug response and the development of agents against radiation toxicity. He has significant administrative experience as a branch chief of Radiation Oncology at the National Cancer Institute, chair of the Department of Radiation Oncology at the University of Rochester, NIAID CMCR PI, chair of the CMCR Steering Committee, chair of the UF Health Cancer Center, and now chair of the UF Department of Radiation Oncology.

He has extensive experience overseeing clinical protocol development; clinical services; medical physics and medical physics research; a radiobiology basic research team focusing on normal tissue effects; basic and clinical radiobiology training; and a physical chemistry group developing high-LET radiopharmaceuticals and related chelates. Finally, he has worked to develop agents that reduce gastrointestinal toxicity—Enterade. His clinical research has also focused on radiation modifiers and biomarkers of normal tissue response to radiation.

Christian Otto, MD, MMSc
Dr. Christian Otto is the Director of TeleOncology for Memorial Sloan Kettering Cancer Center (MSKCC), and an attending physician in the MSKCC Urgent Care Center. He is board certified in emergency medicine and family medicine. Dr. Otto has a 23-year history working in the field of telemedicine. He completed graduate studies in telemedicine at the University of Texas Medical Branch, which operates one of the largest telemedicine programs in the country. Prior to joining MSK in 2017, Dr. Otto spent seven years as a Lead Scientist at the NASA Johnson Space Center in Houston, TX, and acquired over 800 hours of real-time medical data from astronauts on the International Space Station via telemedicine, and he co-authored NASA’s Telemedicine Strategy for Deep Space Exploration.

Previously, Dr. Otto was a Regional Medical Director with the Ontario Telemedicine Network, one of the largest clinical telemedicine programs in operation. He served two one-year tours with the National Science Foundation as the Station Physician at the Amundsen-Scott South Pole Station, and the McMurdo Research Station in Antarctica, where he ran the onsite telemedicine program and conducted telemedicine research. Dr. Otto has also led telemedicine research projects on Mt. Everest and Mt. McKinley, and in the High Arctic for the Canadian Space Agency. Dr. Otto is the recipient of the American Institute of Aeronautics and Astronautics Presidential Citation, the NASA Achievement Award, and the U.S. Congressional Polar Medal.
Debasish Roychowdhury, MD
Dr. Debasish Roychowdhury serves as a director and the Chief Medical Officer of PTx. Dr. Roychowdhury is a medical oncologist and a proven leader in the pharmaceutical industry with more than 15 years of industry senior management experience and 14 years of patient care, academic research and teaching experience. Prior to PTx, he served as the Chief Medical Officer of Seragon through the company’s acquisition by Roche. Prior to Seragon, Dr. Roychowdhury served as the Senior Vice President and Head of the Global Oncology Division at Sanofi, the Vice President for Clinical Development at GlaxoSmithKline, and directed the Oncology global regulatory group at Eli Lilly and Company. Prior to his role in industry, he served as faculty member at the University of Cincinnati. He trained at the All India Institute of Medical Sciences and University of California, San Francisco. Dr. Roychowdhury is a member of the Board of Directors for Radius Health, Celyad, Lytix Biopharma AS and Fund+. 

Frank Rutar, MSc
Frank Rutar is the director of Radiation Safety for the University of Nebraska Medical Center (UNMC), its affiliated hospital Nebraska Medical, and the Omaha VA Hospital. Rutar has been with UNMC for 23 years and is certified in Comprehensive Health Physics by the American Board of Health Physics. As Director of Radiation Safety, he is responsible for the safe and compliant use of ionizing radiation used in research and patient care. Rutar is also the Radiation Safety Officer for Nebraska's Radiation Health Center, which is located at UNMC/Nebraska Medicine and was established to handle radioactively contaminated or highly exposed victims.

Colleen M. Ryan, MD, FACS
Dr. Colleen Ryan is a Professor of Surgery at Harvard Medical School and has more than 30 years of experience in burn surgery at the Sumner Redstone Burn Center at the Massachusetts General Hospital and the Shriners Hospitals for Children-Boston. Dr. Ryan has clinical experience in responding to several burn surge disasters including the 2003 Rhode Island Station Fire. She is Chairperson of the Organization and Delivery of Burn Care Committee of the American Burn Association. She is the ABA representative to the National Academies of Sciences, Engineering and Medicine Forum on Medical and Public Health Preparedness for Disasters and Emergencies and a Co-Investigator along with Dr. Paul Biddinger on the ASPR Massachusetts RHDRS Pilot project. Dr. Ryan has published more than 200 peer-reviewed papers in the field of surgery, disaster management, outcomes and burn care, and leads national and international efforts for burn surge preparedness along with Dr. James Jeng.

Kevin Schlosser
Kevin Schlosser has 40 years of experience in EMS (4 years EMT-Basic; 36 years Paramedic); Hospital Emergency Management for more than 20 years. He is a volunteer firefighter, County Haz-Mat Team member in South Dakota and Wisconsin. He is now entirely dedicated to Healthcare Emergency Management for Avera McKennan Hospital in Sioux Falls, SD. Avera has hospitals, clinics, and long-term care centers in five states: Iowa, Minnesota, Nebraska, North Dakota and South Dakota.
Neel Sharma, PhD
Neel Sharma received his PhD in Neuroscience from Himachal Pradesh University, Shimla and PGIMER Chandigarh India. After receiving the PhD degree, he accepted a postdoctoral fellowship at National Eye Institute, a division of the NIH, Bethesda, USA. Currently, he works as Junior Scientist at Armed Forces Radiobiology Research Institute, Bethesda, and his research focuses on long-term animal studies related to analyzing non-toxic methods to treat radiation exposure and delayed effects.

During his PhD, he studied genetic screening of northern Indian age-related macular degeneration (AMD) patients to analyze the biomarkers and other risks in AMD patients. During his postdoctoral fellowship at the NIH, he studied the genetic variation in FBN2 gene that causes retinal degeneration in AMD patients. While at the NIH, he examined a protein (Cp110) in mouse model that causes ciliopathy. Sharma is currently working as Junior Scientist at Armed Forces Radiobiology Research Institute.

Mary Sproull, PhD
Mary Sproull is a scientist in the Radiation Oncology Branch at the National Cancer Institute. Her biodosimetry work primarily focuses on development of new dose prediction animal models using a proteomic approach. She is also a doctoral student at George Mason University, where she is pursuing her doctorate in Weapons of Mass Destruction and Counterterrorism studies.

Daniela Stricklin, PhD, MPH
Daniela Stricklin is the Program Manager in the Office of Domestic and International Health Studies, DOE. Stricklin serves as a Program Manager at the Department of Energy Office of Domestic and International Health Studies supporting worker health studies and translational research approaches to improve health risk assessment. Before joining DOE, Stricklin was a senior science advisor for Applied Research Associates. She led interdisciplinary health effects projects using cutting-edge techniques in modeling to describe the mechanistic effects of exposures, injury, combined insults, and treatment of these effects. She served on the Oak Ridge Associated Universities (ORAU) Distinguished Scientists Advisory Board, the Medical Technology Enterprise Consortium (MTEC) Board of Directors and is a U.S. representative on the NATO Research Task Group for Radiation Bioeffects.

Previously, Stricklin worked with the National Academy of Sciences (NAS) supporting the Radiation Effects Research Foundation (RERF) program, studies on radioactive waste forms, and medical diagnostic radiation exposures. As a guest researcher at Swedish Defence Research Institute (FOI), she examined environmental radioactive contamination from the Chernobyl accident, established biodosimetry capabilities, initiated an R&D program for early diagnostics, led health risk assessments in peacekeeping missions, and coordinated a European Union (EU) project to harmonize emergency response protocols. She received her PhD in Environmental Health from Johns Hopkins based on radioanalytical studies of chelators used to treat lead poisoning. She was selected as a postdoctoral fellow in the DOE Radiation Health program and earned an MPH in Molecular Epidemiology from the University of Pittsburgh by applying correlation analyses to radiation biomarkers used in epidemiological follow-up if Chernobyl cleanup workers.
Steven G. Swarts, PhD

Steven Swarts, PhD, is a research associate professor in the Department of Radiation Oncology at the University of Florida. He did his doctoral thesis research in elucidating the radiation chemistry of DNA and radioprotective thiols under the mentorship of Dr. Michael Sevilla. Swarts received a PhD in Biomedical Sciences with a specialization of Health and Environmental Chemistry at Oakland University in 1987. Between 1988-1992, he did a post-doctoral fellowship under Dr. Kenneth Wheeler at Wake Forest University Medical Center demonstrating the accessibility hypothesis regarding the repair of radiation-induced DNA strand breaks and base damage.

From 1992 through 2001, Swarts remained at Wake Forest University as an assistant then associate professor in Radiation Oncology, studying the reaction pathways of free radicals to form end-products in irradiated DNA, and developing several instruments based bioanalytical methods for detection and quantification of biomarkers of cancer risk and tumor response. From 2001-2006 Swarts to conducted assessments of human environmental and occupational exposures to radioisotopes and the health risk associated with these exposures while at Syracuse Research Corporation. From 2007-2010 (University of Rochester) and continuing at the University of Florida (2010-present) in the Departments of Radiation Oncology, Swarts has been working on the development of mitigators of radiation induced normal tissue injury in GI and bone marrow, in addition to the development of rapid assays for assessing the extent of radiation injury to normal tissue and tumor response to radiation therapy.

Bob Terbrueggen, PhD

Bob Terbrueggen is the Founder and CEO of DxTerity Diagnostics, a Los Angeles-based molecular diagnostics company specializing in the development of low-cost, high throughput genomic tests. Prior to founding DxTerity, Terbrueggen was director of Research and Development for Clinical Micro Sensors (CMS) and Motorola Life Sciences. He received his PhD in Chemistry from the California Institute of Technology (CalTech), and his BS in Chemistry and Molecular Biology for the University of Michigan. He is an inventor on 24 issued U.S. patents.

Kathryn Todd, PhD

Kathryn Todd received her PhD in Physics from Stanford University in 2009 and has worked at SRI since 2010 as a research engineer, program manager and associate laboratory director. Her research and development interests include point-of-care in vitro diagnostics, nanopore-based molecular diagnostics, and two-dimensional electronic materials.
Tener Veenema, PhD, MPH, MS, RN, FAAN
Tener Veenema is a Professor of Nursing and Public Health at the Johns Hopkins School of Nursing and the Johns Hopkins Bloomberg School of Public Health. An internationally recognized expert in disaster nursing and public health emergency preparedness and as CEO of the Tener Consulting Group, LLC, Veenema has served as Senior Scientist to numerous federal agencies. An accomplished researcher, Veenema is a member of the National Academy of Medicine Forum on Medical and Public Health Preparedness and an elected Fellow in the National Academies of Practice, American Academy of Nursing and the Royal College of Surgeons, Dublin, Ireland. Veenema is editor of Disaster Nursing and Emergency Preparedness for Chemical, Biological and Radiological Terrorism and Other Hazards, 4th Ed.

Veenema was awarded the Florence Nightingale Medal of Honor (International Red Crescent, 2013) the highest international award in Nursing. She received a Fulbright U.S. Scholar Award (2017), served as the 2017-18 Distinguished Nurse Scholar-in-Residence at the National Academy of Medicine, and was recently awarded the Columbia University School of Nursing Distinguished Alumni Award for her Distinguished Career in Nursing.

Lynne Wathen, PhD
Lynne Wathen joined BARDA in 2010 and currently serves as a Biodosimetry Team Leader in the Division of Diagnostics, Devices, and Device Infrastructure (DDDI) of the Biomedical Advanced Research and Development Authority (BARDA) within the Office of the Assistant Secretary for Preparedness and Response (ASPR) at the U.S. Department of Health and Human Services (HHS). Her duties include programmatic and technical oversight of Project Bioshield contracts targeting diagnostic development to detect CBRN threats. Wathen previously served as a Global Program Leader for development of vaccines, drugs, diagnostics and devices at pharmaceutical companies and contract research organizations. She led oncology, antiviral, antibiotic, women’s health and vaccine clinical studies with novel investigational medications and developed in vitro diagnostics.

David Weinstock, MD
Dr. David Weinstock is a Professor of Medicine at Dana-Farber Cancer Institute and Harvard Medical School. He received his medical degree from George Washington University School of Medicine in 1997. Dr. Weinstock subsequently completed his residency in Internal Medicine at New York Hospital/Cornell, and his fellowship in Medical Oncology and Infectious Diseases at Memorial Sloan-Kettering Cancer Center. He joined the staff of Dana-Farber Cancer Institute and Brigham and Women’s Hospital in 2008, where he is a medical oncologist and directs the Weinstock Laboratory, a translational research program focused on novel therapeutics for lymphoid malignancies. His research focuses on the pathogenesis and targeting of lymphoid malignancies. Dr. Weinstock previously served as the Medical Advisor to RITN and a member of the National Preparedness and Response Science Board.
Jessica Wieder
Jessica Wieder is the Director of the U.S. Environmental Protection Agency's (EPA) Center for Radiation Information and Outreach and serves as the senior public information officer for the EPA's Radiological Emergency Response Team. She was part of the team tasked with communicating about EPA's efforts and radiation levels in the United States during the 2011 Fukushima Daiichi nuclear accident. Wieder has facilitated international panels on public communication about radiation risks as part of the Global Initiative to Combat Nuclear Terrorism. She presented at the 2018 International Atomic Energy Agency's International Symposium on Communicating Nuclear and Radiological Emergencies to the Public. Wieder was part of the radiological contingency planning team for the 2011 launch of the Mars Science Laboratory and is working on the anticipated Mars 2020 launch.

Jeff Wren, MBA
Jeff Wren is the manager of Be The Match BioBank and has been with NMDP/Be The Match since 2011. During his tenure, Wren’s primary roles have involved using existing NMDP/Be The Match capabilities to operationalize new programs and services. Wren also leads the Operations teams that deliver these services. He has a deep understanding of NMDP/Be The Match capabilities and the role NMDP/Be The Match plays in the bone marrow transplant industry. Wren will be responsible for operationalizing BioBank and ensuring BioBank development meets its stated goals.