AFRRI

Uniformed Services University

Armed Forces Radiobiology Research Institute

Biennial Report

Fiscal Years 2024 and 2025

The opinions and assertions expressed herein are those of the author(s) and do not reflect the official policy or position of the Uniformed Services University of the Health Sciences or the Department of War.

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DIRECTOR'S MESSAGE

As we reflect on Fiscal Years 2024 and 2025, I am profoundly proud of the incredible dedication and scientific excellence demonstrated by every member of our multi-disciplinary team. Operating the Department of War's (DoW) only institute dedicated solely to radiological and nuclear (R/N) medical defense, our dedicated professionals have proven that AFRRI is a critical force multiplier for our nation's security and the protection of our Joint Warfighters. Across all departments, we achieved historic milestones, impeccable inspections, and groundbreaking scientific progress:

- Exemplary Operations & Safety: The Health Physics Department (HPD) secured a perfect US Army Test, Measurement, and Diagnostic Equipment Activity (USATA) audit with zero deficiencies and renewed the Nuclear Regulatory Commission (NRC) High-Level Cobalt-60 license through 2039.
- Unprecedented Radiation Facilities Productivity: The Radiation Sciences Department (RSD) executed a record-breaking year, performing 433 TRIGA reactor startups to support over 3,000 experiments. The team also completed 28 mission-essential component irradiations for the US Air Force, qualified a historic seven Senior Reactor Operators, and passed multiple NRC inspections with zero violations.
- Scientific Breakthroughs: The Scientific Research Department (SRD) published 71 peer-reviewed articles and advanced our pipeline of over 20 Medical Countermeasures (MCMs), notably holding a highly informative FDA Type C to explore the use of Nplate as a pre-exposure prophylactic against Hematopoietic-Acute Radiation Syndrome (H-ARS). The scientist also provided indispensable subject matter expertise (SME) to NATO, CASSANDRA-E exercise, Israeli Medical Defense Force, SHORESH, and a dozen international partners.

- Expanding Global Readiness: Military Medical Operations (MMO) staff trained more than 1,500 US and international partners via Medical Effects of Ionizing Radiation (MEIR) courses. The creation of the new virtual MEIR program increased our global reach while resulting in a $200K annual cost avoidance. AFRRI Medical Radiobiology Advisory Teams (MRAT) delivered critical SME support to SOCOM for their pre-deployment preparation for OPERATIONs MIDNIGHT HAMMER and EPIC FURY.

Exciting Expectations for FY26, FY27, and Beyond:

Looking ahead, AFRRI will guarantee the DoW is medically and operationally prepared to preserve lethality in any contested R/N environment. We anticipate filing for Emergency Use Authorizations (EUA) for two leading therapeutics, BIO-300 and Nplate, and advance field-deployable triage solutions, such as the CellRADx in the future. To address global volatility, we are expanding education beyond centralized MEIR courses to offer a Forward-Deployed Mobile Readiness & Clinical Integration course which facilitates real-time readiness within a unit's actual footprint. We also plan to formalize procedural training in the TRIGA reactor, with a goal to provide training resources to develop and maintain proficiency in critical trauma management, surgical techniques, and extraction procedures for radiologically contaminated wounds alongside elite units like SOCOM and the FBI Hostage Rescue Team. Finally, to secure these capabilities for decades to come, we are strongly advocating for transformational FY27-31 investments: a $10M annual MCM pipeline, $20M for infrastructure upgrades, $12M for TRIGA refueling, and the recruitment of a senior-level civilian Science Director.

The continuous and invaluable contributions of the AFRRI team will ensure we successfully execute a strategic vision to enhance lethality for the operational force. Thank you for your unwavering commitment to our mission, our Joint Warfighters, and our Nation. Let's harness this incredible momentum and make FY26 and FY27 our most impactful years yet!

AFRRI LEADERSHIP

CAPT Burke, Gerald
USN, MSC, Physicist
AFRRI Director

Col Whiteway, Susan
USAF, MC, Physician
AFRRI Deputy Director

MAJ Stewart, Michael
USA, MSC, Nuclear and Countering Weapons of Mass Destruction Officer, Infantry Officer
AFRRI Executive Officer

LtCol Lang, Michael
USAF, MC, Physician
AFRRI MMO Department Head

Mr. Cook, Andrew
AFRRI RSD Department Head

CDR King, Taj
USN, MSC, Biochemist
AFRRI SRD Department Head

CPT Kern, Justin
Chief, Finance
RSG Department Head

LTJG Johnson, Nadira
USN, MSC, Healthcare Administrator
AFRRI Director for Administration

Chief Henry, Kevin
USN
Senior Enlisted Leader

ABOUT AFRRI

MISSION

The mission of AFRRI is to defend the Nation and our Joint Warfighters from nuclear and radiological threats through innovative research, specialized education, survivability component testing, and rapid operational response to ensure the Joint Force can survive and operate in contested radiological/nuclear environments.

VISION

AFRRI is committed to delivering critical medical and testing capabilities that close critical gaps, ensuring the Department of War is medically and operationally prepared to preserve operational force resilience and fighting strength in the event of adversarial employment of nuclear weapons.

AFRRI BY THE NUMBERS

AFRRI BY THE NUMBERS

2024 – 2025

GLOBAL EDUCATION & OUTREACH

1,584

MEIR STUDENTS TAUGHT

HOSTED **OVER 200** COMBINED STAKEHOLDERS

ADVANCED RADIATION OPERATIONS

433 TRIGA REACTOR STARTUPS

TOTAL IRRADIATION: **359 HOURS**

SPECIFIC IRRADIATIONS

263 LINAC IRRADIATIONS

156 HIGH-LEVEL COBALT IRRADIATIONS

RESEARCH PUBLICATIONS

71

PEER-REVIEWED PUBLICATIONS

TECHNICAL REPORTS

20

REPORTS

SCIENTIFIC FUNDING

FY24
$6M

FY25
$4.4M

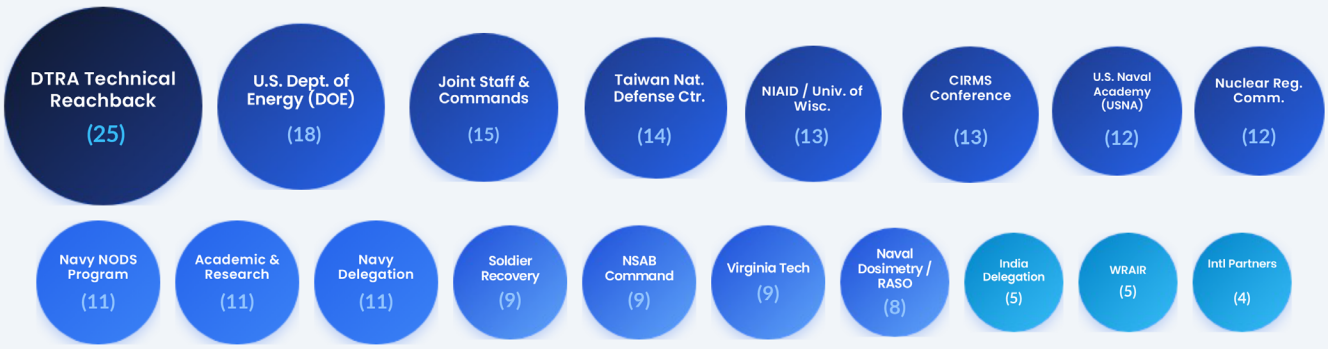
PATENTS AWARDED

TWO

PATENTS

AFRRI

AFRRI Stakeholders and Interns



Combined Stakeholder Total: 204 | USU Summer Interns: 35

DEPARTMENT ACCOMPLISHMENTS

DIRECTOR'S SUITE (DIR)

Under the direction of CAPT Burke, AFRRI continues to advance military-relevant research goals within the field of radiological and nuclear medical defense. Decades of research on critical threats have led to substantial progress, focusing on medical countermeasures for acute radiation syndrome (ARS), advanced biodosimetry, and combined injury responses. With increasing coordination across the Department of War and global chemical, biological, radiological, and nuclear (CBRN) defense networks, our future goals are anchored in enduring efforts to preserve Joint Force lethality on a nuclear battlefield. By continuing to build and nurture basic, translational, and operational research alongside our allied partners, we aim to better serve, protect, and sustain active duty service members and their families facing these critical threats.

STRATEGIC OUTCOMES & KEY DELIVERABLES (2024–2025)

1. Strategic Policy Advising & Senior Leadership Engagement

- **Congressional & DoW Briefings:** Delivered numerous high-level briefings on radiological/nuclear (R/N) medical countermeasures (MCMs) and biodosimetry to the Joint Staff (J8), the Defense Science Board (DSB), and Congress.
- **Policy Advancement:** Engaged with JRO-CBRND to advocate for the creation of a R/N defense program and Milestone Decision Authority (MDA), critical to secure enduring funding for advancing medical countermeasures and R/N medical defense.
- **Executive Oversight:** Hosted DASW (CBRND), OMB officials, and BG Evelyn Laptook (DASW HA) to demonstrate AFRRI's role in counter-nuclear threats and capabilities within the Defense Planning Guidance 2027–2031.
- **SOCOM Alignment:** Briefed SOCOM J10 leadership to recommend course of action on MCM policy, funding, and R/N medical defense strategies.

2. Global Outreach & International Diplomacy

- **Facility Showcases**: Provided specialized briefings to Japanese and Taiwanese Surgeon General delegations. These strategic engagements demonstrated AFRRI's unique capabilities while actively facilitating scientific diplomacy and international educational exchange among allied forces.
- **International Research:** Exchange: Fostered researcher exchange programs and MCM collaboration

with delegations from Italy, Germany, Japan, Korea, and the India Institute of Nuclear Medicine and Allied Sciences (INMAS).

3. Operational Support & Emergency Response

- **Subject Matter Expertise:** Provided exercise support to Norway for a EUCOM/NATO exercise, providing on-the-ground guidance for triage, protection, and MCM administration. Military Medical Operations (MMO) physicians deployed to Poland with the U.S. State Department to assist Ukraine in developing national nuclear detonation response plans.
- **Crisis Consultation:** Provided direct emergency medical guidance to Italy's Defence Institute for Biomedical Sciences regarding a suspected internal plutonium/americium contamination incident.

4. Interagency Research & Academic Development

- **DoW Research Partnerships:** Initiated joint studies with U.S. Army Medical Research Institute of Chemical Defense (USAMRICD) toxicology/animal models, U.S. Army Institute of Surgical Research (USAISR) irradiated blood/combined injury, and the USAF Nuclear Weapons Center (weapon component survivability).
- **Interagency Expansion:** Conducted site visits to Idaho National Laboratory (INL) to establish joint opportunities in emergency response and nuclear nonproliferation.
- **Academic Pipeline:** Partnered with the University of Nebraska Medical Center (UNMC) to explore a joint Radiobiology PhD program and NIH research consortium.
- **Facility Tours:** Led by RSD Department Head Mr. Andrew Cook, AFRRI hosted over 250 visitors and guests, showcasing our specialized capabilities to a global audience.
- **Institutional Collaboration:** The Directorate engaged in high-level conferences and technical exchanges with key partners, including the Joint Staff (J8), NATO, the World Health Organization (WHO), SOCOM J10, and the Defense Science Board.

AFRRI India Delegation Visit

HEALTH PHYSICS DEPARTMENT (HPD)

Under the direction of the AFRRI Radiation Safety Officer MAJ Jacob Vincent, HPD maintained exceptional operational readiness, achieved significant regulatory milestones, and successfully mitigated facility emergencies.

STRATEGIC OUTCOMES & KEY DELIVERABLES (2024–2025)

1. Regulatory Compliance & Quality Assurance

NRC License Renewal: Successfully secured the Nuclear Regulatory Commission (NRC) license renewal for the High Level Cobalt-60 facility. This required a comprehensive review of all associated systems and procedures, extending operational authorization through October 2039.

Zero-Deficiency Calibration Audit: Achieved a flawless biennial U.S. Army Test, Measurement, and Diagnostic Equipment Activity (USATA) inspection. HPD staff transformed the equipment calibration program, correcting 10 prior deficiencies from 2022 into a zero-deficiency operation recognized by USATA investigators as a model program for others to emulate.

2. Operational Readiness & Joint-Service Support

Continuous Facility Support: Successfully executed 411 maintenance and operational work orders in direct support of Uniformed Services University (USU) and AFRRI mission requirements.

Inter-Service Standardization: Trained a Navy Electronics Technician on the Army Calibration System, ensuring technical uniformity, cross-branch consistency, and seamless joint-service operability within the calibration program.

3. Environmental Safety & Crisis Management

Compliant Remediation: Conducted rigorous radiological and chemical analyses to ensure wastewater met all federal and state pH and radionuclide concentration requirements.

MILITARY MEDICAL OPERATIONS (MMO)

MMO equips and trains Department of War personnel and global partners for effective responses in high-risk environments through specialized education, training, and research. Throughout the year, MMO delivered critical radiation medical defense training to over 1,580 domestic and international military members, professionals, and students, significantly enhancing global operational readiness and interagency coordination.

Mr. Woodruff at the 38th Parallel Healthcare Training Symposium, Camp Humphreys, Korea

STRATEGIC OUTCOMES & KEY DELIVERABLES (2024–2025)

1. Global Education & Strategic Training

- **MEIR Course Execution:** Conducted 26 Medical Effects of Ionizing Radiation (MEIR) courses (19 domestic, 5 OCONUS, and 2 virtual), expanding the reach of critical radiological medical training.

- **Joint & Allied Force Integration:** Delivered targeted training to elite and strategic units, including Tier 1 Special Forces, Department of Energy Medics, and over 40 personnel at USSTRATCOM. Strengthened allied partnerships through training at Camp Humphreys/Camp Walker (130 ROK/U.S. personnel), Cobra Gold 24 (Royal Thai Navy/MARFORPAC), and the Australian Defence Force Special Operations Engineer Regiment.
- **Virtual Training Innovation:** Successfully launched the first virtual MEIR iterations in 2024, modernizing the curriculum delivery and expanding educational reach. From 2024 to 2025 the virtual MEIR course was taught to 282 remote students.
- **Educational Innovation:** Dr. Peacock led pioneering initiatives on Generative AI and Prompt Engineering for military medical education, hosting strategic workshops for Uniformed Services University (USU) and Walter Reed faculty.

2. Operational Readiness & Multi-Agency Exercises

- **Interagency & Special Operations Exercises:** Participated in Exercise Fused Response (SOUTHCOM/FBI) and conducted a "proof of concept" medical training course for FBI and Special Forces assets, serving as a critical companion to the US Army Special Operations Command (USASOC) Advanced Chemical and Biological Course.
- **Multinational Field Training:** Partnered with Idaho National Laboratory (INL) for a multinational research exercise focused on radiological dispersal and decontamination. Additionally, initiated pilot ARS triage training for German Special Operations Forces (Bundeswehr).
- **Real-World Crisis Consultation:** Leveraged Medical Radiobiology Advisory Team (MRAT) expertise to advise the Italian Defence Institute (ISBD) on dose monitoring and medical management for a suspected internal americium-241 contamination case.

LT Ober conducting a medical physics survey of an O Arm in the operating room at WRNMMC

3. Clinical Policy & Strategic Advisory

- **DoW Clinical Guidelines:** Contributed to the landmark first publication of the Joint Trauma System Clinical Practice Guidelines (CPG), establishing the DoW standard of care for the medical management of radiation and nuclear injuries.
- **International Strategic Support:** Provided critical radiological injury expertise to the U.S. State Department, assisting Ukraine in developing comprehensive national nuclear detonation response plans.
- **Bilateral & Homeland Defense Advising:** Col. (Dr.) Susan Whiteway was selected to lead the Radiation Medical Response Working Group for the U.S.-Israel Shoresh Meeting. Additionally, Lt. Col. (Dr.) Mike Lang served on a National Center for

Disaster Medicine and Public Health (NCDMPH) panel addressing CBRN, IND, and EMP threats to mass gatherings.

AWARDS AND PROMOTIONS

- **Awards & Institutional Recognition:** Dr. Peacock earned 2nd place in the SNMMI Correlative Imaging Competition and was officially recognized by the *American Journal of Roentgenology* for high-quality peer reviews.
- **Promotions & Leadership Appointments:** Dr. Kelly Vo was promoted to the rank of Major in June 2024. Dr. Justin Peacock was appointed as the Joint Panel Chair for the Nuclear Medicine Board.

PUBLICATIONS

- **Academic Publications & Presentations:** Published six peer-reviewed articles in the *Journal of Nuclear Medicine Technology (JNMT)*, contributed to *Military Medicine*, and presented dry decontamination research for extreme cold environments at the CSCM World Congress.

1. Daley JD, Whiteway SL, Heske CM, Dela Cruz FS, Whittle SB, Cohen-Gogo S, Collier AB, Gupta A, Ohm J, Clark A, Soragni A, Lawlor E, Setty B, Grohar PJ, Janeway K, Reed DR, Slotkin EK, Bailey KM. New Approaches to Investigate Novel Agents in Ewing Sarcoma: A Report From the Children's Oncology Group Bone Tumor Committee. Pediatr Blood Cancer. 2025 Oct;72(10):e31917. doi: 10.1002/pbc.31917. Epub 2025 Jul 24. PMID: 40879325; PMCID: PMC13092261.
2. Dietz MS, Al-Ibraheemi A, Davis JL, Hawkins CM, Craig BT, Dasgupta R, Geller DS, Shulman DS, Cohen-Gogo S, Gupta A, Whiteway SL, Slotkin EK, Heske CM, Ahmed SK, Indelicato DJ, Albert CM, Montgomery N, Sandberg JK, Grier HE, Krailo M, Isakoff MS, Rubin E, Lawlor ER, DuBois SG, Mascarenhas L, Grohar PJ, Binitie O, Reed D, Janeway K, Roberts RD, Bailey KM. Optimizing Ewing Sarcoma and Osteosarcoma Biopsy Acquisition: A Children's Oncology Group Bone Tumor Committee Consensus Statement. J Natl Compr Canc Netw. 2024 Dec 27;23(1):e247063. doi: 10.6004/jnccn.2024.7063. PMID: 39729709; PMCID: PMC11881167.
3. Peacock JG, Adams AM. Fatty Meal Hepatobiliary Scintigraphy for Gallbladder Ejection Fraction Determination. J Nucl Med Technol. 2024 Mar 5;52(1):21-23. doi: 10.2967/jnmt.123.266790. PMID: 38443104.
4. Peacock JG, Adams A. When in Doubt, Add SPECT/CT: A Case of Mistaken Identity. J Nucl Med Technol. 2024 Jun 5;52(2):181-182. doi: 10.2967/jnmt.123.266795. PMID: 38839115; PMCID: PMC11149589.
5. Peacock JG, Farrell MB. Myocardial Sympathetic Innervation Imaging. J Nucl Med Technol. 2025 Jun 4;53(2):101-103. doi: 10.2967/jnmt.125.270093. PMID: 40345821; PMCID: PMC12175993.

6. Peacock JG, Hayes HA, Connor TD. Use of a Fatty Meal Cholecystagogue Protocol in Hepatobiliary Scintigraphy for Chronic Functional Gallbladder Disease. J Nucl Med Technol. 2024 Mar 5;52(1):15-20. doi: 10.2967/jnmt.123.266789. PMID: 38443112; PMCID: PMC10924151.
7. Peacock JG, Majot H, Bansal AT, Neshiwat P, Dimeff K, Prasad K. Illuminating the Hidden: Standardizing Cardiac MIBG Imaging for Sympathetic Dysfunction. J Nucl Med Technol. 2025 Jun 4;53(2):90-100. doi: 10.2967/jnmt.124.269436. PMID: 40262827; PMCID: PMC12176009.
8. Peacock JG, Young TS. Choose Your Collimator Wisely: Inappropriate Collimator Selection During a 177Lu-DOTATATE Posttreatment Scan. J Nucl Med Technol. 2024 Sep 5;52(3):274-275. doi: 10.2967/jnmt.123.266807. PMID: 39237333.
9. Penney SW, Watson NL, Brooks DI, Whiteway SL, Warwick AB, Zanetti RC, Vasta LM. Innovative Algorithm for Incidence of Leukemia and Lymphoma in the U.S. Military Health Care System. Mil Med. 2025 Apr 23;190(5-6):e1184-e1189. doi: 10.1093/milmed/usaf054. PMID: 40036776.

LCDR (Dr.) Eggebroten observes a patient contamination survey during the Capstone exercise at DNWS MEIR Course at Kirtland AFB

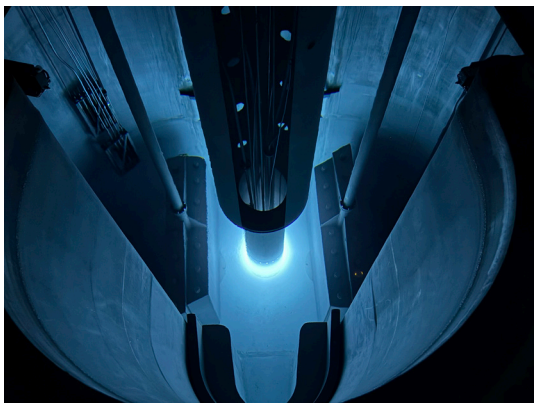
RADIATION SCIENCES DEPARTMENT (RSD)

The Radiation Sciences Department (RSD) maintained exceptionally high operational tempos across its specialized facilities, driving critical experiments, advancing military-relevant medical countermeasures, operational support, and reinforcing AFRRI's role as the DoW's premier radiological research institution.

STRATEGIC OUTCOMES & KEY DELIVERABLES (2024–2025)

1. Facility Operations & Capability Expansion

- **High-Volume Research Execution:** Supported high ops tempo experimental throughput across three primary facilities:
  - **TRIGA Reactor:** Executed 433 startups (15,084 kW-h) across 45 campaigns, 377 irradiations for a total of 2,202 samples (including organ-on-a-chip, cells, and animals) over 359 hours.
  - **LINAC Facility:** Achieved a record year with 46 sessions, 263 irradiations, and 1,826 samples, cementing its role as the facility of choice for partial body irradiations and Gastrointestinal Acute Radiation Syndrome (GI-ARS) countermeasure development.
  - **High-Level Cobalt Facility:** Conducted 76 sessions and 156 irradiations, supporting over 8,000 samples.



- **Strategic Upgrades & Diagnostics:** Strategic Upgrades & Diagnostics: Successfully characterized the neutron/gamma ratio of Exposure Room No. 1 (ER-1), allowing precise adjustments from 5% to 95% to simulate various distances from a nuclear detonation. Initiated design for a new horizontal beam line in exposure room 2. This design, involving the Short Horizontal Radiation Cannon (SHRC) and scraper windows, will allow for precisely shaped beam output to perform partial body irradiations. These capabilities are essential for the development of medical countermeasures (MCM) to treat gastrointestinal acute radiation syndrome (GI-ARS) in a mixed-field neutron/gamma environment. Contracted with General Atomics to restore the reactor's pulsing capabilities. Restoring pulsing capabilities allows the TRIGA reactor to deliver the dose in fractions of a second, more closely mimicking the

prompt radiation environment of a nuclear detonation. This capability is critical for both biological research and the testing of equipment and components under high-dose-rate conditions. Restoration efforts include troubleshooting the NPP pulsing nuclear instrumentation channel and developing software modifications to resolve data capture and transfer issues.

2. Regulatory Compliance & Operational Readiness

- **Flawless NRC Inspections:** Successfully passed comprehensive annual safety and triennial security inspections by the Nuclear Regulatory Commission (NRC) with zero violations, closing all previous open items.
- **Workforce Expertise Milestone:** Reached a historical high of seven licensed Senior Reactor Operators (SROs) after two candidates passed the NRC exams in January 2025, earning specific commendations from the NRC examiner for the quality of AFRRI's training curriculum.
- **Judicial Outreach:** Hosted Administrative Judges from the NRC's Licensing Board Panel to provide critical technical context regarding the institute's mission and radiation bioeffects.

3. Strategic Partnerships & Interagency Collaboration

- **DoW & Interagency Resource Planning:** Briefed ASW (HA) on the strategic plan and funding required to refuel the DoW's only dedicated radiation research reactor. Hosted the DOE Office of Nuclear Energy (NE-5) to discuss fuel procurement, National Scientific User Facility (NSUF) integration, and collaborative low-dose/internal contamination research.
- **Nuclear Survivability Testing:** Partnered with The Aquila Group to perform a radiation field intercomparison between the AFRRI TRIGA reactor and the White Sands Missile Range Fast Burst Reactor, directly supporting the DoW's critical need for equipment nuclear survivability testing.

4. Applied Dosimetry & Technical Support

- **Dosimetry Modernization:** Successfully reestablished both optically stimulated luminescence (OSL) and alanine EPR dosimetry capabilities, complete with new calibration sets, dosimeters, and readers. The integration of advanced dosimetry techniques, specifically Optically Stimulated Luminescence (OSL) and alanine, significantly enhances the Radiation Sources Department's (RSD) capacity to provide researchers with high-precision dosimetry services. These methodologies offer superior sensitivity and stability for various experimental conditions. Maintaining rigorous traceability to the National Institute of Standards and Technology (NIST) remains a fundamental requirement, ensuring that all measurements are consistent, reliable, and adhere to internationally recognized standards for scientific accuracy.
- **Navy Prototype Validation**: Tested and generated technical evaluation reports for several new U.S. Navy dosimeter prototypes.
- **International Exercise Support:** Provided critical dosimetry support for the DOE Nuclear Accident Dosimetry Intercomparison at the Armed Forces Radiobiology Research Institute's TRIGA Reactor.

5. Specialized Tactical Training & Education

- **Hot Zone Medical Operations:** Executed an innovative pilot program for SOCOM and the FBI Hostage Rescue Team using the TRIGA exposure room to develop tactics, techniques, and procedures (TTPs) for removing radioactive shrapnel in contaminated environments.
- **Academic & Field Workshops:** Hosted the National Intelligence University (MST667) for technical threat briefings, and conducted hands-on radioactive materials training for the U.S. Army Global Field Medical Laboratory and DHA Defense Centers for Public Health.

6. Professional Recognition & Thought Leadership

- **Strategic Forums:** Dr. David Schauer represented AFRRI on a featured panel detailing "The Future of Radiological and Nuclear Defense Programs" at the National Defense Industrial Association's CBRN Quarterly Forum.

7. Signed MOA/MOU/CRADA

MOU

1. Aquila, Inc.
2. Department of the Air Force
3. Idaho National Laboratory
4. Mirion Technologies
5. University of Washington

AWARDS

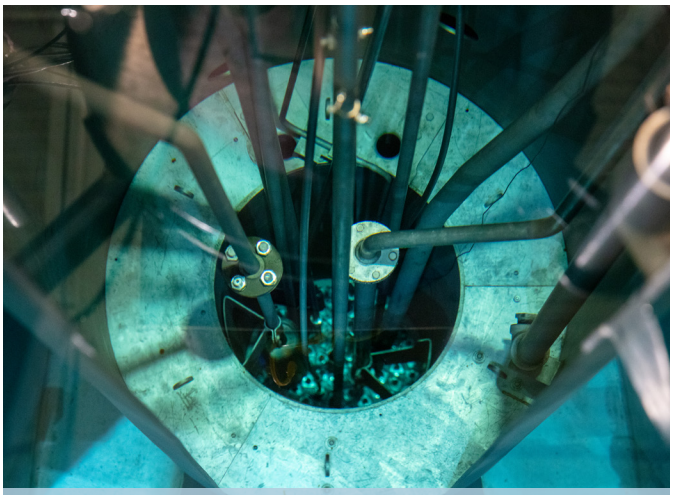
Lifetime Achievement Award: Dr. Schauer was awarded the 2025 Civilian Superior Service Award by the Military Section of the Health Physics Society, honoring 40 years of distinguished service across the Navy, NCRP, ICRU, and AFRRI.

PUBLICATIONS (2024-2025)

1. Cui, W., Hull, L., Rothstein, A., Wang, L., Lin, B., Zhai, M., Weaver, A., Xiao, M. Cytokine Profiling for the Prediction of Lethality and High-Dose Exposure in a Murine Partial Body Irradiation Model, International Journal of Molecular Sciences, 27, 3213 - 3235, (2026), https://doi.org/10.3390/ijms27073213
2. Horseman, T. S., Parajuli, B., Frank, A. M., Weaver, A., Schauer, D. A., Moran, S., Anderson, J. A., Holmes-Hampton, G. P., Burmeister, D. M., Microbiome and Inflammasome Alterations Found During Radiation Finding in a Sinclair Minpig Model of the Gastrointestinal Acute Radiation Syndrome, *Shock* 62(4):p 556-564, October 2024.| DOI 10.1097/SHK.0000000000002422
3. Kumar, V.P., Wuddie, K., Tsioplaya, A., Weaver, A., Holmes-Hampton, G.P., Ghosh, S.P. Development of Multi-Organ Radiation Injury Model with Precise Dosimetry with Focus on GI-ARS, Radiation Research, 201, 19 - 34, (2024), https://doi.org/10.1667/RADE-23-00068.1
4. Reyes, R.A., Burke, G., Delzer, G.A., Romanyukha, A., Saunders, J.L., Managbanag, J.R., Blakely, W.F. Experience and Updates of the U.S. Department of Defense Biodosimetry Network Development. Presented at the Annual Health Physics Society meeting.

5. Romanyukha, A., K. Consani, S. Y. Tolmachev. Variability of radiation doses reconstructed by EPR in teeth of former United States nuclear workers. Presented at the EPRBiodose meeting in Hirosaki, Japan, September 2024.
6. Romanyukha A., Delzer J., Multiple Alanine Pellet Dosimeter: Design and First Test Results, Radiation Measurements, 176, 107201, https://doi.org/10.1016/j.radmeas.2024.
7. Romanyukha A., Saunders J., Boozer D., Consani K., Delzer J. United States Navy Nuclear Accident Dosimetry Program: History and Current Status, Radiation Measurements, 176, 107205, https://doi.org/10.1016/j.radmeas.2024.107205.
8. Phil A, et al. Updated Results of the Nuclear Accident Dosimetry Intercomparison at the Armed Forces Radiobiology Research Institute's TRIGA Reactor (IER-602 CED-4a Report). Technical Report: Updated Results of the Nuclear Accident Dosimetry Intercomparison at the Armed Forces Radiobiology Research Institute's TRIGA Reactor Updated Results of the Nuclear Accident Dosimetry Intercomparison. 2025 March 31. https://doi.org/10.2172/2571374.

Mr. Smolinsky briefing DASW Ian Watson and guests on the TRIGA Reactor bay



AFRRI TRIGA Reactor

SCIENTIFIC RESEARCH DEPARTMENT (SRD)

Under the direction of CDR King, the Scientific Research Department (SRD) maintained a rigorous operational tempo, advancing critical medical countermeasures and cementing AFRRI's role as a global leader in radiobiology. Throughout the year, SRD researchers produced 71 peer-reviewed articles (30 co-authored with internal PIs; 41 with external PIs), 20 technical reports, and secured two patents. By increasing coordination across interagency partners and global chemical, biological, radiological, and nuclear (CBRN) defense networks, SRD's future goals remain anchored in enduring efforts to preserve Joint Force lethality on a nuclear battlefield through basic, translational, and operational research.

STRATEGIC OUTCOMES & KEY DELIVERABLES (2024–2025)

1. Medical Countermeasure (MCM) Development & FDA Pipeline

- **AMGEN Partnership & FDA Engagement:** Successfully engaged AMGEN Inc. leadership to secure sponsorship to explore a label expansion of Nplate (Romiplostim) as a pre-exposure prophylactic for Hematopoietic Acute Radiation Syndrome (H-ARS). This collaboration culminated in an FDA Type C meeting (Q1 2025), where the FDA signaled a willingness to consider the murine model for label expansion pending further simulation data.
- **Prophylactic Efficacy Breakthroughs:** Dr. Lynn Cary secured $250K from the National Strategic Research Institute (NSRI) to advance in vivo and *in vitro* testing of promising prophylactic agents (indralin, captopril).
- **GI-ARS & Targeted Therapeutics:** Dr. Vidya Kumar, alongside Eastern Virginia Medical School, secured funding to test YK-4-250 as a countermeasure against GI-ARS using AFRRI's LINAC facility. Additionally, initiated collaboration with The Tiny Cargo Company (TCC) to utilize milk exosomes for delivering XoLacta as a GI-ARS prophylactic.
- **Novel Agent Research:** Published findings in the *International Journal of Molecular Sciences* demonstrating that Fibroblast-Stimulating Lipopeptide (FSL-1) protects hematopoietic organs by modulating the TLR signaling pathway.

2. Biodosimetry & Battlefield Triage Innovation

- **Diagnostic Software Validation:** Hosted a delegation to review the FDA pipeline status of CellRADx, a biodosimetry tool designed to rapidly identify individuals exposed to >2 Gy of radiation, facilitating immediate battlefield triage decisions.

- **Biomarker Identification:** Dr. Vijay Singh published studies identifying radiation signatures in plasma to improve emergency biological dosimetry (*International Journal of Molecular Sciences*) and a multi-faceted approach to radiation biomarkers (*European Physical Journal*), the latter co-authored with three SEAP/NREIP summer interns.
- **Organ-on-a-Chip Models:** Collaborated with BARDA to advance the late Dr. C. Norman Coleman's foundational research on radiation biomarkers using organ-on-a-chip (OOC) models.

3. International Diplomacy & Global Research Integration

- **NATO Leadership & Doctrine:** Represented the U.S. at the annual NATO meeting in Oslo, Norway, providing critical updates on internal contamination agents and radiation risk communication. Facilitated a NATO workshop (StTAR) in Rome, Italy, training international clinicians on radiation triage software (BAT, WinFRAT), and led a UK-US bilateral scoping study on radiation/nuclear gaps in Porton Down, UK.
- **Bilateral Scientist Exchange Programs:** Advanced research partnerships with allied nations, including a virtual summit with Japan's National Defense Medical College (NDMC) to establish researcher exchange programs, and a site visit from the Director of the Italian Army's Defense Institute for Biomedical Sciences (DIBS) to explore bioinformatics collaboration.
- **ROK Integration:** Successfully hosted LTC Chang Iae Jo from the Republic of Korea Armed Forces Medical Command (ROK AFMC) for a six-month Engineer and Scientist Exchange Program rotation, providing comprehensive training in internal contamination, biodosimetry, and reactor operations.
- **Global Scientific Forums:** Six AFRRI scientists served as invited speakers at the International Radiobiology Conference in New Delhi, hosted by India's Institute of Nuclear Medicine and Allied Sciences (INMAS).

4. Interagency Exercises & Standardization

- **Mixed-Field Dosimetry Standardization:** Hosted NIAID and the University of Wisconsin to form an international, AFRRI-led working group focused on standardizing mixed-field neutron/gamma dosimetry.
- **Nuclear Accident Dosimetry (NAD) Intercomparison:** Hosted the IER-602 International Blind Intercomparison Exercise. Utilizing AFRRI's unique mixed-field radiation environment, eleven global laboratories (including LANL, LLNL, and the UK's AWE) rigorously tested and validated their dosimeter platforms.
- **Interagency Facility Collaboration:** Engaged leadership at Idaho National Laboratory (INL) to establish collaborative efforts in mass spectroscopy (ICP-MS) and laboratory accreditation through the Radiological Environmental Sciences Laboratory.

5. MOA/MOU/CRADA

MOU

1. Office of Naval research and USU/AFRRI for the NREIP and SEAP
2. USU/AFRRI and the Institute of Nuclear Chemistry and Technology, Poland

CRADA

1. USU/AFRRI and Tiny Cargo Company

AWARDS

AFRRI 2024 Research Day:

- HM3 Akeylah Woods, Military laboratory Technician
- Ms. Joan Smith, Civilian Laboratory Technician
- Li Wang, PhD, Junior Principal Investigator of the Year
- William F. Blakely, PhD, Senior Principal Investigator of the Year

AFRRI 2025 Research Day

- HM1 Sunshine A. Edma, LPO, Military Laboratory Technician
- Lisa K. Hull, Civilian Laboratory Technician
- Gregory Holmes-Hampton, PhD, Junior Principal Investigator of the Year
- Juliann G. Kiang, PhD, Senior Principal Investigator of the Year

PATENTS

1. William F Blakely, Eli N Glezer, John Kenten, Sudeep Kumar, Anu Mathew, Natalia I Ossetrova, George Sigal

   Biodosimetry panels and methods

   US Patent 11,967,410

   2024/4/23

2. William F Blakely, Eli N Glezer, John H Kenten, Sudeep Kumar, Anu Mathew, Natalia I Ossetrova, George Sigal

   Biodosimetry panels and methods

   US Patent App. 18/595,584

   2024/10/17

GRANT AWARDED IN 2024-2025

AFRRI grant funding for intramural 6.2 (applied research) totaled to $2,538,097

Studying the Roles of Amphiregulin in Multi-Organs of Mice Exposed to Partial Body Irradiation	Percent Effort: Funding Agency: Period of Funding: Total Cost:	2% AFRRI 2024-2025 $101,794
Mitigating Radiation-Induced Multi-Organ Injuries by Targeting the Complement System	Percent Effort: Funding Agency: Period of Funding: Total Cost:	22% AFRRI 2024-2026 $124,176
The Biological and Behavioral Effects of Chronic, Low Level Radiation Exposure	Percent Effort: Funding Agency: Period of Funding: Total Cost:	40% AFRRI 2024-2026 $636,101

Mechanisms of Radiation-Induced Deficits in Sustained Attention and Social Processing.	Percent Effort: Funding Agency: Period of Funding: Total Cost:	20% AFRRI 2024-2026 $51,226
Circulating MicroRNAs as Radiation Biodosimeters: Evaluation of Organ Responses	Percent Effort: Funding Agency: Period of Funding: Total Cost:	20% AFRRI 2024-2025 $175,130
Biological and Physiological Effects of High LET Radiation: Differential Effects Of Sex	Percent Effort: Funding Agency: Period of Funding: Total Cost:	40% AFRRI 2024-2026 $548,847
Exploration of Microbiome and Transcriptome Responses Across Anatomical Sites and Radiation Injury Patterns for Diagnostic and Therapeutic Value	Percent Effort: Funding Agency: Period of Funding: Total Cost:	50% AFRRI 2024-2025 $83,726
L-Histidine as a Potential Protector for Radiation+Wound-Induced Organ Injury and Mortality	Percent Effort: Funding Agency: Period of Funding: Total Cost:	53% AFRRI 2024-2026 $122,983
Development of a Partial Body Irradiation Murine Model to Study Injury to Lungs and Vascular Endothelial Damage and Evaluate Efficacy of Prophylactic Medical Countermeasures: YK-4-250	Percent Effort: Funding Agency: Period of Funding: Total Cost:	3% AFRRI 2024-2025 $112,243
Combat Operations at Low Level Research: Multi-Organ System In Vivo Approach	Percent Effort: Funding Agency: Period of Funding: Total Cost:	60% AFRRI 2024-2026 $90,613
Biomarkers for the Development of BIO 301 as a Prophylactic Radiation Countermeasure for the Acute and Delayed Effects of Radiation Exposure	Percent Effort: Funding Agency: Period of Funding: Total Cost:	5% AFRRI 2024-2025 $134,155
Mechanisms of L-citrulline for Mitigation of Radiation Combined Injury in a Mouse Model	Percent Effort: Funding Agency: Period of Funding: Total Cost:	10% AFRRI 2024-2025 $133,653
Assessing the Efficacy of Vasculotide in Preventing Combined Ionizing Radiation with Skin Wound Injury	Percent Effort: Funding Agency: Period of Funding: Total Cost:	20% AFRRI 2024-2026 $123,837
Evaluation of Lisinopril as a Mitigator for Combined Ionizing Radiation and Skin Wound Injury	Percent Effort: Funding Agency: Period of Funding: Total Cost:	10% AFRRI 2025-2026 $47,265

Develop New Mitigative/Therapeutic Countermeasures for Radiation Injury: Interleukin-18 Binding Protein (IL-18BP) and Mitigating Amino Acid Mixtures (MAAM) (6.2)	Percent Effort: Funding Agency: Period of Funding: Total Cost:	15% AFRRI 2024-2025 $152,348

AFRRI grant funding for intramural 6.3 (advanced technology development) totaled to $682,715

Multiple Parameter Biodosimetry for Military Applications	Percent Effort: Funding Agency: Period of Funding: Total Cost:	30% AFRRI 2024-2025 $100,242
Radiological Diagnostics for Mass Casualty Radiological Incidents: Cytokinesis-Blocked Micronucleus Assay (Biodosimetry, 6.3)	Percent Effort: Funding Agency: Period of Funding: Total Cost:	60% AFRRI 2024-2025 $9,700
Multiple Parameter Biodosimetry for Military Applications – Cytogenetic and DNA Damage Assays (6.2 & 6.3)	Percent Effort: Funding Agency: Period of Funding: Total Cost:	65% AFRRI 2024-2026 $75,000
Multiparameter Biodosimetry for Military Applications – In-house Biodosimetry Tool Product Capabilities (Biodosimetry 6.2 & 6.3)	Percent Effort: Funding Agency: Period of Funding: Total Cost:	60% AFRRI 2024-2026 $64,476
Developing Circulating Small Noncoding RNA (sncRNA) Assays for Estimation of Mixed-Field Radiation Doses in Mice	Percent Effort: Funding Agency: Period of Funding: Total Cost:	4% AFRRI 2024-2026 $73,278
Development of NPLATE (Romiplostim) as Prophylactic Medical Countermeasure for the First Responders for DoD Operational Missions	Percent Effort: Funding Agency: Period of Funding: Total Cost:	10% AFRRI 2025-2026 $49,498
Screening of Countermeasure in NHPs – Analysis for Countermeasure Efficacy Biomarkers 6.3	Percent Effort: Funding Agency: Period of Funding: Total Cost:	25% AFRRI 2024-2026 $200,000
Microbiome Study Using Irradiated Nonhuman Primate Model and a Promising Radioprotector Under Development, BIO 300	Percent Effort: Funding Agency: Period of Funding: Total Cost:	70% AFRRI 2024-2025 $35,521
Multi-omics-based Biomarkers for Radiation Injury: Validation Across Radiation Qualities and Animal Models	Percent Effort: Funding Agency: Period of Funding: Total Cost:	30% AFRRI 2024-2026 $75,000

AFRRI extramural grant funding totaled to $19,156,005

Advancement of Cs-MIP as a Promising Decorporation Agent	Percent Effort: Funding Agency: Period of Funding: Total Cost:	2% NIAID 2024-2025 $123,532
Develop Medical Countermeasures for Mitigation Efficacy Against Radiation-Induced Lethality In H-Ars Mouse Model	Percent Effort: Funding Agency: Period of Funding: Total Cost:	15% NIAID 2024 $537,154
Screening of Cutaneous Radiation Injury Countermeasures in the Göttingen Minipig Model	Percent Effort: Funding Agency: Period of Funding: Total Cost:	17% NIAID 2024-2025 $1,228,548
Evaluation of Mitigating Radiation Countermeasures in Multi-organ Partial Body Irradiation Mouse Model	Percent Effort: Funding Agency: Period of Funding: Total Cost:	5% NIAID 2024-2025 $1,312,923
Proteomic Biomarkers for Radiation Injury and Countermeasure Efficacy	Percent Effort: Funding Agency: Period of Funding: Total Cost:	1% NIAID 2024-2025 $200,000
Pilot Study in NHP on Evaluation of a Drug as a Radiation Mitigator	Percent Effort: Funding Agency: Period of Funding: Total Cost:	2% NIAID 2024 $81,982
Drug Screen for Radiation Combined Injury in Mice	Percent Effort: Funding Agency: Period of Funding: Total Cost:	4% NIAD 2024-2025 $922,533
Developing IL-18 Inhibitors to Mitigate /Treat Radiation-Induced Acute Gastrointestinal Syndrome in a Partial-Body Irradiated Mouse Model	Percent Effort: Funding Agency: Period of Funding: Total Cost:	2% NIAID 2024-2025 $200,000
Research And Development of a Hand-Held, Rapid, Point of Care Radiation Biodosimetry Triage Device and Integration of Soluble and Cell-Surface Radiation Injury Biomarker	Percent Effort: Funding Agency: Period of Funding: Total Cost:	10% ASELL (NIAID) 2020-2027 $27,450
Development Of JNJ-26366821 (TPOm) as a Prophylactic Radiation Countermeasure as Well as a Mitigator (Shortly After Radiation)	Percent Effort: Funding Agency: Period of Funding: Total Cost:	15% CMDRP (Joint War Fighter) 2021-2026 $4,326,872

Mitigation Of Radiation Induced Immune Dysfunction By PrC-210 Treatment	Percent Effort: Funding Agency: Period of Funding: Total Cost:	23% U01 (NIH) 2022-2027 $2,293,859
Increment 3. In Vivo Medical Countermeasure Development in a Murine Model; AFRRI- NSRI Collaboration	Percent Effort: Funding Agency: Period of Funding: Total Cost:	20% NSRI/ University of Nebraska 2023-2026 $899,973
Development of cx-01 as a Novel Medical Countermeasure for Acute and Delayed Effects of Radiation Exposure	Percent Effort: Funding Agency: Period of Funding: Total Cost:	1% Ceramedix (BAA with NIAID) 2023-2026 $1,021,239
Thrombopoietin Mimetic (TPOm) as a Medical Countermeasure For GI-ARS	Percent Effort: Funding Agency: Period of Funding: Total Cost:	10% Albert Einstein School of Medicine (NIH) 2024-2029 $1,036,014
Evaluation of PEG-BPEI as a Potential Mitigator Against Gastrointestinal Acute Radiation Syndrome	Percent Effort: Funding Agency: Period of Funding: Total Cost:	10% NIH R21 2025-2027 $298,081
Evaluation Of Lisinopril as a Mitigator for Combined Ionizing Radiation and Skin Wound Injury	Percent Effort: Funding Agency: Period of Funding: Total Cost:	10% Columbia University (CMCRC) 2024-2026 $159,569
Mitigating Radiation-Induced Multi-Organ Injuries by Targeting the Complement System	Percent Effort: Funding Agency: Period of Funding: Total Cost:	10% Columbia University (CMCRC) 2023-2026 $260,280
Effects Of L-Histidine Used as a Mitigator On Radiation+Wound-Induced Organ Injury And Mortality	Percent Effort: Funding Agency: Period of Funding: Total Cost:	10% Columbia University (CMCRC) 2025-2026 $51,026

To Establish the Relative Biological Effectiveness of Varying Ratios of Neutron and Gamma Irradiation in Laboratory Mice (Mus Musculus)	Percent Effort: Funding Agency: Period of Funding: Total Cost:	10% DTRA 2024-2026 $270,964
The Role Of L-Citrulline in Preventing and Mitigating Radiation-Induced Cardiovascular Late Effects via Targeting Vascular/Endothelial Injuries	Percent Effort: Funding Agency: Period of Funding: Total Cost:	20% JPC7 2020-2026 $567,339
Workplan X	Percent Effort: Funding Agency: Period of Funding: Total Cost:	20% NIAID 2023-2027 $830,870
Workplan H	Percent Effort: Funding Agency: Period of Funding: Total Cost:	20% NIAID 2023-2027 $528,037
Circulating Micrornas as Radiation Biodosimeters: Evaluation of Organ Responses	Percent Effort: Funding Agency: Period of Funding: Total Cost:	15% JPC7 2020-2026 $850,000
Multiparameter Biodosimetry for Military Applications	Percent Effort: Funding Agency: Period of Funding: Total Cost:	25% JPC7 2023-2026 $233,463
Workplan A	Percent Effort: Funding Agency: Period of Funding: Total Cost:	10% NIAID 2024-2027 $767,795
Workplan C	Percent Effort: Funding Agency: Period of Funding: Total Cost:	10% NIAID 2024-2027 $126,502

PUBLICATIONS (2024-2025)

1. Abel B, Gerling KA, Mares JA, Hutzler J, Pierskalla I, Hays J, Propper B, White JM, Burmeister DM. Real-Time Measurements of Oral Mucosal Carbon Dioxide (POMCO2) Reveals an Inverse Correlation with Blood Pressure in a Porcine Model of Coagulopathic Junctional Hemorrhage. Mil Med. 2024 Feb 27;189(3-4):e612-e619.

2. Abel B, Mares J, Hutzler J, Parajuli B, Kurada L, White JM, Propper BW, Stewart IJ, Burmeister DM. The Degree of Aortic Occlusion in the Setting of Trauma Alters the Extent of Acute Kidney Injury Associated with Mitochondrial Preservation. Am J Physiol Renal Physiol. 2024 Apr 1;326(4):F669-F679.

3. ArabiDarrehDor G, Kramer GC, Burmeister DM, Salinas J, Hahn JO. A mathematical model for simulation of cardiovascular, renal, and hormonal responses to burn injury and resuscitation. Front Physiol. 2024 Oct 3:15:1467351.

4. BERAC. 2024. Assessment of BER Research in Low-Dose Radiation: Report from the BER Advisory Committee, DOE/SC-0216. Biological and Environmental Research Advisory Committee. https://doi.org/10.2172/2337784.

5. Blakely WF, Port M, Ostheim P, Abend M. Radiation Research Society Journal-based Historical Review of the Use of Biomarkers for Radiation Dose and Injury Assessment: Acute Health Effects Predictions. Radiat Res. 2024 Aug 1;202(2):185-204. doi: 10.1667/RADE-24-00121.1. PMID: 38936821.

6. Bolduc DL, Cary LH, Kiang JG, Kurada L, Kumar VP, Edma SA, Olson MG, Vergara VB, Bistline DD, Reese M, Kenchegowda D, Hood M, Korotcov A, Jaiswal S, Blakely WF. Natural-history Characterization of a Murine Partial-body Irradiation Model System: Establishment of a Multiple-Parameter Based GI-ARS Severity-Scoring System. Radiat Res. 2024 May 1;201(5):406-417. doi: 10.1667/RADE-23-00132.1. PMID: 38319684.

7. Bolduc DL, Cary LH, Kiang JG, Kurada L, Kumar VP, Edma SA, Olson MG, Vergara VB, Bistline DD, Reese M, Kenchegowda D, Hood M, Korotcov A, Jaiswal S, Blakely WF. Natural-history Characterization of a Murine Partial-body Irradiation Model System: Establishment of a Multiple-Parameter Based GI-ARS Severity-Scoring System. Radiat Res. 2024 May 1;201(5):406-417. doi: 10.1667/RADE-23-00132.1.PMID: 38319684

8. Boothe PF, Kumar VP, Kong Y, Wang K, Levinson H, Mu D, Brown ML. Radiation Induced Skin Fibrosis (RISF): Opportunity for Angiotensin II-Dependent Intervention. Int J Mol Sci. 2024 Jul 29;25(15):8261. doi: 10.3390/ijms25158261.PMID: 39125831

9. Chakraborty N, Hoke A, Campbell R, Holmes-Hampton G, Kumar VP, Moyler C, Gautam A, Hammamieh R, Ghosh SP. Microorganisms. Ionizing Radiation Dose Differentially Affects the Host-Microbe Relationship over Time. 2024 Sep 30;12(10):1995. doi: 10.3390/microorganisms12101995.PMID: 39458305

10. Carpenter AD, Brink MW, Li X, Li Y, Petrus SA, Fatanmi OO, Wise SY, Zhiguo Zhou J, Bansal A, Cheema AK, Singh VK*: Analysis of the metabolomic profile in serum of mice treated with RadioDefender, a novel radiation medical countermeasure. Rad Res 204:581-594, 2025, PMID: 40991958

11. Carpenter AD, Empfield KM, Petrus SA, Fatanmi OO, Wise SY, Tyburski JB, Cheema AK, Singh VK*: Metabolomic changes in preterminal serum samples of rhesus macaques exposed to two different lethal doses of total-body gamma-radiation. Sci Rep 14:23930, 2024, PMID: 39397118

12. Carpenter AD, Fatanmi OO, Wise SY, Petrus SA, Tyburski JB, Cheema, AK, Singh VK*: Metabolomic changes in plasma of preterminal stage of rhesus nonhuman primates exposed to lethal dose of radiation. Metabolites 14:18, 2024, PMID 38248821

13. Carpenter AD, Fatanmi OO, Wise SY, Tyburski JB, Cheema AK, Singh VK*: Proteomic analysis of plasma at the preterminal stage of rhesus nonhuman primates exposed to a lethal total-body dose of gamma-radiation. Sci Rep 14:13571, 2024, PMID: 38866887

14. Carpenter AD, Li Y, Fatanmi OO, Wise SY, Petrus SA, Janocha BL, Cheema AK, Singh VK*: Metabolomic profiles in tissues of nonhuman primates exposed to total- or partial-body radiation. Radiat Res 201:371-383, 2024, PMID: 38253059

15. Carpenter AD, Li Y, Melendez Miranda I, Wise SY,1,2 Fatanmi OO, Petrus SA, Fam CM, Carlson SJ, Cox GN, Cheema AK, Singh VK*: Pharmacokinetic and metabolomic studies with BBT-059 in nonhuman primates exposed to total-body gamma-radiation. Rad Res 203:83-95, 2024, PMID: 39786949

16. Carpenter AD, Li Y, Packer BE, Fatanmi OO, Wise SY, Hauer-Jensen M, Cheema AK, Singh VK*: Serum metabolomic signatures in nonhuman primates treated with a radiation countermeasure and exposed to a supralethal dose of partial- or total-body radiation. Metabolomics 15:546, 2025, PMID: 40863162

17. Carpenter AD, Li Y, Wise SY, Fatanmi OO, Petrus SA, Fam CM, Cox GN, Cheema AK, Singh VK*: Pharmacokinetic and metabolomic studies with a promising radiation countermeasure BBT-059 (PEGylated interleukin-11), in rhesus nonhuman primates. Radiat Res 202:26-37, 2024, PMID: 38714310

18. Carpenter AD, Melendez-Miranda I, Li Y, Kandhavelu J, Fatanmi OO, Wise SY, Cheema A K, Singh VK*: Proteomic changes in preterminal serum samples of rhesus macaques exposed to two different doses of acute lethal total-body gamma radiation. Rad Res 204:59-74, 2025, PMID 40365718

19. Chakraborty N, Dimitrov G, Kanan S, Lawrence A, Moyler C, Gautam A, Fatanmi OO, Wise SY, Carpenter AD, Hammamieh R, Singh VK*: Cross-species conserved miRNA as biomarker of radiation injury and to predict fatality risk. PLoS One 19: e0311379, 2024, PMID: 39570918

20. Chakraborty N, Holmes-Hampton G, Rusling M, Kumar VP, Hoke A, Lawrence AB, Gautam A, Ghosh SP, Hammamieh R. Delayed Impact of Ionizing Radiation Depends on Sex: Integrative Metagenomics and Metabolomics Analysis of Rodent Colon Content. Int J Mol Sci. 2025 Apr 29;26(9):4227. doi: 10.3390/ijms26094227. PMID: 40362462; PMCID: PMC12071923.

21. Cui W, Plett PA, Sharma GP, Kerns S, MacVittie TJ.Editorial: Ongoing advancements in the research of radiation- induced toxicity and the development of interventions to protect and/or mitigate its effects. Front Public Health. 2024 Aug 21;12:1471228. doi: 10.3389/fpubh.2024.1471228. eCollection 2024.

22. Davis CM, Elliott VE, Smith J. Sleep Disruption Impairs Sustained Attention in Food-Restricted Rats Using a Food-Reinforced Rodent Psychomotor Vigilance Test. Nat Sci Sleep. 2024 Nov 9;16:1771-1777. doi: 10.2147/NSS.S475672. PMID: 39539357; PMCID: PMC11559244.

23. Dronamraju VR, Holmes-Hampton GP, Gu E, Kumar VP, Ghosh SP. FSL-1 Pre-Administration Protects Radiation-Induced Hematopoietic Organs Through the Modulation of the TLR Signaling Pathway. Int J Mol Sci. 2025 May 31;26(11):5303. doi: 10.3390/ijms26115303. PMID: 40508112; PMCID: PMC12154233.

24. Fatanmi OO, Wise SY, Petrus SA, Melendez-Miranda I, Carpenter AD, Olson HM, Serebrenik AA, Lugo-Roman LA, Kaytor MD, Singh VK*: Prophylactic administration of BIO 300, a radiation medical countermeasure, improves erythrocyte associated parameters in the rhesus macaque model. Mil Med 190S2:746754, 2025, PMID: 40984112

25. Garg TK, Garg S, Miousse IR, Wise SY, Carpenter AD, Fatanmi OO, Rhee FV, Singh VK*, Hauer-Jensen M: Modulation of hematopoietic injury by a promising radioprotector, gamma-tocotrienol, in rhesus macaques exposed to partial-body radiation. Radiat Res 201:55–70, 2024, PMID: 38059553

26. Guo W, Jia L, Xie L, Kiang JG, Wang Y, Sun F, Lin Z, Wang E, Zhang Y, Huang P, Sun T, Zhang X, Bian Z, Tang T, Guo J, Ferrone S, Wang X. Turning anecdotal irradiation-induced anticancer immune responses into reproducible in situ cancer vaccines via disulfiram/copper-mediated enhanced immunogenic cell death of breast cancer cells. Cell Death Dis. 2024 Apr 27;15(4):298. doi: 10.1038/s41419-024-06644-3. PMID: 38678042; PMCID: PMC11055882.

27. Holmes-Hampton GP, Kumar VP, Valenzia K, Ghosh SP. FSL-1: A Synthetic Peptide Increases Survival in a Murine Model of Hematopoietic Acute Radiation Syndrome. Radiat Res. 2024 May 1;201(5):449-459. doi: 10.1667/RADE-23-00142.1. PMID: 38373011

28. Holmes-Hampton GP, Soni DK, Kumar VP, Biswas S, Wuddie K, Biswas R, Ghosh SP. Time- and sex-dependent delayed effects of acute radiation exposure manifest via miRNA dysregulation. iScience. 2024 Jan 11;27(2):108867. doi: 10.1016/j.isci.2024.108867. eCollection 2024 Feb 16.PMID: 38318389

29. Hood MN, Ayompe E, Holmes-Hampton GP, Korotcov A, Wuddie K, Aschenake Z, Ahmed AE, Creavalle M, Knollmann-Ritschel B. Preliminary Promising Findings for Manganese Chloride as a Novel Radiation Countermeasure Against Acute Radiation Syndrome. Mil Med. 2024 Aug 19;189(Suppl 3):598-607. doi: 10.1093/milmed/usae198.PMID: 39160887

30. Horseman TS, Frank AM, Cannon G, Zhai M, Olson MG, Lin B, Li X, Hull L, Xiao M, Kiang JG, Burmeister DM. Effects of combined ciprofloxacin and Neulasta therapy on intestinal pathology and gut microbiota after high-dose irradiation in mice. Front Public Health. 2024 May 14:12:1365161. doi: 10.3389/fpubh.2024.136516.

31. Horseman TS, Parajuli B, Frank AM, Weaver A, Schauer DA, Moran S, Anderson JA, Holmes-Hampton GP, Burmeister DM. Microbiome And Inflammasome Alterations Found During Radiation Dose Finding In A Sinclair Minipig Model Of Gastrointestinal Acute Radiation Syndrome. Shock. 2024 Oct 1;62(4):556-564. doi: 10.1097/SHK.0000000000002422. Epub 2024 Sep 3.PMID: 39012765

32. Horseman TS, Parajuli B, Murthy V, Holmes-Hampton GP, Sukumar G, Dalgard CL, Anderson JA, Burmeister DM. A multi-omics approach exploring the gut-liver axis following combined radiation exposure and burn injury in a Sinclair minipig model. Sci Rep. 2025 Nov 20;15(1):41111. doi: 10.1038/s41598-025-24946-0. PMID: 41266667; PMCID: PMC12635091.

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35. Kao YM, Arabidarrehdor G, Parajuli B, Ziedins EE, McLawhorn MM, D'Orio CS, Oliver MA, Moffatt, Mathew SK, Kelly EJ, Carney BC, Shupp JW, Burmeister DM, Hahn JO. Initial Development and Analysis of a Context-Aware Burn Resuscitation Decision-Support Algorithm. Electronics 2024, 13(14), 2713.

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37. Kiang JG, Cannon G, Singh VK: An overview of radiation countermeasure development in Radiation Research from 1954 to 2024. Radiat Res. 202:420-431, 2024, PMID: 38964743

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CAPT Burke and AFRRI members at the 2025 Military Health System Research Symposium (MHSRS) conference

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