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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Defense Health Agency **Date:** May 2021

Appropriation/Budget Activity 0130: <i>Defense Health Program I BA 2: RDT&E</i>	R-1 Program Element (Number/Name) PE 0602787DHA I <i>Medical Technology (AFRRI)</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	11.918	1.383	1.411	1.439	-	1.439	0.000	0.000	0.000	0.000	Continuing	Continuing
020: <i>CSI - Congressional Special Interests</i>	0.124	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
241A: <i>Biodosimetry (USUHS)</i>	2.428	0.283	0.289	0.295	-	0.295	-	-	-	-	Continuing	Continuing
241B: <i>Internal Contamination (USUHS)</i>	1.268	0.149	0.152	0.155	-	0.155	-	-	-	-	Continuing	Continuing
241C: <i>Radiation Countermeasures (USUHS)</i>	8.098	0.951	0.970	0.989	-	0.989	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

For the Uniformed Services University of the Health Sciences (USUHS), Armed Forces Radiobiology Research Institute (AFRRI), this program supports developmental research to investigate new approaches that will lead to advancements in biomedical strategies for preventing, treating, assessing and predicting the health effects of human exposure to ionizing radiation. Program objectives focus on preventing or mitigating the health consequences from exposures to ionizing radiation that represent the highest probable threat to U.S. forces in current tactical, humanitarian and counterterrorism mission environments. New protective and therapeutic strategies will broaden the military commander's options for operating within nuclear or radiological environments by minimizing both short-and long-term risks of adverse health consequences. Advances in assessment, prognostication, and therapy in case of actual or suspected radiation exposures will enhance triage, treatment decisions and risk assessment in operational settings.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	1.383	1.411	1.439	-	1.439
Current President's Budget	1.383	1.411	1.439	-	1.439
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	0.000	-			

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Defense Health Agency **Date:** May 2021

Appropriation/Budget Activity 0130 / 2	R-1 Program Element (Number/Name) PE 0602787DHA / Medical Technology (AF RRI)	Project (Number/Name) 020 / CSI - Congressional Special Interests
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
020: CSI - Congressional Special Interests	0.124	0.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

The FY15 DHP Congressional Special Interest (CSI) funding is directed toward core research initiatives in Program Element (PE) 0602787 - Medical Technology (AF RRI). Because of the CSI annual structure, out-year funding is not programmed.

B. Accomplishments/Planned Programs (\$ in Millions)

N/A

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Defense Health Agency										Date: May 2021		
Appropriation/Budget Activity 0130 / 2					R-1 Program Element (Number/Name) PE 0602787DHA / Medical Technology (AF RRI)				Project (Number/Name) 241A / Biodosimetry (USUHS)			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
241A: <i>Biodosimetry (USUHS)</i>	2.428	0.283	0.289	0.295	-	0.295	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

For the Uniformed Services University of the Health Sciences (USU), Armed Forces Radiobiology Research Institute (AFRRI), this program supports developmental research to investigate new approaches that will lead to advancements in biomedical strategies for preventing, treating, assessing and predicting the health effects of human exposure to ionizing radiation. Program objectives focus on preventing or mitigating the health consequences from exposures to ionizing radiation that represent the highest probable threat to U.S. forces in current tactical, humanitarian and counterterrorism mission environments. New protective and therapeutic strategies will broaden the military commander's options for operating within nuclear or radiological environments by minimizing both short-and long-term risks of adverse health consequences. Advances in assessment, prognostication, and therapy in case of actual or suspected radiation exposures will enhance triage, treatment decisions and risk assessment in operational settings.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Biodosimetry (USUHS)	0.283	0.289	0.295
Description: Biodosimetry (USU): For the Uniformed Services University of the Health Sciences (USU), the mission and research objectives for biodosimetry are to assess radiation exposure by developing and providing biological and biophysical dosimetry capabilities for acute, protracted, and prior radiation exposures for all relevant military applications.			
FY 2021 Plans: FY 2021 plans continue efforts as outlined in FY 2020 in addition to the following: - Evaluate the use of the hematological algorithms using archived animal and human databases to provide prognostic diagnostic capability of radiation injury assessment. - Compare various PCC endpoints for their utility to predict the fraction of the body exposed to radiation to determine those that could best provide rapid and accurate diagnostic information. - Evaluate utility of long range QPCR (LR-QPCR) to quantitatively measure radiation-induced DNA damage in mammalian cells. - Continue efforts to establish high energy LINAC electron dose-response curve using the lymphocyte metaphase spread dicentric chromosome aberration assay.			
FY 2022 Plans: FY 2022 plans continue efforts as outlined in FY 2021.			
FY 2021 to FY 2022 Increase/Decrease Statement: Pricing adjustment for inflation.			
Accomplishments/Planned Programs Subtotals	0.283	0.289	0.295

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Appropriation/Budget Activity 0130 / 2	R-1 Program Element (Number/Name) PE 0602787DHA / <i>Medical Technology (AF RRI)</i>	Project (Number/Name) 241A / <i>Biodosimetry (USUHS)</i>

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

The program element 0602787DHA for AFRRRI in addition to the three program elements: 0601115HPPE, 0602115HPPE, and 0603115HP are coordinated and integrated into the portfolio management by the Joint Program Committee-7/ Radiation Health Effects Research Program (RHERP).

D. Acquisition Strategy

N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Defense Health Agency **Date:** May 2021

Appropriation/Budget Activity 0130 / 2					R-1 Program Element (Number/Name) PE 0602787DHA / <i>Medical Technology (AF RRI)</i>				Project (Number/Name) 241B / <i>Internal Contamination (USUHS)</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
241B: <i>Internal Contamination (USUHS)</i>	1.268	0.149	0.152	0.155	-	0.155	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

Internal Contamination (USU): For the Uniformed Services University of the Health Sciences (USU), the mission and research objective for Internal Contamination is to determine whether the short-term and long-term radiological and toxicological risks of embedded metals warrant changes in the current combat and post-combat fragment removal policies for military personnel. Additionally, the biological effects of internalization of radioactive elements from Radiological Dispersal Devices (RDDs) and depleted uranium weapons, as well as therapeutic approaches to enhance the elimination of radionuclides from the body are being investigated.

B. Accomplishments/Planned Programs (\$ in Millions)

Title: Internal Contamination (USUHS)	FY 2020	FY 2021	FY 2022
Description: Internal Contamination (USU): Radioactive material can enter the body by a variety of pathways including ingestion, inhalation, and wound contamination. While some internalized isotopes will be naturally eliminated from the body, many others are not. They remain immobile or are transported and deposited to other organs where they continually irradiate the surrounding tissue. This chronic internal radiation exposure can cause unrepairable cellular damage eventually leading to death. This Program uses innovative approaches to address this pressing health concern.	0.149	0.152	0.155
FY 2021 Plans: FY 2021 plans continue efforts as outlined in FY 2020 in addition to the following: initiation of feasibility studies of incorporating non-toxic plant-based metal chelators into a dendrimeric structure for use as potential radionuclide decorporation agents.			
FY 2022 Plans: FY2022 plans continue efforts as outlined in FY 2021.			
FY 2021 to FY 2022 Increase/Decrease Statement: Pricing adjustment for inflation.			
Accomplishments/Planned Programs Subtotals	0.149	0.152	0.155

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

The program element 0602787DHA for AFRRRI in addition to the three program elements: 0601115HPPE, 0602115HPPE, and 0603115HP are coordinated and integrated into the portfolio management by the Joint Program Committee-7/ Radiation Health Effects Research Program (RHERP).

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Appropriation/Budget Activity 0130 / 2	R-1 Program Element (Number/Name) PE 0602787DHA / <i>Medical Technology (AF RRI)</i>	Project (Number/Name) 241B / <i>Internal Contamination (USUHS)</i>

D. Acquisition Strategy
N/A

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Defense Health Agency **Date:** May 2021

Appropriation/Budget Activity 0130 / 2	R-1 Program Element (Number/Name) PE 0602787DHA / Medical Technology (AF RRI)	Project (Number/Name) 241C / Radiation Countermeasures (USUHS)
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
241C: Radiation Countermeasures (USUHS)	8.098	0.951	0.970	0.989	-	0.989	-	-	-	-	Continuing	Continuing

A. Mission Description and Budget Item Justification

Radiation Countermeasures (USU): For the Uniformed Services University of the Health Sciences (USU), this program supports developmental, mission directed research to investigate new concepts and approaches that will lead to advancements in biomedical strategies for preventing and treating the health effects of human exposure to ionizing radiation as well as radiation combined with injuries (burns, wounds, hemorrhage), termed combined injury (CI). Research ranges from exploration of biological processes likely to form the basis of technological solutions, to initial feasibility studies of promising solutions. Program objectives focus on preventing and mitigating the health consequences from exposures to ionizing radiation, in the context of probable threats to U.S. forces in current tactical, humanitarian and counterterrorism mission environments. New protective and therapeutic strategies will broaden the military commander's options for operating within nuclear or radiological environments by minimizing both short-and long-term risks of adverse health consequences.

B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2020	FY 2021	FY 2022
Title: Radiation Countermeasures (USUHS)	0.951	0.970	0.989
<p>Description: For the Uniformed Services University of the Health Sciences (USU), this program supports developmental, mission directed research to investigate new concepts and approaches that will lead to advancements in biomedical strategies for preventing and treating the health effects of human exposure to ionizing radiation as well as radiation combined with injuries (burns, wounds, hemorrhage), termed combined injury (CI). Research ranges from exploration of biological processes likely to form the basis of technological solutions, to initial feasibility studies of promising solutions. Program objectives focus on preventing and mitigating the health consequences from exposures to ionizing radiation, in the context of probable threats to U.S. forces in current tactical, humanitarian and counterterrorism mission environments. New protective and therapeutic strategies will broaden the military commander's options for operating within nuclear or radiological environments by minimizing both short-and long-term risks of adverse health consequences.</p> <p>FY 2021 Plans: FY2021 plans continue efforts as outlined in FY2020 in addition to the following: - Further test drug candidates for prophylactic efficacy in a hematopoietic acute radiation syndrome (H-ARS) murine model. Successful candidates will be developed further for dose and time optimization. - Evaluate differential expression of micro-RNAs in C57BL/6 mice (male and female) and minipig long term after radiation. - Determine the DEARE (delayed effects of acute radiation exposure) effects on the gut microbiome compositions and host-microbiome relationship and identify gender differences. - Test the radiation-induced IL-18, IL-18 receptor (IL-18R) and IL-18BP expression and activation in multiple tissues and cells, develop the IL-18 as a radiation biomarker.</p>			

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
<ul style="list-style-type: none"> - Identify the mechanisms by which IL-18 signaling induces mouse tissue and cell injury after radiation and IL-18BP's mitigative effects using IL-18 Knockout mice. - Evaluate the effects and mechanism of radiation-induced inflammatory cytokines including IL-18 and IL-33 release and cell mitochondria response. - Evaluate the efficacy of IL-18BP on survival of radiation-induced GI injury using partial body irradiation (PBI). - Determine the dose reduction factor (DRF) of IL-18BP in irradiated mice. - Evaluate the effects and mechanisms of IL-18BP on survival of mouse gastrointestinal systems after lethal doses of TBI. <p><i>FY 2022 Plans:</i> FY 2022 plans continue efforts as outlined in FY 2021.</p> <p><i>FY 2021 to FY 2022 Increase/Decrease Statement:</i> Pricing adjustment for inflation.</p>			
Accomplishments/Planned Programs Subtotals	0.951	0.970	0.989

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

The program element 0602787DHA for AFRR1 in addition to the three program elements: 0601115HPPE, 0602115HPPE, and 0603115HP are coordinated and integrated into the portfolio management by the Joint Program Committee-7/ Radiation Health Effects Research Program (RHERP).

D. Acquisition Strategy

N/A