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**Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army** **Date:** April 2022

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 2: Applied Research</i>	<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	101.341	120.747	33.976	-	33.976	17.584	19.593	20.442	20.434	0.000	334.117
BS7: <i>Medical Technology (CA)</i>	-	7.000	29.467	-	-	-	-	-	-	-	0.000	36.467
MK4: <i>Warfighter Health Applied Rsch Technology</i>	-	29.726	28.649	31.916	-	31.916	15.663	16.977	17.777	17.771	0.000	158.479
MM4: <i>Cbt Casualty Care Applied Rsch Technology</i>	-	19.301	23.437	1.935	-	1.935	1.797	2.498	2.546	2.545	0.000	54.059
MM6: <i>Medical Technologies to Support Dispersed Ops Tech</i>	-	14.052	10.668	0.125	-	0.125	0.124	0.118	0.119	0.118	0.000	25.324
MM8: <i>Infectious Diseases and Applied Rsch Technology</i>	-	24.542	28.526	-	-	-	-	-	-	-	0.000	53.068
MN1: <i>Applied Sensory Systems Trauma Technology</i>	-	6.720	-	-	-	-	-	-	-	-	0.000	6.720

**A. Mission Description and Budget Item Justification**

This Program Element (PE) supports application of knowledge gained through basic research to refine drugs, vaccines, medical devices, diagnostics, medical practices/procedures, and other preventive measures essential to the protection and sustainment of Warfighter health. Research is conducted in five principal areas: Combat Casualty Care, Military Operational Medicine, Military Relevant Infectious Diseases, Clinical and Rehabilitative Medicine, Medical Capabilities to Support Dispersed Operations, and Systems Biology/Network Sciences. Projects are coordinated with the Defense Health Agency.

The cited research is consistent with the Under Secretary of Defense for Research and Engineering science and technology focus areas and the Army Modernization Strategy.

Work in this Program element (PE) is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

All medical applied research is conducted in compliance with Food and Drug Administration (FDA) or Environmental Protection Agency (EPA) regulations. The FDA requires thorough testing in animals (preclinical testing) to ensure safety and, where possible, effectiveness prior to evaluation in controlled human clinical trials (upon transition to Advanced Technology Development). This PE focuses on research and refinement of technologies such as product formulation and purification and laboratory test refinement with the aim of identifying candidate solutions. This work often involves testing in animal models. The EPA also requires thorough testing of products, such as sterilants, disinfectants, repellents, and insecticides to ensure the environment is adequately protected before these products are licensed for use. Program refinement and execution is externally peer-reviewed and fully coordinated with all Services as well as other agencies through the Joint Technology Coordinating Groups of the Armed Services Biomedical Research Evaluation and Management (ASBREM) Community of Interest (COI). The ASBREM COI, formed

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under the authority of the Assistant Secretary of Defense for Research and Engineering, serves to facilitate coordination and prevent unnecessary duplication of effort within the Department of Defenses (DoD) biomedical research community, as well as their associated enabling research areas.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>
Previous President's Budget	101.341	91.720	0.000	-	0.000
Current President's Budget	101.341	120.747	33.976	-	33.976
Total Adjustments	0.000	29.027	33.976	-	33.976
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	29.467			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	33.976	-	33.976
• FFRDC Transfer	-	-0.440	-	-	-

**Congressional Add Details (\$ in Millions, and Includes General Reductions)**

**Project:** BS7: *Medical Technology (CA)*

- Congressional Add: *Program Increase - Safety and Performance of Female Warfighters in Extreme Heat*
- Congressional Add: *Program Increase - Military Force Vector Borne Health Protection*
- Congressional Add: *Biological Performance Technology*
- Congressional Add: *Center for Excellence in Military Health and Performance Enhancement*
- Congressional Add: *Holistic Health and Fitness*
- Congressional Add: *National Trauma Research Repository Data Population Project*
- Congressional Add: *Physiological Study of Female Warfighters to Improve Training*
- Congressional Add: *RNA Therapeutics for Infectious Disease Threats*

Congressional Add Subtotals for Project: BS7

Congressional Add Totals for all Projects

	<b>FY 2021</b>	<b>FY 2022</b>
	2.000	-
	5.000	5.000
	-	5.000
	-	3.567
	-	1.500
	-	1.900
	-	5.000
	-	7.500
Congressional Add Subtotals for Project: BS7	7.000	29.467
Congressional Add Totals for all Projects	7.000	29.467

**Change Summary Explanation**

Fiscal Year 2023 (FY23) funding increase reflects the fact that the FY22 President's Budget request did not include out-year funding.

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**Exhibit R-2A, RDT&E Project Justification:** PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040 / 2					R-1 Program Element (Number/Name) PE 0602787A / Medical Technology				Project (Number/Name) BS7 / Medical Technology (CA)			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
BS7: Medical Technology (CA)	-	7.000	29.467	-	-	-	-	-	-	-	0.000	36.467

**Note**

Congressional Interest Item funding provided for Medical Technology.

**A. Mission Description and Budget Item Justification**

Congressional Interest Item funding provided for Medical Technology.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

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

	FY 2021	FY 2022
<b>Congressional Add:</b> Program Increase - Safety and Performance of Female Warfighters in Extreme Heat <b>FY 2021 Accomplishments:</b> Program Increase supported applied research on Safety and Performance of Female Warfighters in Extreme Heat.  Work executed under the direction of the Army Futures Command.	2.000	-
<b>Congressional Add:</b> Program Increase - Military Force Vector Borne Health Protection <b>FY 2021 Accomplishments:</b> Program Increase supported applied research on Military Force Vector Borne Health Protection.  Work executed under the direction of the Army Futures Command.	5.000	5.000
<b>Congressional Add:</b> Biological Performance Technology <b>FY 2022 Plans:</b> Congressional Interest Item funding provided for Biological Performance Technology	-	5.000
<b>Congressional Add:</b> Center for Excellence in Military Health and Performance Enhancement <b>FY 2022 Plans:</b> Congressional Interest Item funding provided for Center for Excellence in Military Health and Performance Enhancement	-	3.567
<b>Congressional Add:</b> Holistic Health and Fitness	-	1.500

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army	<b>Date:</b> April 2022
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2021</b>	<b>FY 2022</b>
<b><i>FY 2022 Plans:</i></b> Congressional Interest Item funding provided for Holistic Health and Fitness		
<b><i>Congressional Add:</i></b> National Trauma Research Repository Data Population Project	-	1.900
<b><i>FY 2022 Plans:</i></b> Congressional Interest Item funding provided for National Trauma Research Repository Data Population Project		
<b><i>Congressional Add:</i></b> Physiological Study of Female Warfighters to Improve Training	-	5.000
<b><i>FY 2022 Plans:</i></b> Congressional Interest Item funding provided for Physiological Study of Female Warfighters to Improve Training		
<b><i>Congressional Add:</i></b> RNA Therapeutics for Infectious Disease Threats	-	7.500
<b><i>FY 2022 Plans:</i></b> Congressional Interest Item funding provided for RNA Therapeutics for Infectious Disease Threats		
<b>Congressional Adds Subtotals</b>	7.000	29.467

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army										<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 2040 / 2					<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>				<b>Project (Number/Name)</b> MK4 / <i>Warfighter Health Applied Rsch Technology</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
MK4: <i>Warfighter Health Applied Rsch Technology</i>	-	29.726	28.649	31.916	-	31.916	15.663	16.977	17.777	17.771	0.000	158.479

**A. Mission Description and Budget Item Justification**

This Project conducts research to prevent and protect Warfighters from training and operational injuries; refine mechanisms for detection of physiological (human physical and biochemical function) and psychological (mental) health problems; reduce the effects of trauma and promote rapid recovery from acute stress in far forward operational environments; evaluate hazards to head, neck, spine, eyes, and ears; set the standards for rapid return to duty; and determine new methods to sustain and enhance performance and readiness across the operational spectrum. This research provides medical information important to the design and operational use of military systems, and this work forms the basis for behavioral, training, and nutritional interventions.

- The four main areas of study are:
- (1) Physiological Health and Performance
  - (2) Environmental Health and Protection
  - (3) Injury Prevention and Reduction
  - (4) Psychological Health and Resilience

Research in this Project is coordinated with and complimentary to work done in Program Element (PE) 0602143A (Soldier Lethality Technology) and PE 0603118A (Soldier Lethality Advanced Technology).

The cited research is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

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

	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<b>Title:</b> Physiological Health and Performance	14.272	-	-
<b>Description:</b> This effort evaluates methods for managing and controlling the effects of fatigue on Soldier operational performance and the impact of nutritional strategies to optimize operational performance. Efforts will also contribute to new high-priority medical investments in human biomedical performance enhancement and medical aspects of manned-unmanned machine teaming (MUM-T).			
<b>Title:</b> Environmental Health and Protection	7.431	-	-

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<p><b>Description:</b> This effort involves applied research addressing the physiological (human physical and biochemical functions) mechanisms of exposure to extreme heat, cold, altitude, and other environmental stressors. This effort establishes scientific evidence for specific and sensitive diagnostics of exertional heat illness to optimize Soldier performance in austere environments. This effort also supports and matures non-invasive technologies, decision-aid tools, and models to enhance Soldier protection and sustainment across the operational spectrum. This effort provides the scientific basis for developing focused heating and cooling solutions to maintain fine motor dexterity, core temperature, and optimize physical and cognitive performance during cold- weather and hot-humid operations. This effort will develop knowledge and materiel solutions that enable Soldier individualized metabolic assessments and optimization during training and operations.</p>				
<p><b>Title:</b> Injury Prevention and Reduction</p> <p><b>Description:</b> This effort addresses the Army's number one priority of readiness by improving musculoskeletal injury prevention efforts as well as contributing to preparing Soldiers for potential threats (e.g., directed energy) in and developing capabilities for the multi domain operations environment. It evaluates and assesses the effects of repetitive motion during military operations and training on the human body; provides mathematical models to predict the likelihood of physical injuries following continuous operations and muscle fatigue; evaluates current standards for return-to-duty; and establishes improved medical test methods with the goal of rapid return to duty of Soldiers following injury. This effort also develops prevention-based strategies and medically-based injury criteria for hearing, vestibular (sensory system supporting movement and sense of balance, located in the inner ear), and ocular/ facial protection devices; develops and evaluates neurosensory operational risk factors; develops medically based guidelines to assess neurosensory performance and models the effects of acoustic and impact trauma as stressors on vision and hearing. Efforts will investigate the medical aspects of MUM-T and medical aspects of and protection against directed energy.</p>		4.379	-	-
<p><b>Title:</b> Psychological Health and Resilience</p> <p><b>Description:</b> This effort refines and evaluates tools and early interventions to prevent and reduce the impact of military stressors and combat-related exposures on behavioral health problems, including symptoms of post-traumatic stress disorder (PTSD), depression, anger problems, anxiety, substance abuse, suicide, and other health risk behaviors. This effort assesses and refines tools and interventions to enhance and sustain psychological resilience throughout Soldiers' careers. Efforts also address the health and well-being of families.</p>		3.644	-	-
<p><b>Title:</b> Operational Risk Planning Tools for Battlefield Environmental Threats</p>		-	2.268	1.381

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<p><b>Description:</b> This effort investigates and incorporates mechanisms for health risks of heat, cold, and altitude injuries to develop guidelines and advise countermeasure development for operations in extreme environments. Investigates health risks from industrial chemicals and pollutants found in dense urban and subterranean (SubT) environments in which Soldiers operate.</p> <p><b>FY 2022 Plans:</b> Will develop risk profiles for exposures in extreme environments including cold water; develop and validate models for high-throughput screening for novel or repurposed drugs to counter performance decrements encountered in SubT operational environments; validate heat injury biomarkers to inform return to duty guidance.</p> <p><b>FY 2023 Plans:</b> Will continue to develop risk profiles for exposures to cold water and expand effort to include subzero/artic conditions; advise on functional clothing to prevent freezing injury during military free fall; validate heat injury biomarkers to inform return to duty guidance; determine the influence of female sex hormones on physiological responses and adaptations during heat acclimation; develop gene expression profile signatures to predict individual susceptibility to acute mountain sickness and acclimatization status prior to high altitude ascent.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding decreased due to realignment of US Army Medical Research and Development Command to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>				
<p><b>Title:</b> Prevention of Soldier Performance Degradation in Extreme Environments</p> <p><b>Description:</b> This effort develops and matures non-invasive technologies, decision-aid tools, and other countermeasure to prevent and enhance Soldier performance in extreme environments of heat, cold, altitude, dense urban and SubT environments. This effort includes validation of approved pharmaceuticals as well as provides improved sensors and predictive algorithms models.</p> <p><b>FY 2022 Plans:</b> Will validate performance of pharmaceuticals to reduce acute mountain sickness, heat injuries and other environmental exposures; assess the feasibility of dietary supplements as a mitigation for increased carbon dioxide blood levels and potential respiratory failure recurrent in SubT environments; evaluate cold habituation as an intervention to augment peripheral blood flow in cold exposure; investigate models for the effect of wet clothing on heat loss; determine advanced decision aids for pacing and</p>		-	4.171	4.101

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
load carriage optimization; design physiological modes to predict human state during complex military scenarios; develop and/or assess various countermeasures for improved performance in extreme environments.  <b>FY 2023 Plans:</b> Will validate performance of pharmaceuticals and nutrition-based pharmacologic interventions to reduce acute mountain sickness, heat injuries and other environmental exposures; design physiological modes to predict human state during complex military scenarios; evaluate cold acclimatization as an intervention to augment peripheral blood flow in cold exposure; study the effects of vascular preconditioning to reduce cold-induced blood vessel constriction to maintain core body heat and improve manual dexterity.  <b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding change reflects planned lifecycle of this effort.				
<b>Title:</b> Leader Decision Aid to Manage Blast Head Injury in All Settings  <b>Description:</b> Develop injury risk assessment/guidance/criteria that will inform the development of technologies (i.e., personal protection equipment, vehicles) and strategies (i.e., health hazard assessments) to protect the Soldier against current and emerging operational threats (i.e., blast, blunt, ballistic, and accelerative). Improve the prevention of and reduce the severity of spinal injuries experienced by military vehicle occupants and dismounted Warfighters during non-underbody blast operational exposures (aircrew crash, vibration, head-supported mass) through the development of improved, biomedically valid spinal injury criteria and health hazard assessments.  <b>FY 2022 Plans:</b> Will conduct experiments to build upon performance based weight limit criteria for loads added to the head (head protection systems, night vision goggles) to include acute injury based criteria for mounted and dismounted environments.  <b>FY 2023 Plans:</b> Will continue to develop injury risk criteria for head supported technologies in multiple military operational environments (mounted and dismounted).  <b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding change reflects planned lifecycle of this effort.		-	0.253	0.874
<b>Title:</b> Physical Fitness Standards to Prevent Musculoskeletal Injuries  <b>Description:</b> Develops validated standards and strategies to optimize Soldier readiness and performance related to musculoskeletal injury (MSKI) in order to provide military leadership with strategies and standards to mitigate musculoskeletal		-	1.614	0.890

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
injuries, facilitate quick return to combat effectiveness after MSKI, and decrease risk of re-injury once been cleared to return after injury to increase the probability of mission success.				
<p><b>FY 2022 Plans:</b> Will quantify relative contributions of modifiable and non-modifiable risk factors for MSKI; examine relationship between Holistic Health and Fitness (H2F) metrics and Soldier fitness and operational readiness to inform updates to H2F program; determine incidence of degraded performance metrics in combat units with and without embedded specialty providers and develop strategies to enhance performance and reduce injury and re-injury rates.</p> <p><b>FY 2023 Plans:</b> Will continue to support the United States Army Training and Doctrine Command (TRADOC) Center for Initial Military Training (CIMT) and the United States Army Forces Command (FORSCOM) in development of accurate and reliable physical assessment strategies after musculoskeletal injury to promote more effective and timely return-to-duty with reduced probability for re-injury.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding decreased due to realignment of US Army Medical Research and Development Command to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>				
<p><b>Title:</b> Leader Tools to Reduce Musculoskeletal Injury In All Settings</p> <p><b>Description:</b> Enhances the Army's understanding of the physiological mechanisms underlying musculoskeletal injuries and identifies countermeasures to mitigate injury risk in order to reduce musculoskeletal injuries in new recruits, thereby directly impacting force readiness and improving lethality.</p> <p><b>FY 2022 Plans:</b> Will define factors that contribute to risk for stress fracture and other MSKI development during Basic Combat Training (BCT); develop evidence-based, actionable recommendations to Army leadership (TRADOC-CIMT) to reduce MSKI in recruits without reducing training standards; determine trends/rates of negative health outcomes incurred by Soldiers to include risk and protective factors.</p> <p><b>FY 2023 Plans:</b> Will develop and refine models of musculoskeletal injury risk during basic training, specifically bone health optimization strategies that will transition to TRADOC-CIMT.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b></p>		-	3.603	2.440

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
Funding decreased due to realignment of US Army Medical Research and Development Command to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.				
<p><b>Title:</b> Forward Neuro-Muscular Skeletal Injury Assessment</p> <p><b>Description:</b> Focus on developing portable imaging technologies to identify soft tissue musculoskeletal injury severity in the field and generate capabilities to guide musculoskeletal injury management to inform appropriate evacuation vs. return to duty (RTD) decisions.</p> <p><b>FY 2022 Plans:</b> Design and conduct experiments for an ultrasound-based bone injury screening device and investigate its translation to a soft tissue imaging based capability for diagnosing and screening of musculoskeletal injury.</p> <p><b>FY 2023 Plans:</b> Will develop and refine ultrasound techniques and algorithm development to detect foot and ankle musculoskeletal injuries using machine learning techniques.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding change reflects planned lifecycle of this effort.</p>		-	0.389	0.318
<p><b>Title:</b> Biomedical Performance Enhancement</p> <p><b>Description:</b> This effort evaluates strategies and technologies that enhance Soldier physical and mental performance in Multi-Domain operations. Additional efforts concentrate on characterization of physiological and genetic factors that contribute to physiological resilience to military stressors.</p> <p><b>FY 2022 Plans:</b> Will complete evaluation of drug-delivered testosterone for maintenance of physiological and psychological performance under conditions of medically relevant hypogonadism (a failure of the gonads, testes in men and ovaries in women, to function properly) induced by high operational tempo military activity; investigate pharmacological strategies for improving Soldier vigilance &amp; endurance; refine electrical stimulation technologies to augment military performance and mitigate high OPTEMPO performance degradation.</p> <p><b>FY 2023 Plans:</b></p>		-	6.469	4.840

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<p>Will continue to investigate pharmacological strategies for improving Soldier vigilance &amp; endurance. Will continue to investigate pharmacological strategies for improving Soldier vigilance &amp; endurance. Will also continue to refine electrical stimulation technologies.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding decreased due to realignment of US Army Medical Research and Development Command to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>				
<p><b>Title:</b> Expeditionary Force Nutrition to Improve Performance</p> <p><b>Description:</b> Characterizes and refines field fueling and garrison practices to sustain Medical readiness, military performance and recovery from military operations. Evaluates combat ration components to sustain Medical Readiness and performance in deployed, disaggregated and dispersed operations.</p> <p><b>FY 2022 Plans:</b> Will conduct experiments to improve understanding of environmental influences (heat, cold, altitude) on eating behavior; investigate the effects of protein source on muscle mass growth, strength and maintenance; evaluate nutritional requirements for maintenance of cognitive, physical and immune function during arduous military training.</p> <p><b>FY 2023 Plans:</b> Will continue experiments to improve understanding of environmental influences (heat, cold, altitude) on eating behavior; investigate the effects of protein source on muscle mass growth, strength and maintenance; evaluate nutritional requirements for maintenance of cognitive, physical and immune function during arduous military training.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding decreased due to realignment of US Army Medical Research and Development Command to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>		-	1.781	1.497
<p><b>Title:</b> Medical Interventions to Reduce Impact of Fatigue on Performance</p> <p><b>Description:</b> Investigates and determines strategies and technologies that prevent or mitigate fatigue-related performance decrements and injuries during training and operations. Refines interventions that prevent or mitigate clinical sleep disorders in Soldiers. Evaluates technologies to non-intrusively &amp; non-invasively monitor vigilance and performance in real-time.</p> <p><b>FY 2022 Plans:</b></p>		-	2.334	-

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<p>Will determine the effectiveness of electrical stimulation of the brain for enhancing learning through the consolidation of emotional memories; investigate the effectiveness of slow-wave sleep augmentation via auditory and electrical stimulation for enhancing tactical performance and reducing sleepiness during a subsequent period of sustained wakefulness.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>				
<p><b>Title:</b> Optimal Delivery of Far Forward Behavioral Health Care</p> <p><b>Description:</b> This effort will develop a Far Forward Behavioral Health (BH) delivery system of care for rapid recovery in austere environments, and guidelines for use of pharmacologic and non-pharmacologic solutions for BH issues in MDO without dedicated BH assets, tailored to needs and training of medics, that will reduce the development of deployment-related psychological health issues.</p> <p><b>FY 2022 Plans:</b> Will investigate pharmacotherapies in preclinical models for their efficacy in speeding recovery and restoring behavioral and physiological function after traumatic stress, to inform clinical trials in humans; design guidelines for medics to use existing Role 1 pharmacologic solutions to prevent and reduce the development of behavioral health issues in Soldiers; investigate the safety and efficacy of pharmacologic candidate compounds to speed recovery after traumatic stress exposure, to be tested in humans; investigate delivery of far-forward, non-pharmacological behavioral health services intervention package, and report on feasibility and effectiveness; determine a neurocognitive optimization, sustainment and recovery platform that mitigates responses to and expedites recovery from stress/trauma at or near point of psychological injury (Role 1); determine a blood-based biomarker screening panel to characterize objective signatures of Acute Stress Disorder that indicate risk of unresolved symptoms.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>		-	2.735	-
<p><b>Title:</b> Unit-Level Psychological Interventions to Enhance Performance</p> <p><b>Description:</b> This effort will deliver evidence-based strategies and inform policies to optimize, enhance and sustain Service member and Unit psychological health, well-being, resilience and readiness.</p> <p><b>FY 2022 Plans:</b></p>		-	2.863	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army		<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 2040 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>	<b>Project (Number/Name)</b> MK4 / <i>Warfigher Health Applied Rsch Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<p>Determine recommendations for leaders to address behavioral health threats and profiles identified by the rapid feedback mechanism; design and investigate measures of morally-challenging combat events, moral reactions, and moral leadership; design and conduct experiments on a framework that assists in identifying profiles of cognition and behavior to assist in matching individuals to appropriate resilience interventions; design and investigate candidate tools to improve small-team culture, performance and resilience; determine neurocognitive mechanisms of performance, particularly under high stress conditions.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>				
<p><b>Title:</b> Energy Field Biological Effects and Mechanisms</p> <p><b>Description:</b> Investigate the area of emerging directed energy threat mechanisms and biological effects. Conduct research to support the Department of Defense and US Government's threat mitigation strategy.</p> <p><b>FY 2023 Plans:</b> Will design and develop threat-relevant directed energy source technologies for laboratory investigation; investigate directed energy coupling, penetration, and absorption in biological structures; design and develop directed energy biological effect modeling and simulation tools; explore and characterize the biological effects of directed energy exposure; research to identify mechanisms by which effects are produced.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding increase supports research in the area of emerging directed energy threat mechanisms and biological effects.</p>		-	-	15.575
<p><b>Title:</b> SBIR/STTR Transfer</p> <p><b>FY 2022 Plans:</b> SBIR/STTR tax.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638.</p>		-	0.169	-
<b>Accomplishments/Planned Programs Subtotals</b>		29.726	28.649	31.916
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army		<b>Date:</b> April 2022
<b>Appropriation/Budget Activity</b> 2040 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>	<b>Project (Number/Name)</b> MK4 / <i>Warfigher Health Applied Rsch Technology</i>

**D. Acquisition Strategy**  
N/A

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**Exhibit R-2A, RDT&E Project Justification:** PB 2023 Army **Date:** April 2022

<b>Appropriation/Budget Activity</b> 2040 / 2					<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>				<b>Project (Number/Name)</b> MM4 / <i>Cbt Casualty Care Applied Rsch Technology</i>			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
MM4: <i>Cbt Casualty Care Applied Rsch Technology</i>	-	19.301	23.437	1.935	-	1.935	1.797	2.498	2.546	2.545	0.000	54.059

**A. Mission Description and Budget Item Justification**

This Project refines and assesses concepts, techniques, and materiel that improve survivability and treatment outcomes for Warfighters wounded during combat operations and treated under austere field conditions, including prolonged field care, and during medical evacuation, and maintains laboratory capability to perform these functions. Combat casualty care research addresses control of severe bleeding; resuscitation and stabilization; advanced automated life support systems suitable for use in forward areas, treatment of severe orthopedic injuries, treatment of severe burns, and combat-related brain injury.

Promising efforts identified in this Project are further matured under Program Element (PE) 0603002A (Medical Advanced Technology).

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

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

	FY 2021	FY 2022	FY 2023
<b>Title:</b> Prolonged Care	7.299	-	-
<b>Description:</b> This effort performs applied research to study the physiological implications of delayed medical evacuation and limited access to definitive surgical care in severely injured casualties.			
<b>Title:</b> Blood and Blood Products	4.905	-	-
<b>Description:</b> This effort develops and refines knowledge products (such as clinical practice guidelines, manuals, protocols, studies, and media), materials, and systems for control of internal bleeding and mitigation of shock; minimizing the effects of traumatic blood loss; preserving, storing, and transporting blood and blood products.			
<b>Title:</b> Severe Burns	2.822	-	-
<b>Description:</b> This effort conducts research to enhance the ability to treat acute severe burns at or near the point of injury; protect burn wounds from further injury, infection and inflammation, especially when definitive surgical burn wound care is delayed or unavailable; and accelerate wound healing and return to combat duty.			
<b>Title:</b> Tactical Combat Casualty Care	2.100	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army		<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 2040 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>	<b>Project (Number/Name)</b> MM4 / <i>Cbt Casualty Care Applied Rsch Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<p><b>Description:</b> This effort refines diagnostic and therapeutic medical devices, drugs, and new clinical practices for hemorrhage control, resuscitation, stabilization, and preservation of vital organ function that can be immediately applied by combat medical personnel in the pre-hospital combat setting.</p>				
<p><b>Title:</b> Brain Trauma</p> <p><b>Description:</b> This effort supports refinement of drug (includes mature drug technologies and those that are FDA approved for other indications) and therapeutic strategies to manage brain injury resulting from battlefield trauma.</p>		2.175	-	-
<p><b>Title:</b> Modular and Automated Battlefield Sustainment of Critical Organ Function Cap Set 2</p> <p><b>Description:</b> This effort performs applied research to support development of novel, disruptive technologies to improve survival of the most severely injured casualties when medical evacuation is delayed and access to definitive surgical care is limited.</p> <p><b>FY 2022 Plans:</b> Will conduct experiments on technologies designed to mitigate detrimental effects that would otherwise occur in critically wounded casualties receiving prolonged care in forward operating areas when medical evacuation is either delayed or not possible, or definitive surgical care is unavailable; design tools that will enable medics to continuously monitor vital organ function in severely injured casualties, who for tactical reasons must be provided prolonged critical care in forward operating areas pending availability of medical evacuation and/or definitive surgical care; investigate the effects of reducing inflammation on vital organ function following severe injury; initiate investigation of drugs and other medical products that will protect blood deprived tissues from further damage after blood flow is restored.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>		-	1.223	-
<p><b>Title:</b> Battlefield Pain Control without Physiological Impairment</p> <p><b>Description:</b> This effort performs applied research in laboratory and animal studies to determine novel, non-opioid drugs to treat pain in the austere battlefield environment with minimal side effects.</p> <p><b>FY 2022 Plans:</b></p>		-	2.288	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army		<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 2040 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>	<b>Project (Number/Name)</b> MM4 / <i>Cbt Casualty Care Applied Rsch Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<p>Will conduct preclinical evaluation of promising non-opioid, side effect-free pain relieving drugs that act on non-opioid targets in the nervous system to inhibit pain signaling without affecting cognitive ability in treating post-traumatic, moderate-to severe pain in order for the wounded casualty to be able to remain in the fight.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>				
<p><b>Title:</b> Candidate Capabilities for Rapid Burn Treatment</p> <p><b>Description:</b> This effort conducts research to enhance the ability to treat acute severe burns at or near the point of injury, protect burn wounds from further injury, infection and inflammation, especially when definitive surgical burn wound care is delayed or unavailable, and accelerate wound healing and return to combat duty.</p> <p><b>FY 2022 Plans:</b> Will conduct experiments to evaluate new technologies and clinical practices for improving treatment of acute burns at the point of injury with aim to accelerate wound healing, reduce complications, and increase rate of return to duty; determine a dual treatment targeting both ischemia (poor blood &amp; oxygen supply) and inflammation to prevent burn progression on the battlefield using a large animal model; investigate the effect of enzymatic debridement (removal of damaged tissue) on wound healing of full thickness burns in a preclinical pig large animal model; evaluate extracellular vesicle (particles that are naturally released from a cell)-releasing plasma-alginate wound dressing to reduce inflammation and improve healing of acute wounds; investigate optimal off-the-shelf therapies to accelerate wound healing in a large, 20% total body surface area, and deep partial thickness burn wound model.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>		-	1.650	-
<p><b>Title:</b> Autonomous Cardiopulmonary Resuscitation</p> <p><b>Description:</b> This effort investigates new technologies addressing major causes of battlefield mortality, including non-compressible hemorrhage, safe mitigation of hemorrhagic shock, and airway obstruction and ventilation.</p> <p><b>FY 2022 Plans:</b></p>		-	0.514	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army		<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 2040 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>	<b>Project (Number/Name)</b> MM4 / <i>Cbt Casualty Care Applied Rsch Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<p>Will investigate new technologies that may be deployed by medics in the far-forward, prehospital environment to temporarily stop lethal non-compressible bleeding until definitive surgical repair is available; will design and determine efficacy and safety of emerging foams that stop bleeding in animal models of non-compressible truncal hemorrhage.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>				
<p><b>Title:</b> Unconventionally-acquired Brain Injury (UBI)</p> <p><b>Description:</b> This effort performs applied research aimed at determining the physiological effects of unconventionally-acquired threat technologies to support development of future diagnostic and treatment tools.</p> <p><b>FY 2022 Plans:</b> Will determine and investigate treatment for unconventionally-acquired brain injury threat technologies; conduct Unconventionally-acquired Brain Injury human-like animal experiments; validate Unconventional-acquired Brain Injury threat source symptomology and determine injury mechanisms; validate understanding of injury mechanisms to enable direct medical diagnosis, treatment and clinical management.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>		-	8.660	-
<p><b>Title:</b> Automated Management of Traumatic Brain Injury (TBI) and Concussion in Prolonged MDO</p> <p><b>Description:</b> This effort performs applied research to support development of therapies to treat and clinically manage brain injury under prolonged care conditions.</p> <p><b>FY 2022 Plans:</b> Will investigate efficacy of an immunomodulation agent (stimulates or suppresses the immune system) to mitigate both intracerebral bleeding (bleeding within the brain tissue), as well as neurological, motor impairment and cognitive deficits following TBI.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b></p>		-	1.232	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army		<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 2040 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>	<b>Project (Number/Name)</b> MM4 / <i>Cbt Casualty Care Applied Rsch Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.				
<p><b>Title:</b> Prevention and Treatment of Brain Injury</p> <p><b>Description:</b> This effort supports refinement of drug (includes mature drug technologies and those that are United States Food and Drug Administration (FDA) approved for other indications) and therapeutic strategies to manage brain injury resulting from battlefield trauma.</p> <p><b>FY 2022 Plans:</b> Will determine the efficacy of a novel anti-oxidant and anti-inflammatory peptide, currently undergoing FDA evaluation, against blast-induced TBI, and will perform dosing studies to determine the optimum effective dose.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>		-	1.457	-
<p><b>Title:</b> Next Generation Rapid Burn Injury Treatment and Return to Duty Cap Set 2</p> <p><b>Description:</b> This effort conducts research to support development of novel, disruptive technologies that will significantly enhance the ability to treat acute severe burns at or near the point of injury, protect burn wounds from further injury, infection and inflammation, especially when definitive surgical burn wound care is delayed or unavailable, and accelerate wound healing and return to combat duty.</p> <p><b>FY 2022 Plans:</b> Will determine effectiveness of a thin film containing antimicrobial and anti-inflammatory drugs applied to deep partial thickness- and full thickness-burn wounds early after injury to reduce bacterial burden, inflammation, and injury progression.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>		-	0.707	-
<p><b>Title:</b> Bioengineered Blood Surrogate</p>		-	0.351	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army		<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 2040 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>	<b>Project (Number/Name)</b> MM4 / <i>Cbt Casualty Care Applied Rsch Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<p><b>Description:</b> This effort performs applied research focused on development of modified whole blood or blood products, and synthetic blood products that will stop life threatening bleeding, stabilize tissue metabolism, mitigate shock and restore normal blood clotting, and will improve prompt hemorrhage control and minimize sustainment requirements.</p> <p><b>FY 2022 Plans:</b> Will comparatively investigate ability of promising cold-stored whole blood additives to extend shelf life and maintain normal blood function.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>				
<p><b>Title:</b> Next Generation Human-Derived Blood Replacement</p> <p><b>Description:</b> This effort performs applied research focused on development of improved blood products and biopharmaceutical technologies that stop life threatening bleeding, stabilize tissue metabolism, mitigate shock and restore normal blood clotting, and will improve prompt hemorrhage control and minimize sustainment requirements.</p> <p><b>FY 2022 Plans:</b> Will investigate single drugs and multiple drugs in combination to determine their efficacy in prolonging survival and improving outcomes in animal models of hemorrhagic shock.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>		-	0.751	-
<p><b>Title:</b> Future En Route Casualty Care Sustainment System Cap Set</p> <p><b>Description:</b> This effort performs applied research to support development of technologies that will increase capability and capacity to provide combat casualty care from point of injury to final point of care.</p> <p><b>FY 2022 Plans:</b> Will determine and validate a post mortem human subject model for use in patient in transport research- all use of post-mortem human subjects will be done in an ethical and respectful manner in accordance with the 05-November-2019 Army Policy for Use of Human Cadavers for Research, Development, Test and Evaluation (RDTE), Education and Training. Will conduct engineering</p>		-	1.794	1.935

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army		<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 2040 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>	<b>Project (Number/Name)</b> MM4 / <i>Cbt Casualty Care Applied Rsch Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<p>evaluation of the Interim Medevac Mission Support System to support future studies aimed at improving patient and medical attendant survivability in potentially survivable mishaps.</p> <p><b>FY 2023 Plans:</b> Will perform studies to determine test conditions and development standards for aeromedical patient movement systems. Will perform studies to determine impact of en route care environment and patient number on medical care provider performance.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding change reflects planned lifecycle of this effort.</p>				
<p><b>Title:</b> Candidate Capabilities for Field Stabilization of Bone in Preparation for Evacuation</p> <p><b>Description:</b> This effort focuses on multiple disruptive technologies for early treatment of extremity fractures to accelerate healing and mitigate complications, while maintaining soldier mobility.</p> <p><b>FY 2022 Plans:</b> Will investigate pharmaceuticals and biologics that reduce cellular metabolism in injured limbs and protects injured tissues from the effects of prolonged lack of blood and oxygen followed by period of blood and oxygen re-supply.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>		-	0.528	-
<p><b>Title:</b> Candidate Capabilities for Limb Function Repair and Return to Combat Duty</p> <p><b>Description:</b> This effort focuses on multiple disruptive technologies directed toward early treatment of extremity fractures to accelerate healing and mitigate complications and includes compartment syndrome (Increased pressure within a closed body space, especially of the leg or forearm. May require surgery and loss tissue or extremity).</p> <p><b>FY 2022 Plans:</b> Will determine efficacy of two drugs in preserving skeletal muscle function following extended tourniquet application.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>		-	0.580	-
<p><b>Title:</b> Candidate Capabilities for Battlefield Sustainment of Critical Organ Function</p>		-	1.076	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army		<b>Date:</b> April 2022
<b>Appropriation/Budget Activity</b> 2040 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>	<b>Project (Number/Name)</b> MM4 / <i>Cbt Casualty Care Applied Rsch Technology</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<p><b>Description:</b> This effort performs applied research to study the physiological implications of delayed medical evacuation and limited access to definitive surgical care in severely injured casualties.</p> <p><b>FY 2022 Plans:</b> Will investigate field-deployable pharmacological treatments using a previously developed combat-relevant small animal model that reliably produces acute kidney injury; investigate drugs that increase renal oxygen delivery and improve energy utilization; determine the efficacy of targeting key immunomodulatory (affecting the immune system) players on progression of smoke inhalation injury in a small animal lung injury model.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>			
<p><b>Title:</b> SBIR/STTR</p> <p><b>FY 2022 Plans:</b> SBIR/STTR tax.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC 2638.</p>	-	0.626	-
<b>Accomplishments/Planned Programs Subtotals</b>	19.301	23.437	1.935

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army										<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 2040 / 2					<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>				<b>Project (Number/Name)</b> MM6 / <i>Medical Technologies to Support Dispersed Ops Tech</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
MM6: <i>Medical Technologies to Support Dispersed Ops Tech</i>	-	14.052	10.668	0.125	-	0.125	0.124	0.118	0.119	0.118	0.000	25.324

**A. Mission Description and Budget Item Justification**

This Project supports applied research in two task areas: 1) Medical Robotic and Autonomous Systems (Med-RAS) - will a) leverage emerging technologies in biomedical engineering, robotics, autonomy, unmanned systems, and assured position navigation and timing, to improve capabilities and expand capacity to deliver prolonged care, perform evacuation, delivery emergency resupply of medical material supplies (Class VIII), such as blood products, by ground or air, in dispersed and Multi-Domain Operations and b) establish medical performance criteria to ensure Soldiers are able to effectively perform manned-unmanned teaming tasks; and, 2) Virtual Health - will leverage emerging technologies in information science, artificial intelligence, telecommunications network engineering, and cyber security to enable prolonged care, remote telemonitoring, automated decision support, and telementoring between providers in Role of Care 3 and 4 to patients in Role of Care 1 and 2. Promising work in this Project will be further matured in PE 0603002A (Medical Advanced Technology) / Project MM7 (Enabling Med Cap to Support Dispersed OPS Adv Tech).

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. Work in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

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

	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<b>Title:</b> Medical Robotic and Autonomous Systems	9.726	7.083	0.125
<b>Description:</b> Research, design, and validate autonomous and unmanned capabilities to deliver high quality combat casualty care in dispersed operations with limited or absent medical care personnel, and future medical robotic systems capable of providing autonomous combat casualty care while optimizing the medical logistic footprint in far-forward and dispersed geographic environments in support of the Army Multi-Domain Operations (MDO) concept and the Army Force 2025 and Beyond vision documents.			
<b>FY 2022 Plans:</b> Will conduct in-flight experimentation of emerging semi-autonomous and autonomous en route care technologies and capabilities that are candidates for providing patient management during unmanned aircraft systems (UAS) Casualty Evacuation (CASEVAC) missions; investigate comparisons of performance of medical devices and support systems on board UAS to performance in a controlled environment; funds research of in-flight testing of at least two technologies for low-band width, cyber- secure, communications networking with potential for overcoming limitations in bandwidth, range, beyond line-of-sight transmissions, cyber security, and security domain restrictions which limit medical use of current tactical networks; initiate investigation of methods to modify communications protocols for transmitting telemetry data from the UAS in order to mitigate UAS flight induced communications effects determine and investigate a method for interfacing with the unmanned vehicle's flight controller to adapt			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army		<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 2040 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>	<b>Project (Number/Name)</b> MM6 / <i>Medical Technologies to Support Dispersed Ops Tech</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<p>the vehicles route planning and flight performance parameters based on patient conditions and injury type to ensure a safe ride profile is attainable; determine method for visual and audio data capture for hands free documentation, requiring a data collection system that is worn by the end user; investigate low size, weight, and power (SWaP) body worn data collection system to ensure solutions function within Army established performance parameters; investigate baseline, rule based, Medic Computer Decision Support System (CDSS) prototype for an end user study of CDSS effectiveness.</p> <p><b>FY 2023 Plans:</b> Will expand research platforms for the Semi-Autonomous Casualty Management Module (SACM2) and integration for technologies for in-flight interventions; provide communication infrastructure and cyber security solutions for remote patient monitoring, remote supervision and control of semi-autonomous patient management systems</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding decreased due to realignment of US Army Medical Research and Development Command to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>				
<p><b>Title:</b> Virtual Health</p> <p><b>Description:</b> Develop future Virtual Health enterprise process architectures and integrated physical solutions capable of supporting prolonged field care in conditions with limited or lacking traditional field communications.</p>		4.326	-	-
<p><b>Title:</b> Virtual Health Applications for Multi Domain Operational Environments</p> <p><b>Description:</b> Investigate future Virtual Health enterprise process architectures and integrated physical solutions capable of supporting prolonged field care in conditions with limited or lacking traditional field communications. Deliver sustainable high quality medical care using advanced technology approaches to export medical expertise to ill/injured soldiers where and when it is needed regardless of geographic location of medical providers, enabling the MDO tenet of maximizing human potential.</p> <p><b>FY 2022 Plans:</b> Will conduct research and validation of models for the Virtual Health (VH) support and integration with autonomous (real time) and/or semiautonomous patient care capabilities; investigate methods and determine means to leverage contemporary VH data components to drive future semi-autonomous and autonomous VH system support tools; conduct research and design strategies and mechanisms to provide VH solutions when an established synchronous VH consultation is disrupted due to communication failure/outages to include, but not limited to closed loop systems and machine learning techniques; funds research on vocal patterning data analysis to link vocal capture to stress-related changes in risk mechanisms; investigate the link between vocal behavioral markers sleep loss and stress-related changes in health risk mechanisms for more accurate interpretation of commands and recognize changes in environment to determine risk, for improved recommended/best medical courses of action;</p>		-	3.214	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army		<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 2040 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>	<b>Project (Number/Name)</b> MM6 / <i>Medical Technologies to Support Dispersed Ops Tech</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<p>conduct a systematic retrospective review and case analysis of virtual/telehealth encounters across the Military Health System to quantify and categorize the types of casualty information data required to deliver care and methods of data communication using a mixed method (qualitative and quantitative) approach; determine virtual/telehealth health information data elements and prioritization guide and roadmap for future casualty care information data optimization for virtual/telehealth application in the Role 1&amp;2 environment.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>				
<p><b>Title:</b> SBIR/STTR</p> <p><b>FY 2022 Plans:</b> SBIR/STTR tax.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638.</p>		-	0.371	-
<b>Accomplishments/Planned Programs Subtotals</b>		14.052	10.668	0.125
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army										<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 2040 / 2					<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>				<b>Project (Number/Name)</b> MM8 / <i>Infectious Diseases and Applied Rsch Technology</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
MM8: <i>Infectious Diseases and Applied Rsch Technology</i>	-	24.542	28.526	-	-	-	-	-	-	-	0.000	53.068

**A. Mission Description and Budget Item Justification**

This Project conducts applied (pre-clinical) research for medical countermeasures to prevent naturally occurring infectious diseases that impact operational readiness and maintains laboratory capability to perform these functions. The Project builds on basic research to optimize lead countermeasures and determines their safety and efficacy in animal models of infection. Effective preventive countermeasures protect the Warfighter from disease and sustain readiness and operations. Infectious disease threats from parasitic diseases, bacterial diseases, and viral diseases are high priorities for military operations.

Research conducted in this project focuses on the following three areas:

- (1) Parasitic Diseases
- (2) Bacterial Diseases
- (3) Viral Diseases

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Work is managed by the United States Army Medical Research and Development Command (USAMRDC) in coordination with the Naval Medical Research Center (NMRC). The Army is responsible for programming and funding all Department of Defense (DoD) naturally occurring infectious disease research requirements, thereby precluding duplication of effort within the Military Departments.

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

	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<b>Title:</b> Applied research on drugs and vaccines against parasitic diseases	13.452	-	-
<b>Description:</b> Develop and validate malaria preclinical animal models. Demonstrate and optimize prophylactic safety and efficacy in validated malaria preclinical animal models. Down-select lead malaria prophylactic candidates for use in human clinical trials.			
<b>Title:</b> Applied Research to Prevent Viral Diseases	6.039	-	-
<b>Description:</b> Develop and validate viral disease preclinical animal models. Demonstrate and optimize prophylactic safety and effectiveness in validated viral disease preclinical animal models. Down-select lead viral disease prophylactic candidates for use in human clinical trials.			
<b>Title:</b> Applied Research to Prevent Bacterial Diseases	5.051	-	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army		<b>Date:</b> April 2022
<b>Appropriation/Budget Activity</b> 2040 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>	<b>Project (Number/Name)</b> MM8 / <i>Infectious Diseases and Applied Rsch Technology</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
<p><b>Description:</b> Optimize antigens and platforms for use in animal studies. Evaluate bacterial diarrheal vaccine candidates for safety, effectiveness, and immunogenicity in animal models to advance to human clinical trials (Enterotoxigenic Escherichia Coli, Shigella and Campylobacter). Examine host/pathogen/vector interactions for scrub typhus and other Rickettsial diseases.</p>			
<p><b>Title:</b> Prevention &amp; Treatment of Combat Wound Infections during Prolonged Care</p> <p><b>Description:</b> Determine and validate combat wound infection preclinical animal models. Investigate and validate prophylactic and treatment safety and effectiveness in validated combat wound infection preclinical animal models. Fund research to down-select lead combat wound infection prophylactic and treatment candidates for use in human clinical trials.</p> <p><b>FY 2022 Plans:</b> Will perform test tube and/or cell-based studies to determine the next lead prophylactic and/or treatment candidate for prevention and treatment of combat wound infections; design, assess and validate performance parameters of animal efficacy models of combat wound infections; evaluate the safety and efficacy of lead candidates in validated combat wound infection animal models; investigate technologies for extended release that provides long-term prophylaxis in order to reduce disease and non-battle injury (DNBI) through prevention of wound infections and reduce unit loss rate for effective wound infection prevention to sustain unit readiness, operational effectiveness, Warfighter performance, and quicker return to duty.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.</p>	-	11.327	-
<p><b>Title:</b> Prevention and Treatment of Endemic Diseases</p> <p><b>Description:</b> Determine and validate endemic bacterial and viral disease preclinical animal models. Investigate and validate prophylactic and treatment safety and effectiveness in validated bacterial and viral disease preclinical animal models. Down-select lead bacterial and viral infection prophylactic and treatment candidates for use in human clinical trials.</p> <p><b>FY 2022 Plans:</b> Will perform test tube and/or cell-based studies to investigate and determine the next lead prophylactic and/or treatment candidate for prevention and treatment of endemic bacterial and viral infections; determine, assess and validate performance parameters of animal efficacy models of endemic bacterial and viral infections; investigate the safety and efficacy of lead candidates in validated bacterial and viral infection animal models; assess technologies for extended release that provide long-term prophylaxis.</p> <p><b>FY 2022 to FY 2023 Increase/Decrease Statement:</b></p>	-	16.637	-

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2023 Army		<b>Date:</b> April 2022		
<b>Appropriation/Budget Activity</b> 2040 / 2	<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>	<b>Project (Number/Name)</b> MM8 / <i>Infectious Diseases and Applied Rsch Technology</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023</b>
Funding and mission realigned as part of US Army Medical Research and Development Command transfer to the Defense Health Agency in order to meet Congressional intent as outlined in NDAA 2019 (Section 711) and NDAA 2020 (Section 737). Funding transferred to Program Element 0602115DHA, Project Code 372G.				
<b>Title:</b> SBIR/STTR		-	0.562	-
<b>FY 2022 Plans:</b> SBIR/STTR tax.				
<b>FY 2022 to FY 2023 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC 7638.				
<b>Accomplishments/Planned Programs Subtotals</b>		24.542	28.526	-
<b>C. Other Program Funding Summary (\$ in Millions)</b>				
N/A				
<b>Remarks</b>				
<b>D. Acquisition Strategy</b>				
N/A				

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**Exhibit R-2A, RDT&E Project Justification:** PB 2023 Army **Date:** April 2022

<b>Appropriation/Budget Activity</b> 2040 / 2					<b>R-1 Program Element (Number/Name)</b> PE 0602787A / <i>Medical Technology</i>				<b>Project (Number/Name)</b> MN1 / <i>Applied Sensory Systems Trauma Technology</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>FY 2023 Base</b>	<b>FY 2023 OCO</b>	<b>FY 2023 Total</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>FY 2026</b>	<b>FY 2027</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
MN1: <i>Applied Sensory Systems Trauma Technology</i>	-	6.720	-	-	-	-	-	-	-	-	0.000	6.720

**A. Mission Description and Budget Item Justification**

This Project conducts laboratory and animal studies for the purpose of developing novel, non-opioid drugs to treat pain in the austere battlefield environment with minimal side effects. Research to understand the influence of stress on the effectiveness of pain relief drugs (analgesics). All drugs, biological products, and medical devices are refined in accordance with Food and Drug Administration (FDA) regulations, which govern testing in animals to assess safety, toxicity, and effectiveness and subsequent human subject clinical trials.

Promising efforts identified in this Project are further matured under Program Element (PE) 0603002A (Medical Advanced Technology) / Project MN7 (Musculoskeletal Injury Screening Tool Adv Tech).

The cited research is consistent with the Under Secretary of Defense (Research and Engineering) science and technology focus areas and the Army Modernization Strategy.

Research in this Project is performed by the United States Army Medical Research and Development Command (USAMRDC), Fort Detrick, MD.

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

	FY 2021	FY 2022	FY 2023
<b>Title:</b> Applied Sensory Systems Trauma Technology	6.720	-	-
<b>Description:</b> This effort performs applied research in laboratory and animal studies to develop novel, non-opioid drugs to treat pain in the austere battlefield environment with minimal side effects.			
<b>Accomplishments/Planned Programs Subtotals</b>	6.720	-	-

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

N/A

**Remarks**

**D. Acquisition Strategy**

N/A