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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 3: Advanced Technology Development (ATD)</i>	R-1 Program Element (Number/Name) PE 0603729N / <i>Warfighter Protection Adv Tech</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	0.000	39.949	34.149	4.851	-	4.851	4.949	5.049	5.151	5.254	Continuing	Continuing
2914: <i>Warfighter Protection Adv Tech</i>	0.000	4.713	4.849	4.851	-	4.851	4.949	5.049	5.151	5.254	Continuing	Continuing
9999: <i>Congressional Adds</i>	0.000	35.236	29.300	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	64.536

A. Mission Description and Budget Item Justification

This PE supports the advanced development and demonstration of technologies to improve warfighter performance, safety and survivability. Naval investment in these areas is essential in order to improve the ability to enhance, maintain, and sustain Warfighter effectiveness. Programs are coordinated with other Services through the Office of the Secretary of Defense Communities of Interest.

Today's Sailors and Marines are enabled by naval Science and Technology (S&T). Since 1946, the Office of Naval Research (ONR) has fostered scientific research related to the maintenance of maritime superiority and national defense. ONR manages the Department of the Navy's (DON) portfolio of naval Basic and Applied research, and Advanced Technology Development investments to ensure naval forces can effectively deter conflict, but when called upon, fight, win and come home safe. Current investments hedge against uncertainty, providing solutions to commanders today, and options for the future. The Naval S&T budget supports higher guidance defined by the National Defense Strategy, and responds to requirements identified by the Secretary of the Navy through research priorities set by the Chief of Naval Research, coordinated across the Naval Research Enterprise (NRE), and outlined in the Naval R&D Framework.

This Program Element (PE) funds Advanced Technology Development (ATD) that includes development of subsystems and components and efforts to integrate subsystems and components into system prototypes for field experiments and/or tests in a simulated environment. Efforts in this PE generally have Technology Readiness Levels (TRL) of 4 (component and/or breadboard validation in laboratory environment.), 5 (component and/or breadboard validation in relevant environment.), or 6 (system/subsystem model or prototype demonstration in a relevant environment).

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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	41.377	4.849	4.851	-	4.851
Current President's Budget	39.949	34.149	4.851	-	4.851
Total Adjustments	-1.428	29.300	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	29.300			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.428	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000

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

Project: 9999: *Congressional Adds*

Congressional Add: *Novel Therapeutic Interventions Research*

Congressional Add: *Bone Marrow Registry Program*

Congressional Add Subtotals for Project: 9999

Congressional Add Totals for all Projects

	FY 2019	FY 2020
	4.827	5.000
	30.409	24.300
Congressional Add Subtotals for Project: 9999	35.236	29.300
Congressional Add Totals for all Projects	35.236	29.300

Change Summary Explanation

funding: No significant change.

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Appropriation/Budget Activity 1319 / 3					R-1 Program Element (Number/Name) PE 0603729N / <i>Warfighter Protection Adv Tech</i>				Project (Number/Name) 2914 / <i>Warfighter Protection Adv Tech</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
2914: <i>Warfighter Protection Adv Tech</i>	0.000	4.713	4.849	4.851	-	4.851	4.949	5.049	5.151	5.254	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element supports the advanced development and demonstration of technologies to improve warfighter performance, safety and survivability. Naval investment in these areas is essential in order to improve the ability to enhance, maintain, and sustain Warfighter effectiveness. Programs are coordinated with other Services through the Office of the Secretary of Defense Communities of Interest.

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Naval Noise-Induced Hearing Loss (NIHL) and Warfighter Performance	4.713	4.849	4.851	0.000	4.851
Description: Improve technologies in Warfighter performance and protection in austere (e.g., high noise, hyperbaric, hypobaric) training and operational environments.					
FY 2020 Plans: Develop advanced communication systems and platform quieting approaches for training and operational environments; develop in-ear dosimetry technologies to support the prediction of susceptibility/incidence of auditory damage, as well as the assessment of personal protective equipment; and advance infra-red therapy for the prevention and treatment of auditory injuries.					
FY 2021 Base Plans: Auditory Neuroscience and Performance Develop mitigation technologies to protect Warfighters in high-noise environments. Further advance therapeutic approaches for treatment of auditory injuries. Enhance auditory processing augmentation strategies for communication in high-noise environments, including the development and assessment of personal protective equipment, advanced communication systems, and equipment / platform quieting.					
Warfighter Performance - Conduct advanced development research to enhance Warfighter performance and protection in extreme pressure (hypobaric to hyperbaric), thermal (hot/cold), sensory and electromagnetic environments.					
FY 2021 OCO Plans:					

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
N/A					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> There is no significant change between FY 2020 and FY 2021.					
Accomplishments/Planned Programs Subtotals	4.713	4.849	4.851	0.000	4.851

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

Remarks

D. Acquisition Strategy
N/A

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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
9999: <i>Congressional Adds</i>	0.000	35.236	29.300	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	64.536

A. Mission Description and Budget Item Justification

Congressional Interest Items not included in other Projects.

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

	FY 2019	FY 2020
<p>Congressional Add: Novel Therapeutic Interventions Research</p> <p>FY 2019 Accomplishments: Novel Therapeutic Interventions Program conducts research on therapies that address readiness challenges by reducing battlefield mortality and improving quality of life. FY 19 efforts include utilizing a wearable garment to estimate strains/stresses in lower limbs during extreme exercises to determine joint susceptibility to microfractures, stress fractures, and potential ligament damage; development of a model of fluid resuscitation and physiology algorithm, and development in the use of platelet rich plasma (PRP) and bone marrow concentrate (BMC) for poly-traumatic injuries sustained during field operations</p> <p>FY 2020 Plans: Novel Therapeutic Interventions Program will continue to conduct research on therapies that address readiness challenges by reducing battlefield mortality and improving quality of life. FY 20 efforts include utilizing a wearable garment to estimate strains/stresses in lower limbs during extreme exercises to determine joint susceptibility to microfractures, stress fractures, and potential ligament damage; development of a model of fluid resuscitation and physiology algorithm, and development in the use of platelet rich plasma (PRP) and bone marrow concentrate (BMC) for poly-traumatic injuries sustained during field operations</p>	4.827	5.000
<p>Congressional Add: Bone Marrow Registry Program</p> <p>FY 2019 Accomplishments: Bone Marrow program will develop, test and mature the ability to address contingency events wherein civilian or military personnel are exposed to marrow toxic agents, primarily ionizing radiation or chemical weapons containing nitrogen mustard in four focus areas: Contingency Preparedness, Development of Science and Technology for Rapid Identification of Matched Donors, Immunogenetic Studies in Transplantation and Clinical Research in Transplantation.</p>	30.409	24.300

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020
Conduct efforts to develop and integrate framework, sensors and hardware platform for the real-time detection of acute ionizing radiation exposure and prediction of bone marrow injury to assist in the rapid identification of high risk personnel, assessment and triage, and pre-emptive donor matching for those requiring transplantation.		
FY 2020 Plans: Bone Marrow program will continue develop, test and mature the ability to address contingency events wherein civilian or military personnel are exposed to marrow toxic agents, primarily ionizing radiation or chemical weapons containing nitrogen mustard in four focus areas: Contingency Preparedness, Development of Science and Technology for Rapid Identification of Matched Donors, Immunogenetic Studies in Transplantation and Clinical Research in Transplantation.		
Conduct efforts to develop and integrate framework, sensors and hardware platform for the real-time detection of acute ionizing radiation exposure and prediction of bone marrow injury to assist in the rapid identification of high risk personnel, assessment and triage, and pre-emptive donor matching for those requiring transplantation.		
Congressional Adds Subtotals	35.236	29.300

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

N/A

Remarks

D. Acquisition Strategy

N/A