



PERSONNEL AND
READINESS

UNDER SECRETARY OF DEFENSE
4000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-4000

DEC 23 2021

The Honorable Jack Reed
Chairman
Committee on Armed Services
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

The Department's response to section 742(a)(2) of the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2020 (Public Law 116-92), "Modification of Requirements for Longitudinal Medical Study on Blast Pressure Exposure of Members of the Armed Forces," which requires an annual status report on the longitudinal medical study on blast pressure exposure (section 734 of the NDAA for FY 2018 (Public Law 115-91)), is enclosed.

The Department continues its work on the series of studies being conducted in response to section 734 of the NDAA for FY 2018. The overarching goal of the section 734 studies, also referred to as the Blast Overpressure Study (BOS), is to improve the Department's understanding of the impact of blast pressure exposure from weapon systems on the Service members' brain health and to better inform policy for risk mitigation, unit readiness, and health care decisions. The section 734/BOS continues to leverage existing work and expertise across the various lines of inquiry. Results from these efforts will inform safety standards and medical policy to protect Service members' health.

Thank you for your continued strong support for the health and well-being of our Service members, veterans, and families. I am sending a similar letter to the House Armed Services Committee.

Sincerely,

A handwritten signature in black ink, appearing to read "Gilbert R. Cisneros, Jr.", written in a cursive style.

Gilbert R. Cisneros, Jr.

Enclosure:
As stated

cc:
The Honorable James M. Inhofe
Ranking Member



PERSONNEL AND
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UNDER SECRETARY OF DEFENSE
4000 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-4000

DEC 23 2021

The Honorable Adam Smith
Chairman
Committee on Armed Services
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

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Gilbert R. Cisneros, Jr.

Enclosure:
As stated

cc:
The Honorable Mike D. Rogers
Ranking Member

Report to the Congressional Armed Services Committees



Section 742(a)(2) of the National Defense Authorization Act for Fiscal Year 2020 (Public Law 116-92), “Modification of Requirements for Longitudinal Medical Study on Blast Pressure Exposure of Members of the Armed Forces and Collection of Exposure Information”

**Annual Status Update
December 2021**

The estimated cost of this report or study for the Department (DoD) of Defense is approximately \$661,000 for the 2021 Fiscal Year. This includes \$641,000 in expenses and \$21,000 in DoD labor.

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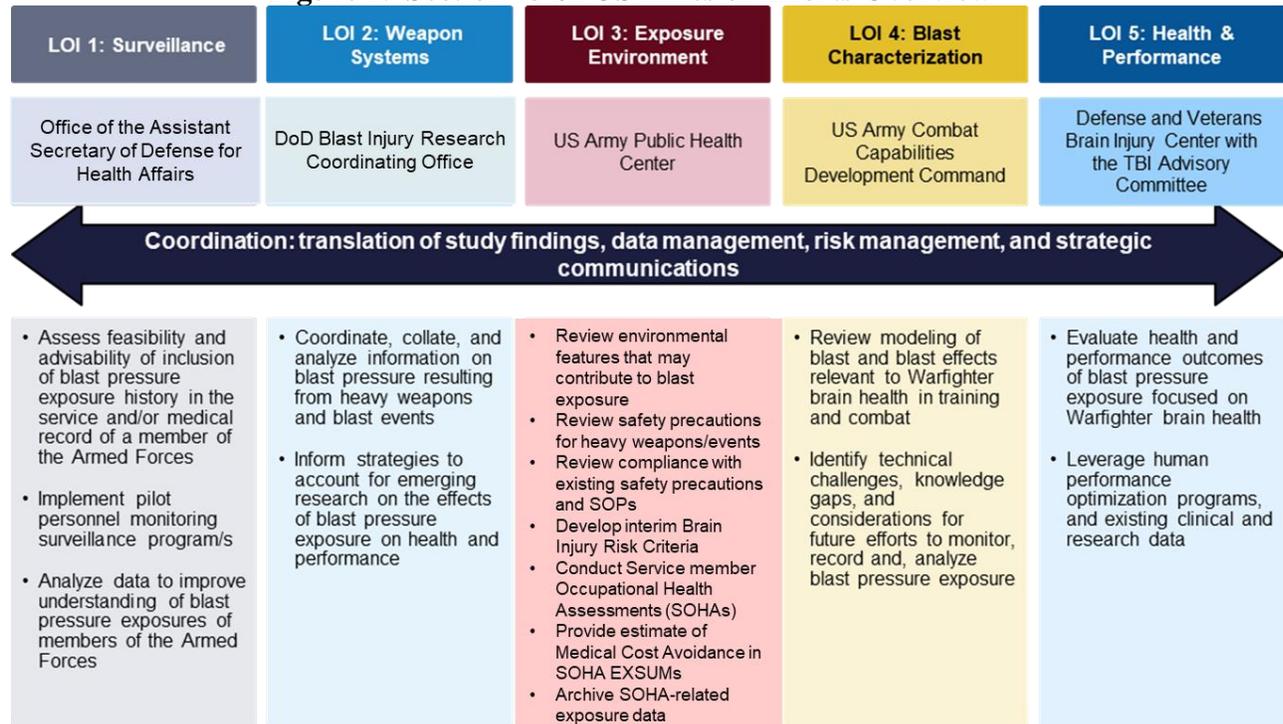
INTRODUCTION

Section 742(a)(2) of the National Defense Authorization Act (NDAA) for Fiscal Year (FY) 2020 (Public Law 116-92), “Modification of Requirements for Longitudinal Medical Study on Blast Pressure Exposure of Members of the Armed Forces and Collection of Exposure Information,” requires an annual status report on the longitudinal medical study on blast pressure exposure (section 734 of the NDAA for FY 2018 (Public Law 115-91)). The recent annual status update (section 742) was submitted on January 19, 2021.

The goal of section 734, also referred to as the Blast Overpressure Study (BOS), is to improve the Department’s understanding of the impact of blast pressure exposure from weapon systems on the Service member’s brain health and better inform policy for risk mitigation, unit readiness, and health care decisions. The scope of section 734 includes a series of studies and assessments to achieve the goal rather than a single longitudinal study. The multiple study methodology will be used in an effort to capture answers to several lines of inquiry (LOIs) that would prove challenging to accomplish with one large and unwieldy study, as well as to enable more opportunities for success.

Section 734/BOS has an established program structure, which includes the following five LOIs: Surveillance (LOI 1), Weapons Systems (LOI 2), Exposure Environment (LOI 3), Blast Characterization (LOI 4), and Health and Performance (LOI 5), to address the Congressional requirements (Figure 1). An In-Process Review for the entire section 734/BOS was conducted in October 2021 to include updates by each of the LOIs and is being used to inform the current status of activities across each LOI for the purpose of this annual status update.

Figure 1. Section 734/BOS Lines of Efforts Overview



SECTION 734/BOS LOIs

Surveillance (LOI 1)

LOI 1 is focused on three main strategic actions to establish a surveillance and exposure monitoring and documentation process. The initial action involves the developing of capabilities to house blast exposure-related variables within the Defense Occupational and Environmental Health Readiness System-Industrial Hygiene (DOEHRS-IH) System and later extract relevant data through the Individual Longitudinal Exposure Record (ILER). Secondly, the study designed a live-fire, Blast Overpressure (BOP) Surveillance Pilot project which included data collection from both Army and Marine units during Tier 1 heavy weapons training. The purpose is to help determine feasibility, limitations, and technical requirements of BOP monitoring using the Department's Doctrine, Organization, Training, Materiel, Leadership, Personnel, Facilities-Policy analysis to inform organizational capabilities. Additionally, the pilot project will provide the Department with discrete, real-time exposure information to optimize data management within our current systems with linkages to the DOEHRS-IH and ILER systems. The final action focuses on automating translatable, unit-level BOP exposure reports for operational leadership to aid in force health protection decision making during training,

Progress to Date:

LOI 1 has progressed in its surveillance efforts with the following successes:

- Fostered functional changes within DOEHRS-IH and ILER systems which accommodate individual blast exposure data for Service members' exposure records.
- Engaged with operational training units of the Armed Forces for completion of the surveillance pilot
- On track for completion of LOI 1 requirements by Quarter 1, FY 2023.

Weapon Systems (LOI 2)

LOI 2 is focused on developing an improved understanding of the blast exposures resulting from firing or detonating various weapon systems, evaluating existing documentation of the weapon systems in development, testing, training and modification scenarios, and analyzing the way these exposure components are described and captured in research, testing, and training communities.

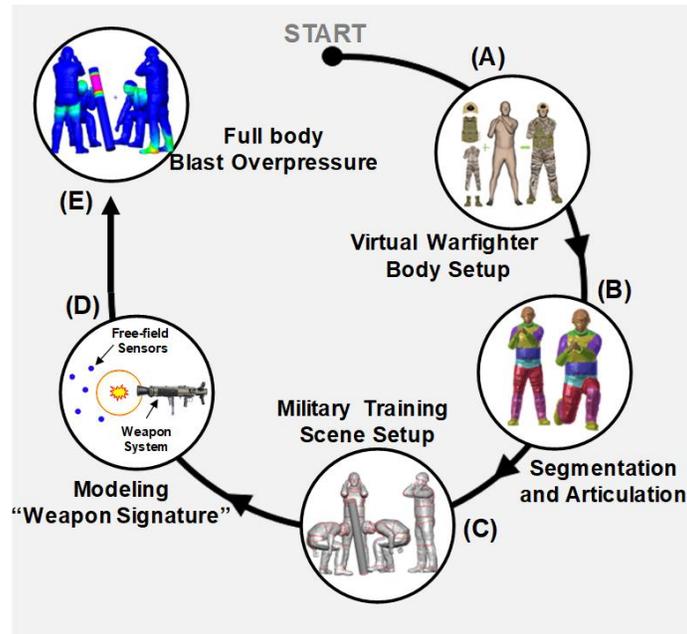
Progress to Date:

LOI 2 accomplished the following:

- Completed Tier 1 weapon systems (refer to Figure 3) executive summaries.
- Identified gaps and variability in safety guidance across the Services (e.g., weapons use conditions, Allowable Number of Rounds (ANORs)) and inconsistent terminology for safety concepts, such as ANOR.
- Coordinated with Army's Training and Doctrine Command and its Marine Corps

counterpart to establish the Range Manager Toolkit BOP Tool Module (Figure 2) to aid training cadre and unit commanders in “real-time” force health protection during weapons fire.

Figure 2. Components of a BOP Tool Module



Exposure Environment (LOI 3)

LOI 3 is focused on determining the factors contributing to how Service members are exposed to BOP. Additionally, LOI 3 is working to identify, assess, control/mitigate, quantify (monetarily), and catalogue post-materiel, fielding-related health hazard exposures (e.g., BOP, impulse pressure, noise exposures to Service members). The plan is for these actions to evolve with completion of the interim Brain Injury Risk Criteria and relevant Service member Occupational Health Assessments (SOHAs) by the study teams.

Progress to Date:

LOI 3 has accomplished the following:

- Proposal to Centers for Medicare and Medicaid Services to add “Primary Blast Injury to Brain” to the ICD-10-CM Tabular List was accepted.
- Completed Joint SOHA Reports for M2A1 MG, 81mm Mortar, Door and Wall Breaching charges (part of Tier 1 Weapon Systems & Breaching Charges (Figure 3)).
- Entered chemical and steady state noise exposure data into DOEHRS-IH not previously available.
- Conducted XM808 (BDM Trainer) SOHA (Instructor Exposures) - Safety Precautions and Chemical Sampling.
- Coordinated FY 2022 Joint SOHA efforts at Ft. Carson, Ft. Benning, and Camp Lejeune

(MOU, IRB/PHRB, training schedules).

- Obtained verification, validation, and accreditation of the Medical Cost Avoidance Model which will be used to estimate avoidable medical, lost time, disability, fatality, and training replacement costs to present the return on investment for implementing preferred mitigation strategy or controls recommended in the Joint SOHA Reports for Tier 1 Systems. Validation and verification is currently being executed.

Figure 3. Tier 1 Weapon Systems & Breaching Charges



Yellow = Completed 01 OCT 21

Blast Characterization (LOI 4)

LOI 4 is focused on modeling blast and blast effects relevant to warfighter brain health in training and combat, and identifying technical challenges, knowledge gaps, and considerations for future efforts to monitor, record, and analyze blast pressure exposure. LOI 4 focused on three areas in collaboration across LOIs: 1) Repository Development and Toolset Integration; 2) Computational Modeling; and 3) Automation and Analysis.

Progress to Date:

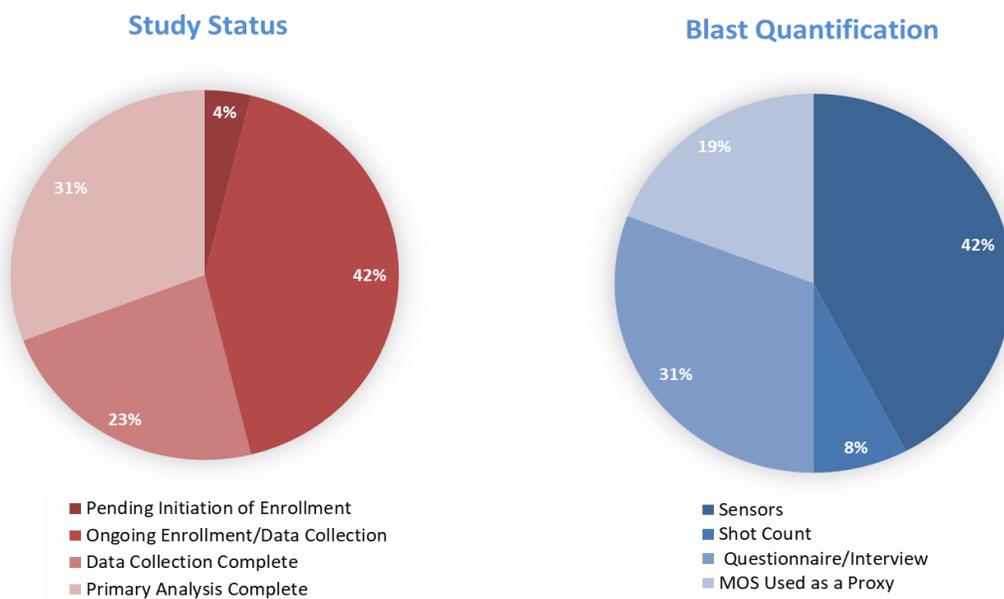
LOI 4 identified gaps across each of its three focus areas which include the following: 1) a lack of standardized validation and verification processes as well as lack of data quality screening; 2) storage of key data elements used by multiple communities of interest (weapons testing and evaluation, clinical surveillance, operations, and research) is not coordinated or standardized elevating the challenges in locating vital information; 3) current blast models are isolated, lack comparability, and have limited automation; and 4) validated protocols or common data elements are often not used. However, these significant gaps notwithstanding, LOI 4 broadened its efforts to include the development of a capability for the longitudinal examination and

derivation of weapons-based effects (existing and emergent) on Service member brain health and performance. Accomplishments included data repository development, artificial intelligence (unsupervised and supervised learning), and continued improvements to a Fast Automated Sign Transformation for Combat Training algorithm to recognize and process blast signatures from heavy weapon systems.

Health and Performance (LOI 5)

LOI 5 is focused on evaluating the acute, sub-acute, and chronic health and performance outcomes for warfighters exposed to repetitive, low-level, sub- concussive blast pressure with an emphasis on data gleaned from wearable sensors. LOI 5 leveraged existing research efforts throughout the DoD and identified 26 relevant studies/performers it currently tracks (“tracked studies”). These studies/efforts align with LOI 5 objectives related to performance, health and biological correlates and will increase the understanding of blast pressure effects on brain health (Figure 4).

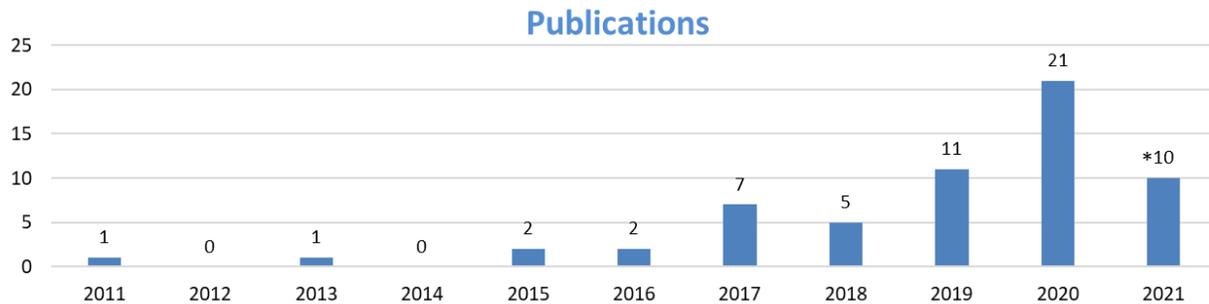
Figure 4. Line of Effort 5 Portfolio Overview



Progress to Date:

Several of the studies are publishing findings. Figure 5 captures the number of published results from the LOI 5 portfolio through September 10, 2021.

Figure 5. Line of Effort 5 Portfolio Publications



Below are recent published findings from LOI 5 studies:

- Neurocognitive assessments have revealed measures of reaction time are altered by low-level blast (LLB) exposure.
- Changes in other neurocognitive domains have not been consistently observed across studies.
- The most common symptom complaints are focused on headaches, fatigue, and sensory related symptoms, notably tinnitus.
- Greater lifetime LLB exposure is associated with greater risk for diagnoses of tinnitus, TBI, and post-concussive symptoms.
- There are currently no consistent findings on molecular biomarkers and/or neuroimaging correlates that can be used to track the effects of LLB exposure.

NEW BLAST PRESSURE EXPOSURE REQUIREMENTS IN THE NDAA FOR FY 2020

The Under Secretary of Defense for Personnel and Readiness has developed a DoD-wide comprehensive strategy and action plan for warfighter brain health as a Departmental initiative developed to address the health effects, including brain health, from blast pressure exposure from the use of kinetic weapons in training and operations. The strategy also addresses promoting and maintaining brain health in support of maximizing individual Service member combat effectiveness. Leveraging efforts already in progress in response to section 734 of the NDAA for FY 2018, work continues in assessing the feasibility and advisability of uploading personnel exposure data into the existing DOEHRS-IH, as required by section 742 of the NDAA for FY 2020. Section 717 of the NDAA for FY 2020 directs documentation of blast exposures into the medical record with a set of minimum elements for inclusion in a final report submitted in 2021.

CONCLUSION

The section 734/BOS continues to leverage existing work and expertise across the various LOIs. The LOI efforts are synergistic and interconnected resulting in close coordination and collaboration between the medical, scientific, technological, and operational communities. These efforts will inform safety standards; operational techniques, tactics and procedures; and medical policy to maximize force health protection. Additionally, this work will address tracking and documenting blast exposure capabilities. The continuation of the coronavirus disease 2019 pandemic slowed progress to a degree but as travel restrictions for mission essential work have been lifted, most efforts have resumed and the studies continues to move forward.