



6th International Forum on Blast Injury Countermeasures 2022

9-11 May 2022

The MITRE Corporation, McLean, VA

Program Day 1 (09 May 2022)

Registration and Introductions (08:30-10:00)	
Monday, 9 May 2022:	
08:30	Registration
09:00	MITRE Welcome & Facilities Overview <i>Dr. Matthew E. Downs</i>
09:05	MITRE Leadership Welcome and Introduction <i>Mr. Paul Bonnewitz</i>
09:15	Program Chair Introductions and Meeting Overview <i>Dr. Raj K. Gupta</i>
09:25	General Chair Welcome Remarks <i>LTC Jacob Johnson</i>
09:35	General Chair Welcome Remarks <i>Prof Daizoh Saitoh</i>
Session 1: Measurements and Prediction of Blast Injury and Exposure	
Co-chairs: Dr. R. Gupta & Dr. S. Sato	
10:00	Accurate quantification of the number and magnitude of overpressure events in highly dynamic military training environments A. Bartsch ¹ , M. Skotak ² , and W. Carr ² ¹ Prevent Biometrics, ² Walter Reed Army Institute of Research
10:15	Global overpressure measurement for blast loading assessment T. Mizukaki ¹ , R. Shimizu ² , and D. Numata ¹ ¹ Dept. of Aeronautics and Astronautics, Tokai University, ² Course of Mechanical Engineering, Graduate School of Engineering, Tokai University
10:30	Blast-structure interaction effects on primary blast injury risk and the suitability of predictive injury criteria J. Denny ¹ , G. Langdon ² , S. Rigby ² , A. Dickinson ¹ , J. Batchelor ¹ , L. Surey ¹ ¹ University of Southampton, ² University of Sheffield
10:45	Morning break
11:00	Bridging the Gaps Between Blast Exposure Measurement, Blast Induced Traumatic Brain Injury Diagnosis, and Prevention C. E. Johnson ¹ , M. Langenderfer ¹ , E. Johnson ¹ , R. Bauer ¹ , C. Thomas ¹ , and B. Rutter ^{1,2} ¹ Missouri University of Science and Technology, ² Rocky Mountain Scientific Laboratory
11:15	Development of military loading exposure guidelines for prevention of blast overpressure related brain injuries M. Philippens ¹ , and M.K. Sköld ^{2,3} ¹ The Netherlands Organization, ² Karolinska Institutet, ³ Uppsala University Hospital
11:30	Cumulative blast exposure estimate model for Special Operations Forces combat Soldiers SFC C. McEvoy ^{1,2} , SFC A. Crabtree ¹ , J. R. Powell ³ , J. S. Meabon ^{4,5} , and J. Mihalik ³ ¹ US Army Special Operations Command, ² University of Colorado School of Medicine, ³ University of North Carolina, ⁴ VA Puget Sound Health Care System (VA Puget Sound), ⁵ University of Washington
11:45	Session Discussion
12:00	Lunch
13:00	Tutorial #1: Comparison of Wearable Wireless Blast Sensor Technologies <i>MAJ Brian Johnson</i>



Session #2: Investigation of Blast Injury Mechanisms	
Co-chairs: Dr. R. Shoge and Dr. A. Makris	
13:30	Potential Mechanism of Auditory Dysfunction after Blast Exposure Y. Wang ¹ , D. Wilder ¹ , P. Arun ¹ , V. S. Sajja ¹ , I. Gist ¹ , and J. Long ¹ ¹ WRAIR
13:45	Blast Injury Prevention Standards Recommendation Process for Auditory Blast Injuries E. B. Brokaw ¹ , R. M. Byrne ¹ , R. W. Spencer ¹ , L. Lalis ¹ , R. Gupta ² ¹ The MITRE Corporation, ² US DoD Blast Injury Research Coordinating Office
14:00	Comparison of fragment penetration into hepatic tissue to ballistic gelatine H. Tsukada ¹ , T-T Nguyen ¹ , J. Breeze ^{1,2} , N. Baxan ¹ , I. E. Gibb ^{1,3} and S. D. Masouros ¹ ¹ Imperial College London, ² Royal Centre for Defence Medicine, ³ HMS Nelson
14:15	Repeated Exposures to Low Level Primary Blasts; Identification of Pathomechanism(s) that Can Lead to Chronic Neurological Conditions D. V. Agoston ¹ , A. Kamnaksh ¹ , J. McCullough ¹ , R. Aniceto ¹ , I.-L. Lin ¹ , M. Eklund ¹ , W. M. Graves III ² , L. S. Russeth ² , F. Leonessa ¹ and J. L. Duckworth ^{1,2} ¹ Uniformed Services University, ² Camp Pendleton
14:30	A study on the clinical triad of blast lung injury in a closed space N. Kiriu ¹ , D. Saitoh ¹ , Y. Sekine ¹ , K. Yamamura ¹ , M. Fujita ¹ , and Y. Tanaka ¹ ¹ National Defense Medical College
14:45	Cerebral Vasculature Influences Blast-Induced Biomechanical Responses of Human Brain Tissue D. R. Subramaniam ^{1,2} , G. Unnikrishnan ^{1,2} , A. Sundaramurthy ^{1,2} , J. E. Rubio ^{1,2} , V. B. Kote ^{1,2} , and J. Reifman ¹ ¹ United States Army Medical Research and Development Command, ² The Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc.
15:00	Session Discussion
15:15	Afternoon break
Session #3: Imaging and Sensing of Blast Injury	
Co-chairs: Dr. B. Brokaw & Dr. N. Kiriu	
15:30	Evaluation of the Blast Injuries using the Blast Gauge Sensor (BGS) and Pencil Probe in an Open Field Blast Environment T. Pandelani ¹ , S. Hamilton ¹ and D. Reinecke ¹ ¹ CSIR Defence and Security Cluster
15:45	Imaging State Variables Associated With Blast Wave Evolution K.L. McNesby ¹ , D.G. Scott ¹ , and R.A. Benjamin ¹ ¹ CCDC-Army Research Laboratory
16:00	Low-Power, Long-Lifetime MEMS-Based Sensing System for Wearable Blast Detection M. Khan ¹ , T. Luong ¹ , M. Winnick ¹ and O. Barham ¹ ¹ Naval Surface Warfare Center – Indian Head Division
16:15	RGB camera-based simultaneous measurements of percutaneous arterial oxygen saturation, tissue oxygen saturation, pulse rate and respiratory rate I. Nishidate ¹ , R. Yasui ¹ , N. Nagao ¹ , H. Suzuki ¹ , Y. Takara ² , K. Ohashi ² , F. Ando ² , N. Noro ² and Y. Kokubo ³ ¹ Tokyo University of Agriculture and Technology, ² EBA JAPAN CO., LTD., ³ Yamagata University, Japan



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16:30	Synchronized multi-sensor approach to soldier-borne dosimetry D. Wong ¹ , J.P. Dionne ¹ , A. Makris ¹ , J. Levine ¹ , and G. Vander Veer ¹ ¹ <i>Med-Eng Holdings ULC</i>
16:45	Wearable 3-D Blast Sensors for In-Air Explosions K. Willens ¹ , B. Muzinich ¹ , B. Kavlicoglu ¹ and F. Gordaninejad ¹ ¹ <i>Advanced Materials and Devices, Inc.</i>
17:00	Nanophotonic Probes for Understanding Pressure Effects on Neuronal Cells K.J. Perry ¹ , S.P. Karna ¹ and R.K. Gupta ² ¹ <i>Aberdeen Proving Ground</i> , ² <i>US Army Medical Research and Development Command</i>
17:15	Session Discussion – 15 mins
17:30	Daily closing remarks, and adjourn <i>Dr. Raj K. Gupta</i>
17:35	Optional meet-and-greet with heavy hors d'oeuvres and cash bar until 7:30 pm EST (For attendees who elected to participate in social event during registration)



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Program Day 2 (10 May 2022)

Tuesday, 10 May 2022:	
08:30	Registration
09:00	MITRE Welcome & Facilities Overview <i>Dr. Matthew E. Downs</i>
09:05	Keynote Address #1: NDAA Section 734 Program Overview <i>Dr. Sean Biggerstaff</i>
Session #4: Congressionally Mandated Longitudinal Medical Study on Blast Pressure Exposure Co-chairs: COL (Ret) Michael Evans, Dr. Shashi Karna & Mr. John Lenox	
09:35	Implications of a Surveillance Program for Blast Overpressure Monitoring M.D. Nieves ¹ , M. Wong ² , T. Whieldon ² , E. Brokaw ² , R. Gaskins ¹ , S. Jones ¹ <i>¹OASD Health Affairs, ²The MITRE Corporation</i>
09:50	FY18 NDAA Sec 734 Program Line of Inquiry 2 Weapon Systems: An Overview R. Spencer ¹ , M. Ghebremedhin ¹ , E.B. Brokaw ¹ , W. Carr ⁴ , Z.J. Chen ⁵ , B.A. Garfield ⁴ , H.T. Garimella ⁵ , H. Gharahi ⁵ , J. Iampaglia ³ , L. Lalis ¹ , A. Przekwas ⁵ , M. Skotak ⁴ , M.A. Xynidis ¹ , S.L. Yablonski ¹ , and R.K. Gupta ² <i>¹The MITRE Corporation, ²US Army Medical Research and Development Command, ³US Army Training Doctrine and Command, ⁴Walter Reed Army Institute of Research, ⁵CFD Research Corporation</i>
10:05	Computational Framework for Monitoring of Blast Exposure during Training of Sniper and Shoulder Mounted Weapon Systems H.T. Garimella ¹ , H. Gharahi ¹ , A. Przekwas ¹ , Z.J. Chen ¹ , W. Carr ² , M. Skotak ² , B. Garfield ² , R.K. Gupta ³ <i>¹CFD Research Corporation, ²Walter Reed Army Institute of Research, ³US DoD Blast Injury Research Coordinating Office</i>
10:20	Transition of New Capability – From Science to Operational Use: Integration of A Blast Overpressure Tool S.L. Yablonski ¹ , M.A. Xynidis ¹ , G.M. Dias ¹ , R. Spencer ¹ , H.T. Garimella ⁴ , M. Ghebremedhin ¹ , J. Iampaglia ³ , L. Lalis ¹ , A. Przekwas ⁴ , W. Skiles ³ , and R.K. Gupta ² <i>¹The MITRE Corporation, ²US Army Medical Research and Development Command, ³TRADOC, ⁴CFD Research Corporation</i>
10:35	Morning break
10:45	FY18 NDAA Section 734 Blast Overpressure Study: Line of Inquiry 3 of 5-Exposure Environment T.A. Kluchinsky ¹ <i>¹US Army Public Health Center</i>
11:00	Assessing Risk of Adverse Health Outcomes due to Blast Overpressure Exposures O. Webster ¹ <i>¹US Army Public Health Center</i>
11:15	FY18 NDAA Sec 734 Program Line of Inquiry 4 Blast Characterization: Technical Challenges, Knowledge Gaps, And Considerations For Future Efforts To Monitor, Record And, Analyze Blast Pressure Exposure T.B. Bentley ¹ , and A.E. Eidsmore ² <i>¹Office of Naval Research, ²US Army Combat Capabilities Development Command</i>
11:30	Identifying an interim blast overpressure safety guidance to mitigate adverse brain health and performance outcomes following repetitive, occupational low-level blast exposure S. Turner ^{1,2} , S. Sloley ^{1,2} , E. Gregory ² , and S. Cota ² <i>¹General Dynamics Information Technology, ²Traumatic Brain Injury Center of Excellence</i>



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11:45	The Military Operational Medicine Research Program – Blast Induced Injury Prevention Overview T. Piehler ¹ , and R. Shoge ¹ <i>¹US Army Medical Research and Development Command</i>
12:00	Session Discussion
12:15	Lunch
Session #5: Assessments of Human Blast Exposure <i>Co-chairs: Dr. T. Piehler and Dr. S. Kawauchi</i>	
13:45	Occupational Risk of Low-Level Blast Exposure and TBI-Related Medical Diagnoses: A Population-Based Epidemiological Investigation (2005–2015) J.N. Belding ^{1,2} , R. Englert ^{1,2} , J. Bonkowski ^{1,2} , and C.J. Thomsen ¹ <i>¹Leidos, Inc., ²Naval Health Research Center</i>
14:00	Increased measures of neuroinflammation in special operators with a history of blast overpressure exposure J.R. Stone ¹ , B.B. Avants ¹ , N.J. Tustison ¹ , J. Gill ² , E.A. Wilde ³ , K.D. Neumann ¹ , L.A. Gladney ¹ , M.O. Kilgore ¹ , LT C.M. Modica ⁴ , F. Bowling ⁴ , C.M. Wilson ⁴ , J.F. Detoro ⁴ , H.R. Linsenbardt ⁵ , and S.T. Ahlers ⁵ <i>¹University of Virginia School of Medicine, ²Johns Hopkins University School of Nursing, ³University of Utah School of Medicine, ⁴US Special Operations Command, ⁵Naval Medical Research Center</i>
14:15	Blast Interview and Quantification of Lifetime Blast Exposure H.R. Linsenbardt ¹ , LT C.M. Modica ¹ , M.J. Egnoto ^{2,3,4} , J.K. Statz ^{1,5} , W. Carr ² , and S.T. Ahlers ^{1,6} <i>¹Naval Medical Research Center, ²Walter Reed Army Institute of Research, ³Katmai Government Services, ⁴EnSCO, ⁵The Henry M. Jackson Foundation for the Advancement of Military Medicine, ⁶Uniformed Services University of the Health Sciences</i>
14:30	Self-Reported Single and Repeated High-Level Blast Exposure, Occupational Risk of Low-Level Blast, and Self-Reported Diagnoses: A Millennium Cohort Study Investigation J.N. Belding ^{1,2} , C.A. Kolaja ^{1,2} , R.P. Rull ¹ , and D.W. Trone ¹ <i>¹Naval Health Research Center, ²Leidos, Inc.</i>
14:45	Session Discussion
15:00	Afternoon break
15:15	Discussion on Defined Blast Exposure to Injury Characteristics
Session #6: Therapies, Treatments, and Protection <i>Co-chairs: Dr. J. Batchelor & M. Risling</i>	
15:45	Pharmacological reduction of shock wave-induced astroglial scarring in the rat brain S. Kawauchi ¹ , S. Seki ² , Y. Muramatsu ¹ , A. Kono ¹ , Y. Komuta ¹ , I. Nishidate ³ and S. Sato ¹ <i>¹National Defense Medical College Research Institute, ²Japan Self Defense Force Central Hospital, ³Tokyo University of Agriculture and Technology</i>
16:00	Progesterone protects against repetitive mild blast induced long-term potentiation deficits in organotypic hippocampal slice cultures C. Kim ¹ , and B. Morrison III ¹ <i>¹Columbia University Department of Biomedical Engineering</i>



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16:15	<p>Pathobiology of terminal complement activation and inhibition of complement C5 creating a pro-survival and organ-protective phenotype in a rat model of blast injury and hemorrhage</p> <p>Y. Li^{1,2}, M.A. Nunn³, Z. Yang¹, T.D. Le¹, M.O. Simovic^{1,2}, P.R. Edsall¹, B. Liu¹, J.L. Barr¹, B.J. Lund⁴, C.D. Hill-Pryor⁵, A.E. Pusateri⁶, L.C. Cancio¹</p> <p><i>¹US Army Institute of Surgical Research, ²The Geneva Foundation, ³Akari Therapeutics, ⁴59th Medical Wing Operational Medicine, ⁵US Army Medical Research and Development Command, ⁶Naval Medical Research Unit San Antonio</i></p>
16:30	Session Discussion
16:45	Daily closing remarks, and adjourn <i>Dr. Raj K. Gupta</i>



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Program Day 3 (11 May 2022)

Wednesday, 11 May 2022:	
08:30	Registration
09:00	MITRE Welcome & Facilities Overview <i>Dr. Matthew E. Downs</i>
09:05	Keynote Address #2: DoD Warfighter Brain Health Initiative <i>Capt Scott Cota</i>
Session #7: Blast-induced Brain Injury Co-Chairs: Dr. Stephanie Sloley and Dr. E. Kirkman	
09:35	Development of diagnostic and prognostic biomarkers for chronic repetitive mild traumatic brain injury J.S. Meabon ^{1,2} , SFC A. Crabtree ³ , SFC C. McEvoy ³ , I. Lee ⁴ , K. Wang ⁴ , K. Pagulayan ^{1,2} , G. Terry ^{1,2} and E.R. Peskind ^{1,2} ¹ Mental Illness Education and Clinical Center, ² Dept of Psychiatry, University of Washington, ³ United States Army Special Operations Command, ⁴ Institute of Systems Biology (ISB)
09:50	Effect of Age and Gender on Clinical Scores of Mice Exposed to Blast Induced Traumatic Brain Injury C.E. Johnson ¹ , E. Johnson ¹ , D. Gines ¹ , J. Harrell ¹ , Y.S. Song ¹ , and J.A. Semon ¹ ¹ Missouri University of Science and Technology
10:05	Long-term effects of low-intensity blast primary brain injury on learning deficits and anxiety-like behaviors associate with glutamatergic hyperexcitability and altered protein expression in mouse hippocampus Z. Gu ^{1,2} , S. Chen ^{1,2} , H.R. Siedhoff ^{1,2} , H. Zhang ¹ , P. Liu ³ , A. Balderrama ^{1,2} , C. Johnson ⁴ , C.M. Greenlief ³ , D. Li ¹ , R.G. DePalma ^{5,6} , and J. Cui ^{1,2} ¹ University of Missouri School of Medicine, ² Truman VA Hospital Research Service, ³ University of Missouri, ⁴ Missouri University of Science and Technology, ⁵ Department of Veterans Affairs, ⁶ Uniformed Services University of the Health Sciences
10:20	Morning break
10:30	Partial depletion of microglia attenuates long term potentiation deficits following repeated blast traumatic brain injury in organotypic hippocampal slice cultures N. Varghese ¹ , and B. Morrison III ¹ ¹ Columbia University
10:45	Distinct Brain Vulnerabilities produced by Military Blast-Induced Synaptic Pathology M.F. Almeida ¹ , M.H. Giang ¹ , M. Yorio ¹ , C.J. Norton ¹ , K.L.G. Farizatto ¹ , and B.A. Bahr ¹ ¹ Biotechnology Research and Training Center, University of North Carolina – Pembroke
11:00	Session Discussion – 15 mins
11:15	Tutorial #2: Anatomical/biological substrates and pathobiology of primary blast induced TBI <i>Dr. Denes Agoston</i>
11:45	Lunch
13:00	Debate: Wearable Wireless Blast Sensor Technologies
Session #8: Modeling and Simulation of Blast Exposure and Injury Co-chairs: Dr. Denes Agoston & Dr. M. Sköld	
13:30	Characterization of a ferret model of under-vehicle blast-induced traumatic brain injury (TBI) G. Fiskum ¹ , J. Proctor ¹ , M. Goodfellow ¹ , M. Shaughnessy ¹ , B. Piskoun ¹ , A. Hrdlick ¹ , and P. Rangghran ¹ ¹ University of Maryland School of Medicine Department of Anesthesiology and the Center for Shock, Trauma, and Anesthesiology Research (STAR)



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13:45	<p>Computational Mechanobiology of Synaptic Injury and Biomarker Kinetics following Repeated Blast Exposures H. Gharahi¹, H.T. Garimella¹, A. Przekwas¹, and R.K. Gupta² ¹CFD Research Corporation, ²US DoD Blast Injury Research Coordinating Office</p>
14:00	<p>Does blast exposure to the torso of a rat cause blood surge to the brain? J.E. Rubio^{1,2}, M. Skotak³, E. Alay³, A. Sundaramurthy^{1,2}, D.R. Subramaniam^{1,2}, V.B. Kote^{1,2}, S. Yeoh⁴, K. Monson⁴, N. Chandra³, G. Unnikrishnan^{1,2}, and J. Reifman¹ ¹United States Army Medical Research and Development Command, ²The Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc., ³New Jersey Institute of Technology, ⁴The University of Utah</p>
14:15	<p>Effects of an Anti-Inflammatory Diet on Gut-Brain Axis in Experimental Traumatic Brain Injury Model N. Chakraborty¹, A. Hoke¹, A. Gautam¹, S. Ann-Miller¹, L. Naidu¹, M.L. Condlin², R. Hammamieh¹, and A.G. Scrimgeour² ¹Walter Reed Army Institute of Research, ²US Army Research Institute of Environmental Medicine</p>
14:30	<p>Primary blast wave impact on a surrogate head model subjected to varying standoff distances R. Banton¹, T. Piehler¹, N. Zander¹, R. Benjamin¹ and O. Petel² ¹US Army Research Laboratory, Aberdeen Proving Ground, ²Carleton University</p>
14:45	<p>Measuring blast loads over a surrogate skull using an advanced blast simulator and a CFD solver J. Hamilton¹, K. Espinoza¹, J. Magallanes¹, A. Nelson², and P. VandeVord² ¹Karagozian & Case, Inc., ²Virginia Tech</p>
15:00	<p>Afternoon break</p>
15:15	<p>Application of a Multi-Material AMR Strategy for UNDEX Injury Simulations and Analysis J.K. Clutter¹ ¹Integrated Solutions for Systems (IS4S), Inc.</p>
15:30	<p>A 3-D Finite-Element Minipig Model to Assess Brain Biomechanical Responses to Blast Exposure A. Sundaramurthy^{1,2}, V.B. Kote^{1,2}, N. Pearson³, G.M. Boiczuk³, E.M. McNeil⁴, A.J. Nelson⁴, D.R. Subramaniam^{1,2}, J.E. Rubio^{1,2}, K. Monson³, W.N. Hardy⁴, P.J. VandeVord⁴, G. Unnikrishnan^{1,2}, and J. Reifman¹ ¹United States Army Medical Research and Development Command, ²The Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc., ³The University of Utah, ⁴Virginia Tech</p>
15:45	<p>Enabling Computational Model Interoperability for Human Lethality, Injury, and Impairment from Blast-Related Threats N. Davis¹, A. Tolk¹, R. Byrne¹, R. Gupta², A. Santago¹ ¹The MITRE Corporation, ²US Army Medical Research and Development Command</p>
16:00	<p>Session Discussion</p>
16:15	<p>Daily closing remarks and final meeting adjournment Dr. Raj K. Gupta</p>