

Day 1 (Wednesday, May 9)

9:20-

Registration

9:50-10:00

Opening Remarks

M. J. Leggieri, DoD Blast Injury Research Program Coordinating Office, USAMRMC (USA)
D. Saitoh, Div. of Traumatology, National Defense Medical College Research Institute (Japan)

Session1: Mechanism of Primary bTBI

Chair R. K. Gupta, DoD Blast Injury Research Program Coordinating Office, USAMRMC

10:00-10:30

Tutorial 1

Primary blast-induced traumatic brain injury – A Canadian perspective

Y. Wang, T. W. Sawyer, T. Josey
DRDC Suffield Research Centre (Canada)

10:30-10:50

Blast induces blood-brain barrier breakage with spatial and temporal variations

(Invited)

N. Chandra, R. R. V. Kakulavarapu, M. Skotak, M. Kuriakose
New Jersey Institute of Technology (USA)

10:50-11:10

Engineering evaluation of shock wave propagation in the animal model for primary bTBI

K. Ohtani¹, A. Nakagawa²
¹Tohoku University (Japan), ²Tohoku University Hospital (Japan)

Session 2: Laser-induced Shock Wave

Chair N. Shinomiya, National Defense Medical College Research Institute

11:10-11:25

What laser-induced shock wave can do and cannot do for blast injury research

S. Sato¹, S. Kawauchi¹, T. Ohsawa², I. Nishidate²
¹National Defense Medical College Research Institute (Japan),
²Tokyo University of Agriculture and Technology

11:25-11:40

Primary blast-induced mild traumatic brain injury research: Laser-induced shock wave model in mice *(Invited)*

S. Tomura¹, S. Seno¹, H. Miyazaki¹, Y. Kobayashi², S. Sato³, D. Saitoh¹
¹Div. Traumatology, National Defense Medical College Research Institute (Japan),
²Dept. Anatomy and Neurobiology, National Defense Medical College (Japan),
³Div. Bioinformation and Therapeutic Systems, National Defense Medical College Research Institute (Japan)

11:40-11:55

Real-time observation of physiological changes and their histopathological consequences in the rat brain exposed to a laser-induced shock wave

S. Kawauchi¹, M. Sakamaki¹, Y. Komuta², I. Nishidate³, K. Kaida², S. Sato¹
¹National Defense Medical College Research Institute (Japan),
²Dept. Internal Medicine, National Defense Medical College (Japan),
³Tokyo University of Agriculture and Technology (Japan)

11:55-12:10

RGB camera-based imaging of cerebral hemodynamics and light scattering property in rat brain exposed to a laser-induced shock wave

I. Nishidate¹, S. Kawauchi², S. Sato²
¹Tokyo University of Agriculture and Technology (Japan),
²National Defense Medical College Research Institute (Japan)

12:10-13:10

Lunch

Day 1 (Wednesday, May 9) - cont'd -

Keynote 1

Chair S. Sato, National Defense Medical College Research Institute

13:10-13:40 **Molecular mechanism of cytoarchitecture formation of cerebellar neurons**

M. Kengaku
Kyoto University (Japan)

Session 3: New Imaging and Sensing Modalities

Chair I. Nishidate, Tokyo University of Agriculture and Technology

13:40-14:10 **Tutorial 2**

Quantification of microscopic 3D cell structures in in vivo animal brains

K. Masamoto
University of Electro-communications (Japan)

14:10-14:30 **Pressure-sensitive fluorescent metal nanoclusters for blast-induced injury studies**

(Invited)

R. E. Jimenez¹, N. J. Bunce¹, K. J. Perry¹, S. P. Karna¹, R. K. Gupta²

¹U. S. Army Research Laboratory (USA),

²U. S. Army Medical Research and Materiel Command (USA)

14:30-14:50 **Quantitative visualization of biological material responses: Review of human femur and skull mechanical behavior** *(Invited)*

T. Weerasooriya, S. Alexander, A. Gunnarsson, K. Rafaels
U. S. Army Research Laboratory (USA)

14:50-15:05 **Coffee Break**

Session 4: Blast-Cell/Tissue Interactions and Small Animal Models

Chair N. Chandra, New Jersey Institute of Technology

15:05-15:25 **Importance of shock wave interaction and transmission to induce cell damage during blast traumatic injuries**

H. Hosano^{1,2}, N. Hosano¹

¹Institute of Pulsed Power Science, Graduate School of Science and Technology, Kumamoto University (Japan), ²Graduate School of Science and Technology, Kumamoto University (Japan)

15:25-15:45 **Mild blast induced traumatic brain injury – A novel laboratory rat model of focused exposure to the head**

H. Matsuura, M. Ohnishi, S. Hosomi, T. Shimazu
Osaka University Graduate School of Medicine (Japan)

15:45-16:05 **The capability of shock tubes to simulate lower-extremity blast injury loading** *(Invited)*

J. W. Denny^{1,2}, R. Critchley³, A. S. Dickinson², S. K. Clubley¹

¹Blast Engineering Research Group, Faculty of Engineering and the Environment, University of Southampton (UK), ²Bioengineering Science Research Group, Faculty of Engineering and the Environment, University of Southampton (UK),

³Cranfield University, Defence Academy of the United Kingdom (UK)

16:05-16:25 **Development of a novel small animal model of underbody blast injury** *(Invited)*

A. P. Pearce^{1,2}, J. Clasper^{1,2}, A. M. J. Bull¹

¹Imperial College London (UK), ²Royal Centre for Defence Medicine (UK)

16:25 **Wrap up**

17:00- **Get-Together (Reception)**

Day 2 (Thursday, May 10)

Session 5: Auditory Systems

Chair M. J. Leggieri, DoD Blast Injury Research Program Coordinating Office, USAMRMC

9:00-9:20

Blast-related auditory injury risk assessment models should not consider middle ear muscle contractions as protective (*Invited*)

H. G. Jones^{1,2}, N. T. Greene^{1,3}, W. A. Ahroon¹

¹The US Army Aeromedical Research Lab. (USA), ²Laulima Government Solutions (USA),

³The Geneva Foundation (USA)

9:20-9:40

Can middle ear muscle contractions provide dependable protection from impulse noise? (*Invited*)

S. M. Tasko^{1,2}, G. A. Flamme¹, K. K. Deiters¹, W. A. Ahroon³, K. D. McGregor², M. V. Smith^{1,2},
W. J. Murphy⁴, N. T. Greene^{3,5}, H. G. Jones^{3,6}

¹Stephenson and Stephenson Research Consulting (USA),

²Western Michigan University (USA), ³U.S. Army Aeromedical Research Laboratory (USA),

⁴The National Institute for Occupational Safety and Health (USA),

⁵The Geneva Foundation (USA), ⁶Laulima Government Solutions (USA)

Session 6: Effects of Repeated Exposures

Chair S. Kawauchi, National Defense Medical College Research Institute

9:40-10:00

The sub-chronic phase of primary blast-induced repeated mild traumatic brain injury process; Molecular and structural fingerprints, behavioral changes and the importance of age at the time of injury (*Invited*)

A. Kamnaksh¹, A. Badea², R. Bekdash¹, B. Nucum¹, C. Lin¹, R. Aniceto¹, R. Anderson²,
E. Calabrese², E. Barry¹, K. Cravedi¹, A. Graham¹, N. Grunberg¹, J. Long³, D. Agoston¹

¹Uniformed Services University (USA), ²Duke University Medical Center (USA),

³Walter Reed Army Institute of Research (USA)

10:00-10:20

Assessing effects of repeated blast overpressure effects in breaching training exercises utilizing NRL head-brain models (*Invited*)

T. J. O'Shaughnessy¹, Y. Chen¹, G. H. Kamimori², D. M. Horner³, M. J. Doherty¹, A. Bagchi¹

¹Stephenson and Stephenson Research Consulting (USA), ²Western Michigan University (USA),

³U.S. Army Aeromedical Research Laboratory (USA),

⁴The National Institute for Occupational Safety and Health (USA),

⁵The Geneva Foundation (USA), ⁶Laulima Government Solutions (USA)

10:20-10:40

Effect of single and repeated blast exposures on long-term neurobehavioral functions in rats (*Invited*)

P. Arun, D. M. Wilder, J. Taskesen, W. Driwech, R. Urioste, O. Eken, A. Batuure, S. Sajja,
S. VanAlbert, Y. Wang, I. D. Gist, J. B. Long

Walter Reed Army Institute of Research (USA)

10:40-11:00

Distinct behavioral and pathological trajectories of single mild or repetitive sub-minimal blast-induced neurotrauma (*Invited*)

S. Hellewell¹, I. Cernak²

¹The Heart Research Institute (Australia),

²STARR-C (Stress, Trauma, and Resilience Research Consulting) (USA)

11:00-11:10

Coffee Break

Day 2 (Thursday, May 10) - cont'd -

Session 7: Blasts and Blast Simulators

Chair H. Hosano, Kumamoto University

11:10-11:40

Tutorial 3

Trends of IED

R. Hiyoshi, M. Tagawa, N. Takahashi
National Research Institute of Police Science (Japan)

11:40-12:00

Fundamental study on detonation-driven blast simulator

T. Mizukaki¹, A. Kato², M. Mori², Y. Sekine³, D. Saitoh³
¹Dept. of Aeronautics and Astronautics, Tokai University (Japan), ²Graduate School of Engineering, Tokai University (Japan), ³National Defense Medical College (Japan)

12:00-12:50

Lunch

Session 7: Blasts and Blast Simulators (cont'd)

Chair H. Hosano, Kumamoto University

12:50-13:10

Introduction of a preliminary study using a blast tube established at the National Defense Medical College (Invited)

D. Saitoh¹, Y. Sekine^{1,2}, Y. Yoshimura², M. Fujita³, S. Sato⁴, Y. Araki⁵, H. Kusumi⁶, S. Yamagishi⁶, H. Miyazaki¹, S. Tomura¹, M. Hamasaki⁷
¹Div. of Traumatology, National Defense Medical College Research Institute (Japan),
²Dept. of Traumatology and Critical Care Medicine, National Defense Medical College Hospital (Japan), ³Div. of Environmental Medicine, National Defense Medical College Research Institute (Japan), ⁴Div. of Bioinformation and Therapeutic Systems, National Defense Medical College Research Institute (Japan),
⁵Dept. of Defense Medicine, National Defense Medical College (Japan),
⁶Dept. of Military Nursing, National Defense Medical College (Japan),
⁷Test and Evaluation Command, Japan Ground Self Defense Force (Japan)

Session 8: Translational Research

Chair S. P. Karna, U. S. Army Research Laboratory

13:10-13:30

Translational neuroimaging, pathological, and behavioral correspondences linking animal models of repetitive blast exposure and military service members with blast-related mild traumatic brain injury (Invited)

D. G. Cook¹, E. Peskind², J. S. Meabon², A. Schindler², A. Logsdon¹, W. A. Banks¹, D. Perl³, D. Cross⁴, T. Richards⁵, D. Keene⁶, D. Marshall⁶
¹Dept. Medicine, University of Washington (USA), ²Dept. Psychiatry and Behavioral Sciences, University of Washington (USA), ³Uniformed Services University of the Health Sciences (USA), ⁴University of Utah (USA), ⁵Dept. Radiology, University of Washington (USA),
⁶Dept. Pathology, University of Washington (USA)

13:30-13:50

Translational research and acquisition of Warrior Injury Assessment Manikin (WIAMan): Crossing the valley of death (Invited)

R. Carter III, J. Eckles, J. Lavoie, T. Haney, M. Landers
Affiliation of United States Army (USA)

13:50-14:10

Integration of findings from clinical assessments and animal models of blast-induced neurotrauma (Invited)

I. Cernak¹, S. Hellewell²
¹STARR-C (Stress, Trauma, and Resilience Research Consulting) (USA),
²The Heart Research Institute (Australia)

14:10-14:20

Coffee Break

Day 2 (Thursday, May 10) - cont'd -

Session 9: Computational Modelling and Experimental Simulation

Chair A. Bagchi, US Naval Research Laboratory

14:20-14:40

Do we need a high-fidelity computational model to characterize brain responses to primary blast? (Invited)

G. Unnikrishnan¹, H. Mao¹, A. Sundaramurthy¹, D. Bell², S. Yeoh², M. Converse³,
K. Monson^{2,3}, J. Reifman¹

¹US Army Medical Research and Materiel Command (USA),

²Dept. Bioengineering, The University of Utah (USA),

³Dept. Mechanical Engineering, The University of Utah (USA)

14:40-15:00

Articulated human body model for computational assessment of blast injury loads, body responses, personal protection and casualty assessment (Invited)

R. K. Gupta¹, A. J. Przekwas²

¹US Army Medical Research and Materiel Command (USA),

²CFD Research Corporation (USA)

15:00-15:20

An engineering study on interaction between shock wave with negative pressure and simulated head models without and with helmet

T. Koita, S. Kobayashi

Saitama Institute of Technology (Japan)

Session 10: Clinical and Epiemiological Studies (1)

Chair R. K. Gupta, DoD Blast Injury Research Program Coordinating Office, USAMRMC

15:20-15:50

Tutorial 4

Late-life neurodegenerative disorders due to traumatic brain injury: Epidemiology, clinical symptoms and in vivo quantification of neuropathology

K. Takahata¹, M. Mimura²

¹National Institutes for Quantum and Radiological Science and Technology (Japan),

²Keio University School of Medicine (Japan)

15:50-16:10

Neuropathologic examination of brain specimens derived from five post-deployed service members with blast exposure who have committed suicide (Invited)

D. P. Perl^{1,3}, D. Iacono^{1,2,3,4}, C. H. Rhodes^{3,4}

¹Dept. Pathology and ²Neurology, Uniformed Services University of the Health Sciences, F. Edward Hébert School of Medicine (USA),

³Brain Tissue Registry and Neuropathology Core (USA),

⁴Henry M. Jackson Foundation for the Advancement of Military Medicine (USA)

16:10-16:30

Blast-related traumatic brain injury in US military personnel: Advanced MRI and clinical outcomes (Invited)

D. L. Brody^{1,2,3}

¹Uniformed Services University of the Health Science (USA),

²Center for Neuroscience and Regenerative Medicine (CNRM): The USU/NIH Military Traumatic Brain Injury Research Group (USA),

³Neurology and Biomedical Engineering, Washington University in St. Louis (USA)

16:30

Wrap up

17:00-

Conference Dinner

Day 3 (Friday, May 11)

Session 11: New Therapies

Chair K. Itaka, Tokyo Medical and Dental University

9:00-9:20

Enhancement of motor function recovery in mice by delivery of mRNA nanomicelles encoding brain derived neurotrophic factor

S. T. Crowley^{1,2}, K. Kataoka², K. Itaka^{1,2}

¹Tokyo Medical and Dental University (Japan),

²Kawasaki Institute of Industrial Promotion (Japan)

9:20-9:40

Single-surgeon series of delayed anastomotic urethroplasty for pelvic fracture urethral injury: an analysis of surgical and patient-reported outcome of a 10-year experience in a Japanese referral center

A. Horiguchi¹, M. Shinchi¹, A. Masunaga¹, K. Ojima¹, K. Ito¹, T. Asano¹, Y. Mayumi²,
T. Kushibiki², R. Azuma³

¹Dept. Urology, National Defense Medical College (JAPAN),

²Dept. Medical Engineering, National Defense Medical College (JAPAN),

³Dept. Plastic Surgery, National Defense Medical College (JAPAN)

9:40-10:00

Radionuclide decorporation therapy: The “urgent approach” versus the “precautionary approach” (Invited)

A. Rump¹, D. Stricklin², A. Lamkowski¹, S. Eder¹, M. Abend¹, M. Port¹

¹Bundeswehr Institute of Radiobiology affiliated to the University of Ulm, Munich (Germany),

²Applied Research Associates Inc. (USA)

Session 12: Microbiome and Infection

Chair R. Shoge, Military Operational Medicine Research Program, USAMRMC

10:00-10:20

Potential microbiome signatures to discriminate features associated with TBI vs. psychological stress (Invited)

A. Gautam¹, R. Hammamieh¹, J. C. DeMar², N. Chakraborty³, R. Kumar⁴, A. Hoke⁵,
J. G. Rosenberger², A. B. Bature², D. J. Bloodgood², D. M. Wilder², V. Sajja², M. Jett¹,
J. B. Long²

¹US Army Center for Environmental Health and Research (USA),

²Walter Reed Army Institute of Research (USA), ³The Geneva Foundation (USA),

⁴Advanced Biomedical Computing Center, FNLCR (USA), ⁵ORISE, ISB, USACEHR (USA)

10:20-10:40

Receptor desensitization by mitochondrial DAMPs may play a key role in the development of nosocomial pneumonia after trauma (Invited)

K. Itagaki¹, W. Y. Kwon^{1,2}, C. J. Hauser¹

¹Beth Israel Deaconess Medical Center/Harvard Medical School (USA),

²Seoul National University College of Medicine (Korea)

10:40-10:55

Coffee Break

10:55-11:15

Progress toward understanding the interplay between blast injury and wound infections (Invited)

D. V. Zurawski, V. Antonic, S. Singh, Y. Alamneh, A. C. Jacobs, R. M. Reddinger, J. P. Shearer,
S. D. Tyner, S. T. Demons

Walter Reed Army Institute of Research (USA)

11:15-11:35

Blast trauma wound infection epidemiology and microbiology (Invited)

D. R. Tribble¹, A. Ganesan^{1,2,3}, K. Mende^{1,2,4}, L. Stewart^{1,2}

¹Uniformed Services University of the Health Sciences (USA),

²Henry M. Jackson Foundation for the Advancement of Military Medicine, Inc. (USA),

³Walter Reed National Military Medical Center (USA),

⁴Brooke Army Medical Center, JBSA Fort Sam Houston (USA)

Day 3 (Friday, May 11) - cont'd -

11:35-11:50	Medical countermeasure for post-traumatic immunosuppression and susceptibility of infection M. Kinoshita Dept. Immunology and Microbiology, National Defense Medical College (Japan)
11:50-12:50	Lunch
	Keynote 2 <i>Chair</i> M. J. Leggieri, DoD Blast Injury Research Program Coordinating Office, USAMRMC
12:50-13:20	Innovation in military medicine and collaboration G. Ludwig US Army Medical and Materiel Command (USA)
	Session 13: Clinical and Epidemiological Studies (2) <i>Chair</i> D. Saitoh, Div. of Traumatology, National Defense Medical College Research Institute
13:20-13:40	Effects of blast overpressure exposure during military and law enforcement training: Neurocognitive performance, blood-based biomarkers, and acoustic sensor results (Invited) G. H. Kamimori ¹ , A. M. Boutte ¹ , T. J. O'Shaughnessy ² , C. R. LaValle ¹ , S. V. Sajja ¹ , Y. Chen ² , A. Bagchi ² ¹ Walter Reed Army Institute of Research (USA), ² U.S. Naval Research Laboratory (USA)
13:40-14:00	Changes in self-reported neurobehavioral symptoms in relation to measurement of blast overpressure on service members involved in combat training (Invited) J. M. Bailie ^{1,2} , S. Wiri ³ , T. Walilko ³ , I. Babakhanyan ^{1,2} , W. Graves ⁴ , G. Hoyt ⁵ , P. Sargent ^{1,2} , J. Duckworth ⁷ ¹ Defense and Veterans Brain Injury (USA), ² Naval Hospital Camp Pendleton (USA), ³ Applied Research Associates (USA), ⁴ Henry M. Jackson Foundation (USA), ⁵ Naval Special Warfare (USA), ⁶ John Hopkins University (USA), ⁷ Uniformed Services University (USA)
14:00-14:20	Impact of blast overpressure from recoilless rifles on neurobehavioral functioning of military service members (Invited) J. M. Bailie ^{1,2} , S. Wiri ³ , T. Walilko ³ , I. Babakhanyan ^{1,2} , W. Graves ⁴ , G. Hoyt ⁵ , P. Sargent ^{1,2} , J. Duckworth ⁷ ¹ Defense and Veterans Brain Injury (USA), ² Naval Hospital Camp Pendleton (USA), ³ Applied Research Associates (USA), ⁴ Henry M. Jackson Foundation (USA), ⁵ Naval Special Warfare (USA), ⁶ John Hopkins University (USA), ⁷ Uniformed Services University (USA)
14:20-14:35	Coffee Break
14:35-14:55	Understanding the influence of military occupation and major blast exposure on traumatic brain injury: An epidemiological approach (Invited) J. N. Belding, U. O. da Silva, S. Fitzmaurice, B. Kowitz, C. J. Thomsen Naval Health Research Center (USA)
14:55-15:15	Dismounted complex blast injuries: Patterns of injuries and methods of primary and secondary reconstruction (Invited) M. Fleming ^{1,2,3} ¹ Navy Trauma Training Center + USC Medical Center (USA), ² University of Southern California (USA), ³ Uniformed Services University of the Health Sciences, USA

Day 3 (Friday, May 11) - cont'd -

15:15-15:45 **Open Discussion**

15:45-15:50 **Closing Remarks**

G. Ludwig, US Army Medical and Materiel Command (USA)
N. Yamada, Lt. Gen. (JASDF), Vice President, NDMC (Japan)