SCHEDULE OF SPEAKERS

Stun Devices: Uncertainties and Gaps in Knowledge
Aegis Industries Public Safety Workshop I

SCIENTIFIC FACTORS ASSOCIATED WITH STUN DEVICE INJURY AND LETHALITY

DATE & TIME
MARCH 23, 2006
8 AM TO 5 PM

LOCATION
Harvard Club of Boston
Estabrooks Room
374 Commonwealth Ave.
Boston, MA 02138

SPONSOR
Aegis Industries, Inc.

BACKGROUND

HEMI (Human Electro-Muscular Incapacitation) devices deliberately apply supra-physiologic electric current to the body causing muscle contraction and a period of incapacitation. The non-kinetic and intended "non-lethal" nature of the method addresses a recognized need for both law enforcement and military operations to reduce ballistic fatality and related consequences. However, the convergence of increased deployment of HEMI devices and an increase in deaths associated with stun incidents have raised more questions than answers regarding their use and public safety. This workshop explores the factors associated with injurious effects of HEMI device usage, including death. While a direct relationship between lethality and HEMI usage is inconclusive, the data available suggest a number of avenues for scientific research and inquiry as well as insights into vulnerable sub-populations. Policing of the drug and alcohol intoxicated represents a critical area of intervention in society yet non-lethal approaches appear to be ineffective and in the case of HEMI devices may be a factor in death.

The goal of the workshop is to engage a multidisciplinary group of professionals in fields that converge on the science of the HEMI phenomenon to further understanding and enhance public safety. The workshop is informal and is open to selected professionals offering views in a variety of areas including:

- *In silico*, mechanistic model studies at the cellular level,
- Waveform measurements using standardized techniques,
- Health effects studies of HEMI devices,
- The role of health status, behavior and drugs in HEMI related deaths,
- Analysis of existing data for HEMI mortality,
- Law Enforcement perspectives on the public safety of HEMI devices,
- Perspectives on dealing with uncertainties in formulating public exposure limits to HEMI devices for vulnerable sub-populations.

LONG TERM AGENDA

The ultimate goal of the workshop is to identify interested and motivated colleagues for continued discussion, interaction and possible collaboration as well as hosting of additional workshops in the future on HEMI issues. Participation in a HEMI Industry consortium will also be welcomed. The workshop is open but seating is limited. Registration is required.

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MARCH 23, 2006
HARVARD CLUB OF BOSTON
AEGIS INDUSTRIES, INC.

7:30 Registration

8:00 Welcome-- Bruno D.V. Marino, PhD, Aegis Industries, Inc.
Opening Remarks-- Donald K. Stern, JD, LL.D
Former Massachusetts Attorney General State, Faculty Harvard Law School and Chair, Snelgrove Commission

8:15 Stun Device Overview
Stun Devices: Theory of Operation and the Basics of Incapacitation
Casey D. Hathcock, PhD
Senior Research Scientist, Avocet Polymer Technologies, Inc.
Plainfield, IL

8:45 Measurement of Commercial Waveforms
Energy Measurement of Electro-Shock Weapons Using NIST Traceable Methods
James Angelo Ruggieri, PE (NAFE 601M)
Fairfax Station, VA

9:15 Comparison of Commercial Waveforms
Commercial HEMI Device Output: Where Is the Baseline?
Stephen K. Burns, PhD
Technical Director, Biomedical Engineering Center for Clinical Instrumentation, Harvard-MIT Division of Health Sciences and Technology, MIT, Cambridge
Associate in Medicine, Harvard Medical School, Boston, MA

9:45 to 10:00 Break

10:00 Cocaine Toxicity and Vulnerability
Cocaine-induced Sudden Cardiac Death Internal and External Triggers
Arthur J. Siegel, MD
Director, Internal Medicine, McLean Hospital, Belmont, MA 02478
Assistant Professor of Medicine, Harvard Medical School, Boston, MA

10:30 *In Silico* Models I: HEMI Side Effects
An *In Silico* Approach to Assessing Side Effects of HEMI Exposures
James C. Weaver, Axel T. Esser, Stephen K. Burns, T. R. Gowrishankar and Kyle C. Smith
Harvard-MIT Div. of Health Sciences & Technology, MIT, Cambridge, MA

11:00 *In Silico* Models II: Nerve Studies
Action Potential Propagation: Relevance to Incapacitation and Modeling
T. R. Gowrishankar, Axel T. Esser, Stephen K. Burns, Kyle C. Smith and James C. Weaver
Harvard-MIT Div. of Health Sciences & Technology, MIT, Cambridge, MA

11:30 *In Silico* Models III: Cellular Injury Studies
Electroporation: Relevance to HEMI Side Effects
Axel T. Esser, T. R. Gowrishankar, Kyle C. Smith, Stephen K. Burns and James C. Weaver
Harvard-MIT Div. of Health Sciences & Technology, MIT, Cambridge, MA

12 to 1 pm Lunch provided.

1:00 Information and Inferences from Electro-muscular Disruption Studies with Animal Models

Review and Interpretation of the *Ex-Silico* Data to Date

Robert J. Walter, PhD
Associate Professor of General Surgery
Research Director, Hektoen Institute for Medical Research, Dept. of Trauma,
John Stroger Hospital of Cook County, Chicago, IL

1:30 Constraints on Applied HEMI Systems

The Role of Exposure Assessment in the Determination of Safety for HEMI-Based Devices

Paul S. Price, MS
Director, Linea, Inc., Cape Elizabeth, ME

2:00 Addressing the Uncertainties in Formulating Public Exposure Limits

Risk, Uncertainty, and Risk Perception: Will 'Exposure Limits' Work?

Peter A. Valberg, PhD
Principal, Health Risk Assessment, Gradient Corporation, Cambridge, MA

2:30 - 2:45 Break

2:45 Secure Scaleable, National Database for HEMI Incident Monitoring

Open Clinica: A Foundation for Encrypted National HEMI Event Reporting

Cal Collins
CEO, Akaza Research, Cambridge, MA

3:15 ECT: An Overview of Parameters and HEMI Context

Electrophysiology of Electroconvulsive Therapy

Charles Welch, MD
Director, MGH Somatotherapies ECT Unit, Psychiatric Neurotherapeutics Program
Dept. of Psychiatry, Mass General Hospital, Boston, MA

3:45 Summary of HEMI Related Deaths

Analysis and Review of 167 Deaths Proximal to Stun Device Usage

TBA

4:15 Human Rights Perspectives on Stun Devices

The Reality of Perception: Insights from the Media on the Public Acceptance of Stun Devices

Edward O. Jackson
Government and Public Relations Consultant (Formerly Media Director,
Amnesty International), Washington, DC

4:45 Moderators Comments, Summary and Open Discussion

Non Lethal Technology Development: General Comments

Glenn T. Shwaery, PhD
Director, Non Lethal Technology Innovation Center
UNH, Durham, NH

5:15 Farewell, Adjourn

A FRAMEWORK OF QUESTIONS

Workshop participants may find the following questions worth considering during the presentations:

1. What adverse and irreversible health effects from the use of HEMI devices, including death, can be expected based on current knowledge in the basic biological and medical communities?
2. What universal features of HEMI devices can be recommended to ensure maximum safety and effectiveness?
3. What laboratory-based certification criteria and industry standard testing protocols should be applied to all HEMI devices?
4. What standard terminology is needed to unify the industry, operators and end-users, academia and policy makers?
5. What clinically based tools and approaches are suitable for short term and long term studies including the use of cellular and whole body models?
6. What candidate electric field/cell interaction mechanisms may be involved in both the desired temporary incapacitation and possible acute and chronic side effects?
7. What medical treatments and protocols are or should be available to HEMI injury victims?
8. What are the responsibilities of manufacturers and Law Enforcement entities in assessing the readiness level of HEMI technologies?
9. What policy driven regulatory oversight is needed for both the law enforcement and military sectors and how should such policy be implemented?
10. Why are sub-populations vulnerable to increased health risks including mortality and what measures should be taken to reduce these risks?

About Aegis Industries, Inc.

Aegis Industries, Inc., is an emerging Intermediate Force Option© (IFO©) company focused on development of devices that are effective with acceptable Human Effects ensuring the safety of the public and operators. IFOs, commonly referred to as non-lethal weapons (NLW), are of great interest to the military and civilian sectors and are used increasingly around the world in peacekeeping missions. The Aegis philosophy is to innovate beyond current market products by designing devices that can be used to facilitate rapid transfer throughout the force continuum ranging from a "warning" to intermediate force to full engagement and final threat resolution. Key to the Aegis approach is simplicity, multi-functionality and compatibility with other NLWs including features for increased stand-off and effective crowd control**.** Aegis is located in Cambridge, MA.

In addition to the current workshop, Aegis Industries, Inc. has sponsored or co-sponsored a number of events focused on the underlying issues of stun devices in an effort to advance the industry and to ensure public safety and the safety of those charged with law enforcement. Aegis has sponsored or co-sponsored the following events:

[1] Potomac Institute of Policy Research, Arlington, VA., Feb., 2005. ***Stun Devices: Uncertainties and Gaps in Knowledge***. Leaders in a variety of areas convened a two day multidisciplinary working group conference to discuss issues from a variety of industry, medical and health effects, policy and regulatory perspectives. See (www.potomacinstitute.org/media/pressreleases/2005/**stun**gunreport.htm) for a summary report.

[2] Bioelectromagnetics Society Annual Meeting in conjunction with BioEM2005, Dublin, Ireland, June, 2005. ***Stun Gun Technology: Mechanisms and Effects.*** The pre-conference symposium focused on the technology and potential adverse side effects of the use of electronic weapons. Many of the world's leading researchers in areas related to stun devices gathered for the "first of its kind" academic meeting, chaired by Dr. Raphael Lee, U. Chicago. Dr. Lee is director of the Electrical Trauma Research Program, U. Chicago, dedicated to understanding the mechanisms and manifestations of electrical injuries and to developing therapeutic interventions.

[3] Bioelectromagnetics Society Winter Workshop, Phoenix, AZ, Feb. 2006. ***Exploring the Boundaries of Electromagnetic Field Intervention Techniques***. Representatives from a cross section of medical, technical and biophysical disciplines assembled to address questions related to "non lethal" technologies from a bioelectricmagnetic perspective.

[4] Bioelectromagnetics Society Annual Meeting, Cancun, June, 2006. ***Scientific Issues in Non-Lethal Interventions***. A pre-conference mini-symposium session is planned to explore ***in silico*** model approaches to aid in the understanding of the mechanisms responsible for side effects and injury of HEMI devices as well updates on health effects studies and other perspectives. The session will be chaired by James Weaver, Harvard-MIT Division of Health Sciences and Technology, MIT. Session details to be announced.

For more information contact:
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Bruno D.V. Marino, PhD, COO, CHIEF SCIENCE & TECHNOLOGY OFFICER, 617.842.5569, marino@aegispds.com
Aegis Industries, Inc., One Kendall Square, Building 400, 4th Floor, Cambridge, MA 02138, 800.507.4146,
www.aegispds.com

DIRECTIONS to the HARVARD CLUB OF BOSTON (www.harvardclub.com; 617-536-1260):

From Route 93 (North of Boston)
Follow Route 93 South towards Boston. Take the right exit that reads Storrow Drive/Cambridge. Next, take the left exit for Storrow Drive and follow it West along the Charles River. Watch for the Kenmore Square/Fenway Exit. Take the exit, staying to the Kenmore Square side (your right side). When you come to the first set of lights off the exit, go straight, and at the second set of lights turn left onto Commonwealth Avenue. The Harvard Club will be on your right, just before the second set of lights (just before the intersection of Mass. Ave. and Comm. Ave.). Parking is located in the back of the Club, at 415 Newbury Street. To get to the parking lot, turn right onto Mass. Ave. and continue one block to the set of lights. At that set of lights turn right, and the lot will be on your right hand side about 100 yards down.

From Route 93 (South of Boston)
Follow all of the signs for Storrow Drive. Take the Storrow Drive Exit and follow West along the Charles River. Watch for the Kenmore Square/Fenway Exit. Take the exit, staying to the Kenmore Square side (your right side). When you come to the first set of lights off the exit, go straight, and at the second set of lights turn left onto Commonwealth Avenue. The Harvard Club will be on your right, just before the second set of lights (just before the intersection of Mass. Ave. and Comm. Ave.). Parking is located in the back of the Club, at 415 Newbury Street. To get to the parking lot, turn right onto Mass. Ave. and continue one block to the set of lights. At that set of lights turn right, and the lot will be on your right hand side about 100 yards down.

From the Mass Pike
Take the Prudential/Copley Square Exit off the Mass. Pike. Once on the exit follow the Prudential signs (bear left). When you get off the exit stay in the right lane and take a right at the first set of lights. Bear right at the fork and continue on road that runs between The Back Bay Hilton and The Sheraton Boston. At the next set of lights you will cross over Boylston Street (passing to the right of the fire station) and take a left onto Newbury Street. Follow Newbury Street to Massachusetts Avenue. At this intersection, go straight across Mass. Ave (be careful not to re-enter the Mass. Pike) to the Newbury Street extension. Our parking lot will be down about 100 yards on your right hand side. There is an entrance into the Club from the parking lot.

From Logan Airport
Take the Sumner Tunnel into Boston. At the end of the tunnel, take the Storrow Drive exit into a second tunnel. Follow Storrow Drive West along the Charles River. Watch for the Kenmore Square/Fenway Exit. Take the exit, staying to the Kenmore Square side (your right side). When you come to the first set of lights off the exit, go straight, and at the second set of lights turn left onto Commonwealth Avenue. The Harvard Club will be on your right, just before the second set of lights (just before the intersection of Mass. Ave. and Comm. Ave.). Parking is located in the back of the Club, at 415 Newbury Street. To get to the parking lot, turn right onto Mass. Ave. and continue one block to the set of lights. At that set of lights turn right, and the lot will be on your right hand side about 100 yards down.

From Route 2 (West of Boston)
Follow Route 2 towards Boston. Go past the Alewife subway stop and continue following Route 2 into Soldiers Field Parkway. Continue on Storrow Drive and follow along the Charles River, until you see the exit for the Fenway/Kenmore Square. Take the exit, staying to the Kenmore Square side (your right side). When you come to the first set of lights off the exit go straight, at the second set of lights turn left onto Commonwealth Avenue. The Harvard Club will be on your right just before the second set of lights (just before the intersection of Mass. Ave. and Comm. Ave.). Parking is located in the back of the Club, at 415 Newbury Street. To get to the parking lot, turn right onto Mass. Ave. and continue one block to the set of lights. At that set of lights turn right, and the lot will be on your right side about 100 yards down.

PARKING: Available in the Club's own lot, located directly behind the Main Club at 415 Newbury Street, $20. Parking is also available in nearby garages.

ACCOMMODATIONS: Numerous hotels are available nearby and at the Club. Please inquire if assistance is needed.