Advanced Brain Monitoring Update October 2005

The past six months have been a productive and exciting period for Advanced Brain Monitoring, as we move from R&D into commercialization. This summer, Advanced Brain Monitoring presented papers and exhibited technology at conferences on Occupational Medicine, Pulmonary Medicine, Sleep Disorders, Human-Computer Interaction, and Fatigue Management. The company has also made significant progress in establishing both corporate and research partnerships.

Strategic Partnerships

In collaboration with ***Dr. Archie Roberts***, former NFL player and president of the ***Living Heart Foundation***, ***Dr. Charles George***, professor of medicine at the ***Univ. of Western Ontario***, and ***Dr. David Rapoport***, director of the ***NYU Sleep Disorders Center***, we used the ***Apnea Risk Evaluation System (ARES™)*** to diagnose sleep apnea among former ***NFL football players***. The ***NFL Players Association*** is interested in addressing the high prevalence of sleep apnea among former athletes.

This spring we completed a pilot study with one of the country's largest commercial trucking firms. Of those employees who participated, 15% had severe sleep apnea as defined by DOT fitness guidelines, a rate which has been confirmed by studies conducted by ***Stanford University*** and the ***University of Pennsylvania***. An additional 30% had mild to moderate sleep apnea. Some of the managers found to have severe sleep apnea have since received successful treatment and note marked improvement in their quality of sleep. With the results of this study, we are anxious to work with transportation companies to initiate a rollout of pre-employment screening, with the goal of screening all drivers in the future.

We initiated a study with ***Washington University and Barnes Jewish Hospital*** in St. Louis, MO, to assess the risk of sleep apnea-related complications following surgery. This study, the largest of its kind, addresses a significant risk that is increasingly recognized by anesthesiologists. The combination of anesthetic and narcotic medications administered peri-operatively can severely exacerbate existing sleep apnea, and early diagnosis can aid doctors in preventing such complications. ***Dr. Meir Kryger***, one of our scientific advisors, has proposed a companion study in Canada. We look forward to launching the ARES into the anesthesiology market.

Outcome Studies

Our products are uniquely suited to evaluate efficacy of treatments for sleep apnea. The ARES is currently being used in a clinical study to examine the effectiveness of novel drug therapies for sleep apnea. A California pharmaceutical firm leased 150 ARES Unicorders to test the drugs in a proof-of-concept study. The company is pleased with the quality of the ARES studies and is hoping to move into Phase II clinical trials.

We began implementation of a study funded by the ***National Institutes of Health*** using the ARES to evaluate oral appliance therapy for sleep apnea. This study is a collaborative effort with dentists and physicians at the ***University of Texas Health Science Center,*** the U.S. Air Force, and ***Dr. Keith Thornton***, designer of the oral appliance.

At the ***American Thoracic Society Conference***, we met a company that has developed surgical implants for the treatment of sleep apnea. We hope they will include the ARES in upcoming clinical trials.

For all of these outcome studies, the researchers have expressed interest in integrating the ***Alertness and Memory Profiler (AMP)*** as a measure of treatment efficacy.

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ABM on the Road: Trade Show Highlights

We completed our first official marketing brochures and hit the road to start promoting our products at a number of industry trade shows. The products generated a great deal of excitement and promising leads among key figures in the fields of occupational and pulmonary medicine, sleep disorders, neurocognitive research, military research, and augmented cognition.

Marketing of the ARES and the AMP to the industrial and transportation markets began with the ***American College of Occupational and Environmental Medicine (ACOEM) Conference*** in Washington, D.C., last April. At this event, it was clear that corporate medical directors are aware of sleep apnea and are interested in efficient, cost-effective methods for diagnosing and treating sleep apnea in the workplace.

We also displayed the ARES at the ***American Thoracic Society (ATS) International Conference*** in San Diego, CA, last May. The conference drew over 15,000 attendees, creating a lot of traffic through our booth! The conference also provided the opportunity to meet with potential distribution partners from Canada, South America, Europe, and Asia.

In July, our wireless EEG system was simultaneously featured in three exhibits at the ***1st International Conference on Augmented Cognition***, held jointly with the ***11th International Conference on Human-Computer Interaction*** in Las Vegas, NV. Many attendees were impressed by our live mobile EEG demo. Our booth attracted a diverse audience including researchers in the areas of neuroscience, military operations, group dynamics, and biofeedback. As an additional highlight, ABM's EEG sensor headsets were modeled by personnel in the ***Honeywell*** and ***Lockheed-Martin Advanced Technology Laboratories (LM-ATL)*** exhibits.

Finally, in September we exhibited and presented at the ***International Conference of Fatigue Management in Transportation Operations*** in Seattle, WA, and were met with enthusiastic support from representatives of the airline, commercial trucking, and railroad industries.

A Look into the Future

We are committed to pursuing grant opportunities that will further our product and research applications. Our NIH-funded study examines the effects of nicotine and nicotine withdrawal on EEG and cognitive performance. This will be the first in a series of planned studies to address the effects of stimulants, hypnotics, and other mind-altering drugs on EEG and performance.

We recently began development of the "second generation" ARES Unicorder. The new design will be about two-thirds the size of the current ARES Unicorder to optimize patient comfort and signal readings.

This smaller design will also allow us to eventually expand into the pediatric sleep apnea market. As a first step, we submitted a grant to NIH to study the ARES in teenagers in collaboration with two leading pediatric sleep researchers at ***Case Western University***.

We will also be studying the effects of sleep deprivation and environmental stressors on Marine Corps performance during training exercises. We will be collaborating with the ***Naval Health Research Center*** on this proposal funded by the ***Defense Advanced Research Projects Agency (DARPA)***, Preventing Sleep Deprivation Program.

Our wireless EEG Sensor Headset will be incorporated into a soldier's helmet as part of the ***Honeywell Mobile Warfighter Project***.

We are continuing the integration of our EEG cognitive workload measures into military simulations in collaboration with ***LM-ATL***.

In Press

Description and Validation of the Apnea Risk Evaluation System: A Novel Method to Diagnose Sleep Apnea-Hypopnea in the Home. Philip Westbrook, Daniel J. Levendowski, Milenko Cvetinovic, Timothy Zavora, Vladislav Velimirovic, Delmer Henninger, Dennis Nicholson. *Chest*, 2005. In press.

EEG quantification of alertness: Methods for early identification of individuals most susceptible to sleep deprivation. Chris Berka, Daniel J. Levendowski, Philip Westbrook, Gene Davis, Michelle N. Lumicao, Richard E. Olmstead, Miodrag Popovic, Vladimir T. Zivkovic, Caitlin K. Ramsey. *Proceedings of the SPIE Defense and Security Symposium, Biomonitoring for Physiological and Cognitive Performance during Military Operations*. John A. Caldwell, Nancy Jo Wesensten, Eds. Vol. 5797: pgs. 78-89. 2005.

EEG Indices Distinguish Spatial and Verbal Working Memory Processing: Implications for Real-Time Monitoring in a Closed-Loop Tactical Tomahawk Weapons Simulation. Chris Berka, Daniel J. Levendowski, Gene Davis, Michelle N. Lumicao, Caitlin K. Ramsey, Kay Stanney, Leah Reeves, Patrice D. Tremoulet, Susan Harkness Regli. *Foundations of Augmented Cognition, Proceedings of the International Conference on Human Computer Interaction*, July 2005, Las Vegas,
NV. Dylan D. Schmorrow, Ed. Vol. 11: In press.

Evaluation of an EEG-workload model in the Aegis simulation environment. Chris Berka, Daniel J. Levendowski, Caitlin K. Ramsey, Gene Davis, Michelle N. Lumicao, Kay Stanney, Leah Reeves, Susan Harkness Regli, Patrice D. Tremoulet, Kathleen Stibler. *Proceedings of the SPIE Defense and Security Symposium, Biomonitoring for Physiological and Cognitive Performance during Military Operations*. John A. Caldwell, Nancy Jo Wesensten, Eds. Vol. 5797: pgs. 90-99. 2005.

Implementation of a Closed-Loop Real-Time EEG-Based Drowsiness Detection System: Effects of Feedback Alarms on Performance in a Driving Simulator. Chris Berka, Daniel J. Levendowski, Philip Westbrook, Gene Davis, Michelle N. Lumicao, Richard E. Olmstead, Miodrag Popovic, Vladimir T. Zivkovic, Caitlin K. Ramsey. *Foundations of Augmented Cognition, Proceedings of the International Conference on Human Computer Interaction*, July 2005, Las Vegas, NV. Dylan D. Schmorrow, Ed. Vol. 11: In press.

Implementation Model for Identifying and Treating Obstructive Sleep Apnea in Commercial Drivers. Chris Berka, Philip Westbrook, Daniel J. Levendowski, Michelle N. Lumicao, Caitlin K. Ramsey, Timothy Zavora, Travis Offner. *Proceedings of the Fatigue Management in Transportation Operations International Conference*, September 2005, Seattle, WA.

Validation of an Apnea Risk Evaluation Questionnaire. Philip Westbrook, Chris Berka, Daniel J. Levendowski, Timothy Zavora, Michelle N. Lumicao, Caitlin Ramsey, Travis Offner. Presented at the ATS Conference, May 2005 in San Diego, CA.

Please contact us if you would like copies of any of our scientific publications or product brochures. Product brochures and recent press releases are also available on our website: www.b-alert.com