



SCIENCE UPDATE



NAMRL MISSION: TO CONDUCT RESEARCH, DEVELOPMENT, TEST, AND EVALUATION IN AEROSPACE MEDICINE AND RELATED SCIENCES TO ENHANCE THE HEALTH, SAFETY AND OPERATIONAL READINESS OF NAVY, MARINE CORPS, AND OTHER MILITARY PERSONNEL.

SUMMER 2010

NAMRL ATTENDS 2010 NAVY MEDICINE RESEARCH SYMPOSIUM

NAMRL was among distinguished guests at the 2010 Navy Medicine Research Symposium at the National Conference Center in Lansdowne, VA. Attendees included representatives from the military medical research community and encompassed a variety of topics such as aviation, population-based medicine epidemiology, toxicology, combat casualty care, and diving medicine programs. The symposium agenda focused on warfighter protection and research lessons learned from the battlefield to the laboratory. During Surgeon General's address, he reminded the attendees that the "research and development work each of you supports is critical to Navy Medicine's success and our ability to remain agile to meet the evolving needs of our warfighters". The SG also emphasized the importance of researchers remaining straight-forward with their approach to research by conducting "open and collaborative research, development, testing, and evaluation (RDT&E) to enhance deployment readiness".

NAMRL exhibited the laboratory's alignment with the current Navy Medicine mission with nine poster presentations and an invited Panel Presentation titled: Aerospace Medical Research in Support of Warfighter Health, Safety and Performance. The panel, presented by several of NAMRL's distinguished researchers, discussed current Navy aeromedical Research and Development (R&D) efforts to address warfighter care, safety, and performance in dynamic Naval Aviation operational environments. The panel specifically covered recent and ongoing applied research to address the principle aeromedical



problems facing our warfighters, such as motion sickness, fatigue, spatial disorientation, and hypoxia.

The SG also formally recognized two NAMRL research products for providing "significant procedural advancements" in Navy Medical R&D with the Naval Medical Research and Development Procedural Advancements Awards. The awards recognize significant procedural advancements or product transitions that have practical application beyond the R&D environment and support BUMED strategic goals. The SG, DSG, and NMSC CO presented the awards to the OIC and a Research Psychologist from NAMRL. NAMRL was recognized for the publications titled

"Low-dose Intranasal Scopolamine: Motion Sickness Countermeasure for Extreme Operational Environments" as well as "The Efficacy of Armodafinil as a Fatigue Countermeasure for Air Traffic Controllers During Sustained Missions". These studies are representative of NAMRL's R&D focus on fleet aeromedical gaps and officially recognize the laboratory's current and future plans for alignment with BUMED strategic goals.

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UNIVERSITY OF DAYTON RESEARCH INSTITUTE (UDRI) REPRESENTATIVES VISIT NAMRL

On 12 and 13 April, the Naval Aerospace Medical Research Laboratory (NAMRL) hosted two visitors from the University of Dayton Research Institute (UDRI), Human Factors Group. The visit presented an opportunity for NAMRL to demonstrate current and future research capabilities and establish a collaborative working relationship with UDRI. Developing relationships with laboratories and institutions in Dayton has been a top priority for NAMRL during its transition to Wright Patterson Air Force Base (WPAFB) and will help NAMRL gain footing and establish itself as a premier research laboratory in the region. It also presents an

opportunity for the growing UDRI to expand its Human Factors Division into the field of Aerospace Medicine.

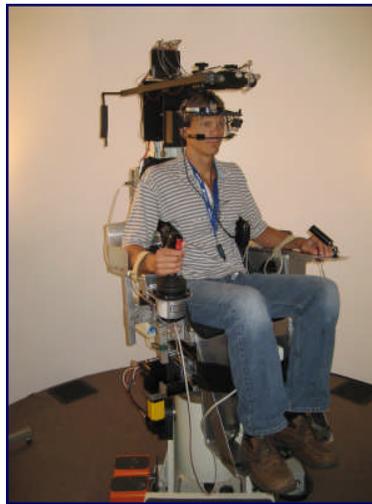
The visit began with laboratory overviews from NAMRL's OIC and UDRI Human Factors Group Leader, outlining core research and development capabilities and discussing common areas of scientific interest. The NAMRL science team provided tours of the Psychophysiology, Hypoxia, and Fatigue Laboratories and demonstrated current motion-based research platforms including the Visual Vestibular Sphere Device and the Clinical Vestibular Rotator. The remainder of the visit

consisted of working group meetings between the UDRI representatives and NAMRL Principal Investigators to discuss specific programmatic goals and opportunities for aeromedical and human factors research collaborations. The visit proved to be hugely successful for both parties, and agreements were made for future joint research in the areas of motion sickness and hypoxia. In addition, UDRI agreed to provide NAMRL with space in a newly acquired facility to set up a wet lab and an Off-Vertical Rotating Chair, which will allow motion sickness research to continue during NAMRL's transition to WPAFB.

AWARD-WINNING NAMRL ANTI-MOTION SICKNESS RESEARCH TAKES CRITICAL NEXT STEPS

Motion sickness is a wide-spread, often debilitating problem across the Services. Military scientists have studied the drug scopolamine as the leading countermeasure to motion sickness for decades. Current scopolamine delivery methods are effective, but have serious drawbacks. For example, oral scopolamine takes up to 60 minutes to take effect – too long if you're already incapacitated. The scopolamine patch can take up to 8 hours to begin working and involves drug levels often associated with increased side effects. In answer to these drawbacks, a team of NAMRL scientists has been working on an alternative delivery method for scopolamine: intranasal administration. This work has demonstrated that intranasal scopolamine is easily administered, quickly and efficiently absorbed, and highly effective at low doses.

Last fall, the NAMRL team received the "Best in Reserach" award for



A Clinical Vestibular Rotator (CVR) will be used in future motion sickness research

presentation of their work on the efficacy of intranasal scopolamine gel as a countermeasure for motion sickness in dynamic military environments. This award, given at the 115th

annual meeting of the Association of Military Surgeons of the United States in St. Louis, MO, highlighted the scientific rigor of NAMRL's work. The operational relevance and great potential impact of this work was recognized again this past spring with the Surgeon General's Award for Excellence in Research at the Inaugural Navy Medicine Research Symposium, Lansdowne, VA.

This year NAMRL scientists were awarded a grant from the Defense Medical Research and Development Program (DMRDP) to take the next critical steps in optimizing intranasal delivery of scopolamine. The gel formulation is being replaced with a fine spray with the goals of increasing absorption speed and identifying the lowest possible effective dose. The ultimate goal is to provide a "just-in-time" treatment for motion sickness in fast-changing, dynamic, operational settings to keep our warfighters mission ready.

OFFICE OF NAVAL RESEARCH FORCE HEALTH PROTECTION ANNUAL REVIEW

The Scientific Director, the Director of Aeromedical Research, and one of NAMRL's Principal Investigators, attended the Office of Naval Research Force Health Protection Annual Review in San Antonio 02-04 June 2010. The conference began with highlights from the Combat Stress, Fatigue and PTSD working group, in which the FY10 new start entitled "Individual Fatigue States" was presented. Discussed was the technical objectives of the study, which were to replicate and extend previous studies of real-time fatigue assessment tools under conditions of chronic fatigue, to identify and validate predictors of individual fatigue susceptibility, and to validate

assessment tests. Subsequently, they discussed the research program, "Interventions to Enhance Stress Resilience in Military Survival Training". The presentation included recently-derived data showing that the nutritional supplement dehydroepiandrosterone (DHEA) enhances anabolic-catabolic balance both during daily living and in response to stressful survival training in military men. The remainder of the review consisted of presentations on a variety of operationally relevant topics, including decompression sickness treatment, repetitive neurotrauma mitigation, hemostatic agents, and pharmacological resuscitation. These examples of the critical, operationally-relevant



medical research being conducted at NAMRL and across the Navy Medical R&D Enterprise reflect the keen focus of the ONR Force Health Protection program, and of NAMRL and her sister labs, on the most pressing health, safety, and performance-related threats to our warfighters.

NAMRL AVIATION SELECTION RESEARCH PRESENTED AT DoD HUMAN FACTORS ENGINEERING TECHNICAL ADVISORY GROUP

The 63rd semi-annual meeting of the Department of Defense Human Factors Engineering Technical Advisory Group (HFE TAG) was held 03-06 May in Tempe, Arizona. This professional organization serves the interests of DoD behavioral scientists and human factors professionals by providing a forum for the exchange of scientific and technical information on a wide range of human factors and human-systems integration topics. NAMRL's Scientific Director presented recent research which developed and validated improved aviation personnel selection methods.

The Personnel Selection and Classification Sub-TAG is one advisory group among several in which NAMRL has been heavily involved over the years. During the period at which the HFE TAG was founded, NAMRL was pioneering the development of computerized performance-based selection tests. In the 1990s, the lab developed the DoD's first online aviation selection test delivery system, APEX, which was transitioned to operational use in 2001. Most recently, a Navy and industry research team, lead by a NAMRL research psychologist, developed a sophisticated set of scoring algorithms for the newest addition to the Navy's battery of aviation selection tests, the

Performance Based Measurement Battery (PBM). These advancements will lead to more effective personnel selection decisions, while improving throughput rates in Naval Aviation training.

The HFE TAG provided a forum for NAMRL to share these findings with colleagues from the Navy, Air Force, and Army. Apropos of the theme of the 63rd HFE TAG, "Readiness for the Future", NAMRL's aviation selection research program ensures the naval services select the best qualified candidates for the future of Naval Aviation. The scientific and technical exchanges facilitated by the Personnel Selection and Classification Sub-TAG enable NAMRL's Air Force and Army counterparts to also benefit from these advancements in aviation selection methods.

BRAC UPDATE

The most significant BRAC event to date has been a change in the Beneficial Occupancy Date (BOD) from 29 May 2011 to 01 March 2011. Once again, the Navy, Air Force, Army Corps of Engineers, and Joint Venture team has managed to achieve a rare milestone in such a huge, technically challenging, MILCON project. The early BOD adds flexibility to the movement of both people and equipment to Dayton and the ability to maintain full mission capability throughout the BRAC process. Not only has the BOD moved up 13 weeks, but the MILCON remains 5 % ahead of

schedule and has limited cost growth to only 4 %. All milestones have been met to ensure successful integration of the Disorientation Research Device (DRD) into the new building. The device foundation has been completed and Environmental Tectonics Corporation's current timeline projects early access to the building, September 2010, to prepare for installation of large device equipment starting December 2010. Team members remain focused on success and are, as said in Naval Aviation, "Keeping their eyes on the Ball".

Progress of the Naval Medical Research Unit – Dayton, OH



Front of NAMRU-D Wing



Back of NAMRU-D Wing



Experimental Prototype Facility



Disorientation Research Device (DRD) Pit



DRD Control Room



View from the DRD Hall to the Control Room

CDR'S CORNER



According to noted English Mathematician, Lewis Carroll, "If you don't know where you are going, any road will get you there". This is true in life and just as true when laying out a strategic research plan.

The NAMRL leadership team, in concert with our scientists, has developed a clear scientific roadmap to ensure we know where we are going and that where we are going is the right destination. Building a successful roadmap requires starting with the end in mind. Our scientific destination is clear, the fleet's doorstep with a relevant deliverable in hand. When laying out the remainder of the map, we are determined to select the most direct route possible. Decreasing

the time from bench to battlefield has necessitated regular contact with our fleet customers to ensure we understand the exact need and operational requirements, considerations, and mission applicability. This eliminates the so-called "ivory tower" research or being caught up in the latest high-tech fad. While high-tech can render very cool ideas, at NAMRL, we put our research to what the Japanese call "dakara nani", the "so what" test. If the research does not meet fleet requirements, fill Navy Medicine gaps, and is not the most expeditious route to a solution, we don't undertake the effort. Our scientific goal and mapped destination is to execute relevant research and deliver products germane to fleet mission needs and success. Protecting the warfighter, enhancing mission

effectiveness, and improving performance in military environments are our prime directives. The research programs and successes described in this, and other newsletter editions, reflect the stops along our roadmap and our dedication to a relevant, product-driven mindset.



NAMRL's Research Team

ASHTON GRAYBIEL AWARD COMES HOME

The 81st Annual Meeting of the Aerospace Medical Association was held May 09-13 in Phoenix, Arizona. The annual meeting hosts an international cadre of physicians and scientists who specialize in military and commercial aeromedical issues. The meeting provides an ideal forum for NAMRL scientists to highlight their most recent research and to network with contemporaries from around the world. Three NAMRL investigators gave presentations at this year's meeting. As part of the poster session entitled "Adverse Effects on Health," First, work examining the link be-

tween dispositional resilience and positive general/mental health status among military personnel was presented. Secondly, findings collected through NAMRL's Individualized Assessment of Fatigue project at the slide session entitled "Alertness, Fatigue and Performance" were presented. The presentation focused on the evaluation of several tools developed to provide fitness-to-fly assessments for pilots and flight officers immediately before they embark on a mission. Finally, as part of the slide session entitled "Hypoxic Effects During Altitude Simulation", a NAMRL investigator presented work collected in NAMRL's hypoxia laboratory. The experiment examined the relationship between acute hypoxia exposure and recovery of cognitive performance. Each presentation was well received and provided a significant contribution to its designated focus area. The highlight of the meeting occurred during the Society of Naval Flight Surgeon's luncheon when NAMRL's Director of Aeromedical Research was presented with the Ashton Graybiel

Award for outstanding contributions to the medical literature. The award was established to honor CAPT Ashton Graybiel, MC, USN, who pioneered Naval Aeromedical Research. Dr. Graybiel served as the Director of Naval Research at NAMRL from 1970-1980 and is associated with advancing the understanding of many common aeromedical issues such as motion sickness, and cardiovascular adaptation to microgravity. The potential positive impact and operational significance of the NAMRL investigator's publications in the journal "Aviation, Space, and Environmental Medicine," earned him this prestigious award. A fitting tribute to his work and very appropriate that the Ashton Graybiel Award comes home to NAMRL.



**Naval Aerospace Medical Research
Laboratory**

www.med.navy.mil/sites/nhrc/namrl