Dr. Scott Lephart Concludes 27 Years at the University of Pittsburgh

After 27 successful years at the University of Pittsburgh, Dr. Scott Lephart, Director of the NMRL/WHPRC, has accepted a new position at the University of Kentucky as Dean of the College of Health Sciences. Dr. Lephart’s distinguished career at the University of Pittsburgh has consisted of excellence in education, service, and research. He is the founder of the NRRL and is globally recognized as a scientific leader in the area of proprioception and neuromuscular control of joint stability.

For the past decade, Dr. Lephart has served as the Principal Investigator of the NMRL’s research initiatives focusing on the unique injury mitigation and performance optimization needs of our military’s elite. Lephart’s work with the military will have a tremendous impact on preparing our warriors for the physical demands of protecting and serving our country, lengthening their service contribution, and improving quality of life outlook after service.

Dr. Kim Beals has assumed the role of interim director. Dr. Beals is an Assistant Professor in the Department of Sports Medicine and Nutrition with a doctoral degree in Exercise Physiology. She is a registered dietitian and certified specialist in sports dietetics.

US Marine Corps

On January 24, 2013 then-Defense Secretary Leon Panetta and Chairman of the Joint Chiefs of Staff, Gen. Martin Dempsey, rescinded the Direct Ground Combat and Assignment Rule, which opens previously-restricted combat Military Occupational Specialties (MOS) to women. In order to provide a deliberate, measured, and responsible approach to studying female integration into combat units, the US Marine Corps established the Ground Combat Element (GCE) Integrated Task Force (ITF) which is an experimental task force to integrate women into combat units and military occupational specialties (MOS). The USMC has requested the NMRL/WHPRC provide research support to its GCE ITF with human performance and injury prevention testing of the newly created integrated infantry unit in Camp Lejeune, NC. Baseline physical, physiological, musculoskeletal, performance, nutrition, training, and injury data are collected as female and male Marines check into the GCE ITF unit. Prospective injuries sustained during MOS school and unit integration are being tracked within the U Pitt-Military Epidemiological database. Task and demand analysis is being conducted in order to study the specific musculoskeletal and physiological demands of female and male Marines performing MOS tactical activities. Overall, the aims will provide correlates/predictors of MOS school and GCE ITF unit integration outcomes, including injury, attrition, and performance metrics measured during MOS tactical activities in the operational environment.

At the request of the USMC Training and Education Command (TECOM), the University of Pittsburgh also plans to conduct a longitudinal study with the USMC, beyond the GCE ITF, to assess long-term force-wide readiness.

Marine Corps Forces Special Operations Command

(MARSOC) in January 2015. This project will utilize the University of Pittsburgh human performance research model to scientifically develop an injury prevention and performance optimization program that is culturally-specific and dynamically responsive to the unique tactical demands of MARSOC Operator.

The overall research initiative will provide baseline and longitudinal assessments to determine the specialized needs of SOF. Additional research aims include a clinical trial to measure current training efficacy, a reliability/validity study of field performance measures, analysis of heart rate variability’s relationship to tactical and physical performance, and an investigation into how marksmanship is influenced by musculoskeletal and physiological factors using a laser target system.

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Full Mission Profiles: AFSOC

Full mission profiles (FMPs) are simulated deployment events usually involving several small teams of Special Tactics operators and support personnel. Active duty Air Force Special Tactics career fields participating in this training include: a) combat controller (CCT), b) pararescueman (PJ), c) tactical air control party (TACP), and d) special operations weather technician (SWT). The purpose of this training is to reflect the tactical and operational environment for the Operator in preparation for deployment.

WHPRC faculty traveled to Oahu, Hawaii, to conduct a task and demand analysis of an enduring full mission profile (FMP) featuring movements within jungle and amphibious environments for Special Tactics operators. The Operators conducted overnight jungle training designed to improve survival and land navigation skills. The amphibious portion of training included deploying rafts and personnel from aircraft into the ocean and movements through surf to the shoreline. The amphibious training concluded with an overnight mission scenario where Special Tactics Operators had to perform an over-the-horizon insertion, paddle rafts to the shore, conduct a search, and exfiltrate by swimming through surf into the ocean to be picked up by an aircraft.

The goals of WHPRC faculty were to collect qualitative and quantitative field data to analyze physiological demands and injury risk associated with the missions of Special Tactics Operators. Specific activities observed by the WHPRC faculty included rope climbing, casualty movements, paddling rafts and swimming with gear through ocean surf, and climbing ladders from aircraft to exit the ocean. Field data collection is currently being analyzed with a final task and demand report in the development phase.

US Army Special Operations Command

Initiated in April 2012, research with the US Army Special Operations Command (USASOC) is supporting refinement of Tactical Human Optimization, Rapid Rehabilitation and Reconditioning (THOR3) program.

Current research will focus on measuring the effectiveness of USASOC’s THOR3. This program was originally designed to increase human performance with peak functional performance and combat effectiveness, reduce SOF manpower lost to injury and disease through focused and individualized assessment and conditioning strategies, and maximize return to duty times with optimized recovery and reconditioning.

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Air Force Special Operations Command

The WHPRC faculty have been busy collecting data for the first two research phases in our injury prevention and performance optimization collaboration with AFSOC and the Special Tactics enterprise. This includes epidemiology data on over 150 Special Tactics (ST) Operators. To date, over 125 ST Operators have undergone testing in the laboratory at AFSOC and at our USASOC laboratory. They have also conducted Task and Demand Analyses on six Full Mission Profiles (FMP) designed to simulate varied mission types, tactical tasks, and ST Operator career-field specific training. These FMPs were based in multiple geographical locations under extreme environmental conditions including jungle (Hawaii), mountain (Colorado), and glacial (Alaska) locations. Mission specific tasks included swift water rescues, traversing glaciers, amphibious insertion/extraction, airfield security, and jungle maneuvers. Physiological, biomechanical, nutritional, and injury risk data were collected during the FMP for further analysis off-site. Work will continue with testing of ST Operators, re-testing of ST Operators tested in the first year of the study along with medical chart reviews for additional injury epidemiology data; and design and planning of the Phase 3 clinical trial.

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Environmental Physiology and Cognition Research

The Neuromuscular Research Laboratory will begin developing research designed to improve the Warrior’s performance when performing exercise in extreme environmental conditions and in combination with high cognitive demands. We will utilize a 1600 ft³ environmental chamber which can alter hot or cold weather conditions. It can also simulate the low oxygen levels experienced at altitude or the high carbon dioxide loads experienced in a disabled submarine. In this way, we will examine limitations of human performance in various environmental conditions. To accomplish this, we will use a variety of physiological testing equipment that can measure metabolism and cardiorespiratory function. In addition to physical performance, we will evaluate cognitive performance and brain function with novel brain imaging techniques that can be used during exercise. Consequently, we will be able to develop appropriate strategies to mitigate these limitations and allow the Warrior to optimally perform in environments similar to the locales where they may be deployed.
The Naval Special Warfare Group 2 lab is in phase three and phase 4 of our four phase research model. Current research activities are focusing on the 2 Year Interval testing and continuing longitudinal testing throughout the deployment cycle to assess performance decrements and injury rates. Future research activities will include collecting data on the physiological demands of field training. Data collected will include bio-mechanics, heart rate variability and energy expenditure. This data will identify specific activities which may result in injuries or decrease performance.

Faculty at Stennis (SBT-22) continue to be busy collecting data for multiple aspects of the Naval Special Warfare research. Operator testing includes first-time testing of newly assigned Operators; testing following deployment; and repeat tests of previously tested Operators. Prospective injury data is being gathered prospectively on all tested Operators and used to predict musculoskeletal injury. In December of 2014, the third of four longitudinal tests were completed on one Riverine Troop to determine the effects of human performance training on physiological, musculoskeletal, biomechanical, and nutritional characteristics. The two years represent the typical training cycle of Operators at SBT-22 and includes a single deployment. Data collection will continue with a final longitudinal test during the summer of 2015.

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Naval Special Warfare SQT/CQT

Since opening in February 2012, 448 SEAL (SQT) and Crewman Qualification Training (CQT) students have completed baseline testing at our Coronado laboratory. By using interval testing to track Operators from graduation through training and deployments, the implementation of human performance initiatives can be timed to maximize performance based on an Operator’s physical needs at different career milestones.

Task and demand analyses with CQT students is also being tracked. Understanding supplement use patterns will provide valuable feedback on prevalence and perceived efficacy for dieticians working with special operations personnel.

Current research activities are focused on completing baseline testing for new Operators, continuing interval testing for those at operational commands, and future task and demand analyses for operation-specific training.

Aquatics Research

The Neuromuscular Research Laboratory has recently initiated the development of aquatic-based research. The current objectives of this research aim are to develop valid and reliable protocols to assess the physical and physiological demands of aquatic-based tasks. This research will include development, pilot testing, and assessment of the validity and reliability of tests measuring anaerobic power and capacity as well as peak aerobic capacity during swimming. Data from these studies will provide quality assurance for future data collection with these methodologies. This will advance the ability to collect data on the aerobic capacity and anaerobic power and capacity of a swimmer that is more specific, with applications to test under military conditions.

Photo by Specialist 1st Class Kenneth R. Hendrix
Personnel Spotlight:

Megan Frame, MS
Megan is an Instructor and Research Associate at the University of Pittsburgh. She earned a Bachelor's degree in Human Performance from Edinboro University of Pennsylvania and completed her Master's degree in Exercise Physiology from the University of Pittsburgh. After obtaining her master's degree she was accepted to Officer Candidate School for the United States Marine Corps but due to injuries sustained during training she was released from the program. Her research interests are geared towards prevention of musculoskeletal injuries and utilization of exercise training for improving physical performance in tactical military operators, as well as, body composition in relation to optimal functional performance.

Corey O'Connor, MS
Corey is an Instructor and Research Associate at the University of Pittsburgh. Corey completed his Bachelor of Science degree in Exercise Science and his Master's degree in Exercise Physiology both from Illinois State University. Corey was previously an intern at the Illinois State University exercise physiology laboratory and worked at Well-Fit, a triathlon training center in Chicago. His research interests include endurance athletes, and injury prevention and performance optimization of military personnel.

Yosuke Kido, MS, ATC
Yosuke is an Instructor and Research Associate at the University of Pittsburgh. Yosuke completed his Bachelor's degree in athletic training at Washington State University and his Master's degree in Sports Medicine from the University of Pittsburgh. Yosuke was previously an intern with the Philadelphia Flyers, a graduate assistant of the University of Pittsburgh, worked as an Athletic Trainer at UPMC, and worked at the NMRL as a research associate. His research interests include prevention of upper extremity and lower back Injury in athletic and military population.

Kathy Poploski, DPT
Kathy is an Assistant Professor and Research Associate at the University of Pittsburgh. She earned her Bachelor's degree in Psychology and Pre-Professional Studies from the University of Notre Dame. She recently completed her Doctor of Physical Therapy degree from the University of Pittsburgh. She completed clinical internships at UPMC South Hills CRS Outpatient Facility and Montefiore Rehabilitation Department. Her research interests include prevent of injuries in both the military and athletic populations and safe return to activity following injury.

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