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Consensus Conference on Hyperbaric Oxygen Therapy in Traumatic Brain Injury

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DEFENSE CENTERS OF EXCELLENCE (DCoE) FOR PSYCHOLOGICAL HEALTH AND TRAUMATIC BRAIN INJURY

“I will repeat here the pledge I made to myself, to Congress and to countless moms and dads, husbands and wives; other than winning the wars we are in, my highest priority is providing the best possible care for those who are wounded in combat.”

~Defense Secretary Robert Gates~

Throughout Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF), the Military Healthcare System (MHS) has been scrutinized by the public, the media, and Congress for responses to the common, yet very complex psychological and cognitive injuries of war. Psychological Health (PH) issues and Traumatic Brain Injuries (TBI) affect thousands of Warriors and their loved ones each year. The use of improvised explosive devices, the signature weapons of this war, often

result in obvious traumatic blast related injuries such as severe burns, loss of limbs, and impaired sensory functioning. However, many of our Warriors suffer from less obvious and often invisible wounds, such as psychological injuries and cognitive traumas.

The Department of Defense Centers (DCoE) of Excellence for PH and TBI establishes a global network for optimizing psychological health and traumatic brain injury treatment. Furthermore, it facilitates research by identifying gaps in current care along with new and promising therapies and, working with a network of academia, the services, Veterans Administration, and industry, to conduct the necessary research expeditiously to move theory into practice.

VISION

Fulfilling America's commitment to all who support and defend our Nation's freedom

MISSION

To apply current biomedical knowledge and a broad variety of scientific and clinical perspectives in formulating research objectives and design to determine the role of hyperbaric oxygen therapy for traumatic brain injury. Benefit will be determined utilizing outcome measures such as improvement in neuropsychological testing, neuroimaging, and functional outcomes will be sought in order to evaluate benefit

CONFERENCE MISSION STATEMENT

To develop research objectives, research trial design, milestones and an overall plan of action to determine the potential for use of hyperbaric oxygen therapy for treatment of traumatic brain injury and/or post traumatic stress disorder. This will be accomplished through study, discussion and application of current biomedical knowledge obtained from a broad spectrum of scientific and clinical perspectives. Benefit will be determined utilizing outcome measures including improvement in neuropsychological testing and functional outcomes and, as a corollary, if benefit is demonstrated, such will be further evaluated for linkage to observable changes in neuroimaging.

Agenda



DAY 1 - FRIDAY, 5 DECEMBER

Time	Location	Agenda Item	Speaker
0700	Hotel Lobby	Registration Opens	
0745 – 0755	Room TBD	Opening and Administrative Announcements	Colonel Christopher Williams, D.O., M.P.H., USAF Senior Executive Director, TBI
0745 – 0800		Welcome and Introduction	Brigadier General Loree K. Sutton, M.D., USA Director, DCoE
0800 – 0830		Keynote Address	Honorable Donald C. Winter, Secretary of the Navy
0830 – 0900		Neurophysiology and Neuropathology of TBI	John Povlishock, Ph.D.
0900 – 0930		Biological Basis and Mechanism of Action for HBOT in TBI	CAPT Brett Hart, M.D.
Break: 0930-0945			
0945 – 1045	Room TBD	HBOT in mTBI at Louisiana State University	Paul Harch, M.D.
1045 – 1145		HBOT in Acute, Severe TBI	Gaylan Rockswold, M.D., Ph.D.
Working Lunch: 1145-1200			
1200 – 1230		Pilot HBOT Trial in mTBI	Lindell Weaver, M.D.
1230 – 1300		Randomized, Controlled Trial of HBOT in mTBI	George Wolf, M.D.
1300 – 1345		Neuroimaging in HBOT in TBI and PTSD	William Orrison, M.D.
1345 – 1415		Neuropsychological and Neurocognitive Testing in TBI: What's Measureable?	LTC Michael Russell, Ph.D.
1415 – 1445		Measureable Functional Outcomes	CAPT Andy Woods, M.D.
Break: 1445-1500			
1500 – 1700	TBD	Working Groups	
1700 – 1730	TBD	Wrap Up	

Agenda



DAY 2 - SATURDAY, 6 DECEMBER

Time	Location	Agenda Item
0800 – 0810	TBD	Administrative Announcements
0800 – 0830		Discussion and Breakout Considerations
0830 – 1200		Working Groups
Working Lunch and Sharing of Ideas: 1200-1300		
1300 – 1500		Working Group Wrap Up
1500 – 1645		Synthesis of Study Design/Consensus Statement
1645 – 1700		Closing Remarks



Executive Summary

Hyperbaric oxygen therapy (HBOT) is a potent intervention with demonstrated effectiveness in dive-related injuries, soft tissue healing, and carbon monoxide poisoning. The Department of Health and Human Services has not approved HBOT therapy for the treatment of Traumatic Brain Injury (TBI) as a covered condition due to the lack of supporting evidence for clinical efficacy. Side effects from HBOT are rare, especially at the doses of HBOT commonly used in clinical trials for TBI. There is evidence from trials in humans to support that HBOT therapy may improve survival, but not functional outcomes, in acute, severe TBI. There are no high quality clinical trials in humans of HBOT for acute, mild TBI or for subacute or chronic complications from TBI of any severity. It is imperative to scientifically determine if HBOT used in the treatment of TBI improves clinical and functional outcomes, in both acute and chronic scenarios. Large, well-designed clinical trials are recommended to further evaluate HBOT treatment for TBI. There is inadequate support for the use of HBOT in the acute or chronic management of individuals with TBI at this time.

Main Points:

- The clinical evidence remains insufficient to prove effectiveness of HBOT for TBI according to a review of the medical literature.
- Research trials thus far in acute, severe TBI have been inconclusive.
- No scientifically rigorous human research has been published or performed in acute mild or moderate TBI or chronic TBI of any severity.
- Further off-label HBOT of TBI outside of well-designed randomized, controlled trials will not prove efficacy but merely add to the case report/series literature and anecdotes of success.
- Based on current data Military Medicine cannot support, endorse, or encourage HBOT in TBI outside of research studies designed to answer the clinical question(s) at hand.
- Well designed clinical research studies that emanate from animal study, case series, and astute experience are the prudent measure to support wide-spread clinical practice.



Background

Hyperbaric oxygen therapy (HBOT) involves the breathing of 100% oxygen at a pressure 1 - 3 times greater than the atmospheric absolute pressure at sea level (1 atm abs). A typical HBOT clinical treatment uses 2.0 to 3.0 atm abs pressure for 90 to 120 minute durations. The total number of treatments per patient and the time elapsed between treatments varies widely depending on the clinical indication. The use of HBOT for treating dive-related injuries, certain soft tissue conditions and carbon monoxide poisoning is proven through rigorous clinical research. The Department of Health and Human Services (DHHS) has not approved HBOT for the treatment of Traumatic Brain Injury (TBI) as a covered condition due to the lack of supporting clinical research. Some advocate the use of lower treatment pressures for TBI to reduce the potential for adverse events.

The intent of HBOT is to increase the oxygenation of the blood and tissues of the patient. The use of HBOT in treating TBI is based on the theory that marginal brain cells around the destroyed areas of the brain may potentially be revived. Improving oxygen availability to these cells may stimulate them to function normally ultimately resulting in neurologic improvement. In addition to restoring proper cellular function, HBOT may reduce brain swelling. The benefits of treatment may diminish the greater the time from injury to treatment. Side effects from HBOT are uncommon and severe or permanent complications are rare, especially at the doses of HBOT used "off-label" for TBI patients (approximately 1.5 atm abs for 60 minutes), compared to HBOT for DHHS covered indications (2 to 2.4 atm abs for 120 to 90 minutes). Clinical support for using HBOT for neurological conditions is primarily based on a large volume of anecdotal case data (Level of Evidence Class III and IV). There is evidence from randomized trials to support that HBOT may improve survival but not functional outcomes in acute, severe TBI. There are no randomized clinical trials of HBOT for subacute or chronic complications from TBI. Consequently, it is imperative to scientifically determine the clinical efficacy of HBOT in the treatment of TBI using clearly defined clinical and functional outcomes, in both the acute and chronic TBI patients.

TBI is a significant and substantial worldwide cause of morbidity and mortality, primarily from vehicular crashes, falls, and assaults, so a determination will not only affect use of HBOT within the Department of Defense but also the standard of care by which TBI is treated in civilian clinical settings. Thus any study proposed and undertaken must be performed in an objective, transparent manner. Development of a research protocol to evaluate the effectiveness of HBOT in patients with TBI requires a multidisciplinary approach including trauma experts, neurosurgeons, neurologists, physiatrists, neuropsychologists, mental health specialists, study design individuals, statisticians, and hyperbaric medicine specialists.



Animal Research:

A systemic review of animal research supports the role of HBOT for acute or chronic acquired (cryogenic) TBI.⁴ Hyperbaric oxygen significantly reduces brain swelling acutely and has also been shown to enhance spatial learning and task following. These effects have also been demonstrated with chronic moderate-severe traumatic brain injury. No HBOT research in mild TBI or post-concussive syndrome is available.

Human Research:

The four systematic reviews of the human research of HBOT for TBI¹⁻⁴ identified 23 papers published between 1972 and 2001; however, only 4 were randomized studies (representing 382 patients, 199 receiving HBOT and 183 controls) that met selection criteria for scientific evaluation. In these 4 unique trials, HBOT consisted of 100% oxygen therapy delivered in a chamber at 1.5-3.5 atm abs for 30-120 minutes (total doses ranged from 10.5 to 40 treatments). In these trials, HBOT with standard intensive neurological care was compared to standard intensive neurological care alone. All trials involved treatment of acute, severe TBI. Overall study quality was assessed as low. Primary outcome measures available for review included proportion of subjects with good functional outcome and proportion of subjects dying. There was a non-significant trend towards favorable outcomes (full recovery or return to activities of daily living up to 1.5 years post-injury). Three trials (327 patients) showed a significant reduction in risk of dying (mortality) with a 'number needed to treat' of 7 (must treat 7 patients to avoid 1 extra death). There was no reduction in coma persistence or duration (1 study) thereby suggesting the clinical need for functional and ecological outcome measures in future HBOT research. Overall, the incidence of adverse events reported among the 186 patients (4 studies) treated with HBOT for TBI was 11.3% but none resulted in permanent complications. Several papers regarding HBOT were published after the systematic reviews were completed; however, each has significant limitations that preclude an immediate change in clinical practice.

Clinical research informs clinical practice standards. Expert opinion and observation together with case studies may be combined with pertinent animal research to provide guidance for appropriate clinical study and randomized controlled trial design. Proof of efficacy of a clinical therapy requires deliberate methodology and demonstration of phase I to III evidence. Phased human trials are essential. Proof of efficacy has to be demonstrated in a time-honored deliberate methodology. Essential core concepts of clinical trials methodology include: randomization, double-blinding, and placebo control or sham control. It is ethical to provide placebo and sham treatment in situations where the magnitude of the treatment effect is unknown and is of likely clinical beneficence (clinical equipoise). Conversely, if it is ethical to conduct a placebo-controlled, double-blinded randomized clinical trial, then it is equally justifiable to avoid prescription of a



treatment with an unproven efficacy. Moreover, further use of that same treatment outside of clinical trials does not advance the body of knowledge for care standards.

Conclusions:

Hyperbaric oxygen therapy is a potent intervention with demonstrated efficacy in dive-related injuries, soft tissue healing, and carbon monoxide poisoning. Research trials in humans with acute, severe TBI are inconclusive with regard to clinical efficacy. No scientifically rigorous research has been published in acute mild or moderate TBI or chronic TBI of any severity. There is inadequate clinical evidence for the use of HBOT in acute or chronic management of individuals with TBI at this time. Large, multi-center clinical trails that are randomized, sham controlled and double-blind are necessary to determine if HBOT has clinical efficacy in the management of acute or chronic TBI.

Systematic Reviews:

- 1- Agency for Healthcare Quality and Research: Hyperbaric Oxygen Therapy for Brain Injury, Cerebral Palsy, and Stroke: Summary. Evidence Report/Technology Assessment: Number 85, 2003.
- 2- Bennett MH, Trytko B, Jonker B. Hyperbaric oxygen therapy for the adjunctive treatment of traumatic brain injury. Cochrane Database of Systematic Reviews 2004, Issue 4, Art. No.: CD004609. DOL: 10.1002/14651858.CD004609.pub2.
- 3- ECRI Health Technology Information Service: Hyperbaric Oxygen Therapy for Traumatic Brain Injury. Short Health Care Technology Assessment (CLIN 1001) 2006.
- 4- Rockswold S, Rockswold G, Defillo A; Hyperbaric Oxygen in Traumatic Brain Injury. *Neurol Res* 2007;29 (2):162-172.

The Honorable Donald C. Winter



Donald C. Winter is the 74th Secretary of the Navy, sworn into office on Jan. 3, 2006. As Secretary of the Navy, Dr. Winter leads America's Navy and Marine Corps Team and is responsible for an annual budget in excess of \$125 billion and almost 900,000 people.

Prior to joining the administration of President George W. Bush, Dr. Winter served as a corporate vice president and president of Northrop Grumman's Mission Systems sector. In that position he oversaw operation of the business and its 18,000 employees, providing information technology systems and services; systems engineering and analysis; systems development and integration; scientific, engineering, and technical services; and enterprise management services. Dr. Winter also served on the company's corporate policy council.

Previously, Dr. Winter served as president and CEO of TRW Systems; vice president and deputy general manager for group development of TRW's Space & Electronics business; and vice president and general manager of the defense systems division of TRW. From 1980 to 1982, he was with the Defense Advanced Research Projects Agency as program manager for space acquisition, tracking, and pointing programs.

The Secretary of the Navy is responsible for all the affairs of the Department of the Navy, including recruiting, organizing, supplying, equipping, training, mobilizing, and demobilizing. The Secretary also oversees the construction, outfitting, and repair of naval ships, equipment and facilities. The office is also responsible for the formulation and implementation of naval policies and programs that are consistent with the national security policies and objectives established by the President and the Secretary of Defense. The Department of the Navy consists of two uniformed Services: the United States Navy and the United States Marine Corps.

Dr. Winter earned a bachelor's degree (with highest distinction) in physics from the University of Rochester in 1969. He received a master's degree and a doctorate in physics from the University of Michigan in 1970 and 1972, respectively. He is a 1979 graduate of the USC Management Policy Institute, a 1987 graduate of the UCLA Executive Program, and a 1991 graduate of the Harvard University Program for Senior Executives in National and International Security. In 2002, he was elected a member of the National Academy of Engineering.

Brigadier General Loree K. Sutton, M.D.

DIRECTOR, DEFENSE CENTERS OF EXCELLENCE FOR PSYCHOLOGICAL HEALTH (PH) AND TRAUMATIC BRAIN INJURY (TBI)

Brigadier General Loree K. Sutton is a Warrior and Psychiatrist. She currently serves as Special Assistant to the Assistant Secretary of Defense (Health Affairs) and as Director, Defense Centers of Excellence (DCoE) for Psychological Health and Traumatic Brain Injury.

Prior to this assignment, Brigadier General Sutton served in a variety of leadership, policy and operational roles, including: Commander, Carl R. Darnall Army Medical Center at Fort Hood, Texas; Command Surgeon, U.S. Army Forces Command (FORSCOM); Commander, DeWitt Army Community Hospital/Health Care Network; Deputy Commander for Clinical Services, General Leonard Wood Army Community Hospital; Division Surgeon, 4th Infantry Division (Mechanized); Special Assistant to the Surgeon General, Lieutenant General (Ret) Ronald R. Blanck; White House Fellow and Special Assistant to Office of National Drug Control Program Director, General (Ret) Barry R. McCaffrey, U.S. Army; Assistant Professor of Psychiatry and Disaster Medicine Consultant at the Uniformed Services University of the Health Sciences (USUHS); Chief of Inpatient Psychiatry at William Beaumont Medical Center; Division Psychiatrist, 1st Armored Division, including deployment from Germany to Operations Desert Shield/Storm; and Mental Health Officer with 3rd Battalion, 9th Infantry Regiment Task Force, Multinational Force and Observers, Sinai, Egypt.

Brigadier General Sutton has received numerous awards to include; the Legion of Merit, Bronze Star Medal, Defense Meritorious Service Medal, and the Order of Military Medical Merit. She has earned the Expert Field Medical Badge, the German Armed Forces Efficiency Training Badge (Silver), and is authorized to wear the U.S. Army 9th Infantry Regiment Manchu Warrior Belt Buckle. Other honors include the Colonel Robert Skelton Award as the outstanding officer in residency training at Letterman Army Medical Center and the Sandoz Award as the outstanding graduate medical student at Loma Linda University in the field of Psychiatry.

Sonja V. Batten, Ph.D.

ACTING DEPUTY DIRECTOR, DEFENSE CENTERS OF EXCELLENCE FOR PSYCHOLOGICAL HEALTH (PH) AND TRAUMATIC BRAIN INJURY (TBI)

Dr. Batten is a clinical psychologist and brings to the DCoE extensive experience in traumatic stress, post deployment psychological health, sexual trauma, and women's health. Prior to joining the DCoE, Dr. Batten coordinated the Trauma Recovery Programs (including the Returning Veterans Outreach Education and Care program) for the VA Maryland Health Care System (VAMHCS). She has also served as an Assistant Professor of Psychiatry at the University of Maryland School of Medicine; Associate Director for Women's Health Research at Yale; and Associate Research Scientist in the Yale University School of Medicine's Department of Psychiatry. Dr. Batten completed a National Institute of Mental Health (NIMH) sponsored postdoctoral fellowship in traumatic stress at the VA's National Center for PTSD, training in both the Behavioral Science Division and the Women's Health Sciences Division in Boston, MA. Dr. Batten received her doctorate from the University of Nevada, Reno, where she received multiple fellowship and dissertation awards. For her undergraduate training, she attended the University of Georgia and graduated first in her class. Dr. Batten has received multiple professional honors and has been recognized for her contributions to the VA Health Care system. She serves on the editorial board of the Journal of Traumatic Stress and Psychological Services. Dr. Batten's work has appeared in 30 publications in the United States and internationally.

Colonel Christopher Williams, D.O., M.P.H.

SENIOR EXECUTIVE DIRECTOR FOR TRAUMATIC BRAIN INJURY, DEFENSE CENTERS OF EXCELLENCE FOR TRAUMATIC BRAIN INJURY (TBI)

Colonel (Doctor) Christopher S. Williams is a neurologist, clinical neurophysiologist and epileptologist who brings extensive clinical, operational, and leadership experience to DCoE. He is a graduate of Southwestern Oklahoma State University with a Bachelor of Science degree in Pharmacy. He received his Doctor of Osteopathic Medicine degree from the Oklahoma State University College of Osteopathic Medicine and completed a Master of Public Health degree at Harvard University School of Public Health. He has completed residencies in Aerospace Medicine and Neurology, and a fellowship in Clinical Neurophysiology (EEG/Epilepsy/Sleep). He is board certified in Neurology, Clinical Neurophysiology (with Added Competency in Epilepsy Monitoring), Aerospace, and Occupational Medicine. He is the current Chief Consultant to the USAF Surgeon General in Aerospace Neurology. He was formerly Commander of the 10th Medical Operations Squadron and Chief of the Medical Staff, 10th Medical Group, USAF Academy, CO; Deputy Chairman, Department of Neurology, Wilford Hall Medical Center, Lackland Air Force Base, Texas; and Consultant in Aerospace Neurology to the Aeromedical Consultation Service, United States Air Force School of Aerospace Medicine. He has recently commanded the 506th Expeditionary Medical Squadron and Joint Freedom Expeditionary Hospital at Kirkuk Regional Air Base, Iraq. He has authored and co-authored numerous publications and received several research awards including the Young Clinical Investigator Award of the Texas Neurological Society in 2001. He is Assistant Professor of Neurology at the Edward Hebert School of Medicine, Uniformed Services University of the Health Sciences.

Paul G. Harch, M.D.

CLINICAL ASSOCIATE PROFESSOR AND DIRECTOR, LOUISIANA STATE UNIVERSITY
SCHOOL OF MEDICINE

Paul G. Harch, M.D. is a 1976 magna cum laude and Phi Beta Kappa graduate of the University of California, Irvine and 1980 graduate of The Johns Hopkins University School of Medicine. He is a diplomate of the Board of Certification in Emergency Medicine and the American Board of Hyperbaric Medicine. Dr. Harch has adapted the concepts of conventional hyperbaric oxygen therapy in shallow perfusion gradient wounds to hypo-metabolic tissue and shallow perfusion gradient wounds in the central nervous system. Beginning with an application of low pressure HBOT to divers with chronic brain decompression illness he extended and refined the protocol to the first HBOT-treated cerebral palsy and autistic children in this country and eventually over 70 different cerebral disorders. He confirmed the human experience in an animal model of chronic traumatic brain injury that was published in Brain Research in October, 2007 (Brain Research, 1174:120-9). This represents the first-ever improvement of chronic brain injury in animals. By invitation he has presented his research three times to the U.S. House of Representatives' Appropriations Subcommittee on Labor, Health, Human Services, and Education and Rep. Dan Burton's Government Oversight Committee. In April, 2004 he was nominated for the NIH Director's Pioneer Award and in April, 2007 published the Oxygen Revolution with co-author Virginia McCullough. This groundbreaking book explains HBOT and its projected revolutionary effects on medicine and neurology.

CAPTAIN Brett B. Hart, M.D.

CHAIRMAN, HYPERBARIC MEDICINE COMMITTEE, NAVAL OPERATIONAL MEDICINE
INSTITUTE

Captain Hart is a clinical anesthesiologist who is an expert in hyperbaric medicine. Captain Hart has published numerous articles related to the treatment and efficacy of hyperbaric medicine. He currently serves as the Chairman of the Hyperbaric Medicine Committee in the Department of Hyperbaric Medicine at the Naval Operational Medicine Institute. Captain Hart also serves as the ECOMS Credentials Review Office and the NOMI Research Coordinator. Captain Hart still serves clinically as the Staff Anesthesiologist at the Naval Hospital in Pensacola Florida and is a Clinical Hyperbaric Medicine instructor at the Naval Undersea Medical Institute. Captain Hart received his Bachelor of Science in Physiology with a minor in Biochemistry from the University of Illinois - Champagne Urbana. He received his Doctor of Medicine from the Uniformed Services University of Health Sciences with a fellowship in Hyperbaric Medicine from Duke University Medical Center.

William W. Orrison, Jr, M.D., M.B.A.

CHIEF OF NEURORADIOLOGY, NEVADA IMAGING CENTERS, LAS VEGAS, NEVADA

Dr. William W. Orrison, Jr., is Director of the Spring Valley Imaging Center that houses the first 3 Tesla MRI units in the state of Nevada. He is also the director of Imaging for AMIGENICS (a company providing advanced medical imaging combined with genetics) and serves as a consultant to HealthHelp Network (a company specializing in radiology quality initiatives). Dr. Orrison is an adjunct Professor at Brigham Young University as well as North Dakota State University, adjunct Professor of Neuroradiology at Touro University Nevada, College of Osteopathic Medicine, and serves on the State of Nevada Board of Regents Health Sciences Center Advisory Committee. Dr. Orrison served as Professor and Chair of the Department of Radiology at the University of Utah School of Medicine from 1996 until 2001, and he completed the Executive MBA program at the University of Utah in 2002. Dr. Orrison is a graduate of the University of Kansas School of Medicine, completed neurology and radiology residencies at the University of Wisconsin, and Neuroradiology fellowships at the University of Wisconsin as well as Ullevål Hospital in Oslo, Norway. Following the completion of his training, he entered the United States Air Force and served as Chair of the Department of Radiology at Keesler Air Force Base in Biloxi, Mississippi. Following completion of his military obligation, Dr. Orrison was the founding president of HealthEdco, one of the world's leading health education companies. He subsequently served as the Director of the New Mexico Institute of Neuroimaging and Professor of Radiology, Associate Professor of Neurology, and Chief of the Division of Neuroradiology at the University of New Mexico School of Medicine and the New Mexico Regional Federal Medical Center in Albuquerque, New Mexico. His primary focus as a clinician and researcher has been the development of advanced neuroimaging technologies as well as special interests in trauma imaging and radiation safety. Dr. Orrison is the author of more than 140 peer reviewed medical publications, six textbooks with translations in three languages as well as numerous book chapters and reviews. He holds radiology-related patents in three countries, and has several patents pending. He serves as a national consultant on radiology quality, and is a reviewer for multiple medical journals including the American Journal of Neuroradiology, Radiology, and the American Journal of Roentgenology. Dr. Orrison is the recipient of a Smithsonian Medal for research in advanced medical imaging, and he has given over 300 invited presentations, nationally and internationally.

John Povlishock, Ph.D.

CHAIR OF ANATOMY AND NEUROBIOLOGY AND CO-DIRECTOR OF THE NEUROSCIENCE CENTER ON THE MEDICAL COLLEGE OF VIRGINIA CAMPUS OF VIRGINIA COMMONWEALTH UNIVERSITY

He serves as Editor-in-Chief of the *Journal of Neurotrauma*, as well as the Director of the Commonwealth Center for the Study of Traumatic Brain Injury. His research focuses on traumatic brain injury, with emphasis on neuroprotection, targeting neuronal, axonal, and vascular change. His work has been reported in over 190 papers, reviews, books, and chapters. For his research accomplishments, he has received two Javits Neuroscience Investigator Awards from the National Institute of Neurological Disorders and Stroke, which also awarded him their Gold Medal for Brain Injury Research. He has also received the Caveness Award from the National Head Injury Foundation, the Brain Trauma Lecture Award from the Joint Congress of Neurological Surgery and the Bass Lecturer Award from the Society of Neurological Surgeons. In 2006, Dr. Povlishock was the recipient of the Commonwealth of Virginia's Outstanding Scientist Award. He currently serves on the National Advisory Neurological Disorders and Stroke Council of the National Institutes of Health.

Gaylan L. Rockswold, M.D., Ph.D.

MEDICAL DIRECTOR, TRAUMATIC BRAIN INJURY CENTER, HENNEPIN COUNTY MEDICAL CENTER, MINNEAPOLIS, MN

Gaylan Rockswold is a Phi Beta Kappa graduate of St. Olaf College and a graduate of the University of Minnesota Medical School where he obtained a Doctor of Medicine degree and pursued residency in Neurosurgery. Dr. Rockswold also received a Ph.D. in Neurosurgery from the University of Minnesota. Dr. Rockswold currently serves as the Medical Director of the Traumatic Brain Injury Center at the Hennepin County Medical Center in Minneapolis, MN and also is a Vice President of the Minneapolis Medical Research Foundation. Dr. Rockswold's extensive research experience in hyperbaric oxygen in traumatic brain injury includes over 30 published works and has lead four large funded researches in the hyperbaric oxygen in traumatic brain injury field. His research topics includes; "Evaluation of Hyperbaric Oxygen in Head Injury"; "Hyperbaric and Normobaric Oxygen in Severe Brain Injury"; "Low Molecular Weight Heparin in Acute Head Injury"; "Hyperbaric and Normobaric Oxygen in Severe Brain Injury". Dr. Rockswold has received numerous awards to include; the Special Recognition Award and Robert L. Karol Care Beyond Expectations Award by the Brain Injury Association of Minnesota; and the Annual Recognition Award by the Minnesota Head Injury Association for his work in this field.

LTC Michael L. Russell, Ph.D.

NEUROPSYCHOLOGY CONSULTANT, US ARMY MEDICAL DEPARTMENT

Now in his 22nd year of active duty service, Dr. Russell is a graduate of the University of Washington and Washington State University, with a Doctorate in Clinical Psychology. He was the graduate of the first fellowship class in Clinical Neuropsychology, Walter Reed, and went on to found the Neuropsychology Fellowship Program at Tripler Army Medical Center, Hawaii, where he won the distinguished "Outstanding Faculty" award for 1996. At Tripler, LTC Russell pioneered WADA testing, awake craniotomies, and helped fuel advances in interventional neuroradiology. LTC Russell has served as the Chief of Psychology at many of the Army Medical Department's largest posts and Medical Centers, to include Fort Hood, Fort Bragg and Fort Bliss. He has served as Deputy TRADOC Surgeon, and overseas in Iraq and Bosnia. He is the former Commanding Officer of the 47th Combat Support Hospital, the only Clinical Psychologist to have commanded a CSH

Lindell Weaver, M.D., FACP, FCCP, FCCM

DIRECTOR, HYPERBARIC MEDICINE, LDS HOSPITAL SALT LAKE CITY UTAH

Dr. Weaver was the past-president of the Undersea and Hyperbaric Medical Society and is currently Director, Hyperbaric Medicine, at LDS Hospital, Salt Lake City, and Intermountain Medical Center, Murray, Utah. He holds a tenure track appointment as Professor with the Department of Medicine at the University of Utah, School of Medicine. His interest in hyperbaric medicine began when he was a diving medical officer in the US Navy in the early 1980's. After leaving the Navy, he trained in Internal Medicine, followed by a fellowship in Pulmonary/Critical Care. Dr. Weaver served as co-director of the Shock, Trauma, and Respiratory ICU at LDS Hospital for 20 years. Dr. Weaver's research activities include caring for critically ill patients treated with hyperbaric oxygen and gas exchange during hyperbaric oxygen and carbon monoxide poisoning. Dr. Weaver's research experience includes serving as the principal investigator of a double blind trial of hyperbaric oxygen for acute carbon monoxide poisoning, published in the New England Journal of Medicine in 2002. Ongoing, he is conducting another randomized trial in acute carbon monoxide poisoning comparing outcomes of patients treated with two different hyperbaric oxygen regimes, as well as a prospective, feasibility trial of hyperbaric oxygen of patients with chronic brain injury.

George Wolf, M.D.

STAFF HYPERBARIC MEDICINE PHYSICIAN, SAN ANTONIO MILITARY MEDICAL CENTER

Dr. George Wolf currently oversees hyperbaric medicine treatments and wound care for DoD and VA beneficiaries, instructs for numerous professional training programs, and develops research efforts regarding hyperbaric medicine uses. He retired with 23 years from the USAF in 2000 with his final assignment as Chief, Davis Hyperbaric Laboratory at Brooks AFB, TX. He served twice as the Consultant to the USAF Surgeon General for Clinical Hyperbaric Medicine. Dr. Wolf then was Staff Physician at the Wound Care and Hyperbaric Medicine Center, Nix Hospital, San Antonio Texas until his current position in Mar 2007. Dr. Wolf has a strong research background, is a chapter author in the text Wound Care Practice and holds two patents.

CAPTAIN Andy Woods, M.D.

BUREAU OF NAVAL MEDICINE (BUMED) SPECIALTY ADVISOR OF UNDERSEA MEDICINE AND RADIATION HEALTH AND BUMED DIRECTOR FOR OPERATIONAL MEDICINE

Prior to his assignment at BUMED he worked full time managing brain injury patients and performing electrodiagnostic exams while assigned to Naval Medical Center San Diego. He has served with distinction as the force medical officer for Naval Special Warfare Command in Coronado, CA and has served as the chairman of both the medical credentials committee and the executive committee of the medical staff at Naval Medical Clinic Pearl Harbor, where he worked as a Clinic Director and Director for Clinical Services. Additional assignments include Medical Department Head aboard destroyer tender USS Puget Sound AD 38, Medical Department Head at Submarine Squadron Seven, Pearl Harbor and Senior Medical Officer at Naval Hospital Great Lakes Branch Clinic Recruit Training Command. Captain Woods has published in Archives of Physical Medicine and Rehabilitation on hypoxic brain injury and neuroimaging using SPEC scanning. He has studied and lectured on decompression related spinal cord injury in Miskito Indian commercial lobster harvesters. He represents BUMED as the authority for authorization of all non diving related clinical hyperbaric treatment. Captain Woods earned a BA in Biology with minors in math and geology from the University of Tennessee in Knoxville. He earned a Master Degree in Biological Oceanography from Texas A&M University. He earned his medical degree at the University of Texas Medical Branch in Galveston, Texas. He is a fellow of the American Academy of Physical Medicine and Rehabilitation and a fellow of the American Association of Neuromuscular and Electrodiagnostic Medicine.

Conference Steering Committee



COLONEL Robert Labutta, M.D., USA, Co-Chairman

COLONEL Christopher S. Williams, D.O., M.P.H., USAF, Co-Chairman

CAPTAIN Andy Woods, M.D., USN, Co-Chairman

Laurie Gesell, M.D., President, Undersea Hyperbaric Medical Society

David Cifu, M.D.

Wayman Cheatham, M.D.

CAPTAIN Bruce Cohen, M.D., USN

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David F. Moore, M.D., Ph.D.

CAPTAIN Mark Olesen, M.D., USN

Lindell Weaver, M.D.

George Wolf, M.D.

Working Group Assignments



Evaluation Form



DCoE Hyperbaric Oxygen Therapy Conference Evaluation Form

We value your feedback. Please complete and return this form before leaving the Conference. We will be collecting it after the end of day two on 6 December 2008.

Name (optional): _____ Position: _____

Please answer the following questions about your experience at the Summit. Your responses will remain confidential. SA=Strongly Agree, A=Agree, D=Disagree, SD=Strongly Disagree	SA	A	D	SD
1. The Conference achieved its objectives to:				
a. Facilitate collaboration and communication				
b. Provide an update on conference progress				
c. The Conference was well paced				
d. Assist the Steering Committee and the HBOT community in strategic planning for the HBOT study				
2. The content of the Conference sessions was appropriate.				
3. The working group sessions were productive.				
4. The facilitators were capable.				
5. The Conference was well organized.				
6. The Conference materials were satisfactory.				

9. What do you feel were the least valuable aspects of the Conference?

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10. What other comments do you have regarding the Conference?

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