

Presidents of AsMA Constituent Organizations

AMDA Elects Bettes

Thomas Bettes, M.D., MPH, is the newly elected president of the Airlines Medical Directors Association (AMDA). Working at American Airlines' own in-house medical department since 1993, Dr. Bettes now serves as the Corporate Medical Director for that airline. His duties include responsibility for supervision of 70 employees, including setting the departmental Goals and Objectives consistent with those of the Senior VP of Human



Resources. He is also responsible for maintaining Service Level Agreements as directed by other operating departments; and responsible for planning, forecasting, and managing departmental budget. Those duties include vendor management and oversight, including those responsible for on-site Employee treatment facilities. In addition to his duties at American, Dr. Bettes is Clinical Associate Professor, Occupational Medicine / Environmental Health, University of Texas Health Center; Tyler, TX.

He received his medical degree from the Univ of Texas Medical Branch in 1982 and completed his Master of Public Health degree at the University of Oklahoma Health Sciences Center in 1992. He is board certified in Family Medicine and in Occupational and Environmental Medicine. Prior to joining American Airlines, Dr. Bettes was in the practice of Emergency Medicine in several locations in the western United States.

He has presented at many AsMA meetings including "Relationship between CogScreen-AE and Regional Airline Pilot Training Outcomes" and "A Disease Management Project Utilizing Telemetric Monitoring of Blood Pressure in Commercial Pilots," both at the 78th Scientific Meeting, 2007, New Orleans, LA. He also recently authored "Prospective, randomized trial of the effectiveness and retention of 30-min layperson training for cardiopulmonary resuscitation and automated external defibrillators: The American Airlines Study" (Resuscitation 2007; 74: 276-85).

Dr. Bettes is a member of the American Academy of Family Practice, American College of Occupational & Environmental Medicine, and the Aerospace Medical Association.

White to Lead AsPS

Lt. Col. Donald J. White, USAF, BSC, is the incoming president of the Aerospace Physiology Society. Lt. Col White currently serves as the Chief of Human Factors and Operational Safety and Deputy Chief of Safety Issues Division, Headquarters United States Air Force at the Pentagon. He is also an adjunct faculty member to the U.S. Air Force School of Aerospace Medicine, and is a military high-altitude, low-opening parachute jumpmaster with more than 3,000

military parachute jumps. Lt. Col. White holds an M.A. in Physiology from Kent State University and B.S. in Physiology from Frostburg State University. Lt. Col. White has been formally involved with safety and mishap prevention as an aerospace physiologist for over 20 years. As Director of Human Factors Investigation and Analysis at the Headquarters Air Force Safety Center at Kirtland Air Force Base, Col. White directed and executed all human factors and human performance functions of the Center for prevention and investigation of mishaps and events. He was responsible for identification



of hazards and risk and for developing intervention and risk mitigation programs for all Air Force human performance and human factors issues and has investigated 20 mishaps or events. In 2002, he developed a more robust identification and risk analysis process within the

USAF Human Factors Taxonomy, demonstrating that the USAF Taxonomy could be incorporated into a system that increased the scope of human factors investigations to include a critical look at both active and latent human error.

He was the recipient of the Harry G. Mosley Award for 2005 and was recognized for his contributions to USAF and NASA flight safety. He revolutionized the USAF safety mishaps analysis system, which made the USAF methodology compatible with that of the U.S. Navy. In 2003, Lt. Col. White was handpicked by the USAF Chief of Safety to participate in the NASA Columbia Accident Investigation Board, where he was recognized for his outstanding contributions. His service as an investigator was instrumental in crafting recommendations to improve the safety and effectiveness of NASA and ensure the future success of America's manned spaceflight program.

Lt. Col. White has written articles for Flying Safety and has made numerous presentations about acceleration, spatial disorientation, human factors, and human performance at the Aerospace Medical Association's Annual Scientific Meeting. He recently became active in the Defense Safety Oversight Council of the Aviation Safety Improvement Task Force, which aims to reduce military mishaps by 50%.

Ercoline Is New LSBEP President

William R. Ercoline, Lt. Col., USAF(ret), is the new President of the Life Sciences and Biomedical Engineering Branch of AsMA. Bill currently manages all operations for Wyle in the San Antonio, TX area, and provides direction to the technical support work for the Air Force Research Laboratory Advanced Life Support Technology Research Contract, Human Effectiveness Directorate, Biosciences and Protection Division, Biobehavioral Performance Branch, Brooks

City-Base, TX. He consults with USAF accident investigation boards, lectures at the USAF School of Aerospace Medicine, and provides subject matter expertise to aircraft cockpit working groups on issues related to human factors, flight symbology design, and life support equipment integration.

A native of Charleroi, PA, Bill received his B.A. in Physics from California



University of Pennsylvania in 1967. He received his Master's degree in Engineering Physics from the Air Force Institute of Technology, Wright-Patterson AFB, OH. He has been involved with spatial disorientation issues since his flying

days with the USAF in the early 1970s. He served on active duty from 1967-88 and has over 4,000 flight hours in a variety of military and general aviation aircraft, including a combat tour in Southeast Asia. He also has more than 25 years of research experience in the area of human factors as it pertains to flight performance and spatial disorientation countermeasures.

He has published many articles about the costs, causes, and countermeasures of spatial disorientation, and he co-edited and co-authored the only spatial disorientation chapter in aviation text of its kind. He lectures internationally on the subject of spatial disorientation, and serves on multi-service working groups and international parties specializing in aircrew performance. He has provided laser eye protection research support for the directed energy field assessment program, and he has received numerous awards and recognitions for his contributions toward improved flight safety and aircrew performance.

Bill has been an active member of AsMA since 1985. He has received the AsMA's 2001 Sidney D. Leverett Environmental Science Award and the 2003 Kent K. Gillingham Award.

Young Leads ASAMS

Col. Paul A. Young, USAF, MC, is the newly installed president of the American Society of Aerospace Medicine Specialists. Col. Young was recently assigned as HQ USAF's Chief of Aerospace Medicine.

He earned his M.D. degree from the University of North Carolina at Chapel Hill in May 1987. Dr. Young underwent residency training in General Surgery from 1987 - 1989 at the University of Medicine and Dentistry of Newark, NJ. Through 1990 he worked as a Fellow-Resident in Thoracic and Cardiovascular Surgery at Beth Israel Medical Center, NJ. He also worked as an ER Staff Physician in Bridgetown, NJ, for that time period.

In September 1990 Col. Young attended the Flight Surgeon's Aerospace Medicine Primary Course at Brooks AFB, TX. Initially stationed at Shaw AFB, SC, he was Interim Chief of Aerospace Medicine during

See YOUNG, p. 642.

YOUNG, from p. 641.

Operation Desert Storm and Desert Shield. While working at Shaw until November 1993 he served one tour as the Flight Medicine Chief and Deputy for the AOR Medical Commander at Dhahran, Saudi Arabia, in support of Operation SOUTHERN WATCH. From November 1993 through June 1996, Dr.



Young was assigned as the flight surgeon for the USAF Weapons School at Nellis AFB, NV.

He entered the Residency in Aerospace Medicine (RAM) in August 1996 and matriculated from the Masters of Public Health Program at the University of Texas Health Science Center at San Antonio. Upon completion of the RAM in June 1999, he was assigned to Aviano Air Base, Italy, as Chief, Aerospace Medicine and 31 AMDS Commander until May 2002. Col. Young received his second squadron command at Kadena Air Base, Okinawa, from June 2002 through July 2004. He then went on to serve 20 months as an Active Duty and Reserve Component Team Chief, Inspector and Consultant with the AF Inspection Agency located at Kirtland AFB, NM, while also taking on the role as the AF's main Physician Liaison to the Joint Commission on Accreditation of Healthcare Organizations and DOD Armed Forces Retirement Homes.

As a Chief/Command Flight Surgeon, Col. Young has accumulated over 1200 hours of flight time in over 50 different airframes and has logged over 650 sorties. Of those flights, many were in combat or combat support roles.

Dr. Young is a Diplomat of the American Board of Preventive Medicine, with specialization in Aerospace and Occupational Medicine. He also is recognized as an Associate Fellow of the Aerospace Medical Association and is a senior member and Board Officer of several medical international counsels and boards. In 2001, he was the recipient of the Society of USAF Flight Surgeon's Howard R. Unger Literary Award.

Among his military award and decorations, Col. Young holds the Air Force Meritorious Service Medal with three oak leaf clusters, Air Force Aerial Achievement Medal, Air Force Achievement Medal with one oak leaf cluster, National Defense Service Medal with bronze star device, Southwest Asia Service Medal with bronze star device, Global War on Terrorism Service Medal, and the NATO medal.

Wyman to Head USAF Flight Surgeons

Col. Daniel O. Wyman, USAF, MC, is the incoming 2008-09 president of the Society of U.S. Air Force Flight Surgeons. Col. Wyman is the Command Surgeon, Headquarters Pacific Air Forces, Hickam AFB, Hawaii. Colonel Wyman also serves as the 13 AF Surgeon. Prior to this assignment, from August 2003 – June 2006, he served as Command Surgeon, Headquarters Air Force Special Operations Command, Hurlburt Field, FL.

Col. Wyman is the senior medical advisor to the Commander, Pacific Air Forces. He is responsible for 9 Medical Treatment Facilities, 3,400 personnel, and a budget of \$890 million in supplies, equipment, and facilities. Col. Wyman exercises operational control of Aeromedical Evacuation in support of Tri-Service medical operations. As the USAF SC's representative in the Pacific theater, he interfaces with other services and medical representatives of foreign governments.

Dan attended the U.S. Air Force Academy in Colorado where he received his Bachelor of Science degree in 1981. He went on to attend the University of Nevada School of Medicine,



Reno, NV, and received his Medical Doctorate in 1985. His residency in family practice was performed at David Grant USAF Medical Center, Travis Air Force Base, CA. In 1994 he completed his Residency in Aerospace Medicine and Occupational Medicine, USAF

School of Aerospace Medicine, Brooks Air Force Base, TX. Col. Wyman is board certified in Family Practice, Aerospace Medicine, and Occupational Medicine and holds a Master's degree in Public Health from the University of Texas School of Public Health in San Antonio, TX.

Colonel Wyman is a Chief Flight Surgeon with more than 750 flying hours. His awards and decorations include the Legion of Merit, the Air Force Meritorious Service Medal with three oak leaf clusters, and the Air Force Commendation Medal.

He is a member of many professional organizations including the American Academy of Family Practice, Uniformed Services Academy of Family Practice, Society of U.S. Air Force Flight Surgeons, American Academy of Preventive Medicine, American College of Physician Executives, and is a Past President of the Associate Fellows Group of the Aerospace Medical Association.

Bopp Heads SMA

Eugenia Bopp, M.D., is the incoming president of the Space Medicine Association. Genie Bopp has been a member of AsMA since 1997. She served as the Treasurer of the Space Medicine Association for 3 years from 2004-2006, and the President Elect for 2007. She is the Program Chair for the Associate Fellows Group, and served on the AsMA Resolutions committee in 2005 and 2006. She is a member of the Scientific Program Committee and served on the committee 2005-2007.

She began work in Space Medicine when she joined Krug (now Wyle) Life Sciences at NASA JSC in the Space Station Science Office in 1987, planning the Space Station Freedom experimental laboratory complement of hardware and analytical capabilities as well as the crew health care requirements. In 1988 she became the Flight Experiments Mission Manager for biomedical experiments on NASA Space Shuttle missions, coordinating flight integration, Orbiter interface, hardware certification, crew training, data collection, launch and landing support, and postflight mission reporting.

She was the coordinator of the JSC Crew

Health Team for the Extended Duration Orbiter refit of the Space Shuttles for missions longer than 10 days. And she was the contractor Project Manager for the Extended Duration Medical Project. In 1994, she became the Deputy Manager for Medical Sciences Flight Projects and was responsible for the start up of crew training and the integration of life science experiments into the Shuttle Mir program in Russia.



From 1996 to 2003 she served as the Manager of Space Medicine for Wyle Laboratories, supporting NASA space medicine and health care systems including mission support, crew and flight controller

training, systems and logistics, behavioral health and performance, astronaut health and physical training, epidemiology, advanced technology development, Russian and contingency medical services, international mission support, and the clinical laboratory. In this capacity she managed a team of over 150 space medicine professionals.

In 2003 she became the Manager of the Crew Health and Research Department on the Life Sciences Bioastronautics Contract at JSC. The CHR Department includes space medicine, medical operations, spaceflight physiology research, environmental monitoring, and human factors. In 2006 she was named Vice President of Wyle Laboratories, Life Science Group.

She is a graduate of the University of Cincinnati and of the University of Houston Executive Development Program. She received training in Project Management Instruction from Kepner Tregoe and has taught project management to spaceflight team members since 2003.

She is the recipient of several awards including: The NASA Silver Snoopy; NASA Certificates of Achievement for integration work on STS-71, Spacelab-Mir, and STS-65, IML-2, and the Multilateral Medical Operations Panel; Wyle Excellence in Management and Distinguished Service awards; the NASA Space Flight Awareness Award; NASA Public Service Medal; and NASA Group Achievement awards for Crew Transport Vehicle Development and the Shuttle-Mir Integration Team.

Mandel Heads SUSNFS

CAPT Lee R. Mandel, MC, USN, is the newly installed President of the Society of U.S. Naval Flight Surgeons. CAPT Mandel is currently the Force Medical Officer for Commander Naval Air Force, U.S. Atlantic Fleet, Norfolk, VA.

Lee Mandel was born in New York City and is a graduate of Washington and Jefferson College. He received his medical degree from the University of Miami School of Medicine. After completing his Internal Medicine internship and residency at the Medical University of South Carolina Hospitals, he reported to active duty in July 1979.

His first assignment was as staff internist at Naval Region Medical Center Philadelphia,

See MANDEL, p. 643.

MANDEL, from p. 642.

and he was shortly thereafter selected for duty as staff internist at the Office of the Attending Physician, United States Congress. After completing that tour, he was accepted for Naval Flight Surgeon training in



Pensacola and received his Flight Surgeon wings in May 1982. He was assigned as Senior Medical Officer aboard the USS *Saratoga* (CV 60) from July 1982 to July 1984.

After serving as the Assistant Chief of Medicine at Naval Hospital Jacksonville

for 9 months, CAPT Mandel became the first physician ever to be brought back for duty at the United States Congress, where he served from April of 1985 to July of 1986. He next reported to Naval Hospital Bethesda where he headed the General Medicine Division in the Department of Internal Medicine. He also served as Intern Advisor, Transitional Year Program Director, and Command Flight Surgeon. CAPT Mandel left active duty to pursue a career in the private sector in December of 1988.

In his private sector career, CAPT Mandel owned his own internal medicine practice in North Carolina, served as a senior group model HMO physician, and was a physician executive in both Charlotte, NC, and Pittsburgh, PA.

After 9½ years in the private sector, CAPT Mandel returned to active duty with the Navy, being re-commissioned in July of 1998. He entered the Aerospace Residency in Pensacola and served as Chief Resident until completing the program in June 2000. He reported aboard USS *Harry S. Truman* (CVN 75) in July 2000 and served as Senior Medical Officer until detaching in July 2002. During his tenure, he made the ship's maiden deployment and the Medical Department won two consecutive "Blue M's" signifying medical excellence in AIRLANT carriers. He reported to Naval Medical Center Portsmouth in August 2002 to serve as the Associate Director (Medical) for Fleet and Family Medicine. In January 2003, he was tasked to deploy aboard the USS *Bataan* (LHD 5) as OIC of the CRTS-4 detachment in support of Operation Iraqi Freedom. He reported as the Senior Flight Surgeon at Sewells Point Branch Medical Clinic in Norfolk, VA, in July of 2004 and in April 2005 entered his current position as the Force Medical Officer for Commander Naval Air Force, U.S. Atlantic Fleet.

In addition to several medical publications, CAPT Mandel has authored several history publications in medical journals and recently had a history manuscript published in a military history journal.

CAPT Mandel has a Master of Public Health degree from the University of Pittsburgh and he is board certified in Internal Medicine and Aviation Medicine. He is a graduate of the USMC Command and Staff College. His personal awards include a Navy Commendation Medal with two gold stars in lieu of subsequent awards and a Meritorious Service Medal with two gold stars in lieu of subsequent awards.

Bailey Heads AsHFA

Larry Bailey, Ph.D. is the newly installed president of the Aerospace Human Factors Association. Dr. Bailey works at the Federal Aviation Administration (FAA) Civil Aerospace Medical Institute (CAMI), in Oklahoma City, as a Human Factors Research Psychologist for the Aerospace Human Factors Division. Dr. Bailey began his career with the FAA in 1992 and during the early part of his career he served as a principle investigator on a number of team training research projects which: 1) explored the psychological and social factors associated with effective work-group relations with particular emphasis on



perceptions of organizational justice; 2) developed behavioral based training strategies for improving the ability of workgroups to coordinate their individual efforts; and 3) developed criterion measures for assessing team performance outcomes.

Beginning in 2003, Dr. Bailey switched his research from teamwork to safety management, which involved in the following efforts: 1) developing safety metrics; and 2) and assessing the impact of organizational efforts to improve operational safety. Currently Dr. Bailey is a co-principle investigator on a research team that is examining the neurophysiologic effects of cognitive fatigue that occurs through sustained mental work. The research is being conducted in the Air Traffic Control Advance Research Simulator at CAMI. Included in this line of research is the neurophysiologic assessment of cognitive fatigue using data collected from electroencephalography (EEG), eye tracking, and pupil diameter recordings.

Dr. Bailey became a member of AsMA in 1996 and was strongly encouraged by Dr. Carol Manning to join AsHFA that same year. Dr. Bailey has served in the capacity of AsHFA Program Chair and editor of the AsHFA newsletter. Dr. Bailey has also been and continues to be an active member of the AsMA Human Factors Committee and the Scientific Program Committee.

Barber Is Incoming ANS President

Lt. Col. Kimberly L. Barber, USAF, NC, is the incoming president of the Aerospace Nursing Society. She was born in Birmingham, AL, and enrolled in the nursing program at Auburn University in 1977. After completing the prerequisites for nursing, she transferred to the University of AL, Birmingham, School of Nursing and completed her BSN Degree in Nursing in 1982.

Lt. Col. Barber joined the Air Force by direct appointment in 1991, in support of Operation Desert Shield/Desert Storm. She was assigned to the 60th Medical Operations Squadron, David Grant Medical Center as an operating room nurse. Her duties included cardio-thoracic, vascular, orthopedic, and pediatric nurse manager as well as staff development officer.

Lt. Col. Barber transitioned straight from active duty to reserve in 1995, when she joined

the 349th AES, 60th Air Wing (AW), Travis AFB, CA. During her 3-yr tenure, she served as Officer in Charge (OIC) of annual tours and flight planning scheduling over 150 aircrew members for annual tour and effective mission crews as well as Medical Crew Director flying over 80 flights throughout the Pacific. In 1998, she joined the 445th AES at 80th AW, Wright-Patterson AFB, OH, where she was OIC of Aircrew Ground Training, Initial Flight Qualification, and Instructor Flight Nurse for over 22 AE crews.

Lt. Col. Barber joined U.S. Transportation Command, Joint Transportation Reserve Unit, in 2002, was activated in support of Operation Noble Eagle/Enduring Freedom in 2003, and deployed as Deputy Director Joint Patient Movement Requirement Center, Al Udeid, Qatar. Lt. Col. Barber continues to serve in the Global Patient Movement Requirements Center at Scott AFB, IL.

On the civilian side, Lt. Col. Barber has a variety of clinical experiences ranging from emergency/operating room nursing and open heart surgery to various ICU settings. Her vast experiences led her to education where she has worked for the last 8 yr promoting



continuing professional education in hospital settings. Most recently she was the project lead for planning, directing, implementing, and evaluating the instillation of the first internet-based learning management system in her organization (three hospital facilities and

multiply ancillary departments).

She holds accreditation in Basic Life Support, Advanced Cardiac Life Support, and Trauma Nurse Core Course, and is eligible to teach all three courses. She is a member of Ohio's Medical Reserve Corps to support her community's disaster preparedness program, and is on the Ohio Board of Nursing's Education Advisory Committee. She is currently working to complete her dual master's degree, a MBA/MSN with a health care management focus, which she will complete in September 2008.

Bernstein to Lead Army AvMedAssociation

COL Stephen A. Bernstein will be assuming the role of President of the U.S. Army Aviation Medical Association this spring. He grew up in St. Louis, MO, and completed



his undergraduate degree in 1986 at Texas Christian University in Fort Worth, TX, prior to completing his medical school in 1990 at the Uniformed Services University of the Health Sciences in Bethesda, MD. After a transitional internship at Walter Reed, he went

to Germany and Belgium for his first 3-year tour as a GMO/Flight Surgeon—2 years as the Stuttgart area flight doctor and then 1 year at SHAPE with the flight detachment. He com-

See BERNSTEIN, p. 647.

This Month in Aerospace Medicine History-- June 2008

By Walter Dalitsch III, M.D., M.P.H.

Seventy-five Years Ago

Initiating aviation medicine in China. "The Central Government of the Republic of China a year ago undertook the development of a military air force along the most modern lines. To accomplish this the Government sought and obtained the services of a delegation of Americans, under the leadership of Colonel John H. Jouett, for duty as instructors. The members of this delegation were experienced both in flying and in the various ground school subjects. The Chinese cadets were given flying instruction in tee morning periods and class work in the afternoons, while the students in the mechanical branches received instruction and practical experience from the American mechanic chiefs. The training outline was patterned after that of our own Air Corps and, of course, provided for advanced training in pursuit, bombardment, aerial gunnery, photography, etc.

"It was my privilege to instruct a group of Chinese medical men in the duties of the flight surgeon and to provide for the development of a school of Aviation Medicine, leaving the original class to serve as the faculty for the training of subsequent classes...

"I arrived in Shanghai in June, 1932, with enough examining equipment, texts and miscellaneous material to serve until additional equipment could be procured by the Chinese themselves. The members of the class were selected by Dr. J. H. Liu, Director of the Health Bureau, Central Government, Nanking. It was through his efforts that five brilliant young Chinese doctors were detailed for the course of instruction. As each was selected he was sent to me for interview in order that the general nature of the work might be explained. While there was no question concerning the medical training and experience of the applicants, I was anxious that each be deeply interested in aviation and that each be willing to enter this new field of medicine permanently...

"The limitations imposed on actual examining work at this stage were many - one room, one electric light (at times no current), only partial darkness for eye examinations, poor ventilation and plenty of humid heat. A leaky roof put the depth-perception apparatus out of order for a time following an evening shower. No purchasing department had been established and, in the absence of a trial lens set, refractions had to be deferred until a later date. The results of these early examinations were written on impromptu forms and many hours were spent later in transferring and completing them for record purposes. After some weeks, however, the details of military organization were worked out. Plans for the flight surgeon's office were drawn up and its construction begun. Requisition forms became available upon which orders for equipment and supplies were made and later obtained.

"As a considerable number of pilots and cadets were awaiting examination the actual performance of the selective physical examinations was not preceded by a course of lectures. Instead classwork and examinations were carried on concurrently, the students conducting those portions of the examination already more or less familiar to them and gradually

taking over the remaining features as they became acquainted with the technic. This sort of an arrangement made an orderly instruction schedule impossible but in the end the field was satisfactorily covered. What additional value might have come from a more extensive lecture program was more than compensated for, I believe, by the early and continuous practical experience arising out of daily contact with pilot and cadet personnel both in the office and on the flying field...

"In conclusion a few remarks may be in order concerning the future of the air training program particularly as it affects the flight surgeons. As squadrons are fully trained they will become available for duty at various distant stations. The school of aviation medicine will have flight surgeons available for duty with these squadrons as rapidly as they are formed. The central aviation headquarters in Hangchow will have a flight surgeon on duty as chief of the medical section of the air service. The flying field is to be in charge of a chief flight surgeon who will also be the head of the aviation medical school faculty. The remaining flight surgeons will serve as instructors in the school for as many groups of students per year as are necessary to meet the demands for additional flight surgeons" (1).

Fifty Years Ago

Effect of acquired myopia on depth perception (Pacific-Alaska Division, Pan-American World Airways). "Acquired myopia in pilots may be unilateral as well as bilateral. If the associated defective vision is bilateral, optical correction is usually indicated. In a unilateral defect, however, the pilot is unaware of any discrepancy in binocular vision and the tendency is to avoid optical correction. This study was undertaken to review the stereoscopic test findings of pilots who had developed unilateral myopia and to observe the serial changes in their depth perception...

"This study was a review of depth perception findings in five pilots before and after the onset of myopia in one eye. The fellow eye maintained normal vision. The data used were the standard Howard-Dolman findings at the testing distance of 20 feet (6 meters) gleaned from the pilot records of periodic examinations, not necessarily by the same examiner nor under identical conditions. The common denominator was the same pilot, periodically re-examined. The findings included deviations (maxima and minima) and averages of five test determinations. This was expressed in millimeters and also in arc seconds of parallax difference, with an assumed interocular distance of 65 mm...

"Normal depth-perception findings at the near point (Verhoeff stereopter) does not necessarily mean excellent depth perception for distance (6 meters). In general, pilots who showed decreased distant vision due to uncorrected low grade myopia and who possessed normal near vision, still had normal Verhoeff stereopter findings at 1 meter. Sloane and Altman noted that uncorrected myopic persons, who have reduced visual acuity at 6 meters and were normal at 1 to 2 meters, made better scores on the stereopter than when tested at a distance of 6 meters or more. Jonkers found the maximal distance for correct depth judgment, for near, varied from 210 to 90 cm. in 95 per cent of normal binocular subjects. Uncorrected myopic persons of 0.50 to 1.00 D would have clear near vision in this range. Conversely, those with presbyopia would ordinarily be blurred in this intermediate range with or without glasses

and subject to error for depth judgment at this distance, whereas their distant findings may be normal...

"Increasing speeds of high performance aircraft require high degrees of stereoscopic acuity. Maximum stereopsis is dependent on excellent binocular binocular visual acuity, and a decrease of vision in one or both eyes may produce a decrease in stereopsis. The Howard-Dolman findings of five pilots were studied prior to and after the development of unilateral myopia. The findings illustrated that small degrees of unilateral visual loss (20/25 to 20/40) may cause a corresponding decrease in stereoscopic threshold. This was reflected as a one to three-fold loss in threshold of stereopsis based on parallax disparity. Periodic Howard-Dolman tests may reveal early and small decrements of depth perception in pilots who show decreased vision in one eye due to uncorrected acquired myopia. These pilots probably should wear corrective lenses for maximum stereopsis" (2).

Twenty-five Years Ago

Evaluation of a synthesized voice cockpit warning system (Flight Skills Section, RAF Institute of Aviation Medicine, Farnborough, Hampshire, England). "The experiment monitored the use of an experimental central warning system by experienced pilots. The warning system incorporated audio warnings, voice messages, and panel legends. The voice messages were produced by a Votrax synthesizer. Warning responses were assessed during a realistic flying task. Audio warnings produced significantly faster responses than panel legends or voice messages. Voice messages and audio warnings had a greater distracting effect on subjects' responses than panel legends. Workload level did not affect response to either the voice or audio warnings but responses to panel legends did lengthen significantly at high levels of workload. The Votrax voice messages were disliked by the pilots who adopted a strategy of cross-referring to panel legends upon hearing the attention-getting sound which preceded the voice messages because they had difficulty understanding the Votrax messages. The results suggest that Votrax voice messages may only augment the noise level of the flight deck and could effectively be replaced with an attention-getting sound and panel legend, it is also suggested that crew response to synthetic voice messages which can be understood on first presentation will be more positive than their response to Votrax messages" (3).

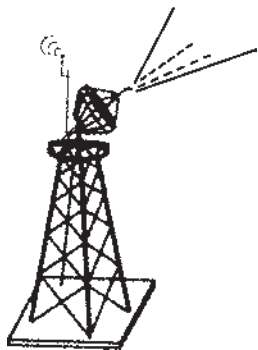
References

- (1) Cooper HJ. Aviation medicine starts in China. *J Aviat Med*, 1933; 4(2):31-38.
- (2) Diamond S. The effect of unilateral acquired myopia on depth perception in airline pilots. *J Aviat Med*, 1958; 29(6):468-74.
- (3) Wheale JL. Evaluation of an experimental central warning system with a synthesized voice component. *Aviat Space Environ Med*, 1983; 54(6):517-23.

ARCHIVAL DVD FOR SALE ! 73 Years of the Aerospace Medicine journal

Members: \$50 / Nonmembers: \$150
Institutions: \$300

Plus S&H: \$5 U.S./\$10 International
Plus 5% VA sales tax (for VA residents only)
www.asma.org or contact Sheryl Kildall:
(703)739-2240, x 107; skildall@asma.org



Science & Technology Watch

Keeping You Informed Of The Latest Advances In Science And Technology

In this edition of the Watch, we present an overview of simple oculometric techniques to gain insight on sleep deprivation, drug intoxications, and identifying neurological disorders and traumatic brain injury.

Ocular Movements for Assessing Brain Function

by Col. Michael Russo, M.D., Tripler Army Medical Center, HI; Maria Thomas, Ph.D., Johns Hopkins University School of Medicine, Baltimore, MD; Carlos Cardillo, M.S., Navigator Development Group, Enterprise, AL; and LT Richard Wacławski, M.D., Marine Air Group 39, Camp Pendleton, CA

The eyes are windows to the brain. This often used expression usually describes the neural information gleaned from evaluation of the optic discs. Recently, ocular movements are also used to reveal information about the complex circuitry of the functioning brain. Without requiring the skill of an optometrist or ophthalmologist, oculomotor measurements are obtained using static (SO) or dynamic oculometers (DO). Static oculometers obtain a brief snapshot of eye movements and provide a comparison to a baseline, usually in less than a minute. DO take repeated measures and compare the most recent measure to baselines and/or immediate prior measures. Oculometers are finding perches on cockpit instrument panels, motor vehicle dashboards, computer monitors, and now even in eyeglass frames, while others are hand-held. Measures are recorded as part of patient evaluations, fitness for duty assessments, and as fatigue and sleepiness monitoring tools.

The measures obtained are used to quantify diffuse neuronal functions. Ocular target selection requires the prefrontal cortical regions to shift through the myriad of visual options and select an appropriate target. Programming for movement towards the target requires the midbrain to calculate the amplitudes and durations of the binocular movements. Executing the eye movements requires coordination among multiple brainstem oculomotor nuclei. Sympathetic activation elevates the eyelids, while sleepiness results in eyelid drooping. Constant communication among the numerous brain regions responsible for eye movements results in an active neural network that may be queried for its functional integrity. Dysfunction resulting from a wide differential of specific conditions, including sleep deprivation, fatigue, neurological illness, or drug use often can be identified.

Saccadic slowing has repeatedly been as-

sociated with sleepiness (1,4,5), alcohol or drug abuse (2), and neurodegenerative disorders. Oculomotor measures have also been associated with cognition and attention (3).

Monitoring alertness and cognitive function during performance of potentially hazardous activities can provide an indicator of readiness and fitness that would likely reduce the risk of injury or operational failure. For application in varied light environments, the characteristics of the pupil light reflex and saccadic movements have been defined under different light conditions (6).

Static oculometry is a well established technique and easily applied, with a single test usually completed in under a minute. An individual is asked to follow a series of static and moving low intensity targets while light-emitting diodes illuminate the eye and capture pupillary and saccadic movements. This technique reduces the influence of the prefrontal brain regions by removing complex decision-making components. Involuntary neural pathways involving midbrain and brainstem pathways are primarily assessed, with the cortical component reduced to a "move" or "no-move" decision. Some SO are handheld with sample rates of 30-60 Hz, while others are desk-mounted with sample rates of up to 1,000 Hz. Higher sample rates capture saccadic movements with greater integrity, e.g., sample rates above 500 Hz are necessary to reproduce the characteristics of saccadic movements. The FIT 2000-3 oculometer (PMI, Inc, Rockville, MD; www.pmi-fit.com) is a field-usable mobile SO, no larger than a shoebox with samples rates up to 1,000 Hz. Static oculometry early found a niche by assessing fitness for duty in high risk professions such as miners and power plant personnel. A baseline is established as an individual's norm, and when changes from that baseline are identified, the individual is further evaluated for potentially high levels of fatigue, sleepiness, or alcohol. The benefits of this technique are that one machine may screen hundreds of individuals for impairment, while the limitations are that the test must be personalized to an individual's own baseline.

Dynamic oculometry is a more complex technique that continuously samples ocular measures, and assesses subtle changes over a period of hours. Used primarily in the monitoring of fatigue and sleepiness, the DO has been integrated into instrument panels and eyeglass frames. The DO illuminates the eye using infrared light. Reflections of the light can indicate closing of the eye, and frequency and velocity of blinks. As high levels of sympathetic activity reflect arousal by elevating the eyelid and dilating the eye, sleepiness is characterized by drooping of the eyelid and diminished pupil diameter. Algorithms combining eyelid opening/closing, frequency, and amplitude of blinks have been applied to detect drowsiness in long-distance truck drivers and train operators. The Optalert system (Sleep Diagnostics Pty Ltd, Melbourne, Australia; www.optalert.com) was the first human-worn operational DO and is widely used, mostly in Australia where trains and trucks travel great distances across non-stimulating terrain. The Optalert system is mounted into eyeglass frames and uses monocular measurements that are mostly immune to ambient light influences. The EyeCom oculometer (EyeCom Corporation, Reno, NV; www.eyecomworld.com) is another example of an eyeglass frame-mounted

system that uses dynamic binocular measures to capture subtle changes in pupil diameter and eyelid closure. The advantages of eyeglass frame-mounted systems are that individuals may wear them continuously. The disadvantage is that one oculometer is required per monitored individual, placing cost-related constraints on application of the technology to high-risk individuals or high-risk situations.

Platform-mounted DO measure primarily blink and eyelid closure characteristics through cameras mounted onto or within an instrument panel or dashboard. These panel-mounted oculometers also project emitted infrared light into the individual's eye and capture reflected light characteristics. Platform-mounted ocular monitoring systems are based at least partly on measuring percent closure of the eyelids. This measure is used in the Driver Fatigue Monitor by Eye Alert, Inc. (Zephyr Cove, NV; www.EyeAlert.com). Advantages of the platform-mounted systems are that they may be transparent to the monitored individual by virtue of being hidden within in an instrument panel. Disadvantages are that they are easily invalidated if the individual wears sunglasses or if bright ambient illumination interferes with ocular capture.

Oculometers are being applied to assessment of patient populations with neurodegenerative disorders. Slowing and fragmenting of eye movements has been qualitatively described in dementing disorders such as Pick's frontotemporal lobar dementia, in multiple sclerosis, and in movement disorders such as corticobasal degeneration and progressive supranuclear palsy. Oculometric technology permits quantitative assessments of ocular dysfunction, and application early in disease course may aid in diagnosis, e.g., by identifying the slowing of vertical saccades in progressive supranuclear palsy. Traumatic brain injury (TBI) may also be accompanied by oculometric dysfunction, with nystagmus and target overshoot. Oculometry as applied to this population would be able to quantify subtle impairment that could be used to identify locations of mild brain injury.

In summary, multiple oculometric measures are being broadly applied for their usefulness in distinguishing sleepiness, fatigue, drug intoxication, and neurodegenerative disorders. Techniques range from brief samples collected by SO in less than 1 minute, to continuous measures collected with DO over many hours. As the understanding of the meaning of these measures continues to increase, as well as the number of companies producing affordable and specialized units, so might their utility towards screening for sleep deprivation and drug intoxications, and identifying neurological disorders and TBI.

ACKNOWLEDGMENTS

The views expressed in this paper are those of the authors and do not reflect the official policy or position of the Department of the Army, Department of Defense, or the U.S. Government.

REFERENCES

1. De Gennaro L, Ferrara M, Urbani L, Bertini M. Oculomotor impairment after 1 night of total sleep deprivation: a dissociation between measures of speed and accuracy. *Clin Neurophysiol* 2000; 111:1771-8.
2. Fant RV, Heishman SJ, Bunker EB, Pickworth WB. Acute and residual effects of

See SCI-TECH WATCH, p. 647.

International Space Station Medical Operations

Jeffrey (Jeff) A. Jones, M.D., Sean Roden, M.D., Josef Schmid, M.D., Steven Hart, M.D., Ed Powers, M.D., Terry Taddeo, M.D., J.D. Polk, D.O., Douglas Hamilton, M.D., Ph.D., and J. Michael Duncan, M.D.

NASA is currently the leader, in conjunction with our Russian counterparts co-leads, of the Multilateral Medical Policy Board (MMPB), which sets medical international space medicine policy, the Multilateral Medical Operations Panel (MMOP), which coordinates medical system support for International Space Station (ISS) crews, and the Multilateral Space Medicine Board (MSMB), which medically certifies all crewmembers for spaceflight on-board the ISS. These three organizations have representatives from NASA, RSA-IMBP (Russian Space Agency-Institute for Biomedical Problems), GCTC (Gagarin Cosmonaut Training Center), ESA (European Space Agency), JAXA (Japanese Space Agency), and CSA (Canadian Space Agency). The policy and strategic coordination of ISS medical operations occurs at this level, and includes interactions with MMOP working groups in Radiation Health, Countermeasures, Extra Vehicular Activity (EVA), Informatics, Environmental Health, Behavioral Health and Performance, Nutrition, Clinical Medicine, Standards, Post-flight Activities and Rehabilitation, and Training.

Each ISS Expedition has a lead Crew Surgeon from NASA and a Russian Crew Surgeon from GCTC assigned to the mission. Day-to-day issues are worked real-time by the flight surgeons and biomedical engineers (also called the Integrated Medical Group) on consoles at the MCC (Mission Control Center) in Houston and the TsUP (Center for Flight

Control) in Moscow/Korolev. In the future, this may also include mission control centers in Europe and Japan when their modules are eventually added onto the ISS. Private medical conferences (PMCs) are conducted regularly and upon crew request with the ISS crew via private audio and video communication links from the biomedical MPSR (multipurpose support room) at MCC Houston. When issues arise in the day-to-day medical support of ISS crews, they are discussed and resolved at the SMOT (space medical operations team) meetings, which occur weekly among the International Partners. Any medical or life science issue that is not resolved at the SMOT can be taken to the Mission Management Team meeting, which occurs biweekly from MCC-Houston. This meeting includes the other International Partners and all flight support and console position representatives via teleconference. ISS Crew Surgeons have handled many medical conditions on orbit, including skin rashes, dental abscesses, lacerations, and ST-T segment EKG changes. Fortunately to date, there have not been any forced medical evacuations from the ISS. This speaks well for the implementation of the primary, secondary, and even tertiary prevention strategies invoked by the Integrated Medical Group, as there were several medical evacuations during the previous Russian space stations.

Assignment for ISS Expedition surgeons usually occurs at the same time as the astronaut crew assignment, which is typically 18-24 months prior to the flight. Training for the Crew Surgeon requires 204 hours of classes, 100 hours of on the job training and qualifications, and over 100 hours of console simulation and real-time mission support. This involves complete knowledge of both

U.S. and Russian medical systems. The Crew Surgeon also participates in the training of his crew in medical operations hardware and procedures. The Crew Surgeon supports any hazardous training of the Expeditionary crew, which includes winter and water survival, vacuum chamber training, and neutral buoyancy EVA training. ISS Expeditions vary in duration from 4-7 months. The crew is then rehabilitated under Crew Surgeon supervision for 45 days after flight. Therefore, the time commitment to the mission for an Expedition assigned ISS Crew Surgeon is quite long, usually 25-33 months.

Launch and landing of ISS crews can be from KSC (Kennedy Space Center), Florida, or Baikonour in Kazakhstan. The Crew Surgeon and Deputy Crew Surgeon travel to the launch and landing site several days prior to the anticipated event to provide support for expected medical issues and for any launch and landing contingencies.

Surgeons support EVAs from either the MCC in Houston, or the TsUP in Moscow, depending upon whether the EVA is conducted in the U.S. spacesuit (Extravehicular Mobility Unit or EMU) or in the Russian Orlan ("eagle" in Russian) spacesuit. The Russians name their suits after birds, as also seen by their launch and entry Sokol ("falcon") suit and their Penguin ("penguin") muscle resistance suit.

There are numerous differences between the U.S. and Russian medical approaches to supporting long-duration spaceflight, but the number and magnitude of those differences has lessened with the experience of the ISS, especially in the area of exercise countermeasures. There have been compromises from both sides in developing an integrated medical support program, and in many ways the MMOP has led the way among the ISS support teams in establishing a multilateral implementation plan built by consensus. Still there are unresolved differences between the U.S. and Russian space medical philosophies. For example, the Russians continue to employ thigh cuffs ("brazelets") to reduce the headward fluid shift during initial entry into microgravity, require the crew to wear the "Penguin" bungee-loading suits while on orbit to offer resistance to the muscles, and use LBNP (lower body negative pressure) as a countermeasure prior to re-entry. The Russians also use a number of herbal or alternative medical prophylactic agents for reducing the physiological re-adaptation effects from microgravity to 1 g. None of these countermeasures are utilized at present by NASA. The Russian onboard diagnostic and medical hardware varies in many ways from the U.S. hardware, although both are now used in an integrated fashion. For example, the Russian ECG hardware requires live data downlink while the vehicle is passing over Russian ground stations, while the U.S. hardware allows storage and forwarding at anytime in the orbit where Ku-band antenna coverage is available. The Russian medical hardware system allows for chemical serum analysis, but only one analyte at a time, while the U.S.

See *SPACE MEDICINE*, p. 647.



ISS EVA SUPPORT--Flight surgeons Jeff Jones (left) and Joe Dervay (right) support an ISS-based EVA from the Blue Flight Control Room at MCC-Houston.

SPACE MEDICINE, from p. 646.

employs a PCBA (portable clinical blood analyzer), which provides a panel of analytes to be run concurrently from a single drop of blood.

As with any multinational effort, politics plays a large role in the daily lives of the MCC flight controllers, especially in regards to program financial matters. The term "balance of contributions" is now well known to all the International Partners and is used at ISS strategic planning meetings to determine prioritization of everything from the flight manifest to crew scheduling of flight activities. Even though English is the official language on the ISS, the Russian segment equipment labels are chiefly in Russian, and the crews speak "Ruglish", a hybridization of English and Russian, depending on which segment of the vehicle they are currently residing in. Some language barriers still do exist, but not nearly as extensively as during the early NASA Phase 1 Program on-board the Mir. Now all transmissions from either MCC to the ISS and back are interpreted real-time and can be monitored on one of the audio loops in the MCC. There are interpreters readily available to allow reliable communication between the MCC and TsUP anytime on Orbits 1 and 2 (day and evening shift, until the crew sleeps). Politics often play significant roles in ISS activities such as crew selection, system training, and flight hardware certification, and will probably eventually be thoroughly discussed in the autobiography of existing or prior ISS program managers. No doubt that it will be interesting reading!

The ISS medical operations organization is committed to the health and safety of the crews who fly on board the space station; and have developed a medical support system which allows high medical standards (primary), medical countermeasures (secondary), and on-board medical care (tertiary) prevention practices to be applied in the great tradition of Aerospace Medicine.

In closing, it is safe to say that working with our International Partners on the ISS has been exceedingly challenging from a professional and operational standpoint. At the same time, it has been very rewarding to know that we have been participants in the world's largest engineering project ever attempted. It is also very gratifying to see a group of nations, all of which have been at war with each other over the past century, now working together in mutual cooperation and synergism towards a peaceful and scientifically enriching endeavor. In a world filled with international strife and violence, it is refreshing to have the opportunity to build something greater than our individual selves, to the benefit of all humankind.

Members, please visit our website: www.asma.org - translation into other languages now available!

Log into the Members Only page, where you can:

- update your address, phone number, and e-mail address
- access the Blue Journal online
- view Association news
- renew your membership
- view the Job Fair and online classifieds -- and much more!

BERNSTEIN, from p. 643.

pleted his first residency in Family Medicine at Fort Bragg from 1994-1996, and then went back to Germany for 3 more years. After spending 1 year at Fort Leavenworth for Command General Staff College, he proceeded to Fort Rucker until entering the Aerospace Medicine Residency from 2003 to 2005. After that, he returned to Fort Rucker to be the Director of the U.S. Army Aeromedical Activity. He is double-boarded in Family Medicine and Aerospace Medicine. Through his 18+ years of service, he has been a medical chief, department chief, flight surgeon, and a commander of three small and medium clinics. Upon return from his current deployment in Honduras, he will assume a position as Director of the Office of Aeromedical Propensity and Consultant to the Surgeon General for Aerospace Medicine.

COL Bernstein has received the Meritorious Service Medal, three Army Commendation Medals, the Army Achievement Medal, and in medical school he received the Joint Service Achievement Medal.

COL Bernstein is an FAA Aviation Medical Examiner (since June 1994), a Fellow of the American Academy of Family Physicians, a Member of the American Medical Association, the American Academy and Uniformed Services Academy of Family Physicians, AMSUS, AUSA, Society of Army Flight Surgeons, and Aerospace Medical Association.

He and his family currently live in Enterprise, AL, outside of Fort Rucker, the home of Army Aviation. His medical interests are vast and include caring for and working with juvenile diabetes, as one of his daughters has the disease. He has helped establish and run support groups overseas, currently volunteers his time to the Southeast Diabetes Education Services and Diabetes Camp as well as being an advisory member for the State of Alabama Department of Public Health for diabetes. Outside of medicine, he is an avid runner, loves most sports/fitness, plays in many, and cheers for the all the St. Louis teams.

Belland Continues as President for IAMFSP

CAPT Kris M. Belland, MC, USN, continues his 2-yr term as President of the International Association of Military Flight Surgeon Pilots. He is currently at Uniformed Services University of Health Sciences, Bethesda, MD, in a masters program. For more on CAPT Belland, see ASEM 2007; 78:637. For more on IAMFSP see the article in the May issue, page 553.

3-Year Membership Available!!!

No dues increases...

No worries about whether you paid this year...

Plus you will save money! For just \$550, you can extend your AsMA membership to 3 years.

For more information, contact Gloria Carter: (703) 739-2240; ext. 106, gcarter@asma.org; or Sheryl Kildall: ext. 107, skildall@asma.org

SCI-TECH WATCH, from p. 645.

marijuana in humans. *Pharmacol Biochem Behav* 1998; 60:777-84.

3. Fukuda K, Stern JA, Brown TB, Russo MB. Cognition, Blinks, Eye-Movements and Pupillary Movements during Performance of a Running Memory Task. *Aviat Space Environ Med* 2005; 76(7(II)):75-85.

4. Rowland LM, Thomas ML, Thorne DR, Sing HC, et al. Oculomotor responses during partial and total sleep deprivation. *Aviat Space Environ Med* 2005; 76(7 Suppl): C104-13.

5. Russo M, Thomas M, Thorne D, Sing H, et al. Oculomotor impairment during chronic partial sleep deprivation. *J Clin Neurophysiol* 2003; 114:723-36.

6. Yu MZ, Kautz MA, Thomas ML, Johnson D, Hotchkiss ER, Russo MB. Operational Implications of Varying Ambient Light Levels and Times of Day Effects on Saccadic Velocity and Pupil Light Reflexes. *Ophthalmol Physiol Optics* 2007; 27:130-41.

The AsMA Science and Technology Committee provides the Watch as a forum to introduce and discuss a variety of topics involving all aspects of civil and military aerospace medicine. Please send your submissions and comments via email to: barry.shender@navy.mil. Watch columns are available at www.asma.org in the AsMA News link under Publications.

MEETINGS CALENDAR 2008

June 22-28, 2008; Angers, France.

Annual Meeting of the American Society of Gravitational and Space Biology. Visit <http://asgsb.org/index.php> for more info.

August 4-7, 2008; 27th Annual Cryogenic Engineering Training; Boulder, CO.

Sponsored by the University of Colorado's Center for Advanced Engineering and Technology Education. CEUs are available. For more information, visit www.cryoco.com or e-mail thomasmflynn@comcast.net.

August 22-24, 2008; Wairekei Hotel, Taupo, New Zealand. Annual Conference of the Aviation Medical Society-New Zealand. Held in combination with ANZSOM. For more information, visit amsanz.org.nz/conference/confindex.htm.

August 20-23, 2008; EASST/45 Conference, "Acting with Science, Technology and Medicine"; Rotterdam. For more information, please visit <http://www.easst.net/node/1646>.

October 27-29, 2008; SAFE Association 2008 Annual Symposium; Reno, NV. For more information, please phone 541-895-3012, e-mail safe@peak.org, or visit safeassociation.com or safeassociation.org.

Future AsMA Meetings

May 3-7, 2009

Westin Bonaventure; Los Angeles, CA

May 8-13, 2010

Sheraton; Phoenix, AZ

May 8-12, 2011

Hilton & Captain Cook; Anchorage, AK