CONTACT

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THE SOCIETY OF U.S. NAVAL FLIGHT SURGEONS
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The Society of U.S. Naval Flight Surgeons is a nonprofit organization. Its purpose is to advance the science, art, and practice of aerospace medicine and the mission of the U. S. Navy and the U. S. Marine Corps; to foster professional development of its members; and to enhance the practice of aerospace medicine within the Navy and the Marine Corps.

Membership is open to all Flight Surgeon graduates of the Naval Operational Medicine Institute. Subscription memberships are available. Dues are $20.00 per year, or $300.00 for a lifetime. Contact the Secretary or Treasurer for more information or a membership application form.

Cover Photo

CAPT Ashton Graybiel

Dr. Graybiel was born 24 JUL 1902 in Port Huron, MI. He received bachelor's and master's degrees from the University of Southern California before graduating from Harvard Medical School in 1930. As a member of the Fatigue Laboratory at Harvard University from 1936 to 1943, he developed methods for measuring cardiovascular performance, and helped design and establish a study of the medical and physical characteristics of commercial pilots. Dr. Graybiel's book, "Electrocardiography in Practice", served as a standard text from the 1940's to the 60's.

During World War II, he moved to the Naval Aerospace Medical Institute in Pensacola to study the effects of fatigue and cardiovascular fitness on the performance of military pilots. He was director of NAMI from 1945 to 1970 and then headed the biological sciences department of the newly formed Naval Aerospace Medical Research Laboratory until 1980. During those years he did experiments on how acceleration affects the organs of equilibrium in the inner ear, the circulatory system and muscle control. Dr. Graybiel and his colleagues did seminal research in finding drugs to alleviate motion sickness.

In the late 1950's, at NASA's request, Dr. Graybiel turned his attention to effects of weightlessness on the human body. He helped design and conduct parabolic flight experiments. His studies continued through the Apollo and Skylab programs, providing information about the ability of humans to live and function in space. Space motion sickness became an important problem to be overcome for the long-duration Apollo missions, and Dr. Graybiel helped develop drug combinations to prevent or alleviate its effects.

The last of his more than 400 scientific papers and books was published in 1994 and concerned the treatment of space motion sickness. Dr. Ashton Graybiel, whose numerous studies on the effects of weightlessness and acceleration on human balance, spatial orientation, physiology and performance helped prepare America's astronauts for manned space flight, died on 27 JAN 1995 in Pensacola, FL. He was 92.

Excerpted from article Written by Tim Hilchey:
The New York Times, Friday, March 3, 1995

President's Column

In my first SUSNFS President's column, I want to thank CAPT Charlie Barker for the incredible job he did during his tenure as President of our Society. Charlie is an inspirational leader that has spearheaded several significant improvements to our organization. He is a great friend and mentor and I have much for which to thank him. I wish him all the best as he continues his great work as Executive Officer of Naval Hospital Roosevelt Roads, PR.

As I pick up the torch from Charlie I have been thinking lately about the good fortune I have had to serve as the Naval Safety Center Surgeon, as AIRLANT Force Medical, as SMO on the U.S.S. Theodore Roosevelt (CVN-71) and all of the great times during the Residency in Aerospace Medicine. The naval aerospace medicine community has been very good to me and I welcome the opportunity to give a little bit of that back. One of the things I have enjoyed most is the almost daily contact with Flight Surgeons and aeromedical professionals throughout the Fleet. The opportunity to be able to work with one of my aeromedical shipmates when there are questions about such things as a mishap investigation, the mishap database, or about a challenging human factors issue is what makes my job so rewarding. I anticipate receiving the same kind of reward while serving as President of your Society.

SUSNFS is the recognized leader in not only Naval Aerospace Medicine but in all of Naval Operational Medicine. I see this Society as an organization that can help a Flight Surgeon or aeromedical professional thrive in a close-knit supportive community while promoting the highest standards of professionalism. It will be my primary goal as President to ensure that our Society continues to provide our Flight Surgeons with the kind of gouge they need to do their jobs safely and successfully.

We are a diverse group with many isolated and far-flung members. Our group includes both first tour Flight Surgeons and seasoned veterans. Some of our shipmates are now on the front lines helping prosecute a new type of war. They are participating in experiences that none in our community have seen before. We must learn from one another. Whether we communicate with our members personally, through our excellent journal *Contact*, through our great website, or through the new aeromedical discussion board on the NOMI forum, we have the means to make Naval Aerospace Medicine stronger and better.

I look forward to working with the new Society officers and all of the aeromedical professionals throughout the Fleet. I am truly blessed to be able to share in the camaraderie that is responsible for the

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strength and reputation of Naval Aerospace Medicine. I am honored and privileged to represent this SUSNFS band of brothers and sisters.

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Board of Governors

Congratulations to the new Board of Governors elected for the 2002-2003 term. Please do not hesitate to contact them if you have ideas or gripes about the Society. They are your voice in helping determine the direction of SUSNFS.

The listing of e-mails and phone numbers is available on the website at www.aerospacemed.org/officers.htm

Emeritus (2002-2003)

CAPT E. J. Sacks (Ret.)
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Immediate Past President (2002-2003)

CAPT Charles O. Barker
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Board Members (2001-2003)

CDR Kris M. Belland
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LCDR David W. Gibson
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Board Members (2002-2004)

CAPT Jay S. Dudley
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LCDR David K. Weber
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Board Member (Reserves) (2002-2003)

LCDR Thomas B. Faulkner
thomas.faulkner@delta.com

The President, Vice-President, Secretary, and Treasurer are the others on the 11 member board. Start thinking about whom you would like to represent you in next years elections. It will be upon us sooner than you think.

From the Secretary

Though I am no longer the Secretary, CDR Valbracht's PCS dates allow me to take one more stab at the column. Therefore, next to his picture and above his name you are actually getting the final column from LCDR Padgett.

CDR Valbracht will be transferring to Code-42 after a successful tour as SMO of the USS Abraham Lincoln. He is a prior Naval Hospital Corpsman who went on to complete a residency in Psychiatry. He was practicing Psychiatry at NAMI when he was picked up for the Aerospace Medicine Residency in 1997. We look forward to CDR Valbracht's return.

I want to say again what a fantastic time I had over the last year. The Secretary job allowed me to interact with junior operational Flight Surgeons, senior Flight Surgeons, NAMI staff, retirees, physiologists, family members, etc. It was a very rewarding experience for me. The input from our members was at times overwhelming, but in a nice way, which allowed *CONTACT* to benefit. I thank all of you for responding to my request for input to the journal. Please keep the articles, stories, letters to the editor, etc. coming in.

The AsMA symposium was a wonderful time in Montreal. Weather was nowhere near as cold as was expected. The ballots were counted, new officers were elected, and By-Laws changes approved. The new officers can be located on page 2 of all issues of *CONTACT* as well as on the website at www.aerospacemed.org/officers.htm. The comments included on the ballots were forwarded to the board for discussion on the Sunday before AsMA began. The SUSNFS Business Meeting was also held in Montreal and the motion to re-instate the Reservist Board Member passed unanimously. LCDR Thomas Faulkner will fill the position for 2002-2003. It will then become a 2 year position. One of the frequent comments on the ballots was how much the reserve Flight Surgeons appreciated the information SUSNFS provided them. SUSNFS definitely wants to capture the knowledge of our Reservists. The presentations at the Business Meeting by CDR Vernon Morgan

(CNARF) and CAPT Paul Rast (4th MAW) were a welcome and informative addition to the agenda. I hope their presence at the meeting continues in the future.

The annual Navy Luncheon is where SUSNFS presented its annual awards. The award winners are listed on page 52 and can be found online at www.aerospacemed.org/awards.htm to include the actual citation. We had a great response to the call for nominations and want to thank everyone who took the time to fill out an award nomination packet. The Awards Committee headed by CAPT Valdez was very impressed with the quality and number of packages brought before it. Keep the awards in mind as you head into the holiday season.

The Society of US Naval Aerospace Physiologists and particularly CDR Dave Service coordinated a very nice Navy Luncheon. CDR Ed Feeks of BUMED-23 hosted the luncheon with SUSNAP being the lead organizing agency. In 2003, SUSNFS will be the lead on organizing the luncheon. The big task is to try to find a speaker for the 20 minute slot that will be of interest to the wide range of attendees. Please forward ideas for a speaker to CDR Valbracht early so arrangements can be made.

Dues are due in May, so please take a look at your labels and see whether or not you need to resubscribe. Your labels should show your status as of 22 June. If we have overlooked something, please get a message to the secretary or me at padgett@1989.usna.com After the OCT issue, we will remove those that have expired from future mailings. You can resubscribe by sending in the form at the back of this issue or by going online to the website and choosing the ONLINE STORE.

An e-mail was sent to all current subscribers in early June requesting address changes as the summer PCS season comes upon us. If you did not get the e-mail from SUSNFS, it means we do not have a current e-mail on you.

Thanks again for a great year....

LCDR William Padgett for

CDR Louis E. Valbracht, MC, USN
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Specialty Leader (MED-23)

The comments from BUMED will be brief this issue.

First, and foremost, I have to bid farewell to CAPT Bob Matthews who is leaving BUMED after four years of superb performance in his roles as the BUMED Program Manager for the Naval Aviation Survival Training Programs and as the community manager for the Aviation Physiologists. Bob was truly an asset to this office both as a professional Medical Service Corps Officer and as an Aerospace Physiologist. During his tenure, he spearheaded the campaign to improve aviation survival training for over 35,000 students a year by bringing 5 new water survival facility MILCONS to 100% design and 80% completion, and by orchestrating the purchase and update of the survival training equipment used at these facilities. His impact will be obvious as we see these efforts to meet fleet requirements translated into new and improved training realities for the students undergoing survival training.

As the Specialty Leader for his community, he encouraged a strong working relationship between the Flight Surgeon Community and the Aerospace Physiology Community that was focused on improving aviation safety for all of Naval Aviation. He ensured that all operational requirements were met in his community's three major career pathways for Navy and Marine Corps Aviation Physiologists - Survival Training, Aeromedical Safety, and RDT&E. And, he was instrumental in helping to establish an Aerospace Physiology Masters Program at the Uniformed Services University of the Health Sciences.

As a leader in the Aerospace Medicine Community, he was actively involved in the Naval Aerospace Medicine Strategic Planning Process as a facilitator for recruitment, retention and recognition of all aeromedical professionals. As the advocate for the "People" goal group, he coordinated 10 action officers in developing and executing objectives related to aeromedical career development, credentialing, and education and training for the over 250 aeromedical

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specialists in the Navy.

Bob will be missed. But, as we say goodbye to Bob, we also welcome CDR Gail Hathaway who brings similar motivation and professional credentials to the position here at MED-23. Gail will be moving down the hall from her previous assignment as the MED-02 Executive Assistant for Admiral Hart.

Second, I would like to pass my congratulations to CDR Frank Chapman, CDR Kevin Gallagher, CDR John Lee, CDR Laurel Clark, CDR Terry Puckett, CDR Vern Morgan, CDR Steve Temerline, CDR Donna Murdoch, and CDR Andy Engle for their recent selection to Captain in their respective communities. Certainly, these selections are representative of some of the many aspects of Navy Medicine that our aviation specialists impact (operational aerospace medicine, MTF-based clinical epidemiology, space medicine, aviation physiology, aviation optometry, and reserve aviation medicine).

(VR-58 Jacksonville providing NALO Flight to AsMA via Pensacola and Norfolk)

Third, I would like to mention that the Aerospace Medicine Strategic Planning Session that took place in May prior to the AsMA Conference in Montreal was very successful. I hope to have the reports from the various goal group leaders back within the next month and will provide an update in the next quarterly issue of C*ontact.*

And, lastly, I would like to thank the Society of U.S. Naval Aerospace Physiologists for their efforts in coordinating the Navy Luncheon at AsMA this year. Their efforts resulted in a very entertaining and informative luncheon for those in attendance.

I thank you for your continued support. More to follow in future issues.

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The Nerve Center (NAMI Neurology)

Obstructive Sleep Apnea, Excessive Daytime Sleepiness and the need for Vigilance Testing

This is the current guidance and rational for the documentation to be included with your Aeromedical Summary to support waiver requests for history and treatment of Obstructive Sleep Apnea (OSA). Information you need is constantly being updated at our Aeromedical Waiver Guide Web Site: *www.nomi.med.navy.mil/index.htm* All situations cannot be addressed so general guidelines are posted. Fortunately, I can be contacted via my email address shown below to guide you beyond what is on the web.

As you know, obstructive sleep apnea is a disorder in which a person stops breathing during the night, perhaps hundreds of times, for periods of 10 seconds to several minutes in some cases. These apnea periods interrupt the natural sleep architecture resulting in non-restorative sleep. OSA inevitably causes excessive daytime sleepiness (EDS). I do not need to explain why EDS is an Aeromedical Safety Issue.

Most are unaware they have OSA or EDS, although sometimes they awaken and gasp for breath. OSA is usually accompanied by snoring. Since people who have OSA may not be aware of the condition, it is usually the sleeping partner, alarmed by episodes of loud snoring alternating with silence (apneas), who insists on medical evaluation.

People with sleep apnea usually do not remember waking up during the night. Indications of the problem may be such vague symptoms as the following: excessive daytime sleepiness, morning headache, irritability, and even impaired mental or emotional functioning, snoring, and heartburn because reflux may be responsible for some cases of sleep apnea.

Polysomnography is the current standard for evaluation of suspected OSA. It provides data on respiratory effort, airflow, oxygenation, and sleep state among other things. Sleep centers diagnose and recommend treatment for OSA and other sleep disorders.

Currently, the best treatment for OSA is a system known as nasal continuous positive airflow pressure (nasal CPAP). It is safe and effective in OSA patients who can tolerate it, about 50%. The device is a machine weighing about five pounds. A mask containing a tube connects to the device and fits over just the nose. The machine supplies a steady stream of air through a tube and applies sufficient air pressure to prevent the upper airway tissues from collapsing during sleep. Nasal CPAP has been successfully used aboard ship.

There are sophisticated systems available now called auto-CPAP devices that can customize air pressure needed to overcome airway resistance. Pressure is low when there are no problems with airflow but is raised gradually when obstructions are detected.

Surgery, uvulopalatopharyngoplasty (UPPP), is also effective for about 50% of cases, in treating OSA. The procedure, cauterization or laser surgery, removes soft tissue on the back of the throat and palate.

(V-22 Osprey flying over Lexington Park, MD during a test flight from Pax River 29 May 2002)

Other treatments include weight loss and dental devices. Some dental devices are similar in appearance to sports mouth guards. The mandibular advancement device forces the lower jaw forward, which keeps the airway open. These treatments are not as effective as nasal CPAP or UPPP.

A new technique called radiofrequency ablation uses radio waves emitted from an electrode to treat patients who snore. The radio waves destroy a small amount of tissue at the base of the tongue. It is far less invasive than standard surgery, and studies are reporting significant improvement in reduced snoring and less daytime sleepiness. It may be helpful for mild obstructive sleep apnea.

Other procedures may be appropriate to correct facial abnormalities or throat obstructions that cause OSA. They may be used alone or combined with each other or with UPPP. Some patients with OSA have nasal obstructions (such as a deviated septum) that contribute to snoring and other symptoms. Surgery for such obstruction may be helpful in reducing symptoms and improving oxygen levels (although it does not always cure the condition).

The only surgery that approaches 100% success for treatment of severe OSA is tracheostomy. However, it requires a permanent opening in the throat and is performed only if sleep apnea is life threatening. I have not had any waiver requests for aviators who have had a tracheostomy…yet.

Regardless of the treatment, a waiver is required for the condition. The Aeromedical Summary needs to include documentation that excessive daytime sleepiness (EDS) is not present. This can be done with vigilance testing. Multiple Sleep Latency Testing, as is done for Narcolepsy, is not sensitive enough for this purpose.

The CogScreen-AE with AVT (Aeromedical Vigilance Test) is what we use here in Pensacola and can be scheduled by calling (850) 452-2257 x 1022 or DSN 922. If this is not convenient, other tests may suffice and can be obtained elsewhere. Acceptable alternatives to the CogScreen-AE with AVT include the Conner's CPT (Continuous Performance Test) and the TOVA (Test of Variables of Attention).

An aviator's report of lack of EDS must be documented objectively. There have been several cases of individuals who have been treated successfully for OSA but on testing were found to have EDS. In some cases this is because EDS is insidious and can be caused by conditions other than OSA alone. Treatment compliance with nasal CPAP has been an issue and surgery as noted above is not 100% successful in all cases either.

Improvement in the apnea index can be documented (not required in all cases) by a post treatment polysomnogram but vigilance testing is still necessary.

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12.13 Corneal Refractive Surgery (PRK/LASIK) Rev JUN 02

AEROMEDICAL CONCERNS: Photorefractive keratectomy (PRK) and laser in situ keratomileusis (LASIK) have proven to be safe and effective corneal refractive surgical (CRS) procedures to correct refractive error in the range –8.00 to +6.00 total diopters sphere with no more than 3.00 diopters of cylinder. The ongoing Navy PRK Aviation Retention Study has demonstrated nearly a 90% chance of one eye meeting visual standards without correction and over 85% of aircrew no longer requiring corrective lenses while flying after surgery. About 75% of treated designated aircrew have returned to duty involving flight at one month after treatment and over 99% by twelve weeks. However, concerns persist regarding corneal healing and scar, quality of vision (halo, glare, contrast sensitivity) and comfort (predominantly eye dryness and minor irritation). Following LASIK the corneal flap may remain hypesthetic for some period after surgery with the potential for fluctuating vision. Also, LASIK flap stability and quality of vision have not been thoroughly characterized in the military aviation environment although early preliminary studies are underway.

PRK and LASIK remain investigational for air warfare duty. To be recommended for waiver for history of CRS by MED-236, a member must enroll in any available Navy-sponsored CRS study. Two such studies exist as of the revision date.

1. The Navy PRK Aviation Accession Study may enroll SNA and SNFO accessions with a history of PRK. PRK may be performed at any military or civilian laser center. An applicant SF-88 requesting waiver may be submitted no sooner than three months or six months after surgery—depending on preoperative refractive error—if vision and stability standards are met. (See below for non-SNFO Class II and Class III accessions.)

2. The Navy PRK Aviation Retention Study may enroll active duty Class I designated naval aviators. Enrollment is prospective and treatment shall be conducted only at Naval Hospitals San Diego or Portsmouth. This Study is now closed to Class II personnel. (See below for designated Class II and III personnel.)

All active duty *designated* Class I, II or III air warfare personnel who desire CRS must submit an **Aviation CRS Request** to the Naval Hospital San Diego Refractive Surgery Center prior to surgery for endorsement and further instructions, no matter where surgery is desired. If treated at a Navy laser center, Class II and III personnel may return to duty involving flight as soon as four weeks after surgery, but only if vision and refractive stability standards are met. If treated at a non-Navy DoD laser center, members may apply for waiver no sooner than three or six months after surgery depending on the preoperative refractive error. Designated air warfare personnel in active duty status treated at a non-DoD (i.e. civilian or foreign host country) laser center will not be recommended for waiver. (See below for selected reservist personnel.)

WAIVER: History of PRK (all forms of anterior corneal stromal surface ablation without creation of a stromal flap, including variants such as LAS**E**K method of epithelial removal) is CD, WR for Class I, II, and III accessions and designated air warfare personnel. LASIK is CD, WNR for Class I or II personnel, WR for CLASS III accessions and designated personnel. All other forms of CRS or manipulation including RK (radial keratotomy), LTK (laser thermal keratoplasty), ICR (intracorneal ring) and orthokeratology are CD, WNR for all air warfare duty Classes I, II and III.

Accessions must be free of visual symptoms and have discontinued all medication related to eye surgery. Designated personnel must be free of visual symptoms. Restriction of duty involving flight to home base is recommended until topical eye medication is no longer prescribed. Initial waiver requests for history of CRS are single submission as long as the required visual standards appropriate to aviation duty continue to be met. Waiver renewal request submission is as directed by the initial MED-236 endorsement.

I**NFORMATION REQUIRED and WAIVER PROCESS:**

1. Accessions (Waiver is requested on the applicant SF-88; do not submit an AMS.)

a. SNA and SNFO (PRK only) (Use **SNA/SNFO PRK Accession Checklist.**) Pre-operative refractive error must be no worse than SNFO applicant standards except that maximum allowable hyperopia is no greater than +6.00 D total diopters sphere. Post-operative refractive stability is required. A final manifest refraction must be performed no sooner than ***three*** months after surgery for pre-operative refractive error in the range plano to –5.50 total diopters sphere (mild to moderate myopia), and no sooner than ***six*** months after surgery for pre-opera-

tive refractive error in the range –5.75 to –8.00 or +0.25 to +6.00 total diopters sphere (high myopia or any hyperopia). This final manifest refraction shall be compared to a previous manifest refraction performed at least one month prior to the final. Neither sphere nor cylinder may change by more than 0.50 D in each eye. If the interval change exceeds the standard, further manifest refractions must be performed at one month intervals until stability is demonstrated. Only the final two manifest refractions demonstrating stability should be recorded on the applicant SF-88 with dates. The member must meet all other vision standards appropriate to his or her class of duty. A post-operative cycloplegic refraction with date must be reported for SNA accessions.

Submit with the applicant SF-88 copies of all records pertaining to PRK surgery including the pre-operative evaluation, operative notes (laser computer printouts), and all post-operative notes including documentation of the manifest refractions at appropriate intervals.

The member will be enrolled in the Navy PRK Aviation Accession Study upon arrival at NAMI for API (except for USNA midshipmen treated at NNMC Bethesda who are enrolled there).

b. Non-SNFO Class II and Class III (PRK) Submit all documentation as in paragraph 1.a. above plus a post-operative **Quality of Vision Questionnaire (QOVQ)** completed by the member.

c. Class III (LASIK) Submit all documentation as in paragraph 1.b. including explicit documentation on the operative report of residual corneal stromal flap bed depth. A bed depth of less than 250 microns shall not be recommended for waiver.

2. Designated air warfare personnel (All must submit **Aviation CRS Request** to NMC San Diego Laser Center prior to surgery to be eligible for waiver afterwards.)

a. Class I DNA (PRK only) Must prospectively enroll in the Navy PRK Aviation Retention Study and receive surgery at only NMC San Diego or Portsmouth. If manifest refraction is stable at four weeks compared to two weeks and vision corrects to the required standard, the member may apply for a waiver as soon as four weeks after PRK. Use the **PRK AMS template** completed as a Word document with typed names of the submitting flight surgeon and aviation optometrist as well as the member's commanding officer. This document will serve as an incomplete LBFS with the third signature blank. Submit this Word document as an e-mail attachment to NAMI Code 323 wanderson@nomi.med.navy.mil or rmkuharich@nomi.med.navy.mil. *Do not send hard copy, fax, or e-mail it to any other account.* We will review the AMS the same day, add our third name to complete the LBFS, and return it to the submitter via e-mail. Upon receipt of the completed LBFS, the submitting Flight Surgeon may then issue a 90-day "waiver recommended" up chit. We also copy the AMS to NAMI Code 42 who shall forward an endorsement to PERS or CMC who issue the waiver letter and U.S. Mail it to the member via command. When the actual waiver letter arrives, a copy of it and the AMS should be placed in the health record and NATOPS jacket and a "waiver granted" up chit of normal duration may be issued. If the waiver letter does not arrive within 90 days, make inquiry at code427@nomi.med.navy.mil.

b. Class II and III (PRK at Navy laser center) Submit PRK AMS following procedure in paragraph 2.a. but also fax **QOVQ** to NAMI Code 323 and include on PRK AMS the statement, "No complaints per **QOVQ**."

c. Class II and III (PRK at non-Navy DoD laser center) Waiting period following surgery and stability interval are as in paragraph 1.a. Submission process is as in paragraph 2.b.

d. Class III (LASIK at any DoD laser center) Waiting period following surgery and stability interval are as in paragraph 1.a. Waiver cannot be processed electronically. Submit AMS via routine fashion. Copies of all operative and postoperative records and **QOVQ** must be enclosed with AMS. Up chit may not be issued until MED-236 endorsement is received from NAMI Code 42.

e. Selected Reserve Accession or Designated Class II and III (PRK) Waiting period following surgery and stability interval are as in paragraph 1.a. Submit applicant SF-88 (accession) or AMS (designated) including copies of pre-operative evaluation, operative report (laser computer printout), post-operative records, and **QOVQ**. Up chit may not be issued until MED-236 endorsement is received from NAMI Code 42.

f. Selected Reserve Class III (LASIK) As in paragraph 2.d.

Corneal Refractive Surgery

The Waiver Guide has been updated online at www.nomi.med.navy.mil/Nami/WaiverGuideTopics/index.htm to show the new Corneal Refractive Surgery Guidelines. In addition, the ***AVIATION CRS REQUEST, SNA/SNFO PRK ACCESSION CHECKLIST, QUALITY OF VISION QUESTIONNAIRE (QOVQ), and PRK AMS TEMPLATE*** *are available at the website. Always refer to the online Waiver Guide for the most recent changes.*

Frequently Asked Questions

1. How is the aeromedical disposition different for accessions and designated air warfare personnel?

Accessions may be treated at any military or civilian laser center. Waiver is requested directly on the applicant SF-88. SNA and SNFO accessions must enroll in the Navy PRK Aviation Accession Study to be eligible for waiver. ***Designated*** active duty air warfare personnel must submit all requests for treatment to the Navy Refractive Surgery Center in San Diego and receive treatment only at a DoD laser center (Class I only at San Diego or Portsmouth). Class I personnel must enroll in the Navy PRK Aviation Retention Study to be eligible for waiver recommendation. Waivers are requested by AMS submission.

2. Can NFOs now be treated at any laser center?

Designated Class II personnel were formerly required to enroll in the Navy PRK Aviation Retention Study to be recommended for waiver after receiving treatment only at Naval Hospitals San Diego or Portsmouth. The Retention Study is now full for Class II (although it continues to enroll Class I). Now, all active duty designated Class II personnel including NFOs may be treated at any Navy, Air Force or Army laser center. Waiver shall not be recommended for active duty designated air warfare personnel treated at civilian laser centers.

3. What is different about the waiver process for designated Class II personnel enrolled in the Retention Study vice not enrolled?

In both cases, waiver is requested via an electronically submitted PRK AMS. Non-study enrollees must also submit a quality of vision questionnaire (QOVC) to ensure the same visual outcome from surgery as monitored by the Retention Study protocol. Non-study enrollees treated at a Navy laser center may return to duty involving flight as soon as four weeks after surgery if vision and refractive stability standards are met, just like study enrollees. Non-study enrollees treated at a non-Navy DoD laser center must follow guidelines similar to the Accession Study for eligibility for return to duty involving flight (one month between stability refractions vice two weeks; final refraction at three or six months vice four weeks).

4. Is an aviation optometrist required to review and add his or her name to a PRK AMS?

Navy aviation optometrists have received special training at NAMI to better care for the optometric needs of air warfare personnel including medical and administrative follow-up after CRS. They are stationed at 21 major Naval Air Station and Marine Corps Air Base optometry clinics around the world. You should use their expertise in ensuring that the data you submit in a PRK AMS complies with the required standards for waiver recommendation. Contact NAMI Code 323 if you do not have access to a Navy aviation optometrist.

5. Is LASIK now approved for air warfare personnel?

At this time, waiver for history of LASIK may be recommended for only accession and designated Class III personnel (air controller, flight deck, UAV operator). If future Navy studies of LASIK in aircrew are favorable, they too may be recommended for waiver, but at present no waiver shall be recommended for history of LASIK in Class I and II personnel.

6. Can I submit an electronic PRK AMS from my hotmail/excite/yahoo/AOL... account?

No. For security, privacy and accountability, we must return signed PRK AMSs only to your .navy.mil e-mail account. This account may be either a line command or .med.navy.mil. World-wide daily internet web and e-mail access are a requirement for modern flight surgery practice. Your line command or branch medical clinic must support you with this service.

7. I wrote an AMS for a designated pilot/NFO/aircrewmember. Can I issue an up chit?

Emphatically, NO. A limited-duration up chit for an NPQ member who has yet to receive a waiver from PERS or CMC may be locally issued only on the authority of a local board of flight surgeons (LBFS)—which is merely an AMS with three provider signatures. The PRK AMS is unique in that the second member of the LBFS is typically a local aviation optometrist and the third member is required to be one of the ophthalmology staff at NAMI. After review at NAMI, the staff member adds his or her typed name and returns the AMS/LBFS to the originating flight surgeon as an e-mail

Word attachment. If the data on the AMS reflects compliance with vision and stability standards, the AMS is typically "signed" and electronically returned within hours of submission. Upon receipt of the now-three-signature LBFS/AMS, the originating flight surgeon may issue a 90-day "waiver recommended" up chit.

8. I got back the PRK AMS and issued a 90-day up chit. Am I done?

Almost. As you know, waivers are recommended by the local flight surgeon and endorsed by NAMI (MED-236), but granted only by PERS or CMC. Transparently to you, the PRK AMS is endorsed and forwarded to PERS or CMC at the same time it is e-mailed back to you. *Do not resubmit the AMS to NAMI after you receive it back from Code 323.* Actual waiver letters must be physically signed in ink, so PERS or CMC sends the letter to the member via his or her command by U.S. Mail. Ninety days should be plenty of time to receive the letter. When you know the waiver has been granted, you may issue a full duration "waiver granted" up chit. If the waiver letter has not arrived and the temporary up chit is about to expire, call or e-mail NAMI Code 427 to investigate. Finally, make copies of the AMS and the waiver letter and place them in the health record and the NATOPS jacket.

9. How do I know a waiver was granted?

The NATOPS jacket Section 1.c. Medical Clearance must contain all correspondence relative to Medical Waivers and related matters—particularly important during annual squadron NATOPS inspection review! Look there. Also, the MED-236 endorsement and PERS or CMC letter granting the waiver should be filed in the health record.

10. What about Selected Reserve personnel and CRS?

Accession and designated Class II personnel not on active duty may receive PRK at any civilian laser center at their own expense and apply for waiver when vision and refractive stability standards are met as soon as three or six months following surgery, depending on preoperative refractive error. Accession and designated Class III personnel not on active duty may receive PRK *or* LASIK at any civilian laser center at their own expense. Do not issue an up chit to selected reserve personnel with history of CRS until they have received MED 236 endorsement or waiver has been granted by PERS or CMC. Designated Class I personnel not on active duty who receive CRS shall not be recommended for waiver until results of the Navy PRK Aviation Retention Study are available.

NAMI Optometry

CONTACT LENSES IN AVIATION

Almost on a daily basis as one of the staff optometrists at NAMI's Department of Ophthalmology, I am asked questions dealing with contact lenses from aviation candidates, designated aviation personnel or aeromedical specialists. Although the topic of contact lenses has taken a back seat in recent years to refractive surgery, contact lens usage continues to be an excellent alternative to both spectacle correction and permanent surgical alternatives. The emergence of newer technology in the field of contacts over the past several years ensures that this choice will remain in use in naval and marine corps aviation for years to come. A quick review of the pros and cons of contact lenses, new developments in the field of contacts, and a review of contact lens usage in naval aviation is presented.

Contact lenses are most commonly used in the correction of ametropic aviation personnel. Current data through NAMI shows that over half of all designated aviation personnel require some form of correction to get them within aviation vision standards. Spectacle correction is prescribed for all aviation candidates to get them to the aviation vision standards. Earlier studies indicated that over 75% of spectacle wearing military personnel, if given the choice, would at least attempt to try out contact lenses as an alternative means for correcting their refractive error. In aviation, Flight Surgeons are taught that contact lenses provide some significant advantages over traditional spectacles in a flight environment. Any aviator who flies in tactical jets has probably experienced the frustration of spectacles and their incompatibility with an O2 mask and helmet. Those aviators using night vision goggles with glasses have noted the same incompatibilities. Many spectacle wearing aviators can also tell you the frustration of walking out of an air conditioned room in the middle of a summer only to have their spectacles fog over. Finally, the perceived better quality of vision, both central and peripheral is commonly noted in contact lens wearers.

There are a few disadvantages of contact lenses which are worth mentioning. Dryness associated with contact lens wear is not uncommon. Overall, there is

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slightly more care and skills in the proper usage ofcontact lenses and there is a higher rate of ocular health problems with contacts over spectacle usage such as conjunctivitis, abrasions and ulcers. With proper care, usage, and appropriate examinations, most of these disadvantages can be minimized while optimizing the benefits associated with contact lens usage.

What ensures contact lens usage in the military comes from several new developments and trends in the field of contacts. 40 years ago, the majority of contact lens usage was with "hard" contact lenses. By the 80's, daily wear "soft" lenses made of hydrogel material had taken over a majority of the market share of contact lenses. Throughout the 90's, the explosion in the disposable or programmed replacement hydrogel lenses ensured that these types of lenses were the lenses of choice. As it stands currently, disposable lenses remain the lenses of choice for naval aviation personnel. With over 50 current brands of these types of lenses marketed today compared to only a handful a decade ago, aviation personnel can now be fitted through a whole range of parameters to ensure the best fit, comfort and success with contact lenses. The addition of many more "toric" type disposable lenses makes it easier than ever before to offer contact lenses for those personnel who have significant astigmatism. Finally, one of the most exciting breakthroughs came about last year with the introduction of an entirely different class of material of "soft" contact lenses, the silicone-hydrogel lenses. Currently, these are manufactured and marketed by only two companies, CIBA Vision with their Focus Night and Day Lens and Bausch and Lomb with their Purevision Lens. These new lenses, with their new material are currently approved for extended periods of use (up to 30 days) without removal and greatly reduce the risk of infection, inflammation and hypoxia associated with extended usage in other soft lenses. Though no lenses can guarantee 100% risk free usage, these type of lenses are currently being touted as the next generation lenses for those who do not want to undergo refractive surgery.

(CH-46E from HC-11 VERTREP USS Bonhomme Richard 26 Mar 2002)

Contact lens usage in naval aviation will probably decline a little due to the emergence of refractive surgery options for aviation personnel. But there are many types of refractive errors, for example mild nearsightedness, mild astigmatism or mixed astigmatism, that are not ideal surgical candidates and wherethe overall benefit to risk is not significant enough to warrant a surgical option. At the same time, we are now allowing new accessions into naval aviation with worse vision uncorrected than ever before, and thus a greater number of aviators than ever before in the history of naval aviation with significant refractive errors is expected in the pilot community. Finally, there are those aviators who will choose to not have surgery on their eyes if there is a better alternative. Thus, contact lens options will continue to play a key and pivotal role for aviators wanting and needing good vision. As naval Flight Surgeons, you are the gatekeepers in watching over your aviation personnel and making the best recommendations and referrals to take care of their eye needs. Get out of your squadron spaces once in awhile and get to know the military eye care professionals at your local MTF or branch clinic. You will find that a good working relationship with them will have nothing but a positive impact to the aviators vision needs you are entrusted with.

If you have any thoughts or questions, please email me at khuyesugi@nomi.med.navy.mil

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NAMI ENT

Asymmetric Hearing Loss

What would you do with this patient? He's your CO, and he is in the middle of his annual flight physical. You take a quick look at his vital signs, eye exam, and audiogram. Everything looks good. But…..you take another look at the audiogram, and see that there's a hearing loss in the right ear. The left ear has only a mild high-frequency loss, the type you see in most of your aircrew, but the loss in the right ear involves all frequencies. It is still within Service Group 1 standards, so there's not a question of him needing a waiver, but you still wonder about it. You ask him if he is aware that his right ear is down, and he shakes his head.

The first thing you should do is to take a look in his ear and check for evidence of a cerumen impaction. Of course both of his ears look perfectly normal. You knew it wasn't going to be that easy.

You complete his physical and find no other abnormalities, so you take a look at past audiograms to see how long this loss has been present. You're not terribly surprised to see a loss on the last three audiograms, with a pattern of slight progression each year. Not enough of a loss to get anyone's attention….until today.

A quick check of your old printed Waiver Guide shows no mention of a standard for asymmetric hearing loss, so you check the NOMI web site, and it has nothing either.

So, when is an asymmetric hearing loss significant enough to evaluate further? And what pathology are you looking for?

There are several causes of hearing asymmetry, some innocent and some not so innocent, but most do deserve further evaluation. So as to avoid unnecessary specialty testing and consultation in cases of minor asymmetry, NAMI has adopted audiometric guidelines essentially identical to those of the Air Force. *If the hearing thresholds in one ear are worse than those in the other ear by more than 20 decibels at two adjacent frequencies (such as at 3,000 and 4,000Hz) between 500 and 6,000Hz, the patient needs evaluation by an audiologist or otolaryngologist.* By setting these numbers relatively high, we eliminate the need for evaluation of the typical noise-induced high frequency loss, which is often asymmetric. The asymmetry of noise-induced is usually seen in the 3-6000Hz range, and the worse ear is usually the left because of the way shooters hold shotguns and rifles. If the trigger is pulled with the right hand, the head is commonly turned a bit to the right of center, so that the left ear gets more of the blast, and the right ear is slightly protected by the skull. Your CO has a 30dB right-left difference at 2,000Hz, and a 25dB difference at 3,000Hz, so shooting is not the likely cause. He requires consultation.

Before writing the consult, ask him about any tinnitus, dizziness, unsteadiness, vertigo, or obvious fluctuation in the hearing. Although noise damage can be asymmetrical (and greatly so in the case of acoustic trauma such as from a single gunshot very near the ear), a patient without significant noise history and no fluctuation may have something serious, such as an acoustic neuroma. This information will help the consultant in zeroing in on the appropriate tests.

An audiologist should be consulted first, if you have one available. These professionals are quite aware of the implications of various types of hearing loss, and can help direct further work-up, including having the patient see an otolaryngologist if indicated.

Thorough audiometric testing, including air and bone conduction and speech testing, can immediately tell you if the loss is conductive (often treatable) or sensorineural (rarely treatable). Speech testing can point to a possible retrocochlear lesion, such as an acoustic neuroma, when the worse ear's speech discrimination score is significantly poorer than that in the better ear. It can also help expose the occasional malingerer.

When a unilateral hearing loss is slowly progressive, such as your CO's, even if the speech discrimination score is not abnormal many otolaryngologists will order an MRI with and without contrast, just to be sure they don't miss an acoustic. The ENT consultant to the British Navy will get an MRI whenever the asymmetry is more than 10dB at two adjacent frequencies, because he feels that a timely diagnosis makes for easier surgery and may well minimize rehabilitation costs and disability payments.

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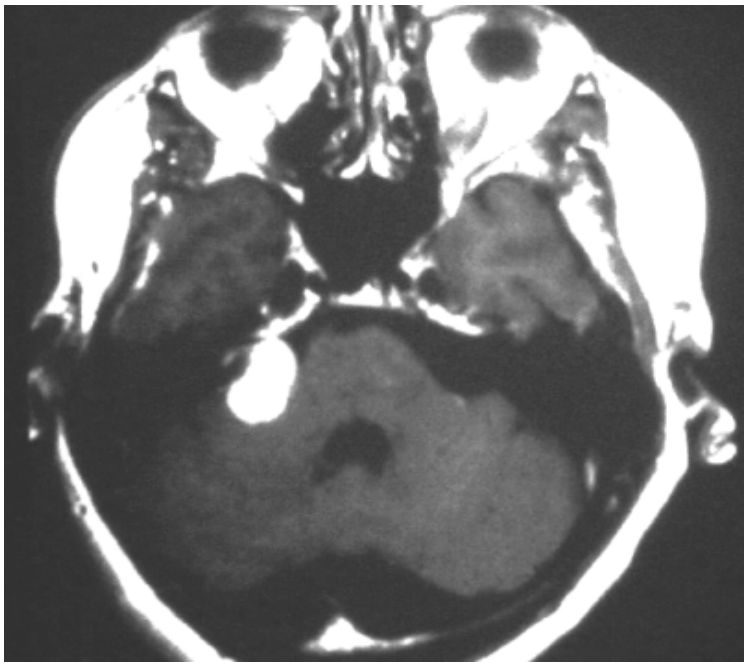
If the workup is negative, no waiver is necessary unless the hearing has fallen below SG1 standards. In contrast, the USAF does require a waiver for this degree of asymmetry, even if nothing is found.

Other causes of asymmetric sensorineural hearing loss not already mentioned include Meniere's disease, in which the hearing loss may fluctuate and is accompanied by episodic vertigo; autoimmune inner ear disease, in which the loss can be quite rapid and involve both ears; inner ear barotrauma, which is associated with flying or diving ; and perilymph fistula, in which there may be fluctuating hearing loss, intermittent dizziness, and a history of barotrauma, or direct trauma (such as an open hand slap or Q-tip intrusion). When any of these conditions are known or suspected, ground the patient and refer to ENT as soon as possible. Worry about flight status implications later.



(Figure 1: MRI showing right acoustic neuroma)

What if the asymmetry is due to a conductive loss, which is generally worse in the lower frequencies? Assuming the visual exam of the ear is normal, most progressive unilateral conductive losses are due to otosclerosis. Otosclerosis is characterized by a gradual fixation of the stapes, and can eventually lead to a large conductive loss in both ears. It is treated with hearing aids or stapes surgery. Check the last issue of *CONTACT*, page 23, for the new, more liberal stapedectomy/stapedotomy policy. Other causes, such as cholesteatoma or ossicular erosion will be accompanied by abnormal tympanic membranes, although the abnormality may be subtle and best seen with a binocular operating microscope. Microscopes are rarely found outside ENT offices, so most conductive hearing loss patients wind up there. Which is good, because most conductive losses can be treated.

Moving on. Your CO sees an audiologist, who diagnoses a sensorineural loss in the right ear. Speech discrimination scores are 92% in right, 100% in the left. Not wanting to miss a retrocochlear lesion, he recommends an ENT consultation. The ENT consultant orders an MRI scan, and to everyone's relief, it is negative.

Since the hearing loss is still within SG1 standards, a waiver isn't required, but eventually it might be, since the loss is progressive. Fortunately, as long as the good ear remains good, the waiver can be continued indefinitely. The Air Force has at least three tactical jet pilots on waivers for total unilateral hearing loss as a result of acoustic neuroma surgery.

What if the MRI had been positive for acoustic neuroma (fig.1)? You'd have to refer him to a neurotologist for treatment. There have been very, very few acoustics in Navy aircrew, but given the Air Force's experience, we would likely recommend a waiver once the member had recovered from surgery and had compensated for the loss of labyrinthine function on the operated side. This compensation is usually complete within a year, and can be tested by platform posturography (Equitest®).

In summary, there are two messages here. The first is to be alert to changes in hearing from one flight physical to the next, especially if they're progressive unilateral losses. Our last acoustic neuroma was diagnosed because a Flight Surgeon in Japan spotted such a loss in one of his pilots. It was only mildly progressive, still within SG1 standards, and the man was completely asymptomatic. But he got an ENT referral because the Flight Surgeon was concerned.

The second lesson is that the Navy finally has some written guidelines for evaluation of an asymmetric hearing loss!

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The Flea Bag (NAMI Internal Medicine)

ES is a Naval Aviator who was happily flying his high performance jet two weeks after a "cyst" removal from his right maxilla when he received the dreaded call. The "cyst", which had been causing him some dental pain, was actually a B-cell lymphoma. The oral surgeon felt this was a benign odontogenic cyst but followed the important rule to always send to pathology whatever you remove from a patient's body. Had they not sent the "cyst," the diagnosis would have been missed.

ES was rapidly sent from his "remote" duty area to a major medical treatment facility where a complete metastatic evaluation was performed. This evaluation included a medical history (unremarkable), a physical exam (no significant findings), blood tests (normal CBC, normal electrolytes, normal glucose, normal renal function, normal LDH and transaminases, elevated total bilirubin c/w Gilbert's), CT scans of his chest/abdomen/pelvis with and without contrast (all normal), a bone scan, gallium scan and PET scan (all normal) and bilateral iliac crest bone marrow biopsies (normal). A CT of his head and neck showed changes in the area of his cyst removal c/w prior surgery, but no evidence of residual mass. The pathology slides were reviewed at two institutions and confirmed the diagnosis of diffuse large B-cell lymphoma. Since there was no evidence of disease anywhere else, ES was diagnosed with Stage I AE primary diffuse large B-cell lymphoma of his right maxilla. Primary lymphoma of bone is a relatively rare diagnosis but is generally treated with standard chemotherapy (CHOP=cyclophosphamide, vincristine, adriamycin and prednisone) and local XRT. ES was offered standard CHOP plus an immune modulator, rituximab. He was recommended to undergo four cycles of this regimen followed by external beam radiation to the involved maxillary region. The Oncologist offered high hopes of cure (90+%). ES sought a second opinion prior to beginning treatment and received the same diagnosis and a similar treatment recommendation (CHOP without rituximab for 8 cycles).

ES decided to research alternative treatment methods. After evaluating his options and being placed on limited duty for treatment of his cancer, ES decided to forego the standard therapy and opted solely for complementary and alternative medicine(CAM) regimen. He began with 7 days of cleansing fasts and twice daily high colonics and then adhered to a strict raw vegetarian diet supplemented by multivitamins and essiac tea. After three months on this regimen with repeat cleansing fasts and colonics and his dietary restrictions, a mass was detected in his maxilla in the same area as his original cancer. ES decided against the recommendations of his physicians to undergo standard chemotherapy. Instead, he intensified his CAM regimen by adding enzyme therapy and 714X injections to his regimen. ES also had his dental amalgams removed for fear that the mercury contained in them might be contributing to his cancer. He was referred to a CAM clinic is Europe that he went to for one month on permissive TAD.

At the CAM clinic, ES received such tests as "dark field blood analysis", "computer regulated thermography" and "biological terrain assessment". His "treatments" included a mixed cooked and raw vegetarian diet, total body hyperthermia treatments, local hyperthermia treatments, magnetic and magnetic resonance therapy, every other day ozone injections alternating with vitamin infusions, deep colon hydrotherapy, mistletoe injections and homeopathic injections at acupuncture sites and into his kidneys.

ES continued on with his CAM regimen for several more months. He was evaluated several times and eventually the recurrent mass disappeared. No biopsy of that mass was ever taken so we will never know if it represented recurrent cancer or slowly resolving post surgical changes. A year after diagnosis, ES was declared in remission with no detectable disease on CT, physical exam or laboratory analysis.

ES then had a medical board, which referred him to a physical evaluation board. He was found fit for full duty and subsequently asked for a waiver to return to flight duties. His case was discussed at NAMI and after careful consideration a waiver was not recommended.

The waiver guide states that members diagnosed with non-Hodgkin's lymphoma (NHL) are considered for a waiver five years after diagnosis. However, a review of the NAMI database found that several pilots with NHL who had undergone standard CHOP therapy were waived at about two years after completion of treatment.

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NHL is a systemic disease at the time of diagnosis. Surgery is reserved for diagnostic tissue sampling and palliative relief depending on tumor burden and location. Systemic chemotherapy is the standard of care for all stages of disease. While the Ann Arbor staging system is used for prognosis, it is less accurate than with Hodgkin's disease since NHL spreads hematogenously early in the course of the disease unlike Hodgkin's which spreads via contiguous lymph nodes. The majority of NHL are of B-cell origin (about 85%). Diffuse large B-cell and follicular cell are the two most common types with over 62,000 cases of NHL diagnosed in the US in 2000. While the response to therapy varies with the type of lymphoma, diffuse large B cell tends to respond well if in the early stages and a patient has no poor prognostic factors (age >60, elevated LDH, stage 3 or 4 disease, more than one extranodal site and low performance status).

After extensive research into the CAM treatments ES chose, it was found that none of the treatments received have been shown experimentally to have any treatment benefit in cancer therapy. There is some debate about preventative measures from some CAM treatments, but this may be due to healthy lifestyle changes in general as opposed to the actual "treatments". There are also some palliative benefits, especially for late stage and terminally ill patients from some of the CAM treatments, but none of those employed in ES's case have any peer-reviewed studies to show they can achieve a cure.

Since ES had only been diagnosed 17 months ago and he had not received any treatment that we could consider curative he was denied a waiver by the standard approach. A Special Board of Flight Surgeons was then requested and granted so that a more thorough review of his case could be performed and objectively presented before a large group of Flight Surgeons with variable clinical backgrounds. All of the CAM tests and treatments were discussed in detail at the Board along with ES's current clinical status.

Since we can't find any cancer now does that mean he is cured? If so should we let him fly now or wait five years? If not, where is the cancer now?

We simply do not know. The initial tumor was small (1.2x.8x.4cm) and presented early with pain because of its location along the dental ridge. The tumor was therefore found earlier than most NHL, which usually have a greater tumor burden by the time of diagnosis. This does not mean that the disease had not already spread hematogenously. Since it was so early on in the natural history of the disease the metastatic cells may not have established a large enough tumor burden to be detectable yet by our standard screening techniques. If this is the case, do we need to worry about these potential micrometastasis before they become clinically evident? Unfortunately, since NHL has a propensity to metastasize to the brain, the initial manifestation may be a catastrophic neurologic occurrence. Unlikely? Maybe, but unfortunately we have no good data to go by since any recurrence rate studies assume patients have had standard chemotherapy and do not apply to ES who opted to use CAM treatments only. ES's oncologist stated that without chemotherapy he would recommend a five year waiting period to allow for the natural history of ES's disease to declare itself before allowing him back into the cockpit. The Board addressed all of these issues and then voted to not recommend a waiver at this time.

I did not know what ES's CAM modalities entailed until faced with presenting his case to the Special Board. I did extensive research in both the medical and lay literature to find out the details of these modalities. I found that while there is a lot of information out there, there is little scientific research. The primary care providers must educate themselves and their patients about the dangers and potential benefits of CAM techniques available. Even if we do not prescribe these "treatments" we are charged with the overall care of our patients. If we feel that a therapy is harmful we need to evaluate it closely and then educate the patient about the potential dangers. But, we must do so in as informed a manner as possible or we will be dismissed by our patients as uncaring and uneducated.

OK, enough soap box for one article. There were many more details in this case that were "edited" out in order to fit in this issue and not get too lost in the details. I hope you had as much fun reading this as I did preparing for the discussion at the Special Board.

Until next time…

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Complementary and Alternative Medicine

Americans make over 600 million visits to Complementary and Alternative Medicine (CAM) providers every year making it the fastest growing area in health care. With this is mind, it is important for providers in an Aviation environment to be aware of the types of alternative therapies available so we can offer appropriate guidance and advice. While the affects of complementary and alternative medicine are largely theoretical and/or anecdotal, this should not lead aviation medicine providers to completely discount the beneficial effects of CERTAIN modalities. A more informed Flight Surgeon is a better Flight Surgeon.

A 32 year-old male presented to his dentist with complaints of right upper tooth pressure in Sep 2000. An X-ray showed what appeared to be a bone cyst. A biopsy was performed and the pathology report showed diffuse large B-cell lymphoma of the right maxilla, intermediate grade. Laboratory data, chest X-ray, bone scan, CT of the chest, abdomen, pelvis, head and neck and a bone marrow biopsy were negative for disease outside of the right maxillary bone. A gallium scan and a PET scan were performed and also showed no sign of disease outside of the right maxilla.

Chemotherapy and radiation treatment were recommended by the Hematology/Oncology consultants at both the National Naval Medical Center in Bethesda and the Dana Farber Medical Center in Boston. After extensive research, this aviator chose to pursue complementary and alternative medicine rather than risk the long-term side effects of radiation and chemotherapy. His treatment regime included, but was not limited to 7-day fasting cycles, enzyme therapy, a macrobiotic diet, hyperthermia treatments, vitamin infusion treatments and deep colon hydrotherapies. As of December 2001 he remains in clinical remission. His intention is to continue a 7-day cycle of fasting with a 21-day enzyme regimen every 6 months for the next five years.

Many patients are reluctant to share information about their use of CAM therapies. The restrictive nature of aviation medicine makes pilots and aircrew even more likely to avoid full disclosure when CAM therapies are used. The unknown side effect profiles of most CAM therapies are the key component in decisions to limit their use in personnel involved with aviation. There is also little evidence-based medicine that specifically demonstrates the beneficial effects of herbal remedies, mind/body interventions, bioelectromagnetics or other biological treatments. On the contrary, some studies have shown chiropractic manipulation and acupuncture to be beneficial (www.ncbi.nlm.nih.gov and www.nccam.nih.gov) while not manifesting any apparent long-term side effects.

So how does all this apply to you as an aviation medicine provider? Always do a complete history and physical and don't forget to ask patients if they are "doing anything else for their condition" or if they are taking any OTC or herbal remedies. To date, there is not a policy letter that specifically addresses CAM or herbal medications. Flight Surgeons have had to use their best judgment. One of the Army Aerospace Medicine Residents is in the process of drafting a new Aeromedical Policy Letter (APL) that will specifically address the use of herbal supplements for both the Army and the Navy. In the interim, it is up to the Flight Surgeon in the field to ensure pilots are aware of the potential benefits and drawbacks of alternative therapies.

Bottom Line:

Keep an open and honest dialog with all aviation personnel. There are some modalities that may be used under the strict supervision of the Flight Surgeon, but if a pilot believes that alternative methods are going to be immediately discounted, they may choose not to disclose important medical information, putting them and their crew at increased risk. The ultimate fate of the pilot who chose CAM instead of conventional treatment has been determined. He was found fit for full duty as a Marine Corps Officer but found unfit for special duty involving aviation.

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Tales from the Sea (Carrier Psychology)

In this article we want to relate some sea stories and lessons learned based on our experiences as Ship's Psychologist (LCDR Jones) and SMO (CDR Lee) aboard the USS ENTERPRISE (CVN 65) during work-ups and deployment. Our deployment (Apr-Nov 2001) included combat operations in support of SOUTHERN WATCH and ENDURING FREEDOM. We begin with a sea story from LCDR Jones's first day on the ship and then offer a variety of perspectives on mental health issues at sea.

First day of school: Breaking in the new shrink

I (LCDR Jones) CODed aboard the Big E to begin my first sea tour about 6 months prior to our cruise. It was my first COD flight. Now I didn't really know what that meant, but I figured that since I was a pretty flexible guy I'd just roll with it. I had just detached from HQMC so I knew something about being Semper Gumby. Now it was just a tad annoying not to be given any real information about how long a flight it was going to be or where we were headed other than some nebulous patch of ocean called the VACAPES area. But I figured that's how things worked and since there were a number of other passengers in the same situation there was no use getting upset about it. Anyway I smiled to myself and thought how hard can this be? Piece of cake. I should have known I was in trouble when it dawned on me as I strapped into my seat that they really meant what they said about having no windows around us. And facing backwards? Now this was starting to get interesting! Ten minutes into the flight, the nuke sitting in front of me started tossing his lunch into a clear plastic baggie. I got hit with a few wafts of that stuff and my stomach started gurgling. I reached into my psych bag of tricks to pull out every distraction and relaxation technique I know of and for the next hour and a half valiantly fought off waves of nausea. About then the plane made a roller coaster turn to begin its approach to the carrier and I thought I was going to be a psych casualty myself—and I hadn't even made it to the ship yet! I braced myself for the thump at the end. We made a good landing and I told myself I was going to make it without getting sick. After we landed, we sat in the plane for a while and I started fighting back nausea again. My brain told me that another minute on the plane and I was going to lose it. Finally, the door opened and a fresh ocean breeze cleared my head. I walked off the plane a bit blanched, but no worse for the wear. CDR Lee met me on the Flight Deck and said, "are we glad to see you! We have a suicidal sailor waiting for you in Medical and a homicidal sailor from another ship who is going to be medevaced to us within the hour. Welcome Aboard!" As I waited for my bags I tried to get my bearings and make some sense of the activity and equipment noises going on around me. I looked a few feet away and saw the nuke standing there holding a rather full plastic baggie and I thought what have I gotten myself into now?

Psychology is a Flight Surgeon's friend

While Dr. Jones may have been wondering what he had gotten himself into, I (CDR Lee) knew just how much we needed a psychologist on the ship. I had been on board only two weeks myself and was managing four mental health patients that I had picked up through sick call. It was obvious to me that a significant percentage of the sailors we saw in sick call had a psych component to their physical complaints related to poor coping skills, motivational problems, job dissatisfaction, or interpersonal conflicts. While I had an interest in behavioral health from my days in pain management, I didn't have the background to provide the counseling support these sailors needed. I would advise new Flight Surgeons to get to know your psychologists as soon as possible in the work-up cycle. The pay off will be improved quality of life for patients, reduced attrition, and a decreased need for costly medevacs. In our situation, we spent a good amount of time during our first work-ups together developing an approach to handling psychology referrals that was applicable to both ship's company and the air wing. Obviously, we had a learning curve in managing and treating psychology patients, but we kept our focus on retaining people and returning them to work as soon as possible. We handled all psychology referrals on a consult basis. Routine cases were first medically evaluated by a provider usually through sick call and given a psychology consult. These routine cases were usually seen within a week to 10 days. Urgent and emergent cases were seen immediately, but still required a medical screening prior to be seen by the psychologist or psych tech.

About 4 months before our cruise, I made a decision to move Dr. Jones from a small office on one of our wards to a larger office frequently used by our Flight Surgeons. Since I didn't want the change to be perceived negatively, I talked with our Flight Surgeons, LCDR McArthur and LT Hughes about other arrangements we could make to accommodate their patient care needs. The new psychology office comfortably seated about 5-6 people and also doubled as one of our isolation rooms. The purpose of the change was to facilitate group interventions in managing cases. For urgent and emergent cases, we had developed an intervention approach that required that chain of command representatives (e.g., LPO, LCPO, DIVO) be involved as part of the initial interview process. Having the extra room, meant we could more easily facilitate these meetings. Chris and Mark were good sports about giving up the office because they saw the effectiveness of the approach, but the change did mean some inconvenience to them.

(Enterprise(top)extended on station and Vinson meeting in Southwest Asia 16 SEP 2001)

Rolling with the waves

Between Oct 00 and Nov 01, we conducted 219 new psychological evaluations from the ship, air wing, and other ships in the battle group. Of that total, 105 (48%) of the evaluations occurred during the pre-deployment work-up cycle. One hundred fourteen (114) (52%) were conducted during deployment. Early in the cruise, the highest percentage of referrals related to junior personnel E1-E3. About mid-way in the cruise, we started to see more E4-E6s, as well as a few chiefs and officers. Overall, about one-fourth of our total cases were emergency or urgent care cases involving suicidal or homicidal ideation/behavior in response to a range of problems including relational, occupational, or legal stressors. Over the course of the work-up cycle and deployment, our psychology "business" came in fairly predictable waves. In counting new patient referrals, our three busiest periods were the month long combined COMPTUEX and JTFEX 4 weeks before our deployment (28 new cases), the first month after our deployment (27 new cases), and our 6 weeks in the Persian Gulf (in August) about four months into the cruise (24 new cases). Interestingly, we had very few new patient referrals in the weeks immediately after the 11 Sep terrorist attacks. We saw a gradual increase in referrals during the days just prior to our first strikes against Afghanistan (07 Oct 01). At the time, it was uncertain what our role would be in military action against the terrorist network. New patient referrals decreased to almost zero as the ship and battle group moved into high intensity operations in support of ENDURING FREEDOM. After several weeks of combat operations, we saw a slight increase in referrals as it became clear we would be extended on station a few weeks past our original return date. In the week prior to our return home, we had a few urgent cases as long-standing relationship problems at home came to a crisis point for a few sailors. Now that we're in the yards, we're facing a new set of challenges. Sea duty is a much more controlled environment than shore duty. In port, sailors have increased opportunities to get into trouble—and they do.

Closing the door on administrative separations

In CY 2001, we did not have any administrative separations for Personality Disorders. Yes, that's right, zero. It's not that we didn't have any sailors with Personality Disorders. We're sure that through some randomized process in Navy manpower we ended up with our share. The difference was that we weren't going to let any of them leave the Navy for "personality problems." Our CO made a decision about six months prior to cruise that he was not going to separate sailors for Personality Disorders, including those recommended for expeditious administrative separations. He made it clear that he intended to take all his "friends" to sea. Of course, in supporting this retention strategy we in Medical had to learn some new things about risk management. Sailors whose behavior was incompatible with naval service would be held responsible for their actions. Eventually these

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sailors might be separated from the service, but only after a pattern of misconduct was established. These sailors would then leave the Navy, but with an Other Than Honorable Discharge or worse. In short, our command did not believe that first term sailors who failed to maintain proper military standards due to personality problems or poor coping skills should receive discharges that would allow them to retain their benefits.

In God we trust, all others require data

In getting to the truth of what was going on our troubled sailors, we found we needed to obtain information from multiple sources to get the most accurate picture of what was really going on. Sources of information we found most helpful included co-workers, work center and department supervisors, previous medical providers, and family members. The better the information we had, the better able we were to make effective diagnostic and treatment decisions. One of the great advantages of shipboard medicine over shore-based support is the speed at which we are to obtain information from various people in the command and the amount of input available regarding work performance, liberty behavior, social interactions, and financial and legal concerns. So how do you learn about being a better "truth detective"? Probably, the best place to begin is seeking input from your chiefs. In fact, if you want to strengthen the interviewing skills that most of us learn in graduate or medical school, then get some "advanced" shipboard training by observing a Disciplinary Review Board, XOI, or Captain's Mast. Through years of experience at sea, senior enlisted leaders and line officers acquire very effective skills at cutting to the chase with their troops to get to the heart of the matter regarding accountability and responsibility. We in medical can learn a few things here. Part of our work as clinicians is to develop our own base rates for various behaviors so that when we see patients we can place their behavior within the context of their communities or squadrons. Overall, we deal with a fairly healthy group of people in the fleet. The most common diagnoses will likely be: Occupational Problems, Adjustment Disorders, Alcohol Abuse, or Partner Relationship Problems. Beware of over-diagnosing sailors; some have learned to play the "psych" game when it suits their needs. Some sailors view Medical not as a helping resource, but as an avenue to get out of the Navy prior to EAOS. They want out of their contracts and feel that Medical affords them an "honorable" way to do so. If they can receive a diagnosis such as a Personality Disorder, some of these sailors felt entitled to leave the Navy because they believed they had a "medical" reason to go home. Of course, it's the CO's call on these type of separations.

It's a marathon not a sprint

In operational medicine, we all have to prepare for the long-haul. Patient care during extended underway periods can be very demanding. If you look to have some fun, there are enough absurdities to life at sea to keep you in good humor. So in summary, how did we make all this work for us?

- We took care of ourselves by ensuring that we stayed in good physical and mental health through proper nutrition, adequate sleep and regular exercise.
- We fostered a climate of teamwork and cooperation in our Department and with the ship.
- We worked to get the pertinent facts of each case. This allowed us to reduce the amplification of symptoms by sailors and to address the real reasons for their behavior.
- We showed patients that they have options and that help and counseling support were available.
- We held sailors accountable for their actions and provided guidelines on acceptable behavior.
- We ultimately found sea duty itself to be therapeutic. It provides opportunities for growth and skill development that sailors can take with them wherever they go in life.

Our troubled sailors may not have turned into superstars. Many, however, have learned to become average sailors who have learned to do their jobs and keep their commitments. In our book that goes into the win column.

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Doctor Death

Drinking Yourself To Death

Greetings once again from the Psychiatry Department here at NAMI. This is my second article for *CONTACT* that is based on both my experience as a Flight Surgeon and from following Navy and Marine Corps active duty fatalities since May 1984.

As in the previous article ("Suicides At Sea." *CONTACT*. Vol. 26, No. 2, p21-22,56) - I would like to discuss active duty Navy and Marine Corps deaths over the last eight years associated with a specific cause. In this article, I will review deaths associated with alcohol ingestion. To be specific – I am not talking about suicides or traditional accidents in which the victim was intoxicated – I am referring to people who die directly as a result of alcohol. This phenomena frequently brings national attention to colleges after students die while "binge drinking." As discussed below – it happens also in the Navy and Marine Corps.

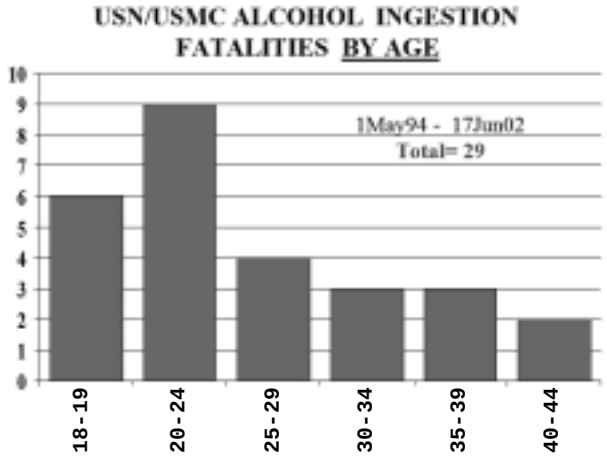
Just as with suicides, I would suggest that a sailor "drinking himself to death" is a very "high visibility" occurrence and a review of previous alcohol ingestion related deaths might be helpful in our efforts to prevent future similar deaths.

The information in this article is from a personal study of all Navy and Marine Corps active duty deaths since 1 May 1994 when I began to track them. It is not official Navy or Marine Corps data.

To put this topic in perspective. Since 1 May 1994 until early June 2002 (as I write this article) there have been about 3141 Navy or Marine Corps fatalities while on active duty from all causes. The major contributor over this time can be classified as "accidental" (54%). Of these "accidents" I have noted 29 or roughly 4 per year to be associated with the direct effects of alcohol.

In reviewing these 29 alcohol deaths, I offer the following comments.

As shown in Figure 1 the majority of these deaths are in younger Navy and Marine Corps personnel. 15 of the 29 deaths (55%) were in people 18-24 years old. Similarly (as shown in Figure 2) the more junior ranks make up the majority of these deaths. 22 of the 29 deaths (75%) were in the ranks E1-E4.



(Figure 1)

Blood alcohol levels were not published for all these deaths – but for the ten I am familiar with – the average level at autopsy was 439 with a maximum of 650 mg%.

There was no specific pattern to these deaths – but here are some phrases that appeared with minor variations in the casualty reports:

- "at a party drank 4 mixed vodka drinks and 6 beers then went to friends home and consumed 2 more beers and ½ bottle of vodka"
- "FR and SR had drinking competition"
- "went to a park and consumed beer heavily through the night"
- "while on camping trip with friends, member expired from choking on own vomit due to excessive alcohol consumption"
- "the member was put to bed and the next morning was noted to be dead."

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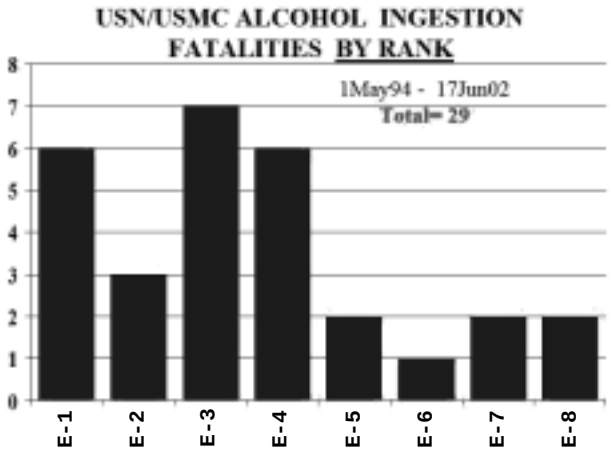

(Figure 2)

(continued from page 21)

So having described the Navy's experience with "drinking and dying" over the last 8 years – here are some questions that come to mind:

- How are you, the reader of this article, addressing admittedly this small (but potentially deadly) risk to the sailors and marines at your command?
- Do you address binge drinking in your Indoctrination classes?
- How sure are you that your command follows up 100% of those with alcohol related incidents and/or a diagnosis of alcohol abuse or dependence – to ensure they are evaluated and treated appropriately?
- What is your protocol for the Officer of the Deck to provide guidance as to the disposition of intoxicated crewmembers returning late at night to your ship or Fleet Landing? Specifically, is it up to the OOD's "best judgement" as to when a returning crewmember requires medical evaluation before he or she is allowed to go to their rack unescorted? Or do you provide specific indications (e.g. cannot walk without assistance, is somnolent and cannot be aroused, etc) that require medical evaluation?

  (Hopefully, your commands are not "clam-shelling" the intoxicated and agitated crewmember by placing him inside two Stoke's stretchers as was once done.)

Hopefully, some of these questions cause you to be slightly uncomfortable. Intoxicated individuals are by definition "high risk" but those risks can be managed through education and appropriate management.

For more information please visit

http://www.edc.org/hec/pubs/binge.htm for the findings of a survey of college student drinking recently completed by the Harvard School of Public Health.

http://www2.potsdam.edu/alcohol-info/ for a discussion of Alcohol use and abuse and effective ways to reduce drinking problems; topics include health, drunk driving, advertising, binge drinking, and education.

If your command is interested in having me present a multimedia presentation on the "top ten" causes of death at a safety standdown - please contact me.

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NASA News

Space is the Next Port of Call for Navy Docs

In this time of transition for our nation, the military has been thrust to the forefront of news. The media routinely highlights the works of our Naval forces stationed 24 hours a day on board ships, in remote field locations and at shore stations around the globe. But how much media coverage focuses on our shipmates training to serve in an environment considered by many to be out of this world?

For a few successful Navy professionals, their skills, career experiences and a little luck cultivated an opportunity that most of us have probably dreamed of at some point. Their ship actually flies and their duty station is with the National Aeronautics and Space Administration (NASA).

CAPT Lee Morin, MC; CDR Laurel Clark, MC; and CAPT Dave Brown, MC, three of the Navy's finest Flight Surgeons, are participating in two of this year's missions with the Space Shuttle program as mission specialists.

Traditionally, the Navy's role is identified as an integral part of our national defense. Navy astronauts, however, are part of the offense due to the research they conduct as part of the space program. Much of the work done on the ground and in space is proactive, in that it seeks to answer tough questions or find solutions to scientific problems. While all astronauts share common experiences in training, their missions, STS-110 and STS-107, have distinctly different flavors.

Brown and Clark are scheduled to launch in July aboard STS-107. During their 16-day mission, the focus will be on research and the Navy doctors will be very busy. As mission specialists, they have overall responsibility for payloads and experiment operations, as well as training in the details of the onboard systems. Their medical expertise makes them well suited to conduct what NASA refers to as "life science" experiments.

NASA will be flying bone cells and prostate cancer cells together for the first time, looking at the biochemical signals between them that enhance or are involved in the transmission of prostate cancer early

and aggressively to bone. The hope is that the experiment and observation will offer an understanding of this process in order to help advance the development of a therapy. "Prostate cancer doesn't kill people, it's the bone metastases that kill people," Clark said.

Brown will spend some time conducting physical science experiments related to combustion research and soot emissions. In a microgravity environment, combustion does not act in the same way as on earth, allowing researchers a different perspective on its basic characteristics. "In microgravity, a flame has no distinct shape, because gravity is what gives it the shape that we are familiar with," Brown explained. By studying soot emissions, researchers hope their findings help identify methods that can be used to curb their rapid expansion. "People throughout the world burn fires and our projects will hopefully help with the reduction of soot, which is a major pollutant," he said.

STS-107 will be bustling with activity for the entire duration of its mission, with many projects on board. Medical research will also look at protein turnover and calcium kinetics when humans are exposed to microgravity. Four crewmembers will be studied before, during and after the flight, to try to answer the question of why microgravity contributes to bone loss.

Another medical experiment will grow stremmal bone cells inside a bioreactor. This equipment is also used on earth to grow cell cultures. "The advantage of growing the cells in space is that it more closely replicates the production of cells in the human body," Clark explained. Other studies will assess the effects of antibiotics on different strains of bacteria at a cell and cell culture level.

"We will also be doing some research for a group of Dutch scientists who are trying to treat patients who have trouble with their blood pressure when they stand up," noted Brown. This condition, known as orthostatic hypertension, affects astronauts for a few hours after a flight. The Dutch scientists will examine the astronauts immediately after landing to help further their studies related to this problem.

In contrast to STS-107 and its research focus, STS-110, Morin and other members of the crew will concentrate on the continued construction of the International Space Station (ISS). Time in orbit will be much shorter, with only nine days scheduled to complete assigned tasks. When asked how he feels about his April mission, Morin said succinctly, "I'm pretty excited."

The STS-110 orbiter Atlantis will spend the majority of its time in orbit docked with the ISS to facilitate the addition of new structural elements. The crew is taking up the first piece of a large truss that will eventually be hundreds of feet long and hold the solar arrays that provide electrical power for the station modules. This first section just fits in the shuttle's cargo bay, at about 40 feet long, and weighs about 30,000 pounds.

Installing the truss requires the performance of four extravehicular activities (EVA) or spacewalks. Morin will make two EVAs, installing two struts that help support the main truss. Other related tasks include installing configurations and cables along with fellow mission specialist, Jerry Ross. The EVA with Ross will mark a small milestone in NASA history. "Our spacewalk will be the first with two grandfathers," he remarked.

Working in space presents a whole new set of challenges for astronauts. Morin is quick to point out that working in microgravity does have some connections with his medical past. "It's a lot like sterile technique in the operating room, where you have a protocol that you follow in terms of levels of protection and handling of equipment," he said. "Actions must be very disciplined, almost deliberate, even when you're getting tired."

Losing equipment while floating in space can pose a great risk to the mission. "Space debris is a real hazard, because with orbital mechanics, it may be moving away from you and a half hour later, it comes back and bangs into you," he said. "In addition, you may lose a critical tool to do your job."

To help compensate for these difficult working conditions, NASA has designed every dial, knob and tool to be user friendly and efficient. They also acclimate astronauts to EVA-like conditions by training them in the Sonny Carter Neutral Buoyancy Laboratory (NBL) at Johnson Space Center. The lab houses a large water tank that helps to simulate microgravity conditions, and is named after a fellow Navy Flight Surgeon and astronaut, the late CAPT M.L. "Sonny" Carter, MC. "Other people who have been in space have said that your feel right at home after this training," said Morin.

Morin will also continue the further development

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of on-orbit exercise equipment that aims to help people stay fit while living in microgravity. Additionally, he'll be acting as the crew medical officer, tending to any medical needs that may arise.

"One great challenge in rendering medical treatment in space is how the patient is restrained in a microgravity environment. To administer CPR, you basically stand on the ceiling and push down against the patient's chest," he explained. If he gets a chance, Morin would like to spend some time testing the Advanced Cardiac Life Support equipment on the space station so he can give a physician's perspective on its use.

Some may ask what the advantages of doing research in space are, especially considering that time is limited, quarters are tight and costs are high. Brown offered some interesting insight, "Science typically tries to control variables and change one, but in microgravity you can actually eliminate some variables. By eliminating variables, it allows researchers to understand very basic fundamental physical principles and that's why you go to space," he said.

Before being assigned to a specific mission, astronauts spend years in training and evaluation. As an example, Clark, Brown and Morin were selected as part of the 1996 astronaut class, but 2002 will mark the first time any of them will travel in space. The application process includes a stack of paperwork and competition is fierce.

Naval personnel have been a large part of the astronaut program, with 96 out of 310 astronauts selected coming from the Department of the Navy, according to NASA records. Seven of those have been Flight Surgeons. "Navy involvement in the space program dates back to the original seven astronauts in 1959," said Duane Ross, manager of the astronaut selection office at NASA. In fact, the first American in orbit, the late Alan Shepard, was a retired Navy Rear Admiral.

When evaluating candidates, NASA looks at applicants who can bring a broad base of skills and abilities. "The thing we look at when we evaluate a candidate is good operational experience and how applicable the experience may be," explained Ross. "Just a clinician is probably not what we're looking for. Doc Brown flew jets, Laurel did a lot of work with divers and Lee is an absolute genius and can build just about anything."

To say this trio is an accomplished group is certainly not an overstatement. Each one of them brings a diverse skill set gathered from working in very challenging environments.

Morin appears to have an insatiable appetite for education. To complement his Doctorate of Medicine degree, Morin's educational background includes a Doctorate of Microbiology and a Master of Public Health. He is qualified as a Diving Medical Officer as well as a Submarine Medical Officer. During his career, Morin has developed software used in a multilingual voice translator and he has written much of the 5000 plus pages of software that STS-110 will employ.

Operational experience has been familiar territory for Clark. She has been on numerous deployments, including one to the Western Pacific. Clark also spent time assigned to Submarine Squadron Fourteen in Holy Loch, Scotland. Her military qualifications are diverse, including Radiation Health Officer, Diving Medical Officer, Submarine Medical Officer, as well as Naval Flight Surgeon. Medical accomplishments include Advanced Trauma Life Support Provider and Hyperbaric Chamber Advisor.

From the time he was a young boy, Brown dreamed of flight. "I still remember my first airplane flight, watching the wheels while we rolled down the runway so I could tell the exact moment we were airborne," he noted. After joining the Navy as a physician, Brown completed Flight Surgeon training and spent some time on deployment in the Western Pacific. In 1988, Brown was the only Flight Surgeon to be selected for pilot training in a ten-year period. He graduated number one in his class and earned his designation as a Naval Aviator. During his career, Capt. Brown has logged over 1700 hours in high performance military aircraft. He also owns two airplanes and operates them from an airstrip located behind his home.

For Clark, Brown and Morin, the choice to apply to the program was natural once they found they met the criteria of a qualified applicant. "Once I was aware of the space program, it was an easy thing to apply," Clark said. For Brown and Morin, the space program was a logical transition in their careers. "I was a Flight Surgeon, then flew jets, so I saw the space program as the next greatest challenge," Brown explained.

All three are very satisfied with their choice to join one of the world's leading scientific and opera-

tional communities. "I felt that if I had never applied, I would always wish that I had," said Morin.

As a mission draws near, personal time for astronauts becomes very limited. "Once you get assigned, you set aside pretty much all of your hobbies and interests to get ready for the mission," said Morin. Clark shared an analogy that most Navy personnel can understand. "It's like the time before a deployment, you're not thinking about your recreation time or softball team."

Each had a uniquely different answer when recalling a favorite point in the training program.

- For Clark: "Going to Russia to train for weightlessness in their 0G aircraft. That was wonderful."
- For Brown: "Riding bicycles through the tulip fields outside Amsterdam during our time training with Dutch researchers."
- For Morin: "Seeing the vehicle that we were actually going to fly, climbing around on it in bunny suits and realizing that it wasn't a model."

Although it may take years to return to space after their missions are over, the three Navy doctors look forward to the opportunity. Capt. Morin sums it up best, "We'll worry about first things first, but I hope I get a chance to go again. Right now, there are over 100 astronauts and the number of flights will only be about four per year."

The space program may seem like a lofty goal to some, but for Laurel Clark, Dave Brown and Lee Morin, their hard work and success throughout their careers helped to open doors in ways they never imagined. "I feel very fortunate to be where I am. Some of it was due to career choices but some of it is simply good fortune," Clark noted.

When asked what advice they would pass on to Navy colleagues or anyone who might want to follow in their footsteps, one should reference the emphatic philosophy of Dave Brown for guidance. "If you get an idea in your head that there is something you really want to do, just go do it. You have to live your life today and do the things that are right for you," he said. "If the path opens up to other things, then that's great. But don't ever underestimate yourself."

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Puckett's Perspective from PERS

In my last article, I discussed some salient points in PSR Top Sheet. Before we take a look at Parts II and III, you will want to access your PSR on line at http://www.staynavy.navy.mil Please take the time to access and download your PSR now. If you experience any problems accessing your file, please contact the BUPERS Help Desk at (901) 874-4714, DSN 882-4717.

Parts II and III of the PSR are often referred to collectively as the "PSR bottom sheet." Part II contains fitness report information prior to 01 January 1996. Part III summarizes performance since 01 January 1996. While both Parts II and III are reviewed by a selection board, the information in Part III reflects a member's most recent performance (i.e., in their current grade) and consequently receives the more detailed review. That being the case, let's focus on the PSR Part III.

As you review individual line items in Parts II and III you will want to have your personal copies of prior fitness reports on hand for line-by-line confirmation. Occasionally, albeit infrequent, an error is made in the automated fitness report-to-PSR transcription process. Bottom sheet corrections should be sent to PERS 311, DSN 882-3313/3315/3316. Their website offers additional information at: http://www.bupers.navy.mil/pers311/customer.htm

After you have validated the general biographic data of name, designator, SSN, etc., take a look at the first row of information. Each block of data is derived from a specific block on that particular fitness report. "PG" is the member's paygrade from block 2; "Station" is the duty station from block 7; "Duty" is the first 14 characters from member's primary duty in block 29; "Dates" are the inclusive dates from blocks 14 and 15; "MOS" is the length of the report rounded to the nearest whole month; "Reporting Senior" information is drawn from blocks 22, 23, and 25; "Traits" is broken out by the total number of marks for that specific grade in blocks 33 through 39 (for medical corps officers, there should generally be a total of 6 marks).

Next comes the "Average" section which contains key information but can be a little tricky to interpret.

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"IND" is the individual's trait average for that report. It is calculated by dividing the summary of traits for that report by the total trait count. "SUM" is the summary group average for all fitness reports in that specific summary group. "R/S" is the total number of reports on file for that reporting senior for that paygrade regardless of designator. "R/S CUM" is the reporting senior's cumulative average calculated by dividing that reporting senior's total trait summary of all accepted reports by the total trait count from the number of reports listed above the R/S CUM. Said another way, the R/S CUM is the average grade of all fitness reports that reporting senior has written for that paygrade throughout his/her career.

The last major section is the "Promotion Recommendation" for that summary group. It provides both the individual's promotion recommendation (denoted by an "X") and the total number of individuals with that promotion recommendation in that summary group.

Now that we've dissected Part III, let's step back and take a look at what the information tells us and what we typically see on competitive records.

First, information in the "duty" block should show a progression of responsibilities as described by job title. A record noting division officer-level jobs followed by department head and even directorate-level responsibilities is much more competitive than one that stagnates at flight surgeon or department head.

Next, look at the traits grade section. Competitive records tend to show grades skewed toward the right. Grade progression across multiple reports is particularly important when comparing fitness reports from the same reporting senior and while in the same billet.

The averages section can be very informative and helpful to a selection board. Records that break out on top are those where the member's individual average tends to be higher than the summary group average. However, don't loose heart if an individual average on a particular report is closer to (or perhaps the same as) that summary group's average. That is not uncommon on a member's first report either at a new command or by a new reporting senior. The reporting senior's cumulative average can help the board get a sense of how that reporting senior grades, i.e., is he/she a tough grader or are his/her grades typically higher than other graders. The best records tend to have an individual's average both higher than the summary group average as well as above the reporting senior's average.

Last, the promotion recommendation section can give a quick, bird's eye view of an officer's performance trends over time. A few pearls from this section are: the more EP's the better; getting an MP when the reporting senior chooses not to assign an EP for that summary group sends the board a clear message; however MP's are not necessarily fatal (particularly if followed by higher recommendations by the same reporting senior); and avoid a series of "1 of 1 EP's," they typically tell the selection board very little about an officer's performance as compared to others. The promotion recommendation block is the reporting senior's personal recommendation on whether to promote an officer or not. Those records that consistently identify an officer's performance as superior to his peers and those that maintain recommendations for early promotion fair better at selection boards than those that do not.

Being mindful that this is my last article while serving here at BUPERS, let me share a heartfelt thank you for the opportunity and honor to serve as your assignment officer. As you may know, this is the first time in many, many years that an operational medicine physician has served as detailer for our community. Armed with the sage counsel of so many accomplished, operationally savvy shipmates, as well as with the drive and enthusiasm of our younger, first tour colleagues, I feel we have made a difference. Together, we have ensured our afloat and deployed forces are supported with the best-trained, most capable physicians our country has to offer. For your insight, your wisdom and your friendship I am most grateful. This tour has been far more rewarding and gratifying than I ever expected. I am sure that my relief, LCDR Tim Halenkamp, will similarly benefit from having the opportunity to work with you.

Best wishes for continued success in your career. Fly safe, aim high and shoot true.

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Low Pressure Chamber Training (Historical Review)

On the following pages are two articles discussing Low Pressure Chamber(LPC) training. I want to thank CAPT Frank Dully (retired naval Flight Surgeon) and Rogers Shaw (Airman Education Programs, CAMI) for allowing me to publish their articles as the examples of debate that can be found whenever this topic is brought up. While researching LPC training, I had the opportunity to probe the thoughts of many different specialties and players. LTCOL Andrew Huff (Air Force RAM and editor of Flight Lines) put me in touch with COL Benton Zwart(Hyperbaric Medicine Consultant to the USAF Surgeon General) and COL James Dooley(Chief, Hyperbaric Medicine Division USAFSAM/FEH) to learn about the Air Force experience and thoughts. I talked with NAMI staff, and received e-mail correspondence from CAPT Terrence Riley(Flight Surgeon Neurologist), CAPT Louis Antosek, and even an Ethicist discussing the morality of the issue. Civilian training units even returned my queries.

The risk of Hypoxia Training is well described and seems to have little debate. CAPT Dully presents a risk of 0.1% for decompression sickness(DCS) while Rogers Shaw found 0.03% (4/15412) at the FAA for student training and makes reference to Navy and Air Force studies showing 0.1%. More recently, LT G. Merril Rice, in a study to be submitted for publication, found an incidence of DCS at NOMI Det Central hypobaric chamber of 0.25%. The most recent Aviation Space and Environmental Medicine. Vol 73, No. 4, p395-398 reports on the Japan Air Self-Defense Force hypobaric training finding an incidence of DCS of 0.05% from 1960-1998. This is a great improvement over the original results found at the Altitude Training Activity Maxwell Field, Alabama as reported by Motley, "Studies on Bends," Aviation Medicine. Vol. 16, No. 4, AUG 1945, p210-233. Motley found 9500 cases of DCS occurred in 68,422 trainees(13% incidence) from the opening of the chamber in the fall of 1941. Throughout the course of instruction, the flight profiles were changed to shorter and less severe flights as well as the introduction of prebreathing oxygen. The original trainees were experiencing DCS rates of 27.4% while the 1944-45 trainees were having rates of only 7.3% with the profile changes.

While diving DCS is felt to have long term consequences, I was unable to find any literature finding the same to be true in altitude DCS. It makes sense that diving DCS would be a more severe disorder given the multiples of atmospheres that can be achieved, time at these multiples, and surfacing exacerbates the situation. On the other hand the change in atmospheres experienced in altitude DCS is no greater than 1 and returning to the surface does not exacerbate the situation. CDR Porter, NAMI Neurology, was not aware of any cases of irreversible altitude DCS disability. The use of the COG-AE screen may be something to consider to better examine for subtle changes. Given the low incidence and the reversible nature of DCS, it can be said that the risk for DCS from Low Pressure Chamber training is minimal.

Barotrauma is another risk often experienced in the chamber. LCDR Chuck Wilson reports an incidence of 3.1% in a 15 month retrospective review while LT G. Merrill Rice found 3.3% in his study. CAPT Dully describes a 2.5% incidence in his article while Rogers Shaw is using 7.9% if Aerotitis Media and Aerosinusitis are considered to have occurred separately in the FAA trainees. The Japanese study found Aerotitis Media to occur with an incidence of 5.4-7.2%. Smedal, "The Treatment of Aero-Otitis Media by Redecompression," Aviation Medicine. Vol. 14, No. 4, AUG 1943, p211-215, reported approximately 12% incidence of "ear block" in more than 10,000 individuals in the LPC at U.S. Naval Air Training Center Pensacola.

Again, no long term complications have felt to arise from the barotrauma cases. CDR Jay Phelan, NAMI ENT, is unaware of long term disability due to LPC flights. AGE has not been reported and the decompression demonstration has been altered to minimize this risk. So again, both sides of the debate on LPC training seem to agree that the risk is small.

The conflict arises when balancing the small risk against the benefit. Many will argue strongly, as do Mr Shaws and quite a few others I spoke with, that the benefit of experiencing your personal hypoxia syndrome far outweighs the risk. Many others besides just CAPT Dully will argue that there is little benefit and therefore the risk, albeit small, far outweighs the benefit.

(continued on page 28)

(continued from page 27)

The benefits of LPC training are difficult to objectively document and therefore explains why there is debate. As with all preventive interventions it is difficult to quantify the outcome unless a true experiment is carried out. This has not occurred with LPC training so we are left with anecdotal reports. The Canadian aviator with hypoxia in the article by LT Jorge Garcia-Zuazaga in *CONTACT,* Vol. 26, No. 1, JAN 2002 p37-39 told the Flight Surgeon that his recent experience in a LPC training allowed him to properly recognize his hypoxia. Other Flight Surgeons, physiologists, and pilots have related similar stories. LTCOL Andrew Huff describes another benefit, "demonstration of the dangers of hypoxia encourages young, invincible aviators to respect their oxygen system and check the back up systems (masks)." It would appear that a survey of pilots using the new NOMI Survey Solutions Software (CAPT Dudley at jsdudley@nomi.med.navy.mil) may help to better quantify the benefit as would a pre and post chamber psychological test to measure reaction/change.

At the same time, despite the training on hypoxia, we hear stories of the pilots off oxygen at altitude taking pictures of one another. There are still mishaps blamed on hypoxia despite the initial and refresher training. CAPT Dully makes the case that the symptom complex in flight with all the other stressors will be much different than in the controlled chamber settings. Smedal, "Observations on the Results of Indoctrination of Aviation Personnel in the Use of Oxygen Equipment in the Low Pressure Chamber at Pensacola, Florida," Aviation Medicine. AUG 1943, p206-210 discusses their conclusion after watching 6000 flight students go through the training. "During the two to three month interval since their indoctrination, some seem to have forgotten most of what was taught them. They are not at all 'mask conscious' and will often place the mask upon their face upside down and wonder why it does not fit."

Although the benefit is not clearly defined, it may exist and be saving lives. So take a step back and ask what is the goal of training? Is it to experience low pressure or to experience the effects of low oxygen?

Ballooning in the late 1800's caught the attention of Paul Bert in France who published in 1878 *La Pression Barometrique* in which he described the first LPC and experiments used to discover principles of the body's reaction to reduced barometric pressures. The first low pressure chamber in the United States was built during World War I in 1917 at Mineola, Long Island as part of the Medical Research Laboratory of the Army Air Force. It was dismantled after the war as concentration on the engineering factors of flying became the main research thrust to the detriment of human factors research.

The civilian institutions, Harvard and Columbia, developed Low Oxygen Rooms instead of Low Pressure Chambers to research man's response to hypoxia. McFarland,"A Comparative Study of the Effects of Reduced Oxygen Pressure on Man During Acclimatization," Journal of Aviation Medicine. Vol. 9, No. 1, MAR 1938, p.18-43 found in a study comparing the Low Oxygen Rooms at Harvard and Columbia with the LPC at Wright Field, Dayton, Ohio that "…aside from the effects on the ear drum of increasing and decreasing pressures, the physiologic and psychologic consequences of a given oxygen pressure were the same whether produced by adding nitrogen to the air at atmospheric pressure or by decreasing the total pressure in a vacuum chamber.(cf. Tables I and II)."

Despite the findings that the hypoxia was equivalent, the military had other goals for its Altitude Training Units. Not only were they to teach about hypoxia, but also classify pilots by their susceptibility to DCS. Wigodsky, "The AAF Altitude Training Program," Aviation Medicine. Vol. 15, No. 3, JUN 1944, p.190 stated one of the Army Air Forces' 5 principal objectives was "..to identify, through such experiences in an altitude chamber, those individuals who have physical or mental characteristics which make them unsuitable for high altitude flight." The Navy literature from the same time period describes indoctrination flights followed by "classification" flights which determined what aircraft a pilot would fly depending on his reactions in the LPC. And thus in the 1940's both services built many LPC's to aid in the classification. Low Oxygen Rooms were forgotten.

By the end of the 40's, multiple articles began to appear from authors in both services stating that the "classification" of pilots using the LPC had failed. I was unable to find the data that led these authors to that conclusion. In the discussion at the end of Wigodsky's paper, CAPT J.C. Adams reflects on the Navy's LPC training program and states "This training program of ours is what it says it is. It is a train-

ing in indoctrination. It varies in that extent from what the early program was, in that at the time we attempted classification of personnel with reference to high altitude susceptibility. We had to forget this part of the training because we found that our limits did not establish a true and valid measure of an individual's susceptibility." The Altitude Training Units continued their hypoxia training. The use of Low Oxygen Rooms was not mentioned in the literature probably as a result of LPC's already being in place and capable of the mission.

Research in Low Pressure Chambers has led to many advances in modern aviation. However, routine indoctrination of aircrew again raises the question, "What is the goal of the training?" Since classification in a low pressure environment has been removed, is there a need to experience low pressure and the small risks involved. OPNAVINST 3710.7S, Appendix E, Naval Aviation Survival Training Program (NASTP) Requirements, NASTP Curricula Outline, "C. LOW PRESSURE CHAMBER(LPC) BRIEF/FLIGHT. Classroom and Laboratory presentation on the various oxygen systems, proper equipment use, a review of the LPC flight profile, and reinforcing the effects of altitude on the human body with the corrective action required. The training device evolution is a simulated altitude flight in the LPC. LPC Flight profiles are per the CNO approved curricula. Reduced Oxygen Breathing Device (ROBD) training, when available, can be substituted for the LPC Flight."

CAPT Dully makes the case that though the risk is small on a population basis, to the affected pilot and his family it was an unacceptable risk. However, Hypoxia Training, which many strongly argue is of great benefit, can continue with even less risk. The Low Oxygen Rooms of the 1930's can be brought back.

My gut instinct tells me that Hypoxia Training is a wonderful primary prevention tool. I remember wanting to be the guy who gutted it out the longest in the chamber, and being humbled how quickly my mind failed me. It left a lasting impression that I want to have oxygen available at altitude, not that I could recognize my personal subtle signs of hypoxia. I was one of LTCOL Huff's invincible people who was humbled by the experience it could happen to me. I do not believe the ear and sinus pressure changes or gas expansion are a necessary part of the training. The underlying physiology of that experience is too variable to have a few chamber flights provide meaningful true experiences.

LT G. Merrill Rice has an article in this issue discussing the Reduced Oxygen Breathing Device (ROBD) as a possible solution to the risk of our current hypoxia training. The Royal Australian Air Force at www.defence.gov.au/news/raafnews/editions/4405/story01.htm on 28 MAR 2002 touts itself as the world's first to introduce a revolutionary technique to eliminate the risk of DCS at it's hypobaric chamber using its Combined Altitude Depleted Oxygen (CADO) Hypoxia Awareness Training Protocol." COL Benton Zwart at Brooks Air Force Base is looking into Reduced Oxygen Breathing Environment (ROBE) research doing much the same thing.

I again thank all those people that took the time to educate me on the nuances of the risk/benefit equation of LPC training. The opinions on its usefulness runs from one end of the spectrum to the other, but all approached their differences in a very professional manner and respected the other's difference in opinion. Please fill in gaps or reference other data that you feel is pertinent to this review by sending a Letter to the Editor via CAPT Mike Valdez, mrvaldez@nomi.med.navy.mil or CDR Lou Valbracht, levalbracht@nomi.med.navy.mil. This may also be a topic which could be discussed on the NOMI forums at forum.nomi.med.navy.mil/forum.htm

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(RAMs challenging CAPT Valdez's Flight Suits only when flying rule)

Unresolved Hypoxia Training Issues

The classic hypoxia training evolution in an altitude chamber that has been the accepted practice for almost 60 years is flawed in three ways; it misrepresents reality, it ignores ethical standards having to do with the dignity of man, and it routinely courts risks uncommonly found operationally. Safer alternatives that could resolve these issues are available. It took me years to figure this out.

(CAPT Barker thanking LCDR Kleinberg for 3 years as Treasurer)

It never would have occurred to me in September 1965 to question the wisdom of a U. S. Navy training procedure well steeped in tradition. I accepted on faith that the wisdom of 20 years of naval aviation stood behind the training requirement that I undergo a hypoxia experience in an altitude chamber. Thus, as a member of Student Flight Surgeon Class 111, I took my place in line outside Building 625-D at NAS Pensacola for my turn in the low-pressure chamber. We were to have the opportunity to learn, first hand, the effects of oxygen deprivation at 25,000 feet. My class was fully informed about the risks of such a hypobaric exposure. We were assured that the knowledge gained from the experience was appropriate recompense.

Privately wondering whether to be scared or not, like good soldiers we did our duty. With oxygen masks removed at altitude, we carefully studied ourselves to learn the minute details of the onset of our symptom complex. We carefully observed the subtle color changes that would take place in our nail beds. We played patty-cake with each other and/or tried to place playing cards in slots appropriate to their suits, noting the gradual decrements in our coordination. A few members were asked to demonstrate the progressive deterioration of their handwriting as their hypoxia deepened. We looked intensely for whatever we could find from the long list of possible symptoms we had studied. One member of the class was allowed to proceed to a point where he was sufficiently incoordinate that he was unable to replace his mask when directed. In what I considered a very telling and dramatic episode, he required assistance just to replace the mask on his face and restart his oxygen flow. When this evolution was completed, the chamber ascended to a simulated altitude of 40,000 feet where we learned about the discomfort attendant to pressure breathing at that altitude. During the descent, two members of our class suffered painful ear blocks that caused some delay in finishing the run while they were attended to. Except for the ear problems in my classmates, I considered the experience to have been as fruitful as it was benign, a necessary wicket to be passed through on my way to becoming a designated United States Naval Flight Surgeon. I emerged from the experience thinking I was now armed with valuable information about how I responded to hypoxia.

We were taught that each member of the class had his own unique responses to diminished oxygen tension, and that the symptom complex we had just experienced was essentially the same as that which would occur in flight. This had to be, we thought, supremely useful information. If we ever got into an actual in-flight hypoxic episode, we would not be caught unaware. We were confident that we could certainly recognize it were it to occur again. More importantly, we believed that our credibility as teachers of aviation physiology had just crystallized.

For the next quarter century, I would periodically repeat my altitude chamber experience as directed by NATOPS. Over those years, I gradually acquired a sneaking suspicion that the morbidity associated with such training was being taken for granted. Along with two other officers, I participated in researching the actual incidence of “chamber reactions” with special attention to aviator’s bends. (1) We showed an overall incidence of 0.1% for bends. Other sources have since confirmed our findings while also reporting a 2.5% otorhinlogical barotrauma incidence. (4) The numbers do not appear large, yet translated into real

life, NAMI treated an average of 10 cases of bends per year and 100 cases of barotrauma for the same period. Though it took me ten years, I was impacted that these "cases" were somebody's son, somebody's father, somebody's spouse or sweetheart. These were real people who were suffering real pain at our direction.

In the September 1975 issue of Aviation, Space, and Environmental Medicine, (2) I reported a case of Type I aviator's bends with central nervous system involvement. The subject had personality and electroencephalographic changes that took months to resolve. I had to ask myself if I could justify what he and his family endured in the name of training. At the time, I never answered my own question. I failed to get past the pondering stage. During the period in which that article was written, I was senior member of a NAMI medevac team that arranged for emergency helicopter evacuation on six occasions for trainees stricken with serious forms of aviators' bends in the altitude chamber for which recompression therapy in a distant hyperbaric facility was the treatment of choice. Each of these experiences could be appropriately described as "hairy". These events went a long way towards encouraging the command to activate its own hyperbaric treatment facility. They also got my attention that we played in a potentially dangerous sandbox and toyed with serious risk.

As a two-tour carrier SMO, as Wing Surgeon for a Marine Air Wing, and as AirPac Force Medical Officer, a total of almost 10 years of fleet experience, I never saw a case of aviator's bends occurring in an airplane. Through the grapevine, I heard of several in maritime patrol aircraft and one in an A-6, none of which received treatment. I became impressed that, for all practical purposes, aviators' bends was a clinical entity restricted to altitude chambers engaged in teaching hypoxia.

In 1980, while serving as AirPac Force Medical Officer, I experienced an in-flight episode of hypoxia in a TA-7 that was unlike that which I had learned in repeated chamber exposures. I was at a loss to explain why this was so, but reported my deviant experience to the fleet in an official naval message on 17 January 1980.

I do not recall anyone questioning the validity of Navy hypoxia training. In the late 1980s, however, NAMI's Aeromedical Advisory Council recommended that the option for such training without the altitude exposure be examined, citing the morbidity associated with accepted practice. As a result, NAMRL began looking at the issue, was soon well along in the research, and invited me to be a member of their Project's Scientific Advisory Board. (3)

When I retired from the US Navy in 1987, I accepted a teaching post at the University of Southern California's Aviation Safety School where USAF aviation safety officers received their training. I was made aware that a significant number of USAF aviators admitted that their hypoxic incidents in aircraft failed to mirror the experience they had been taught to watch out for. (5, 6) Some reported that things in the airplane could be so hectic that the subtle warning signs they learned in the chamber passed unnoticed. Others reported that the symptom complex they experienced in flight was unlike the one in the chamber. Still others maintained that the real hypoxia in flight was totally different from what they had expected. I had to wonder how it was that I had never heard such comments from naval aviators. I concluded that I had never interacted with Navy people in the relaxed milieu of a civilian University setting that actually encouraged such frank exchanges. Then I read an abstract being presented at the 1990 AsMA Annual Scientific Assembly reporting the same variability from Israeli Air Force hypoxia incidents (7).

I was left to ponder disturbing questions. By what right did we continue to ignore the dignity of the men and women we sought to train? Why did we persist in perpetrating a training in the name of false realism? Why did we subject our personnel to pain and suffering for a goal that could be reached without either? How can it be that research on sea level hypoxia training drags on more than a decade after it started?

It is clear to this observer that we have sold ourselves a bill of goods. Hypoxia training in the altitude chamber is not the tool we wish to believe it to be. The morbidity that is regularly associated with this training as it is currently required is unjustifiable on ethical as well as clinical grounds, and yet it continues. Why?

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Training of Civilian Aircrews in Altitude Chambers

Are Altitude Chamber Flights Really Safe?

The mission of the Federal Aviation Administration is to provide service to the Nation by fostering a safe, secure, and efficient aviation system. Aviation physiology training of civilian pilots is a "must" in the pursuit of this mission.

Technological advances of modern aircraft give a larger number of civilian pilots (commercial and private), the option of flying at higher altitudes (over 12,000 feet). In the past, only airline, military, and a handful of other aircraft were operated in that capacity. Some early civilian pilots were able to receive some type of aviation physiology training while they were in the military. Previously, only the military establishment offered educational programs that focused on the aeromedical issues related to the operation of aircraft at these higher altitudes.

Also, in the past, most civilian pilots operated in what is called the Physiological Zone, which extends from sea level to 12,000 feet. Currently, there is an increasing number of aviators who fly in the Physiological Deficient Zone, which extends from 12,000 to 50,000 feet. Pilots flying at these higher altitudes should have working knowledge of the environmental factors that affect human physiological tolerance and performance.

Currently, U.S. Federal Aviation Regulations (FARs) Parts 121 and 135, mandate high-altitude physiology training for cockpit and cabin crews operating above 25,000 feet. The National Transportation Safety Board has recommended additional physiology training for pilots flying in aircraft with service ceilings at and above 18,000 feet; however, the physiological problems associated with altitude exposure begin well below this service ceiling. In addition, a recent FAA report stated there is evidence that civilian pilots who fly at lower altitude (10,000 feet during the day and 5,000 feet at night) would benefit from physiological training.

A thorough educational program that includes teaching the physiological aspects of the body at altitude and providing training experiences in an altitude chamber represents an effective approach to promoting operational safety during high altitude flight.

Are altitude chamber flights really safe? What about concern over gas expansion, hyperventilation, hypoxia, and decompression sickness? Are training benefits overshadowed by safety concerns?

Lately, criticism on a very safe and reliable tool for training pilots at altitude may have given general aviation pilots some misconceptions that need to be clarified.

Since 1965, we have provided 15,412 students with altitude chamber flights at the Civil Aerospace Medical Institute in Oklahoma City, Oklahoma. Let's review chamber reactions of these students and see if safety is a problem.

There was a total of 11 reactions of suspected decompression sickness (DCS) during this period. Of these suspected reactions, only 4 involved students in training. Outcomes are listed below.

- Elbow pain 25,000 ft. Relieved at 24,000 ft.
- Ankle pain 23,000 ft. Relieved at ground level
- Shoulder pain 18,000 ft. Relieved at 10,000 ft.
- Knee pain 25,000 ft. Relieved at 25,000 ft. (with O2)

We believe the safety concerns are very adequately addressed by these figures. Why, then, is there such a discrepancy between the above figures and those reported in the September/October 1992 issue of Flight Safety Foundation's, Human Factors & Aviation Medicine concerning risk in altitude training? The following quote from that article will answer that question. "There has been about one DCS case for every 1,000 chamber exposures. One Air Force study reported their incidence as 105/100,000....A Navy study reported 140/136,696 during an eight year period."

These figures deal with military pilots who make repetitive chamber flights, military career personnel who act as inside observers, and with flights over 25,000 feet. The general aviation pilot is not exposed to any of these conditions during training in altitude chambers.

Other reactions observed during altitude chamber flights include: gas expansion (ear blocks, sinus blocks, tooth problems, abdominal gas), hyperventilation, claustrophobia, apprehension, and pulmonary gas expansion during a rapid decompression. The following table lists reactions associated with training of civilian personnel at CAMI's altitude chamber:

- Aerotitis Media 992
- Aerosinusitis 219
- Abdominal Gas 23
- Aerodontalgia 21
- Hyperventilation 18
- Apprehension 9
- Claustrophobia 3

None of these reactions produced any serious or life-threatening problems, nor were the students "victims" of an aviation physiology community not concerned with their safety. The vast majority of these reactions are momentary in nature.

Why are there no pneumothorax cases listed as a result of rapid decompression demonstrations? Military chamber rapid decompressions in the past went from 8,000 feet to 22,000 feet in 1 1/2 seconds. The FAA rapid decompression profile is from 8,000 feet to 18,000 feet in 3 to 5 seconds. That's a big difference in onset rates. The general aviation pilot is not exposed to this rapid a change.

Should we be satisfied with these results? Through more intensive education, it is possible to reduce the number of reactions.

With this excellent safety record, we should not stop using the altitude chamber in exchange for mere movies and lectures to educate our pilots.

A thorough educational process will identify the students' needs, and select appropriate training methodologies. We advocate our program using lecture and simulation with the altitude chamber. That prepares them for emergency survival that they could not possibly get from a film and lecture. Students learn best with realistic training.

Subjects covered at CAMI during the six hours of academics are: spatial disorientation, atmosphere, respiration, hypoxia, hyperventilation, duration of consciousness without supplemental oxygen at altitude, gas expansion, gas bubble formation, physical phenomena and incidents of decompression, visual problems, self-medication, carbon monoxide poisoning, and oxygen equipment. Additional subjects related to pilot performance, like stress, drugs and alcohol, fatigue, nutrition, physical fitness, dehydration, hearing, noise and vibration, are reviewed.

The altitude chamber profile simulates flight to 25,000 feet accompanied by a rapid decompression from 8,000 to 18,000 feet. This training is, for most pilots, their first and only exposure to the effects of unpressurized flight.

We at the Civil Aerospace Medical Institute's Airmen Education Branch receive a tremendous amount of feedback from the aviation community concerning the physiological training offered here and through the Interservice agreement with the U.S. Air Force and U.S. Navy physiological training units. Some recent comments include:

— "I had experienced the altitude chamber flight at Lowry AFB while attending the Air Force Academy and I thought I had a good understanding of the effects of high altitude. I was pleasantly surprised to find that I was able to learn many new ideas as well as review some previously learned material."

— "Though I will probably operate an aircraft not much over 11,000 feet MSL, I feel that high altitude training is a must for all general aviation pilots."

— "I made 6 pages of legal-size notes, flew the vertigon, reviewed the chamber, and enjoyed all. Attendance was well worth the time."

This is just a small sampling of how well this training is received by the general aviation community. Our classroom feedback has been 100% positive concerning physiological training—and this ranges from student pilots to pilots with over 25,000 flying hours.

It is our hope that the aviation community could work together to promote aviation safety through education. There are thousands of pilots who have not had the opportunity to take an academic course on aviation physiology and to experience hands-on training in an altitude chamber.

Our goal at the Aeromedical Education Division is to make this opportunity available to all.

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Barotrauma in Navy Altitude Chamber Training

Most naval flight personnel undergo altitude chamber training during Aviation Preflight Indoctrination (API) or Aircrew School, and for fixed-wing crewmembers there is also periodic refresher training. Unfortunately, barotrauma is a frequent consequence of altitude chamber flight. Although the injuries sustained are relatively minor, ear or sinus barotrauma may results in temporary grounding and a delay in the completion of aviation training. In Pensacola, all suspected cases of barotrauma from altitude chamber exposure are referred to the ENT clinic at NAMI. When multiplied by the number of individuals seen, the time cost of these evaluations and the expense of medical work-up and treatment are substantial.

(Aircrew are lifted off the deck of Kennedy during Special Purpose Insertion/Extraction Exercises)

A retrospective study was undertaken to determine the incidence of barotrauma and the degree to which antecedent water survival training influences the risk of injury. It has long been suspected that inflammation of the sinus and nasal mucosa from exposure to chlorinated water increases the risk of barotrauma. In this study, altitude chamber logs and ENT clinic records were reviewed for the period from 1 OCT 1998 to 1 JAN 2000. For students undergoing initial chamber training, the completion date of the preceding water survival training was also determined.

During the 15-month period covered by this study, there were 279 chamber flights with a total of 4868 hypobaric exposures and 150 cases of barotrauma. The cases were those individuals who were treated with a decongestant during the flight, underwent politzerization or were referred to the ENT clinic for evaluation.

Rated aviation personnel undergoing refresher training and inside observers had the lowest incidence of barotrauma - less than 0.2%. The injury rate for students was considerably higher. While student inexperience with performing the valsalva maneuver was undoubtedly a factor, the data show a strong association between the timing of the preceding water survival training and risk of injury.

During the period covered by this study, API students underwent a 35,000 foot (Type IIA) altitude chamber flight, occurring two or more weeks after the completion of their water survival training. For API students, the overall injury rate was 2.2%. This was considerably lower than the injury rate for the aircrew students who generally underwent a 25,000 foot (Type II) flight, either 1 or 4 days after completion of an identical water survival curriculum. The overall injury rate for aircrew students was 6.5% (RR 2.9, p value < 0.001).

In order to eliminate confounding due to different flight profiles, a subsequent analysis was performed using only the data on aircrew students, all of whom flew the same Type II flight profile. Two cohorts were identified. One group consisted of individuals who completed the final water survival evolution - a one mile swim - the day prior to the hypobaric chamber flight. The second group was composed of students who completed the mile-swim 4 or more days prior to the chamber flight. Before every flight, students were required to fill out a questionnaire that inquired about recent illness and cold symptoms(Pre-Flight Medical Screening). Those individuals who acknowledged having had recent cold symptoms or a recent illness were precluded from flying in the chamber.

The group of aircrew students who completed the mile-swim the day prior to the chamber flight were twice as likely to fail the Pre-Flight Medical Screening (RR = 2.0, p value < 0.05). Despite the pre-flight screening,

this group of students was also six times more likely to be removed from the flight after the 5000 foot bounce, due to inability to adequately equalize pressure in their ears or sinuses. Likewise, the injury rate was higher for the group of students who underwent the full chamber flight the day after the mile-swim. Overall, those students who underwent hypobaric exposure one day after the mile-swim were twice as likely to suffer barotrauma as those who underwent the exposure 4 or more days after the completion of the swim training (RR = 2.3, p value < 0.05). While the group that was delayed 4 or more days had a lower incidence of barotrauma than other aircrew students, this cohort still had a two-fold higher incidence of barotrauma than the API students.

The total number of weeks spent in swim training also correlated with risk of barotrauma. Students who were unable to pass required swimming tests were "rolled back" to a later class for additional instruction. As a result, they had a more prolonged exposure to the pool environment. This subset of individuals had almost twice the incidence of barotrauma as students who went straight through the water survival curriculum (RR = 1.7, p value < 0.05).

The results of this study show an association between the timing and duration of swim training and the subsequent development of barotrauma in the altitude chamber. Fortunately, as of January 2002, aircrew students no longer undergo altitude chamber training the day after the mile-swim. Still, the current training schedule, which allows at least 4 days between the completion of pool training and the altitude chamber flight, may not provide sufficient time to completely eliminate the (apparent) additional risk of barotrauma due to prolonged pool-water exposure. Increasing the time interval between the completion of water survival training and the altitude chamber flight or changing the order of the training may result in a substantial reduction in barotrauma cases.

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The Reduced Oxygen Breathing Device

New developments in hypoxia research and training

Until recently, exposure of the aviator to hypoxic conditions was not possible without the dangers of hypobaric conditions. The reduced oxygen-breathing device (ROBD) has revolutionized the way aerospace medicine clinicians and researchers may evaluate aviators under hypoxic conditions while performing simulated flight activities. The ROBD works by delivering a varied percentage of oxygen and nitrogen under normobaric conditions to the trainee through a standard Navy oxygen mask. (See Figure 1) The advantages of the ROBD are numerous. Because the ROBD remains at sea level atmospheric pressure there is no risk of altitude DCS or barotraumas. Weighing approximately 40 lbs and measuring 20''x 32''x 12'' inches, the ROBD is extremely portable compared to a hypobaric chamber. (See Figure 2) Additionally, the manning and maintenance requirements are much lower for the ROBD, involving a maximum of two instructors to operate compared to as many as nine for the hypobaric chamber.

Data from our current studies at NAMRL suggest that not only does the ROBD reproduce the symptoms and signs of hypoxia, but is actually more accurate in delivering simulated partial pressures of oxygen and nitrogen at altitude compared to the hypobaric chamber. Future studies at NAMRL involving the ROBD will entail measuring cognitive performance decrements due to mild hypoxia and the possible synergistic effects that pharmaceuticals may have when taken during mild hypoxic exposures. Operationally, the marriage of the ROBD with simulators will provide

(continued on page 36)

Figure 1

Figure 2

(continued from page 35)

more realistic in-flight hypoxia training. NAMRL is currently collaborating with the Naval Aviation Survival Training Program Directorate to provide a curriculum utilizing the ROBD for hypoxia refresher training. Training utilizing the ROBD will be platform specific, and may not apply to all aviation personnel who need to undergo refresher courses. It is important to realize also that the ROBD will not replace initial hypoxia training provided by hypobaric chambers.

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(The X-31 Enhanced Fighter Maneuverability (EFM) aircraft on test flight at Patuxent River 17 MAY 2002)

G-LOC (Current NAMRL Research)

INTRODUCTION

The threat of G-induced loss of consciousness (G-LOC) has continued despite over a half-century of research and the introduction of anti-G suits, anti-G straining maneuvers, positive pressure breathing, reclined seating, and didactic- and centrifuge-based training programs. Without a doubt, these components have saved the lives of countless aircrew, and have pushed the performance envelope of tactical military aviation. But G-LOC still takes its toll. The Naval Safety Center lists G-LOC as a causal factor in nine Class A mishaps (i.e., fatality, >$1,000,000 damage, or destruction of aircraft) during 1989-1996. These mishaps resulted in the loss of 10 aircrew and the destruction of 7 aircraft. It is estimated that 12-30 percent of U.S. Navy and Air Force tactical aircrew have experienced at least one G-LOC episode in flight.

At present, it is impossible to completely protect aircrew from the risks of G-LOC; the capabilities of today's high-performance aircraft are simply too great. Many advanced fighter jets can develop forces of +7 to 9 G_z *within a second* and can sustain high G levels for several minutes. The G-LOC threat will likely increase with the upcoming "agile" aircraft (e.g., Joint Strike Fighter and F-22 Raptor). It must be noted however, that G-LOC isn't just associated with tactical jets pulling ultra-high G_z. The Navy aircraft with the highest reported incidence of G-LOC is actually the T-34. For example, a recent Hazard Report details a physiological episode that occurred as a T-34C performed a maneuver from approximately -1.5 to +3-4 G_z. Even at this relatively low G load, the instructor pilot reported a 10-second episode of complete G-LOC, and the instructor-under-training became spatially disoriented and mentally confused. This case is especially disturbing given that both pilots were highly experienced in tactical aircraft.

G-LOC PHYSIOLOGY

The basic physiological responses to sustained $+G_z$ environments are well known. The apparent weight of blood increases as $+G_z$ accelerations rise, which causes a reduction in arterial blood pressure above the heart and total venous return from below the

heart. Cardiovascular reflexes attempt to compensate for the diminishing carotid sinus blood pressure and stroke volume by inducing tachycardia and peripheral vasoconstriction. Overall, for each additional +1 G_z applied, the cardiovascular system must generate an additional 22 mmHg of blood pressure in order to maintain constant cerebral perfusion. If compensations are overwhelmed, intracranial blood pressures drop. G-LOC is the final result when a critical pressure threshold is reached and oxygen reserves are exhausted. With a return of cerebral blood flow, complete loss of consciousness may still persist for roughly 15 seconds. Recovery usually requires an additional 20 to 30 seconds, and is associated with relative incapacitation.

Recent studies have uncovered additional physiological adaptations to +G_z loads. These suggest that repeated exposures to high, sustained +G_z accelerations are associated with lower venous compliance and blood pooling in the legs; higher carotid-cardiac baroreflex sensitivity; less decline in stroke volume and cardiac output during orthostatic maneuvers; increased a_1-adrenoreceptor responsiveness; higher vasoconstriction reserves; and larger total circulating vascular volume. Each of these components would be beneficial for enhancing the cardiovascular system's capacity to resist G-LOC.

This raises an interesting question: If regular exposures to hypergravity induce physiological adaptations that increase G-tolerance, then couldn't the opposite also be true? In other words, is it possible that the absence of high +G_z exposures (i.e., "G-layoff") would result in a *decrease* in G-tolerance? If such an effect does exist, then it would also be important to know the time course of the G-tolerance loss. This knowledge could have beneficial effects on aviation training, accident costs, safety, and mission effectiveness. Unit commanders might better select aircrew for specific flight operations by tailoring flights to the physiological capabilities of the crew. The optimal ratio of simulator-to-actual flight time could be determined to balance operating costs with the maintenance of G-tolerance. Moreover, aircrew would have some quantification of the expected reduction in their G-tolerance after leave or TAD periods. If even one mishap was avoided through developing this knowledge, then the effort would be worthwhile.

PAST RESEARCH

It is common gouge in the aviation community that time away from your aircraft will reduce your maximum G-tolerance. For example, one Blue Angel demonstration pilot notes a subjective decrease in G-tolerance after just 3-4 days without flying. A peer-reviewed journal article states as fact–without references or data–that layoff periods reduce G-tolerance. But despite anecdotal reports and a widespread belief in the phenomenon, little has been written on this G-layoff topic and only two centrifuge-based studies have investigated it specifically.

One unpublished study noted reductions (though not statistically significant) in both gradual- and rapid-onset G-tolerances after 2- and 4-week layoff periods. Significant reductions were found however, in endurance to +5 to 9 G_z simulated air combat maneuvering profiles (SACM). Subjects who had not been exposed to high G activity for 2 weeks showed a decrease from 212 to 166 seconds of SACM versus control subjects. Similar endurance decrements were found for 4-week layoff periods. This study also investigated G-layoff effects on subjects' aerobic and anaerobic capacities, but found none. The author concluded that since there were no associated metabolic reductions, decreased SACM endurance might have been simply due to degraded anti-G straining maneuver effectiveness. A second G-layoff study revealed no significant differences in tracking tasks, call-sign reaction times, G dose, or time above +8 G_z for subjects after either 2- or 4-week layoff periods.

While both studies were well thought out and executed, they suffered from low statistical power due to small sample sizes. This is a frequent problem in centrifuge-based research as these studies are expensive to perform and "professional centrifuge pilots" are a rare breed. It is entirely possible that the two G-layoff studies failed to uncover statistically significant findings just because they did not include enough subjects (i.e., they lacked precision and yielded false-negative errors).

THE NAMRL "G-LAYOFF" STUDY

At the Naval Aerospace Medical Research Laboratory (NAMRL), G-layoff questions were first penned and a project created by CDR Eric Bower, MC (FS). Routine conversations and interactions with

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local aircrew sparked his original idea. When CDR Bower departed from NAMRL, I continued his project and grant funds were secured from the Office of Naval Research. Because G-layoff is of great concern to both the Navy and Air Force, a collaboration was set up with centrifuge experts at the Wright-Patterson AFB Biodynamics & Acceleration Branch Facility in Dayton, Ohio. This is win-win scenario as laboratory costs, expertise and data will be shared. This bi-service team consists of experts from a variety of fields, including experimental psychology, physiology, biomedical engineering, research optometry, and aerospace medicine.

Two hypotheses will be tested in this research. The first is that the G-tolerance of trained subjects is degraded by layoff periods of 1- and 2-weeks. If an effect is discovered, the time course of G-tolerance decline can be described. The second hypothesis is that measurable physiological changes result from G-exposure and reverse upon discontinuation of G-exposure. The Dynamic Environment Simulator (DES) at Wright-Patterson AFB is being used to produce the sustained acceleration for the study (Figure 1). Six-

FIGURE 1: The Dynamic Environment Simulator centrifuge.

teen research subjects will participate in a within-subjects study design.

The fundamental experimental protocol is quite simple (Figure 2). After subjects become familiar with the centrifuge environment and with the associated equipment and tasks, they are pretested for their (1) relaxed $+G_z$ tolerance and (2) endurance to +4 to 7.5 G_z SACM cycles. We used this SACM profile because of its relative difficulty and its similarity to the

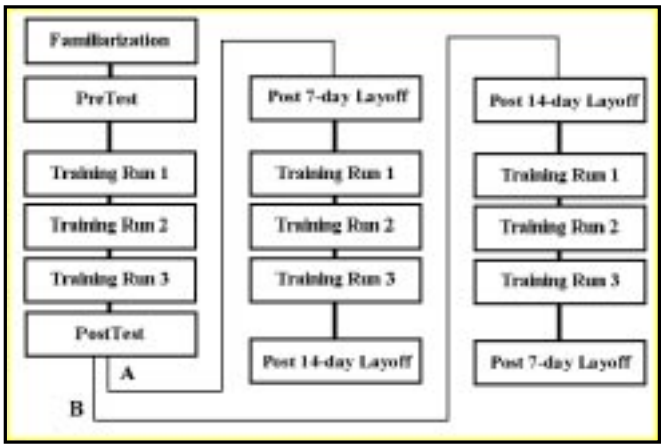

FIGURE 2: Flowchart of the "G-layoff" centrifuge run schedule for subjects

Navy's centrifuge-based flight environment training protocol for F/A-18 aircrew. After pretesting, subjects undergo a series of training run days. They are then are retested for their $+G_z$ tolerance and SACM endurance. From here, subjects are randomly assigned to either a 7- or 14-day layoff period (shown as paths A and B, respectively, in Figure 2). Afterward, post-layoff tolerance and endurance data are collected. Finally, subjects repeat the training protocol, complete the other layoff period, and complete post-layoff tolerance and endurance data collection. G-suits are not being used in this study.

In addition to answering the "big" G-layoff question, we are also breaking new ground in centrifuge physiology data collection. Heart rate and rhythm, leg muscle activity, cerebral oxygen perfusion and blood lactate, pyruvate and phosphocreatine levels will be monitored to uncover other G-induced physiological effects. But the project's true jewel is the COSMED $K4b^2$ pulmonary function monitor. For years, equipment to analyze breath-by-breath pulmonary gas exchange was bulky and immobile. The length of cables, cords and breathing tube limited any physiological study that included these units. The $K4b^2$ now makes this equipment compact and portable enough to be used inside the centrifuge. This unit will collect brand new physiological data (e.g., total caloric expenditures, respired oxygen/carbon dioxide levels, etc.) on-the-fly while subjects repeatedly combat SACM cycles. Figure 3 shows the $K4b^2$ unit just prior to its first successful field-test in the DES centrifuge.

CONCLUSION

G-induced loss of consciousness will probably remain a serious threat to Navy aircrews for some

time. Acceleration education and training will continue to be key to maximizing their defense against G-LOC. We hope that our work will make a significant contribution to these areas. Data collection began in January 2002, and final results will be presented at the 2003 Annual Scientific Meeting of the Aerospace Medical Association (AsMA) and in NAMRL technical reports and articles published in *Aviation, Space and Environmental Medicine*.

For general questions about NAMRL's G-layoff Study, contact the author or CDR Fred Patterson (DSN 922-3287 x 1149). For COSMED K4b^2 or other physiological questions, contact LCDR Mike Prevost (DSN 922-3287 x 1124). The Flight Surgeon has a valuable and unique relationship with the fleet, so as always, we welcome your input, suggestions, and ideas.

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FIGURE 3: The COSMED K4b² unit just prior to its first field-test inside the DES centrifuge.

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PROPOSED Premenstrual Dysphoric Disorder Policy

LT Tarah Johnson presented the following at an AAC. These recommendations are **NOT POLICY** *at this time. However, LT Johnson does provide us with a well thought out set of guidelines that the Flight Surgeon can refer to until the waiver guide is officially updated.*

Premenstrual Dysphoric Disorder (PMDD) appears in the appendix of the DSM-IV under 'depressive disorder not otherwise specified', but in 1999 a group of experts reached a consensus that it is a distinct clinical entity with characteristic symptoms of irritability, anger, internal tension, dysphoria, and mood lability during the luteal phase of the menstrual cycle. Unlike premenstrual syndrome (PMS), symptoms of PMDD cause severe emotional and physical distress significantly interfering with occupational or social functioning.[1] As more females enter the aviation community, this topic is one that should be addressed and aeromedical disposition determined.

Epidemiology

As many as 75% of women with regular menstrual cycles experience some symptoms of premenstrual syndrome (PMS) and require only conservative non-pharmacologic interventions. An estimated 3-8% of women of reproductive age have PMDD, also known as severe PMS. Onset of these symptoms typically occurs in the late twenties to mid-thirties, and there is some evidence of worsening premenstrual symptomatology following childbirth.[2]

Etiology

The etiology of PMS and PMDD is largely unknown. The fact that PMS and PMDD are biological phenomena (as opposed to psychological or psychosocial events) is primarily emphasized by recent evidence of the heritability of premenstrual symptoms

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and the elimination of premenstrual complaints with suppression of ovarian activity or surgical menopause.[3]

The current consensus is that normal ovarian function and endocrine events, rather than hormone imbalance, are the cyclical triggers for PMDD-related biochemical events within the central nervous system and other target tissues. Symptoms seem to be caused by a differential sensitivity to circulating hormones, rather than abnormal hormone concentrations.[4] Reproductive hormones affect noradrenergic, serotonergic , and dopaminergic neuronal pathways, but dysregulation of the serotonergic system appears to play a particularly substantial role in the pathophysiology of PMDD.[3]

Risk Factors

Factors increasing the risk for premenstrual syndromes include:

- Age: Women during their late twenties to mid-thirties.
- Menstrual cycle characteristics: Menses longer than 6 days are associated with more severe symptoms.
- Past or current psychiatric illness: Reports are mixed but indicate that a higher proportion of women presenting with PMDD have a history of mood disorders, suicide attempts, anxiety disorders, personality disorders, or substance abuse than other women. Women with an ongoing mood disorder report premenstrual magnification of symptoms.[5]
- Family History: Population-based twin studies of familial risk factors for premenstrual symptoms have suggested that PMS is heritable.[3]
- Psychosocial stressors: A strong correlation exists between life stress and PMS symptoms.[5]

Diagnosis

The diagnosis of PMDD is made by using the symptom criteria from the DSM-IV and based on a prospective diary of symptoms for two menstrual cycles. Examples of such diaries include the Calendar of Premenstrual Experiences (COPE), the Prospective Record of the Impact and Severity of Menstruation (PRISM)[4], or a Daily Symptom Checklist.[6] Once the patient has documented symptoms and severity for two complete cycles, the symptoms during the follicular phase (days 3-9) and the luteal phase (the last 7 days of the cycle) are compared. If luteal phase symptoms are greater (suggested at least 30% greater) than the follicular phase symptoms, PMS is suggested. If symptoms are present throughout the cycle, an underlying affective disorder should be suspected. Symptoms should demonstrate clear premenstrual worsening and remission within a few days after the onset of menstruation. The pattern of symptoms must always include a symptom-free interval after the menstrual flow and prior to ovulation.[4]

The ICD-10 states that simple PMS is diagnosed if the patient illicits even just one of the 11 symptoms listed in Table 1. Criteria for PMDD are stricter, and symptoms must cause a marked interference with occupational or social activities. It is important to differentiate between PMDD, PMS, and other medical and psychiatric illnesses. It is not uncommon for patients to present with symptoms that are compatible with other medical conditions or for other psychiatric illnesses to be exacerbated during the late luteal menstrual phase. The assistance of a Psychiatrist and OB/GYN may be necessary in making the diagnosis.

Treatment

Recommendations for treatment of premenstrual syndromes range from conservative nonpharmacologic therapies to surgical removal of the ovaries.

- Lifestyle changes and stress management are an adjunct to any intervention. Nonpharmacologic approaches should be tried as first-line therapy for milder symptoms of those who only meet the criteria for PMS, not PMDD. Patients can eliminate or reduce caffeine, alcohol, chocolate, and tobacco, adopt a diet of high-protein and low-refined-sugar meals, decreased sodium, and, if needed, reduce weight to within 20% of their ideal. Regular exercise (including aerobic exercise) is important and particularly effective when combined with stress management techniques.
- Nutritional supplements suggested include Vitamin B6 (100mg/day), Calcium (1200mg/day), and Magnesium (200mg/day).[5,6]
- Psychotherapy may be beneficial, especially for women who have endured distressing premenstrual symptoms for an extended length of time.

- Pharmacologic approaches include psychotropic medication and hormonal interventions. The only drug approved by the FDA for the treatment of PMDD so far is fluoxetine, an SSRI and common antidepressant, but several other SSRIs including sertraline, paroxetine, and clomipramine are used with good results. Fluoxetine is used at 20 mg daily throughout the cycle, or just during the last 10-14 days of the menstrual cycle. SSRIs are effective in treating physical and behavioral symptoms in about 60% of patients. There was no significant difference in symptom reduction between continuous and intermittent dosing. Non-SSRI antidepressant medications such as bupropion, maprotiline, and desipramine have been shown less effective to ineffective.
- Oral contraceptives have been shown effective for the physical symptoms of PMS such as bloating, but they may increase mood lability.
- Gonadotropin-releasing hormones (GnRH) have been shown to be clinically useful, but should only be considered for a short period of time due to the severe side effects.
- Surgical removal of the ovaries has shown definitive results, with complete resolution of symptoms, but is a poor option in the young population.[5]

Prognosis

Most studies show that women requiring SSRIs for true PMDD/severe PMS have recurrent symptoms when taken off medications until they reach the menopause (surgical or natural).

Aeromedical Disposition

None of the waiver guides of any of the services or the FAA policy discuss this condition. The Navy database showed one female ATC who had "severe PMS" and "depression" treated with Prozac in 1995, and was subsequently disqualified from aviation duty. No other females requested waivers for severe PMS or PMDD, although the topic of treating PMS with SSRIs has been questioned over the past several years. Recently, civilian physicians have been treating mild to moderate PMS symptoms with SSRIs, which underscores the importance of obtaining a clear diagnosis for the purpose of aeromedical disposition.

PMDD is a cyclic and chronic condition that requires treatment with psychotropic medications, mainly SSRIs, which are disqualifying in aircrew in the US Navy. The diagnosis of PMDD requires significant disruption of the patient's normal occupational and social functioning. These symptoms are not compatible with the ability to reliably perform aviation duties. For these reasons, PMDD should be grounding.

As with any other diagnosis, symptoms of premenstrual syndromes should be controlled with approved or waiverable medications, or the member should be considered disqualified for aviation duty. Guidelines for the fleet will be approved soon for addition to the Naval Aeromedical Waiver Guide. *

***Disclaimer: This topic has been presented, but final waiver policy has not yet been determined. Until that time, questions should be passed through Code 42 at NOMI.**

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Compartment Syndrome

Pain, Paresthesias, Paralysis, Pallor, Pulselessness, Plaintiff

(How You Can Prevent the Last "Sign" of Compartment Syndrome)

Case Presentation

A previously healthy 23 year-old male active duty sailor (Seaman S.) was playing a pick-up game of basketball at the NAS gym. Seaman S. had just landed from a jump shot when he was struck by another player and heard a loud "pop" in his right lower leg. His leg immediately became swollen and had a noticeable deformity. The local EMS system was called. He had a splint placed and was transported to the nearest emergency department.

The emergency department was very busy so the EP on duty had the triage nurse order x-rays based on the patient's complaints. The emergency physician viewed Seaman S's films around 1730 and confirmed a comminuted mid-shaft tib-fib fracture. By this time, the patient was complaining of numbness and tingling in his foot and leg. The EP notified the on-call Orthopedic surgeon, replaced the splint and sent the patient to the floor with holding orders until Dr. Ortho arrived.

Dr. Ortho finished in the OR and arrived to the floor around 2300. The Orthopedic surgeon reviewed the films, noted the findings, and then went to see his patient. By this time, Seaman S. was writhing in pain and complaining of pain when he tried to move his foot. The Orthopedic surgeon told Seaman S. about the fractured leg and obtained consent for surgery in the morning. Dr. Ortho noted the following in his progress notes: fx mid-shaft tib-fib, surgery in Am, NPO, Demerol 50/ Phenergan 25 Q3-4 prn pain. In spite of frequent dosings of Demerol and Phenergan, Seaman S. awoke every 2-3 hours throughout the night complaining of unrelenting pain to his leg.

The next morning, approximately 14 hours from the time of injury, Seaman S. underwent surgery to repair his fractured leg. About 1-2 hours following surgery, the nurse noted no palpable dorsalis pedis pulse. She promptly notified Dr. Ortho who confirmed her findings of a painful, pulseless right lower extremity. Dr. Ortho could not find any mention of the patient's lower leg neurovascular exam on either the ER chart or the previous night's admission note. Dr. Ortho immediately took Seaman S. back to surgery to perform a fasciotomy and extensive debridement of necrotic muscle tissue. Fortunately he did not require amputation. However, despite aggressive physical therapy over the last year, he still walks with a limp.

Introduction

Richard Volkmann (1830-1889) was a German surgeon who first described compartment syndrome in the late 19th century. (1) A devastating complication, Volkmann's ischemic contracture, was named after him. In this condition, ischemic tissue degenerates, leading to contracture of the muscles, tendons, fascia and other soft tissue.(1,6,7) The resulting contracture causes a claw hand or foot.

This risk of significant morbidity requires physicians to maintain a high index of suspicion for this disease. This is particularly true for Emergency physicians as those who frequently see these patients at their initial presentation.

Pathogenesis

Extremity compartment syndrome can be defined as a perfusion deficit into an osteofascial space secondary to increased pressure within that space. Two basic circumstances can create this perfusion shortfall. The first is from an accumulation of intracompartmental contents (blood, edema, or crystalloid), and the second is through a reduction in size of an osteofascial compartment. (1-4) This perfusion discrepancy creates a supply and demand problem that ultimately results in necrosis of myoneural tissue. The pressure in the compartment becomes elevated and restricts outflow of the venous system. This causes a cycle of increasing pressure within the given compartment.

Normal compartment pressures range from 0-10 mmHg. Capillary blood flow is affected at 20 mmHg and muscle and nerves become ischemic at pressures of 30- 40 mmHg. Necrosis of muscle and nervous tissue in the compartment can occur within 4- 8 hours following injury.

Clearly, higher pressures in place for a similar period of time would produce more rapid results. (2) Some authors feel that taking an absolute pressure neglects the clinical status of the patient. For this rea-

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Table-1 Etiology of Compartment Syndromes

Accumulation of Intracompartmental Contents

- Bleeding
  - Fractures
  - Hemophilia
  - Sickle cell
  - Medications (coumadin, heparin, aspirin, fibrinolytics)
- Edema
  - Prolonged compression (drug overdose, alcohol intoxication, operations, trauma)
  - Vigorous exercise & weightlifting
- Intracompartmental Fluid Infiltration
  - Digital block with anesthetic
  - IO infusion

Compartment Size Reduction or Restriction of Size

- Casts and wound dressings
- MAST trousers
- Burn eschar
- Closure of fascial defects

Source: **(5,6)**

son, there has been a push to reference the compartmental pressure with respect to the patient's systemic blood pressure.

One author deduced from clinical studies that a compartment pressure that approaches 10-30 mmHg of the diastolic pressure will produce ischemia and is thus an indication for fasciotomy. (1) Another author coined the term Delta P to indicate the mean arterial pressure (MAP) minus the compartment pressure. He concluded that as Delta P dipped below 40mmHg (i.e. compartment pressures approaches MAP), muscle perfusion dwindled, and the need for fasciotomy increased. (4)

Epidemiology

Seventy percent of compartment syndrome presentations occur secondary to a fractured extremity. (2) While over half of cases involve the four compartments in the lower leg secondary to tibia fractures, a significant number involve the two compartments within the forearm secondary to radius/ulnar fractures. The most common locations are the anterior compartment of the lower leg (shin) and the volar aspect of the forearm. (2,3) Other less commonly reported locations of compartment syndrome are in the hand, shoulder, back, buttocks, thigh, and foot. (5)

Table-2 Extremity Compartment Locations

Upper Extremities

- * Arm
- Forearm
  - Volar Compartment
  - Dorsal Compartment

Lower Extremities

- *Thigh
- Lower Leg
  - Anterior Compartment
  - Lateral Compartment
  - Superficial Posterior Compartment
  - Deep Posterior Compartment

***The arm and thigh contain fascial "compartments" named only for the muscles they contain.**

Source: **(3)**

Clinical Diagnosis

Unfortunately, diagnosis of compartment syndrome is not as simple as identification of 'Pain, Paresthesias, Paralysis, Pallor, and Pulselessness'.

Initial exam must include and document inspection, palpation, and neurovascular status. Sensation and capillary refill may provide early clues. A firm muscular compartment is worrisome as well. Remember that compartment syndrome may occur under a newly placed cast or splint which may need to be removed in order to make the diagnosis.

Pain, especially with passive stretch or active contraction of the muscular compartment in question, has routinely been cited as the most common "sign" of compartment syndrome. (2,3) Sometimes the pain may even appear "out of proportion to the presenting injury."(12)

While pain is the most common symptom, paresthesias are the most sensitive feature of developing compartment syndrome. (2,3,4) This sensitivity likely stems from the higher intolerance of nervous tissue to ischemia as compared to muscular tissue. (2)

Other clinical clues such as a firm muscular compartment, elevated CPK levels, myoglobinuria, or compartmental pressure elevations further support a conclusion of compartment syndrome. (5) Paralysis and particularly, pulselessness are rare, late findings and should not be relied upon to make the diagnosis! (2) Reliance on these signs to exclude compartment syndrome early in the injury process may contribute

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to making you a defendant if the diagnosis is missed.

Compartmental pressures are measured when confirmatory objective data is needed and conventional signs and symptoms are equivocal or difficult to assess. Typically this applies to children, multitrauma patients, or unconscious individuals. (2) Compartmental pressures are also used to support the decision to perform fasciotomy.

Currently, there are two predominant modalities used to measure intracompartmental pressures. They are the slit catheter technique and the Stryker System. (3,4) The slit catheter technique is an accurate, easy to use mechanism utilizing an 18g needle over a fenestrated (slit) plastic catheter. After the patient has been locally anesthetized, the slit catheter is inserted into the appropriate compartment and a digital readout is obtained. One author advises measurement at the point of maximal pain as this area has been shown to be the most representative of true intra-compartmental pressure. (4,7)

The Stryker Intracompartmental Pressure System is an inexpensive, operator friendly, hand held apparatus. The device can use an 18g needle for intermittent monitoring or an indwelling slit catheter for continuous monitoring. Interestingly, both devices can be attached to a continuous computerized monitoring system with a threshold alarm that alerts the staff when a particular pressure has been reached. (2,3)

Compartmental pressures are measured to confirm the need for surgery (fasciotomy). (2,9) Unfortunately, like pressure-measuring devices; there is no gold standard to interpret the information gained. However, recent literature employing various animals and medical student volunteers has developed some guidelines that are quite useful to physicians who perform these measurements.

Normal compartment pressures range from 0-10 mmHg. In general, an absolute compartmental pressure of 30-45 mmHg for 4-8 hours in an injured extremity will produce irreversible myoneural injury. (2-4)

Treatment and Disposition

Emergency department treatment of compartment syndrome hinges on diagnosis. One must have a high index of suspicion when dealing with patients with extremity fractures or other potential causes of compartment syndrome.

Early consultation and testing for compartmental pressure is essential in the patient with suspected compartment syndrome. Patients with normal pressures should be treated appropriately for any co-existing injuries and released with good follow up instructions and reasons for return to the ER. At minimum, the instructions should alert the patient to return to the emergency department immediately for:

- Pain in an extremity from an applied splint or cast.
- Pale or cyanotic extremity compared to the uninjured side.
- Numbness, tingling, or throbbing of the inured extremity
- Inability to move fingers or toes or there is considerable pain when they are moved.
- Burning, cramping, or excessive pain in the injured extremity.
- Swelling around applied splint or cast edges.
- Pressure and release of nailbeds on injured extremity side returns circulation discernibly slower than that of the non-injured side (capillary refill test).

If your department does not have a list, several commercially produced lists are available. (11,13)

Patients with intermediate pressures of 10-20 mmHg may need several hours of monitoring in the ER or admission for continued observation.

Patients with compartment pressures of 30-40 mmHg generally are considered candidates for emergent fasciotomy, followed by admission to the Orthopedic service.

One should also be aware that commonly used treatments for extremity injuries such as ice packs or elevation may actually worsen the perfusion in the injured compartment when the pressures are already increased.

Medicolegal Issues

The majority of litigation surrounding compartment syndrome is directed toward intra-operative error during fasciotomy. These cases generally involve severing essential nerves or creating a secondary compartment syndrome by cutting vital blood vessels. (13) Regretfully, there are instances when the diagnosis was either delayed or missed altogether in

the ED or patients were given inappropriate follow-up instructions that resulted in disastrous consequences.

One such true-life example of misdiagnosis involved one of our U.S. Army Golden Knights elite parachutist. While performing a routine training jump, JD found himself with an entangled parachute 30 ft from the ground. His unimpeded drop to the ground resulted in a comminuted fracture of the right heel. JD, who was in excruciating pain according to the emergency room nurse's notes, claimed: "I feel like my toes are going to explode from the pressure mounting in my foot." The Emergency Physician as in our first case, made the fracture diagnosis, but failed to appreciate the potential for compartment syndrome. JD was subsequently transferred three and one-half hours to another facility for further orthopedic care where the devastating diagnosis was made. Unfortunately, JD required a below the knee amputation and medical discharge from the Army. (11)

The medical malpractice literature is filled with many cases such as the ones above. Plaintiff's attorneys scrutinize these cases in an effort to determine if they warrant pursuing. The following criteria should therefore be kept in mind: (8)

- Was the patient properly assessed? And reassessed?
- Was appropriate nursing care provided?
- Was there appropriate communication between health care providers (RN's, Residents, Attendings, Specialists)?
- Was there proper documentation?
- Was there a delay in diagnosis and treatment?

When sending patients home with painful/traumatized/fractured extremities, the medical record should reflect that the patient received a detailed list of return instructions. See detailed discharge instructions under the heading *Treatment and Disposition.*

Summary

Acute compartment syndrome can be a difficult diagnosis to make. Many times it is simply an unavoidable consequence of trauma or surgery. Unfortunately, there are a multitude of situations that may precipitate this condition and each one can present in a variety of ways. Therefore, the diagnosis must be entertained early whenever a patient presents with a painful extremity, especially if it is associated with a fracture. The literature is replete with "learning" cases whereby the Emergency Physician attributed a patient's ongoing pain simply to the injury of presentation. Don't let this happen to you. Take care of your patients. Have a high index of suspicion for compartment syndrome. When in doubt, measure the compartmental pressure. The new generation devices are inexpensive, accurate and user friendly. Involve your Orthopedic consultants early in an concerted effort to avoid irreparable damage from compartmental ischemia *and* to avoid producing the last "*sign*" of compartment syndrome.

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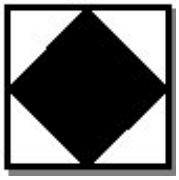
Naval Aerospace Medical Institute
218th Flight Surgeon Graduation Ceremony
14 June 2002



Navy "Wings of Gold" were awarded to a new class of Navy Flight Surgeons, Aerospace Physiologists, and Aerospace Experimental Psychologists at the National Museum of Naval Aviation on 14 June 2002. The speaker was CAPT Myron D. Almond, NAMI Psychiatry and father of one of the graduates.

The following is a list of the graduates and their new assignments.

Anchors Away!

Flight Surgeon Class 0202	**Billet Assignment**
LT Peter S. Ariel	Branch Medical Clinic, Yuma, AZ
LT Christopher A. Alfonzo	VP-30, Jacksonville, FL
LT Nathaniel B. Almond	NAMI, Pensacola, FL
LT Eric L. Anderson	VP-30, Jacksonville, FL
LT Sameer Bakhda	MAG-39, Camp Pendleton, CA
LT Anthony C. Biascan	Ambulatory Care Center, Port Hueneme, CA
LCDR Stephen C. Brawley	HM-14, Norfolk, VA
LT William K. Chin	Branch Medical Clinic, Fort Worth, TX
LT David C. Danish	Branch Medical Clinic, El Centro, CA
LT Diana C. Fu	MAG-26, New River, NC
LT Todd A. Gardner	CVW-11, Lemoore, CA
LT Stephen K. Hanses	
LCDR Douglas G. Hawk	NAS, Willow Grove, PA
LT Sean Jones	2nd MAW, Cherry Point, NC
LT Carmin M. Kalorin	MAG-29, New River, NC
LT Matthew R. Kirk	MAG-39, Camp Pendleton, CA
LT Andrew H. Lin	NSAWC, Fallon, NV
LT Joel T. McFarland	VP-10, Brunswick, ME
LT Alan W. McInnes, Jr.	Point Mugu, CA
LT Guillermo A. Navarro	TRAWING-4, Corpus Christi, TX
LT Michael W. Nielsen	3rd MAW, Miramar, CA
LT Thomas Y. Pak	VPU-2, Kaneohe, HI
LT Lawrence H. Potter	NAS, Atlanta, GA
LT Thomas J. Presenza	2nd MAW, Cherry Point, NC
LT Nathaniel J. Ruttig	TRAWING-4, Corpus Christi, TX
LT Rolf K. Schmidt	CVW-5, Yokosuka, Japan
LT Jason D. Sweet	HSL-37, Kaneohe, HI
LT Brendan T. Tribble	Branch Medical Clinic, Memphis, TN
LT Barry K. Young	Medical Clinic, Pearl Harbor, HI

CLASS 0202
(3 DEC 01 – 14 JUN 02)

Bottom Row: (Left to Right)

LT Anderson, LT Gardner, LT Jones, LT Biascan, LTJG Chuba, LT Pak, LT Fu

2nd Row:

LT McFarland, LT Nielsen, LCDR Brawley, LT Bakhda, LT Lin, LT Airel, LT Ruttig

3rd Row:

LT Young, LT Kalorin, LT Almond, LT MacKay, LT Navarro, LT Presenza

4th Row:

LT Tribble, LT Potter, LT McInnes, LTJG Scheeler

5th Row:

LT Danish, LT Hanses, LT Schmidt, LT Chin, LT Kirk

Top Row:

LCDR Hawk, LT Alfonzo, LTJG Fatolitis

Naval Operational Medicine Institute

Residency in Aerospace Medicine
Year 2002 Graduates

June 28th, 2002 marked the graduation of 14 residency trained Aeromedical Specialist from the Naval Operational Medicine Institute. These specialists are trained to be experts in aeromedical analysis, treatment and policy. Many of the graduating residents are previously trained in other medical specialties along with their specific training in Aerospace Medicine. The residency consist of a PGY-1 clinical year (Internship), a PGY-2 year obtaining a Masters in Public Health, and PGY-3 and 4(if needed) years being trained in Aeromedical Policy, Hypo/Hyperbaric medicine, Safety and Occupational Medicine, etc.

These graduates have successfully completed their required training and now move to the Fleet and Army units to help increase readiness, provide leadership and to be source experts for the operational Flight Surgeon.

Anchors Away!

Graduating RAM Class of 2002

from left to right: ***1st Row:*** *LT O'Neal, LCDR Newton, LT Johnson, LCDR Wilson*
2nd Row: *LCDR Wechgelear, LCDR Delonga, CDR Farr, MAJ Sauer*
3rd Row: *MAJ Husak, CDR Ciccone, LCDR Lucas, MAJ King, LCDR Padgett, CDR Goyins*

RAM Trained Aeromedical Specialist	Billet Assignment
CDR Charles A. Ciccone	SMO, USS John F. Kennedy (CV67)
CDR R. Wesley Farr	SMO, USS Harry S. Truman (CVN75)
CDR G. Gerald Goyins	SMO, USS Abraham Lincoln (CVN72)
LTCOL Ronald P. King	Middle Wallop, United Kingdom
LCDR David M. Delonga	NAMRL, Pensacola, FL
MAJ John P. Husak	Fort Hood, TX
LCDR Christopher C. Lucas	NAMI Physical Exams, Pensacola, FL
LCDR George A. Newton	COMAEWWINGPAC, Point Mugu, CA
LCDR William S. Padgett	HMH-464, New River, NC
MAJ Samual W. Sauer	WRAIR, Forest Glenn, MD
LCDR Peter N. Wechgelaer	VMAT-203, Cherry Point, NC
LCDR Charles E. Wilson	1st MAW, Iwakuni, Japan
LT Tarah L. Johnson	VMFAT-101, MCAS Miramar, CA
LT Brian A. O'Neal	VFA-106, Oceana, VA

We at the Naval Operational Medicine Institute want the aviation community to know that we are launching a group of graduates who report to the Fleet and Army units to serve not only aviation personnel, but all those who contribute to the Army and Navy's mission. Fair winds and following seas to our departing shipmates!

Aerospace Residency News

Residents arriving in Pensacola summer 2002

LCDR Wayne Caroleo	Harvard	GMO
CPT Fred Harris	UTMB	Aviator/Flight Surgeon
CPT Jonathon Stabile	UTMB	Flight Surgeon
CPT Greg Lang	UTMB	Aviator/Internship

Residents starting MPH summer 2002

CDR John Burgess	UCLA	ER/Flight Surgeon
CDR Paul Kane	Tulane	IM/Flight Surgeon
LCDR Dave Krulak	Johns Hopkins	Flight Surgeon
LCDR Jack Wyland	UAB	Flight Surgeon
CPT Bascom Bradshaw	UTMB	Internship
CPT Kevin Diel	UTMB	Aviator/Flight Surgeon
MAJ Alan Gatlin	UTMB	Aviator/Flight Surgeon
CPT Richard Roller	UTMB	Physiologist/Flight Surgeon

The Residency in Aerospace Medicine is available to all Navy and Army physicians. Prior designation as a Flight Surgeon is desirable, but not a requirement for selection. For application materials and procedures for this exciting operational specialty, contact the Naval Operational Medicine Institute at namiramdir@nomi.med.navy.mil.

Aerospace Residency News

Amazing how quickly time goes when you're having fun, isn't it? All of a sudden, it's been four years, and now time for me to go. CAPT Mike Valdez and I joined the residency as director and associate director that long ago, and we've since surfed this program through seas buffeted by change. It's been an incredible ride. As I look back at my time here, I'm amazed how far we've come and how much has changed.

When we came aboard, the residency was the traditional mid-career Flight Surgeon's path to specialty in aerospace medicine and preparation for carrier SMO tour. Our mandate was to shorten the conduit and tailor it for new interns entering directly into the field of aerospace and operational medicine. The vision was an accelerated program, and one that would initially support 24 residents a year, well beyond the historical 4-5.

(CAPTs Valdez and Davenport demonstrating wrestling moves??)

The interns who have come through our program did great and are now out in the fleet as aerospace specialists, acting as a new breed of "Super Flight Surgeon." The MPH and Aerospace Practicum years are heavily academic and didactic however, and it became evident as we trained, that to be fair to them, we needed to augment the clinical skills they'd lost in the classroom. We were successful in convincing the then Surgeon General to add an advanced clinical year to reinforce their clinical skills before they graduated, and provide operational medicine experience beyond that required for aerospace medicine board certification. The cost trade-off was to cut the pipeline from the 12 training slots to 8, a zero-sum game in the DoD world of strict training budget accounting.

The new program, now robust both in the preventive medicine aerospace and clinical arenas, and flexible enough to deal with a broad spectrum of applicants, attracted the interest of the Army. They elected to send their aerospace medicine residents to us, instead of the Air Force program they'd used for years. The residency now includes roughly equal numbers of Army and Navy residents, and LTC Otto Boneta joined us as the Army Liaison Officer. And the collaboration has been wonderful. The breadth of experience and differences in philosophy between the two services greatly strengthens the alloy of this "melting pot" residency.

Through all this, we've maintained the flow of mid-grade career Flight Surgeons whose goal is the carrier SMO tour. The residency has preserved the flexibility to provide these more senior Flight Surgeons with not just aerospace medicine certification but the tools they need to flourish in this demanding job at sea.

The winds of change are blowing again. This residency has for years been the prime pathway to Navy operational medicine. The traditional stovepipes of clinical specialists in Navy hospitals on one side of the fence, and career operational Flight Surgeons in the Fleet on the other, are breaking down. For those specialists locked up in Navy MTFs, the vision is for this program to become the avenue to fleet experience and certification in their second specialty of aerospace. And with RAM graduates who also possess a primary care specialty, they have an entrée to the MTF and executive medicine that was denied to the aerospace specialist of the past. Many of these folks are already in our program, sharing their clinical experience with their more junior Navy and Army RAMS. The residency will become the conduit for Navy Medicine to the Fleet, and I know this program will respond, as it has in the past, in superb fashion.

Since Mike and I have been here these past four years, we've had a hand in the education of 58 aerospace medicine residents. They have ranged from lieutenants to captains. A third of them had prior specialties before joining us, and seven joined the pro-

gram directly out of civilian practice. As a reflection of the changing selection criteria I've mentioned, 40% have not been prior Flight Surgeons. Nine have seen prior service as aviators or flight officers. Nine are Army residents and four have been international students – 3 Canadians and this year, our first Saudi Arabian officer. Mike, Otto, and I have had the pleasure and pride of witnessing our RAMs present at national meetings, having their recommendations accepted by the Aeromedical Advisory Council for Waiver Guide changes, and having their projects accepted for publication in peer-reviewed journals. And of the 33 eligible for their boards during this time, 31 have taken and 27 passed on their first attempt – an 87% pass rate, enviable for any residency program.

But those are the dry statistics, and don't represent the true diversity of these extremely motivated, talented, and experienced residents. Each RAM has brought unique qualities to the program, and left his or her imprint on the residency. Curriculum changes and new rotations, the "Academic Friday," quarterly mishap reviews, expanded lecture series – all make the residency even better than it was when I came through as a RAM in '94 -'96. The exuberance of such a mix of enthusiastic, experienced, and talented physicians guarantees that great ideas will percolate into the program. As staff, Mike, Otto, and I can take little credit for these successes – we're lucky to stay one step ahead of our students. And now our former RAMS are our aerospace and operational medicine colleagues in this great specialty – on the high seas, in the hospitals, and serving well the aviation assets of the Navy, Army and Marine Corps.

This summer I'll head to the School of Aviation Safety at Monterey, to be faculty in that program. CDR Jay McMahon will relieve me as the new associate director here. I'm excited about my new assignment, where I'll still have a hand in training RAMS, but will leave the residency staff and my peers here at NAMI with feelings of appreciation for a great tour. It's been a privilege to be here. My heartfelt thanks to CAPT Mike Valdez, LTC Otto Boneta, Ms. Carrie Moore, Ms. Kathy Fredrickson, the NAMI Faculty, and all of you, for making it such an outstanding experience.

Cheers,

CAPT Nicholas A. Davenport, MC, USN
Aerospace Medicine Residency
Associate Director
nadavenport@nomi.med.navy.mil

Job Opportunities

A newly established world class medical institute in Gulf Shores, Alabama is seeking an FAA certified Aviation Medical Examiner. Preferred candidate should be qualified or eligible to conduct First Class Medical examinations. Targeted patient groups include General Aviation, Corporate, and Commercial Airline Pilots. Salary and opportunity is negotiable and unlimited.

Contact Bert Krages, telephone 251-967-7673 or email berthlc@gulftel.com

The position for the Chief, Population Health at Region 11 TRICARE (FT Lewis Washington) is expected to become available in the next few days. The individual who is recruited for this position would also be the Deputy, Medical Director for Region 11. This is an unexpected vacancy at the Lead Agent office and is a Navy Medical Corps billet.

Physicians (O-5 and O-6) with training / experience in many of the following areas might want to consider this job: MPH degree, epidemiology, database mining, outcomes management, condition management, or primary care optimization. Training will be available pertaining to medical director duties.

Physicians with an interest in leading tertiary prevention strategies (condition / disease management, implementation of clinical practice guidelines, etc) for a TRICARE Region and a vision for new opportunities in primary and secondary prevention should investigate this job opportunity.

Region 11, with about 390,000 TRICARE members, has been a pioneering region pertaining to Population Health Management. A new Lead Agent, BG Dunn, reported last week; he was very supportive of Population Health and Outcomes Management when he was the Commander at Walter Reed.

The Chief, Population Health, is the Lead Agent Coordinator of local MTF activities pertaining to population health. There is a regional Population Health Implementation Team (PHIT) and several ongoing Population Health initiatives. There are five subcommittees of the PHIT: Demand Management, Disease Management, Preventive Services, Community Health, and Medical Readiness. Very successful improvement in outcomes for the current cohort of patients with diabetes has been documented. The In-

(continued on page 56)

2002 SUSNFS Award Winners

Aerospace Medicine Technician of the Year 2001

HM1 (SW/AW/FMF) Michael Glenn Stahl
United States Navy
USS Theodore Roosevelt (CVN-71)

Presented annually at the Problems Course held in March to an AVT displaying outstanding professional performance, military behavior, leadership, appearance, adaptability, community spirit, self-education and special contributions.

Richard E. Luehrs Memorial Award 2002

LT Christopher B. Chisholm
United States Navy Reserve
Branch Medical Clinic Kaneohe Bay

Presented annually at the Aerospace Medical Association Meeting held in May to recognize outstanding performance in operational aviation medicine practice by a first or second tour Naval Flight Surgeon of the rank of lieutenant or lieutenant commander based on leadership qualities, dedication, initiative, resourcefulness and industry in carrying out their duties with the operational forces.

Ashton Graybiel Memorial Award 2002

CDR Eric A. Bower
United States Navy
Naval Hospital Pensacola

Presented annually at the Aerospace Medical Association Meeting held in May to recognize outstanding contributions to the medical literature by members of SUSNFS in support of operational issues in Aerospace Medicine with promise of long-term impact to the health and safety of aviation.

Bruce W. Jackson Memorial Award 2002

CDR Daniel H. Serrato
United States Navy Reserve
VAW-77

Presented annually at the Aerospace Medical Association Meeting held in May in recognition of outstanding contributions to the practice of Aerospace Medicine as a Reservist and service to those sailors and marines that depend on their Flight Surgeon for their health and safety in peacetime and war.

(CDR Lee accepting Sonny Carter Memorial Award from ADM Arthur and CAPT Fraser)

Sonny Carter Memorial Award 2002

CDR John J. Lee
United States Navy Reserve
USS Enterprise (CVN-65)

Presented annually at the Aerospace Medical Association Meeting held in May in recognition of resourcefulness, leadership, and professionalism promoting teamwork among the various aeromedical specialties and embodiment of the spirit of cooperation.

Robert E. Mitchell Lifetime Achievement Award 2002

CAPT Conrad I. Dalton
United States Navy (Retired)

Presented annually at the Aerospace Medical Association Meeting held in May to recognize an emeritus Naval Flight Surgeon for their career contributions to promoting and advancing the knowledge and science or aerospace and operational medicine.

(CAPT Dalton accepting Robert E. Mitchell Lifetime Achievement Award from ADM Arthur)

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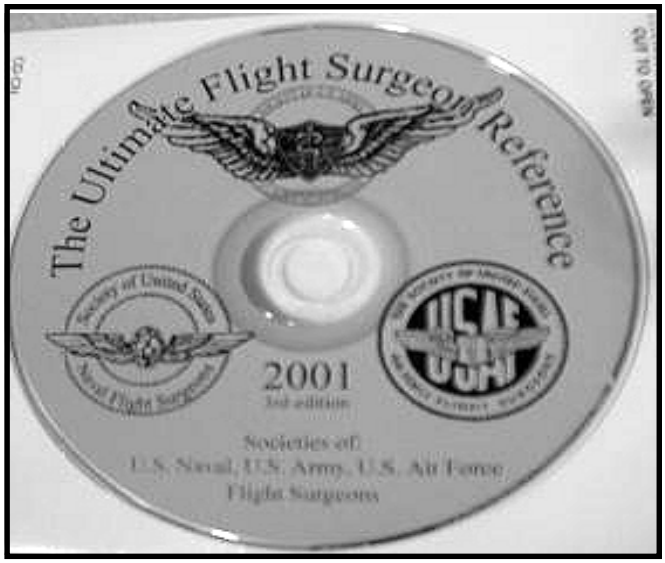

Ultimate Flight Surgeon 2001 CD-ROM

Selected SUSNFS Merchandise Items Catalog

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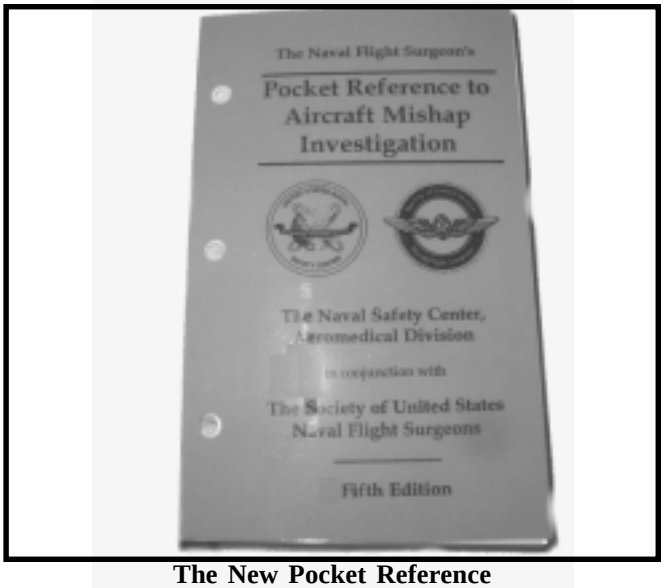

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___	**NEW - NAMI Flight Surgeon Belt Buckle!!!!**	**24.00**	**24.00**	_____
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(continued from page 51)

tegrated Clinical Database (ICDB) a relational database for tracking healthcare outcomes is being used at regional commands and would be a tremendous resource for population health data.

The Navy physician currently in this job is CDR Bill Cogar (253-968-6693) If you have interest in this position or know others that might, the detailer for this vacancy is:

CDR Charles Hames, MC, USN
Non-Surgical Specialties Detailer, P4415N
(901) 874-4046 Fax (901) 874-2680
p4415n@persnet.navy.mil

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Submissions should clearly indicate the author's return address and phone number. All submissions should reach the Editor one month prior to the scheduled date of publication. Correspondence should be sent to:

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