Orbiter

The Official Newsletter of the Aerospace Medicine Student and Resident Organization

AMSRO @ AsMA 2009

by Alex Garbino, President

As we near the start of the AsMA 2009 Annual Meeting, I hope all of you who will be attending will join us for our member-wide AMSRO meeting. This year's conference is promising to be captivating: the possible outbreaks of pandemics via air travel (as well as how to mitigate their spread), increasing commercial and participant travel into space, updating aviation medical certification regulations, and many other topics will be addressed by specialists in the field. Drs. Chuck Berry & Christopher Wickens will be key speakers.

AMSRO will be having a meeting Monday, May 4th from 5:30pm-6:30pm; the agenda will be sent out on the mailing list and you can always email me directly for copies/further information (agarbino@gmail.com). The most important issue will be the election of officers for the coming year. Please be there and vote! We will also discuss making many updates to the bylaws so as to improve the functioning of AMSRO and satisfy AsMA's requirements.

We will also be discussing the next steps forward for the organization, and where we want it to go. It's your organization, so please be there to share your ideas! If you cannot attend, I or any of the other officers will be happy to present your ideas & concerns to the membership. In particular, we will discuss how to help regional chapters get started and grow. Montreal (McGill University) and Philadelphia already have chapters starting! You will also be able to become a member and pay your dues at the meeting. Finally, if you are in LA Saturday on Sunday, the Jet Propulsion Lab will be having its 2009 Open House. Don't miss it!

See you in LA!

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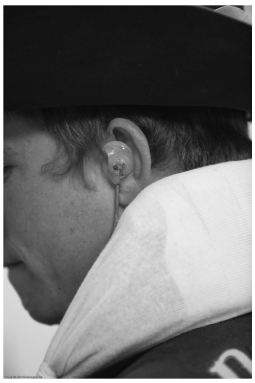
Acceleration Research at the Houston Rodeo

by Charles Mathers, M.D.

In 2007, a member of the Aerospace/Internal Medicine Residency Program at UTMB, Sharmila Watkins, M.D., M.P.H., conducted a pilot study examining head acceleration experienced by rough stock riders. The study was conducted on one bareback and one bull rider during the 2007 Houston Livestock Show and Rodeo. This study was based on the observation that many rough stock riders experience head injuries during their events, often without even experiencing a head impact. The two riders were outfitted with an earpiece that was embedded with tri-axial accelerometers. These accelerometers measured head accelerations experienced by the rough stock riders, and fed the data to a small data recorder worn on the rider's belt. The bull rider experienced a maximum of 26 linear g's during their ride, while the bareback rider experienced up to 46 g's. Though this small study was just a proof-of-concept design, it suggested that rodeo riders may experience head injuries from high g forces alone.

As a second-year resident in the Aerospace/Internal Medicine Residency Program at UTMB, I had to opportunity to continue this study and expand its scope. Using the lessons learned in 2007, a new hardware system was constructed using smaller, lighter materials. The second study was conducted this past March at the 2009 Houston Livestock Show and Rodeo. Twenty riders participated over an approximately two-week period. Instead of just linear acceleration, data was collected on both tri-axial linear and angular acceleration about the head. Though the data is still being analyzed, some preliminary findings revealed that bareback riders in particular experienced repetitive, high angular accelerations in the x-axis during their rides. The mean peak acceleration was around 3000 degrees/second, with some riders experiencing as high as 6000 degrees/second. To put that number into perspective, a professional baseball pitchers arm reaches 7000 degrees/second when throwing a fastball. Imagine your head moving that fast! On average, bull riders experienced less linear and angular acceleration than bareback riders. However,



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one bull rider's head accelerated to 90 linear g's in the y-axis while being thrown from the bull. Much work still needs to be done, but clearly these rough stock riders are experiencing high amounts of head acceleration during their events, potentially exposing them to injury.

Working at the rodeo was an absolute blast. I worked closely with the Justin Sports Medicine Team, a group of doctors and sports medicine practitioners who treat rodeo injuries. My team had a back-stage pass to the arena, and sitting behind the chutes with very large animals was hair-raising at times! Overall, I was impressed with the kindness and professionalism of all the rodeo participants and staff. The rodeo is a fun and affordable event for the city of Houston, and I would encourage all of you to attend.

Another one of our residents, Dr. Leigh Lewis, will be using the same hardware to conduct acceleration research in aerobatic pilots this year. She is studying G-inducted Vestibular Dysfunction (GIVD), also known as "the wobblies". We are also planning to use a similar system to study head acceleration in astronauts aboard the Russian Soyuz and the new NASA Aries spacecraft. If you are interested in being involved in this research, consider joining our residency program. The UTMB Aerospace/Internal Medicine Residency Program offers you the chance to participate directly with NASA researchers and flight surgeons, and provides residents with top-notch training towards being the flight surgeons of the future. For more information, you can email me at chmather@utmb.edu or contact the department directly at aerospacemed.pmch@utmb.edu.

Photos courtesy of Maltz Photography
www.maltzphotography.com

Pictured from left: Pat Puzzuto, DTS, Inc., Leigh Lewis, M.D., Charles Mathers, M.D.

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Aerospace Medicine in the Navy

by Captain Jonathan Stinson, M.D.

One of the more varied and interesting places to practice aerospace medicine is in the US Navy. The experiences to be had and the steps one takes to enter this field can be quite variable, so I will try to go over the most common pathway and relate some of my experiences along the way.

The majority of Navy physicians come from the Health Professions Scholarship Program. Uncle Sam pays for their Medical School and they pay him back with a time commitment, usually one year per year of training. Typically the Navy will put you through medical school and internship, then follow that with a utilization tour. It is at this point that you can either select to do a General Medical Officer tour, or go on to additional training as a Flight Surgeon or Undersea Medical Officer. My path was a little different. I entered the Navy and went to Flight Surgeon School after having already completed my medical school and residency as a civilian.

The primary entry point for aerospace medicine in the Navy is Flight Surgeon School, and it is a great experience. You spend the first 3 months learning the basics of aerospace medicine as well as how to navigate the paperwork required to certify and maintain aviators in a flight status. The second 3 months you go through aviation preflight or ground school where you get courses in Aerodynamics, Meteorology, Jet engines and Navigation, as well as your water safety qualification. This is followed by primary flight school where you get primary flight time (you're at the controls) in both fixed wing and rotary aircraft. It is a ton of fun.

After successful completion of the training, you are awarded your Flight Surgeon Wings and are assigned to your follow-on tour. This tour is usually with a squadron or air wing as their flight surgeon. In this role you typically work in a hospital or clinic 50% of the time taking care of the day to day medical needs of your squadron and other aviators. The other 50% of your time is spent with your squadron, getting to know them, learning about the aircraft they fly and flying with them. You are very involved in safety of flight issues so it is important to know as much about their particular flight environment as you can. This can be a very unique and rewarding experience. You form bonds and get to know these guys as well as anyone in your family. I deployed to the Middle East 3 times with my first squadron and remain friends with many of them to this day.

After the first operational tour, many Flight Surgeons will apply to continue their training and complete their residency. Completion of residency is usually followed by a hospital tour in your designated specialty. Since I was already board certified, I did a second squadron operational tour, and went on to a

hospital tour after that.

At the completion of the hospital tour, one can either stay in clinical medicine, or take the opportunity to go further in aerospace medicine. The latter involves applying for the Residency in Aerospace Medicine (RAM). This program is open to anyone who is already board certified and preferably has prior Flight Surgeon experience. It consists of an MPH program with a follow-on practicum year at Pensacola FL, basically a more in depth aerospace medicine clinical and classroom curriculum. At the completion of this program, you have an opportunity to get boarded in aerospace medicine.

The tour that usually follows the RAM is that of Senior Medical Officer (SMO) on an aircraft carrier. There you are the head of all medical and dental services for a ship with 5500 sailors airmen and marines. Additionally when deployed, you are responsible for the entire carrier strike group comprising 3000 more. You have roughly 100 people (Doctors, Dentists, Physical Therapist, Psychologist, Nurses, HCA officer, and Corpsmen) who work for you. You answer directly to the Carrier Strike Group Admiral, Captain of the ship, Commodore of the Destroyer Squadron or CAG of the Air Wing about all things medical.

Some of the issues dealt with during my SMO tour were as follows: Norovirus epidemic affecting 400 crewmembers, rhabdomyolysis with acute renal failure, K of 7.0 and Creat of 13, cervical crush injury from accidental closure of an FA-18 canopy, acute compartment syndrome, tib-fib fracture, several finger amputations, 4 myocardial infarctions, 17 cases of acute appendicitis, one small bowel resection for obstruction from Crohns, approximately 5000 small pox vaccinations, 12,000 anthrax immunizations, many other common vaccinations, radiation exposure limitations, heat stress limitations, noise limitations, food and water safety, and many more things I can't possibly list here. On top of that, there were multiple air medivacs that required a calculated balance between safety of the patient and safety of flight issues. The tour is an exceptionally busy and equally rewarding 2 years. During that time there are also a lot of opportunities for flying. A carrier launch in an FA-18 (0 to 140 knots in 2 seconds) can be a nice break in an otherwise busy day.

Following a successful SMO tour, follow on jobs tend to involve larger groups and organizations such as Fleet Surgeon, Naval Air Forces Surgeon or Marine Air Wing Surgeon. There are also opportunities to teach at the Naval Operational Medical Institute. Throughout a career one tends to advance to jobs of increasing responsibility and authority, each job having its own challenges and rewards.

But lest you think this is a Navy Flight Doc recruitment ad, you should realize there is some down side to all this too. I've had to spend a lot of time away from family and friends, and you don't always get a choice where you are going to go or when. Still, I have found my time as a Navy Flight Surgeon to be very rewarding and at times, a ton o' fun.

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Interested in Conducting Research on Dynamic Hypoxia Training in the Military?

by LCDR Anthony R. Artino, Ph.D., CAsP

Hypoxia is one of the most frequently encountered physiological hazards for aviators who routinely fly above 10,000 ft (Rainford & Gradwell, 2006). Although fatalities from hypoxia are normally considered rare events, the U.S. Navy has experienced three fatal flight mishaps attributable to hypoxia since 2001 (Ostrander, 2005). Accordingly, hypoxia familiarization has been a fundamental component of aviation survival training in the U.S. and foreign militaries for more than 65 years (e.g., Chief of Naval Operations, 2004; West, Every, & Parker, 1972). Traditionally, aviators learn hypoxia recognition and recovery while being exposed to hypobaric conditions in a low pressure chamber (LPC). Recently, a training device has been developed that induces hypoxia using mixed gas delivered through an aviator's oxygen mask. The reduced oxygen breathing device (ROBD) simulates the diminished oxygen present at altitude by mixing breathing air and nitrogen under normobaric conditions.

The use of dynamic hypoxia instruction in military aviation, both LPC and ROBD training, is predicated on several fundamental assumptions. One assumption is that exposing aviators to hypoxia under controlled conditions provides trainees with the cognitive tools and experience necessary to recognize and recover from acute hypoxia, should an incident occur in flight. This assumption is based, in part, on the individuality of hypoxia symptoms, its insidious onset, and the learning benefits associated with first-hand experience with hypoxia, all of which are thought to make exposure to acute hypoxia a critical aspect of any education and training program (West et al., 1972). A second assumption is that the subjective symptoms of hypoxia experienced during dynamic training are similar to those experienced by aviators during actual in-flight hypoxia incidents. These assumptions, while intuitively appealing and supported by several anecdotal accounts, have not been well tested. What is more, dynamic hypoxia training, in general, has received very little attention in the research literature. In short, there is limited empirical evidence that LPC and/or ROBD training are effective instructional methods for improving hypoxia recognition and recovery.

The program of research conducted in the Performance Improvement and Learning Technologies (PILeT) lab at the Uniformed Services University (USU) seeks to validate and further improve dynamic hypoxia training in military aviation (previous work includes, for example, Artino, Folga, & Swan, 2006; Artino, Folga, & Vacchiano, in press; Folga, Sather, Artino, Swan, & Wheeler, 2007). In short, the PILeT lab addresses several fundamental, yet largely unexamined assumptions that guide all aspects of hypoxia training in the U.S. military and abroad.

If you're an aerospace medical student or

resident and are interested in studying dynamic hypoxia training, as described above, please contact Lieutenant Commander Anthony Artino, Ph.D. He can be reached by email at anthony.artino@usuhs.mil, or by phone at 301-319-6988. For more information about LCDR Artino and his research agenda, please see his web page on the USU website: http://www.usuhs.mil/pmb/arartino.html.

AMSRO Officers

This section features one of your current AMSRO officers

President: Alex Gabino
Vice President: Joseph Novak
Secretary: Rebekah Campbell
Treasurer/Membership Coordinator: Derek Nusbaum
Parliamentarian: Tovy Kamine
Chief Editor: Charles Mathers
Website Coordinator: Jennifer Law

Chief Editor - Charles Mathers

Dr. Mathers was born and raised in the Northeast but moved to Texas to attend Rice University. After graduating in 2002, he worked for NASA's Space and Life Sciences Directorate for one year before entering medical school at the University of Texas Medical Branch in Galveston, TX. He is currently a PGY-2 in the Aerospace/Internal Medicine Residency Program at UTMB, and was recently selected to be chief resident for the department of internal medicine during the 2010-2011 academic year.

Scholarship Opportunities

Are the entry fees, flights and hotels keeping you from attending events? There are many scholarships being offered in aerospace medicine!
Make sure to check with your own school for travel scholarships to meetings; many schools set aside a fund specifically for student travel.

IAASM Scholarship ($15000)
Sponsored by the International Academy of Aviation and Space Medicine this scholarship aims to help young physicians starting a career in aerospace medicine attend a formal course of instruction or gain research experience in aerospace medicine.
Deadline: June 30
http://www.iaasm.org

On the Horizon

AsMA Annual Meeting
May 3-7, 2009, Los Angeles, CA
http://www.asma.org

Undersea & Hyperbaric Medical Society
Annual Scientific Meeting
June 25-27, 2009, Los Cabos, Mexico
www.uhms.org

Seventh Annual Meeting of the Society for Human Performance in Extreme Environments
October 18-19, 2009, San Antonio, TX
www.hpee.org