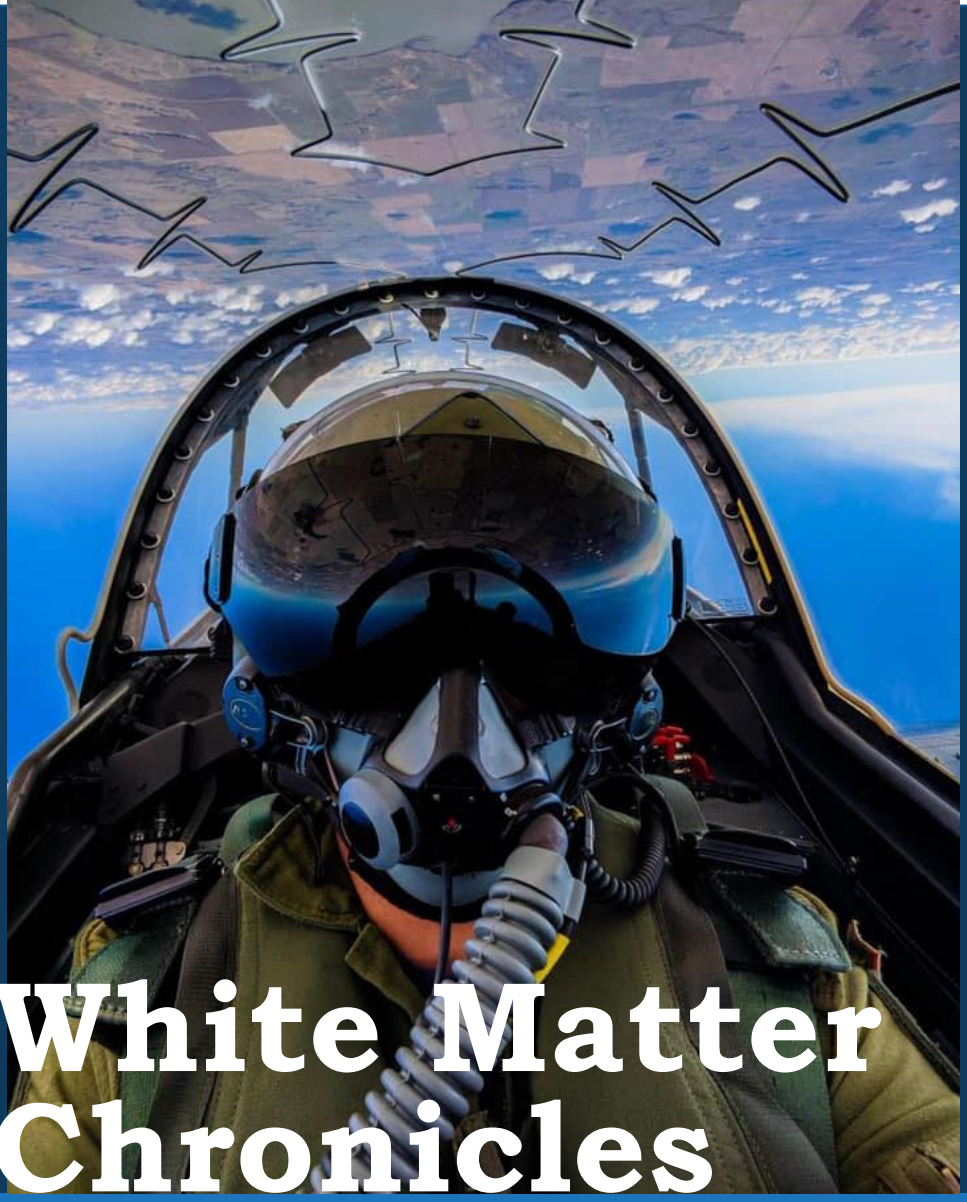

White Matter Chronicles

Edition 20 | 2Q 2022 | Publication of the Aerospace Physiology Society (AsPS)
A constituent organization of the Aerospace Medical Association (AsMA)

"Alone we can do so little, together we can do so much."

-Helen Keller

E-mail: aerophyzsociety@gmail.com
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Inside This Issue

AsPS President 2021-2022

Maj Andrew "Metal Cow" Metelko

The upcoming 92nd Annual Aerospace Medical Association (AsMA) Scientific meeting and associated Aerospace Physiology Society (AsPS) events offer a truly exciting opportunity to come together and share in our areas of expertise. ✈ At our conference in Reno, NV, three individuals will test for board certification in Aerospace Physiology. ✈ AsPS will recognize an educator in the Reno area with our Partnership in Education Award and visit with that educator's students to demonstrate career opportunities in science. ✈ AsPS is sponsoring the panel, "Advancing Technology for Hypoxia Research Needs in Aerospace Medicine" which will be presented on Tuesday, May 24th. This panel is chaired by Dr. John French and Co-chaired by Dr. Rowena Christiansen. ✈ The speaker for the Smith W. Ames Memorial Lecture at our luncheon on Wednesday, May 25th is Dr. Jim Web. The title of his lecture is, "Breathing Atmosphere for Use in Deep Space Vessels." ✈ Also, at our luncheon we will recognize scientific achievement with presentation of the Fred A. Hitchcock Award for excellence in aerospace physiology, Paul Bert Award for physiological research, Wiley Post Award for operational physiology, and Master Sergeant Lloyd Tripp Award for outstanding contributions by an aerospace physiology technician. Award winners for 2022 are featured in this newsletter and will be recognized at our annual luncheon. ✈ Wednesday evening will be The Aerospace Social at the National Automobile Museum. These events would not be possible without the hard work and dedication of all of our members, leaders, and sponsors past and present. Your contributions encourage, promote, and advance the science and practice of aerospace physiology. Your work enhances the professional stature of Aerospace Physiologists, and provides a unified voice for our members in the Aerospace Medical Association. I'm incredibly proud and grateful to be a member of the Aerospace Physiology Society. I'm truly excited to see you at AsMA's 92nd Annual Scientific Meeting in Reno, NV!

AsPS Sponsored Events at the AsMA 92nd Annual Scientific Meeting

Peppermill Resort Hotel, Reno, NV

Sun, 22 May, 8:00 am – 3:00 pm: Aerospace Physiology Certification Exam. Room is Roma 1.

Tue, 24 May, 4:00 pm: Panel: Advancing Technology for Hypoxia Research Needs in Aerospace Medicine. Room is Tuscany F.

Tue, 24 May, 5:30 pm: Lecture by Dr. Jay B. Dean: Fred A. Hitchcock: explosive decompression pioneer (1941-1960) and co-translator of Paul Bert's La Pression Barométrique (1941-1943). Room is Tuscany F.

Wed, 25 May, 12:00 pm – 2:00 pm: AsPS Luncheon sponsored by Environics. Room is Naples 7.

Wed, 25 May, 6:00 pm – 10:00 pm: Aerospace Social, National Automobile Museum. For more info to include obtaining tickets see page 7.

Thu, 26 May, 10:00 am – 12:00 pm: AsPS Business Meeting. Room is Sorrento 2.

Fred A. Hitchcock Award, sponsored by International ATMO, INC.

The Fred A. Hitchcock Award recognizes career contributions of senior aerospace physiologists for excellence in either operational aerospace physiology or aerospace physiology research. The award was established in 1972 and is named in honor of Fred A. Hitchcock, Ph.D., co-translator of Paul Bert's classic work, "Barometric Pressure." International ATMO of San Antonio, TX, sponsors the Fred A. Hitchcock Award with an honorarium, a plaque, and an edition of Paul Bert's classic work, "Barometric Pressure."

2022: CAPT Richard Folga, CAsP, FAsMA

Captain Folga's contributions to aerospace physiology span 25 years and are documented in his service as AsPS President, CAsP Board Chair and through 29 AsMA conference presentations. As an aeromedical scientist, he has served as an investigator on over two dozen research studies, co-author of five ASEM/AMPH journal articles, five technical reports and 40 presented abstracts. His efforts as a founding member of the Joint Strike Fighter Aeromedical Community of Interest and Physiologic Episode Team representative has been utterly invaluable.

As both a Naval Aerospace Physiologist and Aerospace Medical Association member since 1997, Captain Folga has attended and actively supported 23 consecutive annual meetings and served six years on the Aerospace Physiology Certification Board, including the role of Chair. For his 23 years as an Aerospace Physiology Society member, he served on the Board of Governors for 15 years, to include leading as the societies' 50th anniversary year President. His contributions to the field of Aerospace Physiology are numerous. Early in his career he spearheaded US Navy aircrew life support equipment development efforts including supplemental aircrew eye protection, communication ear plug approval for Marine Corps Rotary Wing aircrew and improved rotary wing helmet comfort. He made significant improvements to the quality, content and delivery technology for night vision goggle training curricula. He led the Naval Aviation Survival Training Program team in the initial fleet-wide training and subsequent large-scale roll out of the Reduced Oxygen Breathing Device (ROBD). He shared all the successes and lessons learned of the ROBD program with US Air Force and US Army Aerospace Physiology Program colleagues, helping to advance their effort to implement normobaric hypoxia training. Throughout his entire career, he has been an advocate for deeper understanding of the causes of, improved training quality for, and the development of advanced countermeasures to spatial disorientation (SD). This includes advanced courseware development and custom courseware delivery based on new SD research findings while assigned to the Naval Survival Training Institute. In his role at the Naval Medical Research Unit Dayton, he has been consultant on suspected SD mishaps, SD and human orientation research collaborator and most significantly, charged with the delivery and development of the world's largest disorientation research device.

Paul Bert Award, sponsored by KBR

The Paul Bert Award recognizes outstanding research contributions in aerospace physiology. This award was established in 1969 and was originally given for achievement in operational physiology. It is named in honor of the famous French physiologist, Paul Bert, the "Father of Pressure Physiology."

2022: Dr. Ryan Mayes

Dr. Mayes's career entails a litany of research where he investigated, or had technical oversight that directly explained previously unexplained physiological events. He founded and led a plethora of multi-service and international summits to mitigate physiological events. Dr. Mayes serves as the Senior Technical Advisor & Senior Aeromedical Scientist for the USAF School of Aerospace Medicine (USAFSAM).

Dr. Mayes served as the lead analyst for the USAF F-22 Task Force to explain physiological episodes in the F-22 fleet. His coordination and research on this project corrected work of breathing issues to end the fleet-wide stand-down. Additionally, he spearheaded implementation of real-time oximetry and performance task sensors to measure the impact of the flying environment on performance. Revelations from Dr. Mayes's research include discerning a 35 percent reduction in cerebral perfusion after subjects breath 100% oxygen for 30 minutes, bio-markers of fatigue after flying, and aircrew flight equipment interactions to identify sources or resistance within aircrew breathing systems. In his current capacity Dr. Mayes has technical oversight of the $10 million dollar a year Studies and Analysis Portfolio at USAFSAM.

Additionally, Dr. Mayes has profoundly enhanced flight safety for DoD and NATO partner military aircrew by establishing and maintaining forums for aircrew, scientists, government agencies and suppliers to collaborate and solve physiological issues. Dr. Mayes founded and chairs the Characterizing and Optimizing the Physiological Environment for Fighters (COPE-Fighter) meeting and is the Academic Director for the NATO-Ramstein Flight Medicine Summit. COPE has directly resulted in multiple impacts to the tactical aviation community, including numerous funded research projects, operator briefs on Physiological Events, Dash-1 changes to improve safety, and updates and standardization to mishap response. He is also the chair for multiple NATO exploratory topics to include Unexplained Physiologic Incidents in High-Performance Aircraft, and Evidence-Based Aerospace Medicine. Furthermore, Dr. Mayes set up the first of its kind Joint working group to provide enhanced support for female aircrew.

Wiley Post Award, sponsored by GENTEX Corporation

The Wiley Post Award recognizes outstanding contributions in direct operational physiology and aeromedical training and education. In 1972, the Wiley Post Award replaced the Paul Bert Award for Operational Physiology. It is named in honor of the aviation pioneer Wiley Post and is presented for exceptional service and achievement in operational physiology, including education and physiological support of Dept. of Defense, FAA, NASA, or civilian aircrew.

2022: LT Tyler Grubic

LT Grubic has amplified the resilience and expertise of the military aviation and aeromedical communities. His role as lead author of two chapters of the revised NAVMED manual, "Performance Maintenance During Continuous Flight Operations", has borne innovative fruit in a pictorial checklist for aircrew management of spinal pain, already yielding tangible benefits. Additionally, he cultivated expertise & collegiality in the Joint aviation and aeromedical communities by organizing and moderating the seminal Military Pilot Optimization conference on human performance.

LT Grubic is an agent of readiness in the Naval aviation community, with initiative and expertise that consistently earn the respect of aviators and colleagues. Over the past year, his efforts markedly enhanced aeromedical training and education, improving knowledge, resilience, and effectiveness of joint military aviation. These noteworthy endeavors elevate him as an excellent candidate for the Wiley Post Award.

His subject matter expertise has borne immediately relevant fruit as the lead author selected to rewrite two chapters in the revision of the NAVMED P-6410 publication, "Performance Maintenance During Continuous Flight Operations", to be published by the Bureau of Medicine and Surgery (BUMED) in FY22. As such, he has developed new solutions for fatigue mitigation, as well as neck and back pain awareness & management. These efforts begat a game-changing innovation: a first-ever kneeboard pictorial for pre-flight and post-flight spinal pain management exercises. Presented in a concise checklist format appealing directly to the aircrew audience, this tool empowers military aircrew to mitigate aviation-inherent pain and injury, promotes a paradigm of self-sufficiency, and augments Force Health Protection. This product is highly praised by the Neuromuscular Sub-Committee Group and the Human Performance Sub-Committee (HPSC) Group of BUMED, and in fact, the HPSC has employed this kneeboard tool as an intervention measure in the third phase of a Navy-wide study to assess its effectiveness in reducing spinal pain.

Additionally, in collaboration with the National Strength and Conditioning Association (NSCA), LT Grubic orchestrated and moderated the Society of US Naval Aerospace and Operational Physiologists (SUSNAOP) seminal lecture series on Military Pilot Optimization, educating 232 joint Warfighters and diverse aeromedical professionals in human performance optimization, and cultivating collegiality among SUSNAOP, the NSCA, and other Department of Defense (DoD) and non-DoD organizations.

MSgt LLoyd Tripp Award, sponsored by Martin-Baker

The MSgt Lloyd Tripp Award recognizes outstanding contributions by aerospace physiology technicians. This award was established in 2021 and first awarded in 2022. In recognition of the feats accomplished as a technician and for his lifetime of service to the aerospace physiology profession this award is named after Dr. Lloyd Tripp.

2022: MSgt (r) James Hanna

James Hanna has worked at KBR's San Antonio Altitude & Acceleration facilities for 10 years. Jim's background as a USAF Aerospace Physiology tech with duties in RDT&E at Brooks Air Force Base and U2 mission support at Beale AFB, made him a perfect fit for the Brooks mission as Chief of Altitude Operations. He maintains 60 year old equipment, works closely with customers (DoD, NASA, Aerospace contractors), investigators, and other staff to execute projects in a variety of altitude chambers.

Customers come from across the DoD, NASA and other government and non-government entities - with requirements that fall into 3 main categories; test & evaluation of equipment and/or procedures, training astronauts/aircrew, or physiological research involving human or animal subjects.

Expertise/capability sought after is usually either altitude or High G simulation using hypobaric chambers and a human-rated centrifuge - a few customers require both. KBR recruited Jim 10 years ago, shortly after his USAF retirement - a perfect addition given his extensive experience in aerospace medicine RDT&E at Brooks AFB, and his expertise gained at Beale AFB supporting the U2's high altitude recon mission. Jim's knowledge and work ethic quickly resulted in promotion to Chief of Altitude Ops. He ensures human and equipment resources are available to support a range of project types/schedules. A typical day may have him overseeing a 13 hour altitude/fatigue study in E Chamber requiring multiple shifts of staff - an animal study in C chamber supporting aeromedical evacuation research - 2/3 flights in Chambers A5/6 that could include subject training, Life Support System (LSS) T&E, altitude training for USAF U2 aircrew or a physiological experiment using a subject volunteer. F-22, F-18, F-35, T-6, T-7, U-2, Commercial Space, Spec Ops, NASA, TV production companies and a variety of other customers frequent Brooks, and all come to know and rely on Jim. He's particularly adept at keeping 60+ year old equipment running, to include doing his own self-help upgrades or negotiating with local contractors to get best value help with old or new systems. When Winter Storm URI hit Texas Feb '21, causing widespread damage and disruption - power outages, flooding, fires, loss of potable water, etc - Jim limited facility damage while the storm was raging, and got systems back up quickly to keep schedules on track. He worked night & day, pulled in other staff when San Antonio was literally shut down. Jim also supports centrifuge ops when LSS projects require acceleration tests - he leads the installation.

The Aerospace Social

SPACE PRECISION MEDICINE ASSOCIATION

SPACE SURGERY ASSOCIATION

Wed 25 May 2022 @ 6:00 to 10:00 pm

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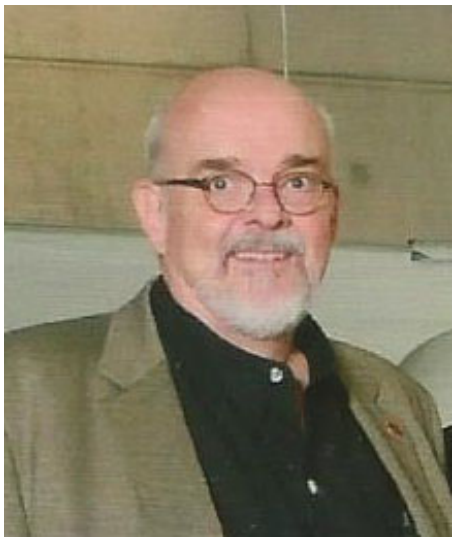
Tickets: $35

Tickets $35.00 per person via Zelle to Cherie Richards at 202-875-9710 or CashApp

Ticket's also available at the AsPS Table during AsMA's Scientific Meeting while supplies last.

Does Your Oxygen Mask Leak?

Jay B. Dean, PhD
Professor of Molecular Pharmacology & Physiology
USF Hyperbaric Biomedical Research Laboratory
Morsani College of Medicine
University of South Florida, Tampa, FL 33612
jaydean@usf.edu



With the success of the Mayo Clinic's B-L-B oxygen mask in 1938,[1] it soon became apparent that not one size fit all aviators. A subsequent analysis of airmen's facial structures revealed that three standardized sizes of oxygen masks were needed given the variation in the population. Regardless, there were still some faces that proved problematic. The following study at the Wright Field Aero Medical Laboratory during 1944 was an attempt to identify airmen whose facial structures proved problematic and facilitate oxygen mask fitting in these individuals.

Figure 1 is an X-ray image of an airman wearing the A-14 demand oxygen mask, which was used by aviators at altitudes ranging from 10,000 to 35,000 feet during World War II (WWII). The image was made by coating the interior of the A-14 mask with litharge paint (a natural mineral form of lead II oxide, PbO) and outlining the airman's profile with lead monoxide paste; obviously, this method was developed and used before the harmful effects of lead exposure were fully appreciated! The x-ray technique was developed to show the relative spatial relationships between bone and soft tissue of the face and the contact surfaces and interior of the oxygen mask. It was recommended by the physiologists of the USAAF Aero Medical Lab at Wright Field (Dayton, OH) "…that in all cases in which masks cannot be fitted comfortably, the subject be x-rayed to determine the exact position of the mask on his face in relation to soft tissue and bone." Figure 2 shows a normal image of the A-14 demand oxygen mask for comparison.

Figure 1. Litharge paint on A-14 demand oxygen mask and lead monoxide paste outlining subject's profile.

A poorly fitting oxygen mask that leaked at 30,000 feet diluted the oxygen inside the mask during inspiration as lower pressure inside the mask drew anoxic air through the leak and into the mask. Gradually, as the airman's inspired oxygen pressure decreased the airman became dazed and then unconscious. Eventually, he would die if the level of anoxia was severe enough. I have not encountered any discussion of implementation of the x-ray method in any subsequent aero medical manuals or literature, implying that this method was not adopted by the USAAF or USN. Nonetheless, it's an example of the innovative approaches employed by aviation physiologists to protect to the health of the high-altitude warfighter during WWII; that is, exclusive of lead poisoning (from WPAFB; M. R. No. ENG-49-698-24, Roentegenographic Technique, Appendix 6, Exhibit 1, 13 July 1944).

[1] B-L-B, Boothby-Lovelace-Bulbulian oxygen mask.

[2] *Anoxia* was a widely used term for very low level of partial pressure of inspired oxygen (P_IO_2) that produced impaired cognition, motor skills and, eventually, death if O_2-reduced air was breathed for too long a period while at high altitude. In the truest sense, anoxia is a completely O_2-deficient atmosphere; however, that is not how the term was used during World War II. The term used today for an abnormally low level of oxygen in the breathing atmosphere is *hypoxia*.

Figure 2. A-14 demand oxygen mask on a WWII airman.
From Dr. Jay B. Dean's Collection.

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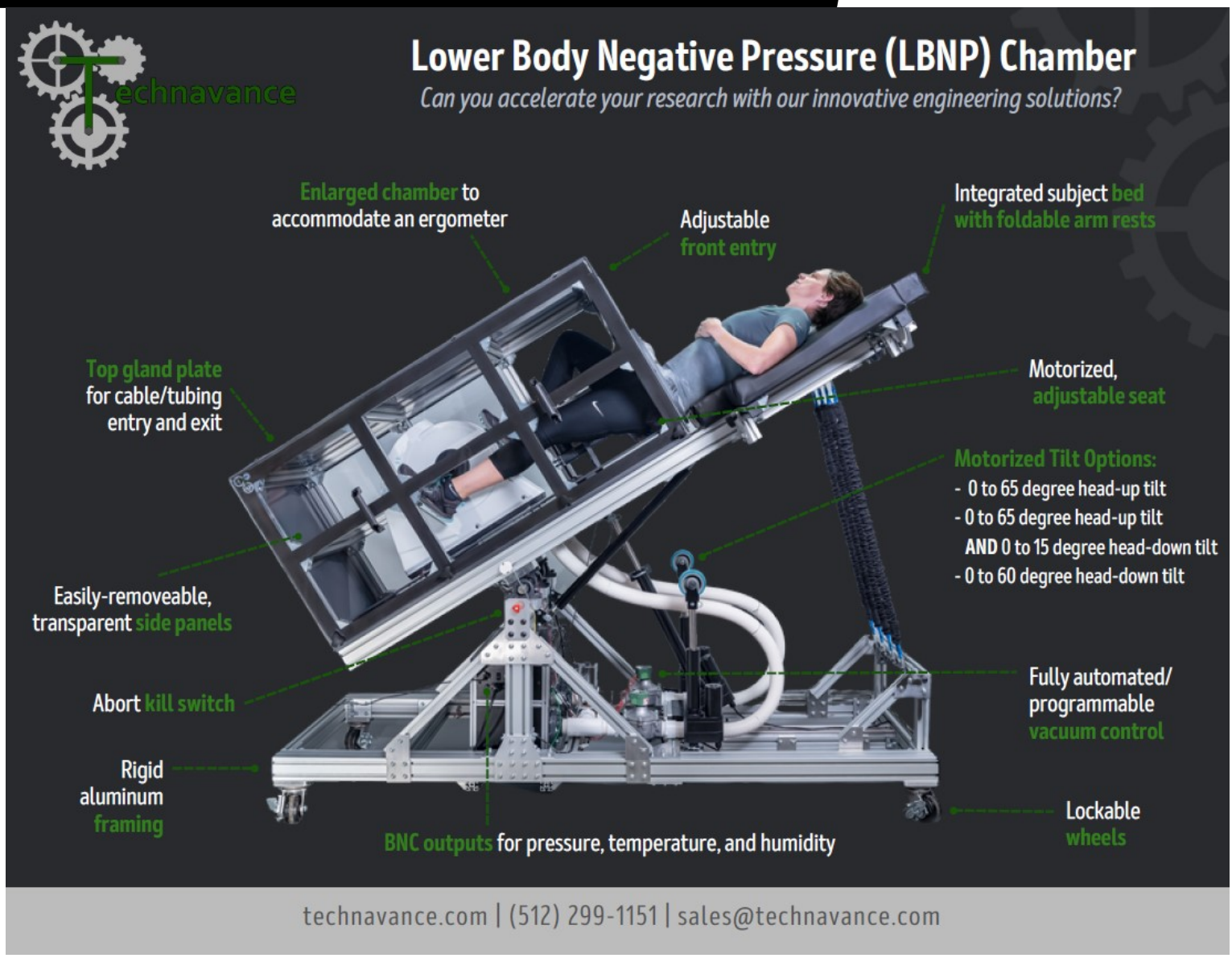

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