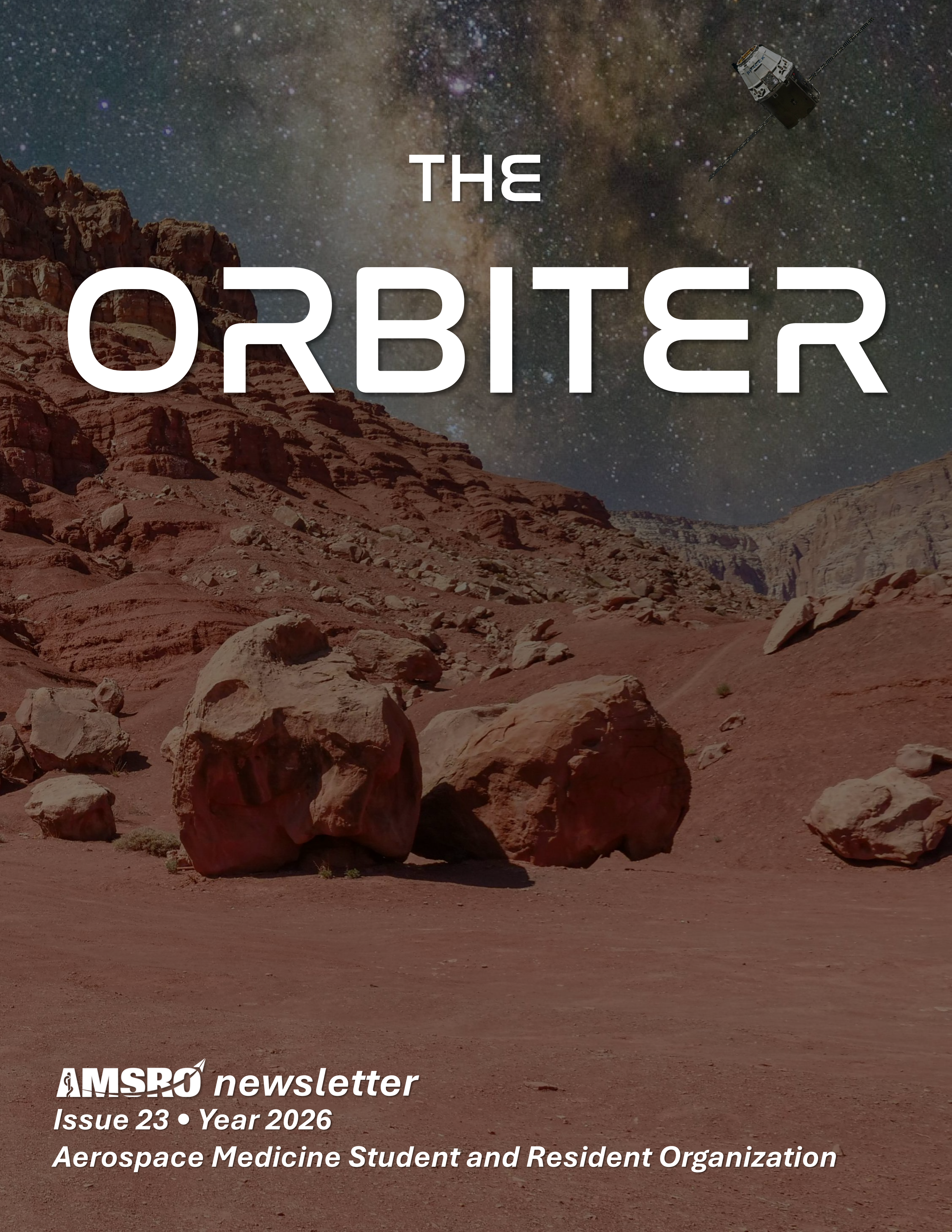




THE ORBITER

AMSRO *newsletter*

Issue 23 • Year 2026

Aerospace Medicine Student and Resident Organization

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Outgoing President's Message

To the AMSRO Community,

As I write this letter, I find myself reflecting not only on the conclusion of my term as President, but on a journey with AMSRO that began seven years ago. What started as an interest in aerospace medicine became a community that shaped my professional development, introduced me to lifelong mentors and friends, and provided opportunities that I could not have imagined when I first joined.



Serving as AMSRO President has been one of the greatest honors of my career. While my time in the presidency lasted one year, it was built upon years of involvement within this organization, including service as Treasurer and Vice President. Having the opportunity to help guide AMSRO during this chapter of its history has been both humbling and deeply rewarding.

During my time with AMSRO, I have watched the organization grow in ways that once seemed ambitious and distant. Today, AMSRO is larger and more vibrant than it has ever been. Our membership continues to expand, our programming continues to evolve, and our impact within the aerospace medicine community continues to strengthen. Most importantly, we have remained true to our mission of supporting students and residents who are passionate about this extraordinary field.

None of that growth happened because of any one individual. AMSRO's success has always been the product of dedicated volunteers who believed in the organization and were willing to invest their time and energy into its future. I have had the privilege of working alongside multiple Executive Boards and dedicated committees over the years, and each group left AMSRO stronger than they found it. To every board member, committee member, volunteer, mentor, and advisor I have worked with, thank you. Your commitment to this organization has inspired me throughout my tenure and has made AMSRO what it is today.

I would also like to express my gratitude to the leaders who helped shape my own journey within AMSRO. I was fortunate to serve under Presidents Ben Johnson and Michael Stephens, whose leadership, mentorship, and example influenced not only my understanding of this organization but also my approach to leadership itself.

The lessons I learned from both of them have remained with me throughout my service on the Executive Board, and I am grateful for the opportunity to have worked alongside them.

Perhaps what I will remember most about AMSRO is not any particular initiative, conference, or accomplishment, but the people. I have watched many other students discover aerospace medicine for the first time, residents find mentors who changed the trajectory of their careers, and colleagues become friends. I have seen members step into leadership roles they were unsure they were ready for, only to exceed every expectation. These experiences are the true measure of AMSRO's success and the reason I remain so optimistic about its future.

As many of you know, I recently graduated from Emergency Medicine residency at Brooke Army Medical Center and will transition to my next assignment at Eglin Air Force Base, Florida. While this marks the end of one chapter of my career, it does not mark the end of my involvement with AMSRO. I am proud to remain engaged with the organization as an Associate Member and look forward to continuing to support the mission that has meant so much to me over the past seven years. Though my role will change, my commitment to AMSRO will not.

To the incoming leaders of this organization, thank you for your willingness to serve. AMSRO's future is bright because of the talent, passion, and dedication of those who continue to step forward and lead. I have every confidence that the organization will continue to grow, innovate, and create opportunities for generations of aerospace medicine students and residents to come.

Thank you for allowing me the privilege of serving this organization. AMSRO has given me far more than I could ever repay, and I will always be grateful for the friendships, mentorship, opportunities, and experiences that came from being part of this community.

I look forward to seeing what comes next for AMSRO, and I look forward to remaining a part of the journey. If anyone needs anything, please do not hesitate to reach out as my door is always open.

With gratitude and respect,
Ryan J. Keller, MD



Incoming President's Welcome



Dear AMSRO Members,

Hello fellow AMSRO Members

It is my privilege and honor to be serving as the next president of this organization. I joined AMSRO while I was a medical student in 2012. Over the past fourteen years, I remained a member and served in a variety of ways, including Parliamentarian and Chief Editor. I've observed the remarkable growth, influence, and reach of this organization over time. I hope to continue that legacy by way of the three pillars of my election platform:

First: we will continue to collect, share, and promote information about educational opportunities for our members. When possible, we will help develop new opportunities as well.

Secondly, there will be service opportunities to help the organization run as intended. If you are interested to get involved I encourage you to do so. The people in this organization are the next leaders of this medical specialty, the medical profession itself, academia, and industry. Participating in this organization provides opportunities to make a contribution, to become better acquainted with each other, and to prepare for future professional roles.

Lastly, we will be updating our bylaws to include a policy of basic rights and responsibilities. Direct democracy may work in small groups, which was the case when AMSRO was first founded. But since our organization is now several hundred members, it can be said that AMSRO has grown to the size of a small town. It is now necessary to put routine and appropriate checks and balances upon our democratic structure. This will ensure smoother functioning, good faith, and fair dealing.

I look forward to a productive year with you all.

Joe Butterfield, MD, MS, MPH, EMT-P, PA-C
Graduate Student, University of Florida
AMSRO President

Letter from the Editor

It has been an honor to once again share your stories and passions of aerospace medicine through *The Orbiter*. As always, I have enjoyed connecting with you virtually.

Each article within this publication reflects the dedication, curiosity, and passion of so many trainees interested in this amazing field of medicine. From students taking their first steps into the field to residents and fellows sharing lessons from their experiences, every voice adds something meaningful to our organization.

As I close another chapter as Chief Editor, I am reminded that aerospace medicine is built on collaboration, mentorship, and the willingness to keep exploring the unknown. Thank you for trusting *The Orbiter* with your stories and for continuing to inspire one another through your work. I am grateful for the opportunity to serve this organization and to help highlight the incredible people who make it so special.

Continue shaping this field and organization into the amazing thing it has become.



Air show medical support in Kentucky

Meet AMSRO: Corey Morris is the current editor of AMSRO's *Orbiter*. He is a graduate of Tennessee Tech University (B.S.) and Lincoln Memorial University (D.O.). He is a board-certified family medicine physician and a current fellow in Undersea & Hyperbaric Medicine at LSU-New Orleans. Corey serves on AsMA's communications committee and is an Associate Fellow of AsMA.



Working at LSU's Hyperbaric Clinic.



Surface supplied hard hat diving at a Diver Medic Technician course.

Corey Morris



WHO ARE WE?

AMSRO is the official student and resident organization of AsMA (Aerospace Medical Association). Our members include:

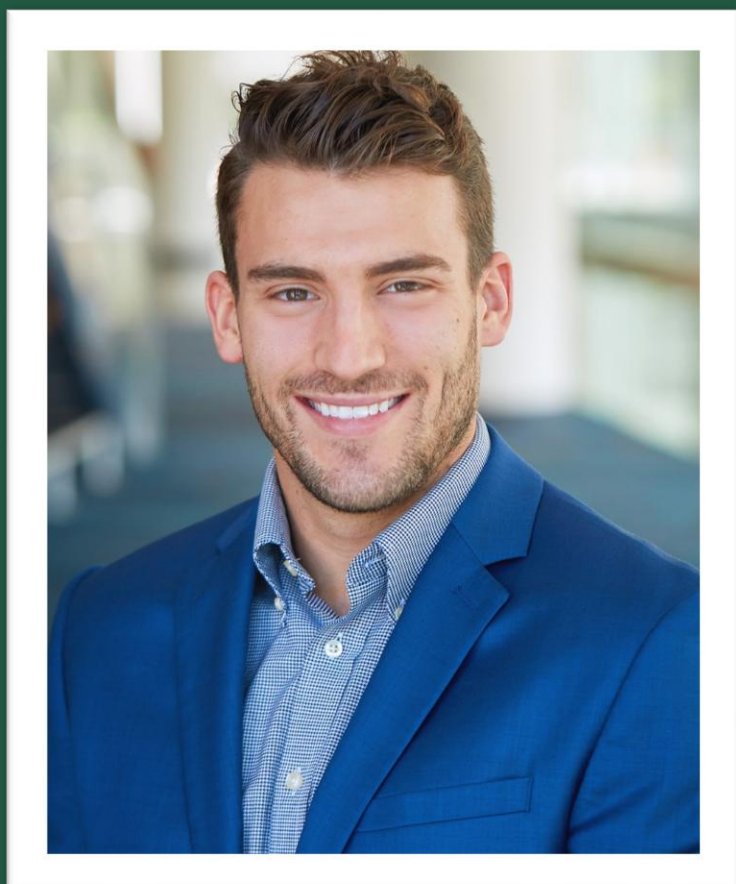
- Medical Residents/Students, Graduate/Allied Health Students (Pharmacy, Nursing, Occupational Therapy, etc), and Undergraduate Students

WHAT DO WE DO?

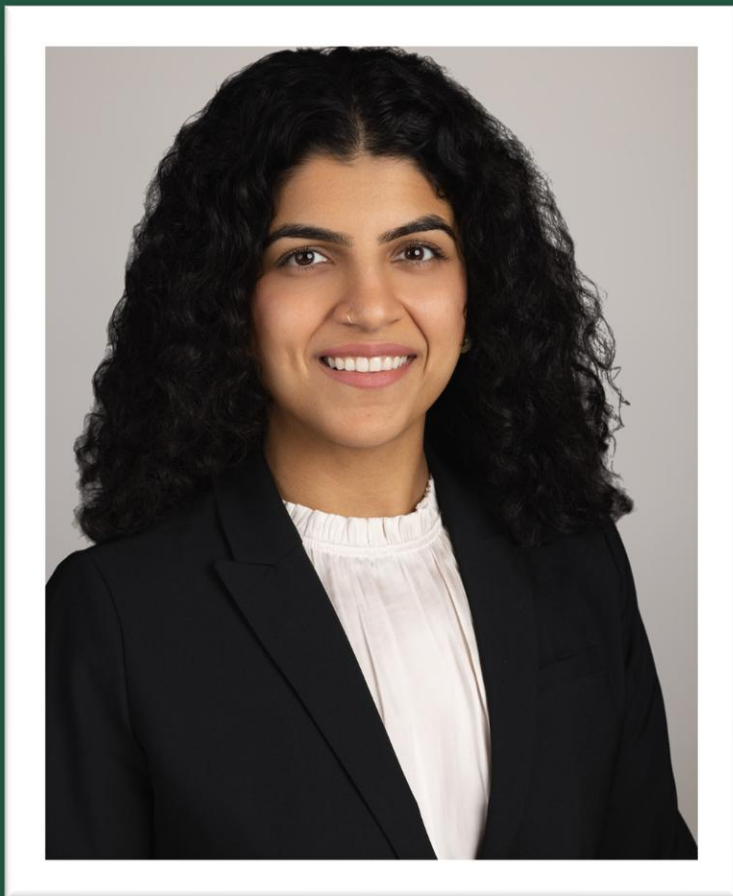
- We advocated for aerospace medicine and human performance among students and residents around the world
- We provide a voice for the student and resident community
- We share educational and research opportunities to advance the careers of our members



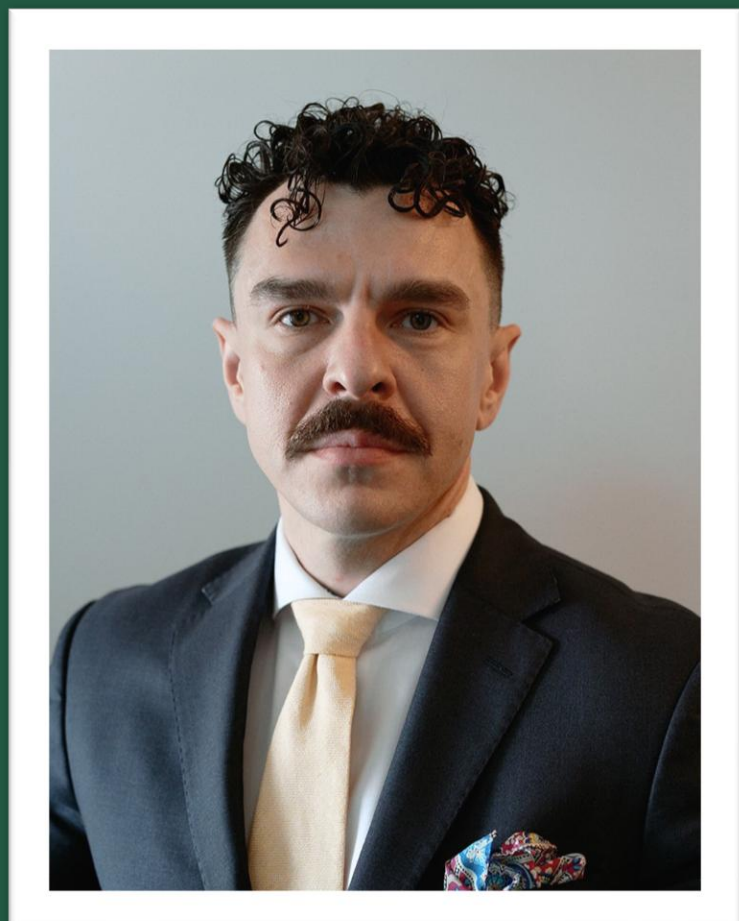
2026 AsMA & AMSRO Scholarship Winners



Stanley R. Mohler ASM
Endowed Scholarship
Daneil Cox



Anita Mantri, Ph.D., Memorial
Travel Scholarship
Kadambari Suri



AsMA International Aerospace
Medicine Scholarship
Mark Biernacki



Jeffrey R. Davis, M.D., Aerospace
Medicine Endowed Scholarship
Patrizia Borzi



Philip J. Scarpa, Jr., M.D., Aerospace
Medicine Endowed Scholarship
Isabel Candir





2026 AsMA & AMSRO Scholarship Winners



The Dr. Jeffrey Myers and Dr. Mark
Campbell Outstanding Mentorship Award
Dr. Amanda Kelley



The Anita Mantri, PhD Memorial Award
Dr. Clare McNerlin

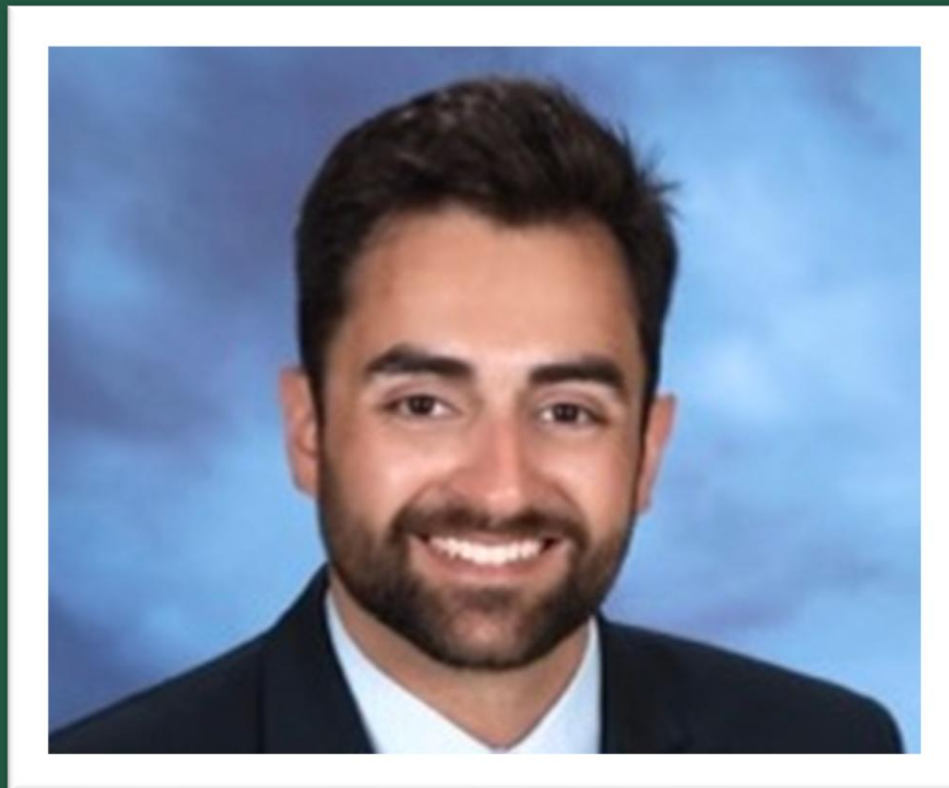


The AMSRO Trailblazer Award
Tyrone Jacobs Jr.





2026 AsMA & AMSRO Scholarship Winners



The AMSRO Scientific Paper Award: Basic Sciences

Dr. Wiaam Elkhatab

“Subclinical Cardiovascular Disease Risk Stratification in Aircrew using Predictive ECG Artificial Intelligence”



The AMSRO Scientific Paper Award: Case Report

Drs. Christina DeInnocentiis and Lindsay Kingston

“When the Centrifuge Fights Back: A Case of Vertebral Compression Fracture During Centrifuge Training”



Military Medicine to Microgravity: Charting a Path to Aerospace Medicine

-Cole Munro

During my medical training, serving both in uniform and in civilian clinics has highlighted how different environments demand different approaches to health. Working in military medicine has emphasized a preventative mindset: the mission is not only to treat illness, but to keep healthy people well enough to train, deploy, and return home safely. This focus on primary prevention and operational readiness is not only cost-effective, it also offers a powerful model that civilian family practice could adopt more broadly to improve long-term outcomes for patients.

My journey began when I enrolled in the Canadian Armed Forces as a combat medic, completing Basic Military Qualification and learning the core soldiering skills expected of all CAF members. After basic training, I undertook occupation-specific training in combat casualty care, gaining exposure to providing care in austere environments and learning how to work effectively as part of a multidisciplinary team. These early experiences cemented my interest in operational medicine and showed me how medical care can be tailored to support the unique demands placed on service members.

This operational lens shaped how I approached research when I participated in the Student Spaceflight Experiments Program (SSEP). As principal investigator of an undergraduate team, I helped design the first experiment to investigate how Concanavalin A, a plant lectin, affects *Escherichia coli* biofilm

formation in microgravity, with the goal of developing a cost-effective strategy to mitigate antibiotic-resistant biofilms in astronauts and better understand how gravity influences bacterial biofilms. Our team prepared a comprehensive grant proposal detailing the scientific rationale, experimental design, materials, ground controls, and analysis plan, which was first reviewed at Queen's University and then evaluated by an international panel of space-science experts.

Meeting CSA astronaut Joshua Kutryk during a presentation at Queen's University, where he discussed his experiment scheduled for launch to the International Space Station.



The project ultimately secured more than 27,000 USD in funding and launched to the International Space Station for a six-week mission in November 2024.

Leading this project felt like an extension of my military experience in a new domain. I contributed to idea generation, conducted an extensive literature review, designed figures and schematics, and coordinated an interdisciplinary team of students from health

sciences and physics, each bringing a distinct perspective to the proposal. This collaboration mirrored the interprofessional teamwork of military and clinical environments, where diverse expertise strengthens decision-making. Once the experiment was selected, my responsibilities shifted to optimizing our protocol in the laboratory to satisfy NASA toxicology and flight-safety requirements, which underscored how engineering constraints, safety rules, and limited crew time shape what is possible in orbit. In the same way that operational realities influence how medicine is delivered in the field, spacecraft systems and mission parameters dictate how science can be executed in microgravity.

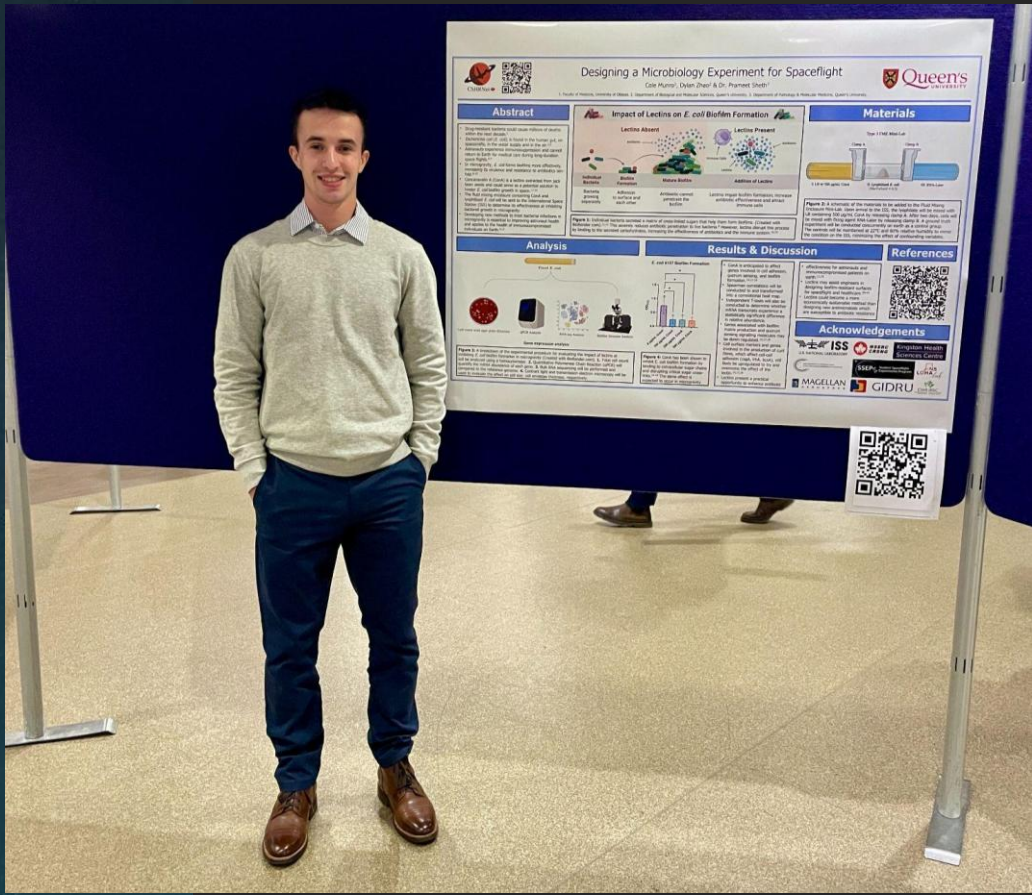
The opportunity to share this work publicly was just as transformative as the research itself. I presented our experiment at the Student Spaceflight Experiments Program National Conference at NASA's Kennedy Space Center, joining students, educators, and scientists from across North America to discuss how

student-led projects can advance space science. I was also invited to present at the Canadian Space Health Research Network National Conference at the University of Western Ontario, where clinicians, scientists, trainees, and industry partners gathered to discuss the future of space health and its impact on terrestrial medicine. Presenting in these two very different but complementary settings challenged me to tailor the complexity of my message, from describing biofilms and microgravity to students to engaging in technical discussions with space-health experts, and strengthened my skills in communication, collaboration, and knowledge translation.

After being accepted to medical school at the University of Ottawa, I transferred from my combat medic role into training to become a physician, continuing my service while beginning my Doctor of Medicine (M.D.). At the Canadian Forces Health Services Centre in Ottawa, I was able to see how military medicine functions in a tertiary clinical setting, where primary care, preventive medicine, and specialist services are integrated to support CAF personnel. In this environment, I observed occupational medicine in practice: how clinicians assess fitness for duty, manage work-related injuries, and help members safely return to their roles, as well as the work of flight surgeons, who focus on the health and readiness of aircrew operating in demanding aviation environments.



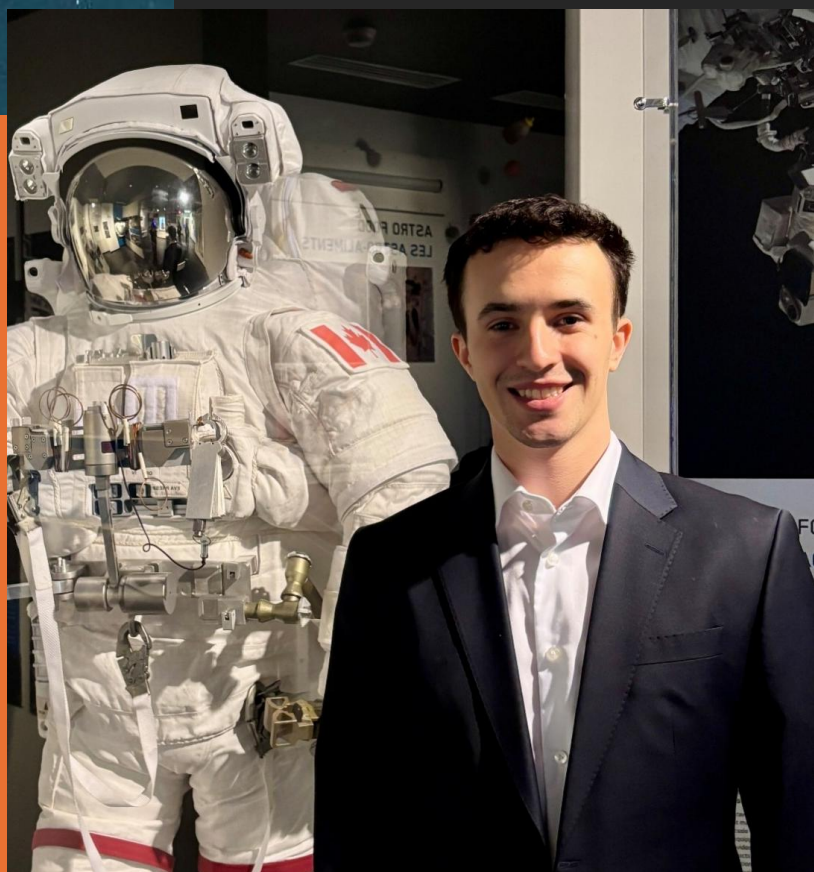
Presenting an oral presentation at the Student Spaceflight Experiments Program (SSEP) National Conference at NASA's Kennedy Space Center.



Presenting a research poster at the Canadian Space Health Research Conference

Taken together, my progression from combat medic to medical student, my experiences at the Canadian Forces Health Services Centre, and my work on an ISS-bound experiment have defined how I see my future in medicine. Military service has taught me to value prevention, operational readiness, and adaptability, while spaceflight research and national conferences have shown how those same principles can be applied in low Earth orbit and beyond. My long-term goal is to serve as a flight surgeon with the Canadian Armed

Forces and the Canadian Space Agency, caring for aircrew and astronauts before, during, and after missions while contributing to research that keeps them safe in some of the most challenging environments humans can face.



MEET AMSRO: Cole Munro is a second-year medical student at the University of Ottawa and a member of the Canadian Armed Forces, where he first served as a combat medic before transitioning into training as a Medical Officer. As part of the Student Spaceflight Experiment Program (SSEP), he was the principal investigator of a project studying Concanavalin A's effect on Escherichia coli biofilm formation in microgravity, which was launched to the ISS with the goal of preventing urinary tract infections in astronauts. Cole is also the founder of ClinSava, a bilingual AI-based OSCE and SOAP note education platform designed to help trainees practice clinical encounters and documentation more effectively. He has presented his work at the Student Spaceflight Experiments Program National Conference at NASA's Kennedy Space Center and the Canadian Space Health Research Network National Conference, and he hopes to pursue a career as a flight surgeon with the Canadian Armed Forces and the Canadian Space Agency.

Membership Spotlight: Research, Training, and Reproductive Health in Space Medicine

-Jessica D'Urbano, MD

I'd like to share a few recent updates that may be of interest to the AMSRO community.

Book Highlight

I recently contributed to the book *Fundamentals of Space Medicine and Clinical Technology*, published by Elsevier, a multidisciplinary reference addressing the medical and technological challenges of human spaceflight.

I am the co-author of Chapter 9, "Reproduction and Obstetrics in Space," which focuses on the current evidence, knowledge gaps, and future challenges related to human reproductive health in space environments. Topics include the effects of microgravity and radiation on fertility, pregnancy, and developmental outcomes—an area that is becoming increasingly relevant as space missions grow longer and more ambitious.

The book ([click here](#)) may be of interest to colleagues working in aerospace medicine, human factors, psychology, and applied or translational research.

Professional Update

Alongside my residency training, I have recently started a Specialization Course in Aerospace Medicine at the University of Padova. ([click here](#))

This experience is allowing me to further integrate clinical medicine with aerospace operations and human performance, strengthening my focus on how medical knowledge can support safe and sustainable human spaceflight.

Research Perspective: Radiation and Female Fertility

One area closely connected to my research interests is the impact of space-relevant radiation on reproductive health. In this context, the AOP 620 (Adverse Outcome Pathway: deposition of energy leading to decreased female fertility), available through the AOP-Wiki, ([click here](#)) offers a valuable mechanistic framework.

By linking molecular and cellular events to adverse reproductive outcomes, this AOP supports risk assessment and countermeasure development, and represents a useful tool for researchers working in space medicine and radiation biology.

I am thankful for the opportunity to share these experiences with the AMSRO community and look forward to continued learning, collaboration, and dialogue.

Ad Astra,
Jessica D'Urbano



MEET AMSRO: Jessica D'Urbano, MD, is an AMSRO member and Occupational Medicine resident at the University of Trieste whose professional path sits at the intersection of space medicine, human factors, and applied research.

Wings Over Houston : It started with a Sandwich

-Janki Patel

It Started with a Sandwich

Who knew bringing your own sandwich to a volunteering event opened an opportunity that I doubt would have happened otherwise. Let me explain. I am an OMS-III when I arrive at the first Wings Over Houston Airshow I have ever volunteered at. As an OMS-III, I am to be with a group of similar students, walking around certain sections of the airshow with a leading resident and help as we go. UTMB residents and leading physicians would remain at the physician tent to look after incoming patients. That was the plan, and I had fully intended to follow it. But I didn't think bringing my own sandwich would separate me from my group and thus leave me stranded at the physician tent that I was clearly not meant to be at.



Inaugural UIWSOM Aerospace Medicine Interest Group in front of an F-16, spending their Saturday at the Wings Over Houston Airshow. From left to right: Ashley Acosta, OMS-II, Joseph Niziol, OMS-III, James Mayberry, MD, Ravi Patel, OMS-III, Janki Patel, OMS-III

“We got a kid here who fainted suddenly and hit their head.”

Despite being mid-October, the familiar Houston weather (fresh after a quick rain



Various vendors at designated areas in Ellington Airport, Houston, TX as the Wings Over Houston Airshow was underway.

shower) led to a rather blazing, humid atmosphere. Those taking shelter at the tents found respite and could even enjoy the occasional soft breezes that whirled by. I was watching the “ambulance” golf cart that brought the tired child over, enjoying the last bits of my melted peanut butter-jelly sandwich before closing the Tupperware and migrating to my backpack. A lead physician went eye-level towards the patient to examine them and ask the parents questions, while a UTMB resident rummaged through the provided supplies for vitals. One of the supplies piqued my interest, leading me to summon a small bag from the bottom of my Mary Poppins’s backpack and head over to the group.

“Y’all need a child’s bp cuff?”

It was manual, the kind my school provided for me. Having the mindset of “better to have and not need than need and not have,” I was used to carrying seemingly excessive things in my backpack on a daily basis. Except for a bandana, but that’s a different story.



B-29 Superfortresses flying proud. Both B-29s, FIFI and Doc, flew in formation at one point.

Next thing I know, it's not just my child bp cuffs, but the adult and thigh bp cuffs too, that start making rounds all afternoon at the physician tent. As the blaring sun bestowed upon us heat exhaustion cases and excitement blossomed into hypoglycemia cases, the tent got swamped hard and fast in waves, and I gained enough experience to make a firehose blasting at you feel like nothing.

In retrospect, I ran around a lot that day, heading in and out of the nearby bus with AC to see how patients were doing, getting history of incoming patients at the tent, bringing in supplies, water, and electrolytes to the patients, and asking for medical and logistical advice from other UTMB residents. At the start, it felt like I was a pesky fly, annoyingly zipping about in a place I shouldn't be. Yet no one treated me that way. In their eyes, I was an extra pair of hands. I did a whole 180 on my outlook to learn everything I could to be more helpful. Maybe it paid off, because after a few hours of running around like a waitress in the most famous restaurant in town, those at the tent

called for other medical and pre-med students to help.

My only regret at this event was not knowing the airshow had literal explosions. The way I jumped out of the bus while checking in on a patient and wondering why no one was running to the fields! The whole event left me rather embarrassed for the next five minutes.

Oh, and that bandana? Shout-out to the student who happened to be wearing one. It came in handy for a child with a potential fracture. Time to keep a few of those in my backpack the next time I volunteer.

Overall, this experience was my first exposure to aerospace medicine. I saw how everyone worked as a team, what an airshow was like, and learned a bit more about different aircrafts. The entire event was two days long, but I could only attend for one day. In the near future, I'll volunteer for both days. This truly was a fun and rewarding experience!

The South Medical Tent cleaning up at the end of a rewarding day.



MEET AMSRO: Janki is an OMS-III Pre-Doctoral Fellow at the University of the Incarnate Word School of Osteopathic Medicine in San Antonio, Texas. She completed undergrad at Texas A&M University majoring in Genetics and minoring in Philosophy. Her current goals are to better understand aerospace medicine and see how far Osteopathic Manipulative Medicine can be utilized in the field.

Creating a Home for Aerospace Medicine at OSU-CHS

-Grayson McBee

Starting an aerospace medicine club can feel ambitious at a school where the field still seems distant or unfamiliar. For us, what began as a small idea quickly turned into something tangible: a student organization, club merchandise that gave us an identity, and a packed first meeting featuring NASA astronaut Dr. Frank Rubio that showed just how much interest was already there. Building the club taught me that students are eager for aerospace medicine opportunities, they often just need someone to create the space for them to gather, learn, and get involved.

I started the Aerospace Medicine Club at OSU Center for Health Sciences because I was deeply interested in aerospace medicine, but quickly realized there were very few resources available to help me explore that interest at my school. There was no clear roadmap, no established group, and no easy place to find mentorship, events, or guidance. Much of what I learned early on, I had to seek out on my own. That experience was exciting, but it was also frustrating at times. I did not want students who came after me to have to start from scratch in the same way.

That idea became the foundation for the club. More than anything, I wanted to make aerospace medicine feel accessible. I wanted students with even a small interest in aviation, space, physiology, or exploration to have a place to go and a community to join. Instead of having to search for every opportunity alone, I wanted future students at OSU-CHS to be able to step into something that was already built.

Getting the club started required more than enthusiasm. Before we could become an official organization, we had to work through the school's approval process. We first gauged student interest with a poll, then presented the club proposal to Campus Life and executive leadership. The proposal was presented in front of around 20 students and faculty members, and it passed unanimously. That was one of the first moments when the idea truly felt real. What had started as a personal interest was now something our school had formally recognized and supported.

After that, we went through AMSRO to become an official chapter. That step gave the club a stronger sense of identity and connected us to the broader aerospace medicine community. It also made the mission feel even more meaningful. This was no longer just about creating one student organization. It was about establishing a lasting entry point into aerospace medicine for students at our school.

The response from students was stronger than I ever expected. We recruited over 50 members, making it the largest club at OSU-CHS. That alone was exciting, but it was also validating. It showed that the interest had always been there. Students just needed an opportunity that felt real, welcoming, and worth showing up for. A lot of that excitement came from our promise to deliver two things: great guest speakers and cool merch. Both may seem simple, but both mattered. The guest speakers brought inspiration and access, while the merch helped create identity, visibility, and a

sense that this club was something students were proud to be part of.

Our first meeting was the clearest sign that we had built something meaningful. We hosted Dr. Frank Rubio, and the turnout exceeded all expectations. More than 50 students attended, along with over 5 faculty members. At our school, the average attendance for a club meeting is around 20 students, so this was an overwhelming success. What stood out even more than the numbers was the energy in the room. Students were engaged, faculty were engaged, and even anatomy professors were asking questions. It did not feel like a routine student meeting. It felt like the beginning of something with real momentum.

For me, that meeting was more than a successful event. It was proof that the effort had been worth it. All of the work that went into finding interest, pushing the club through approval, building excitement, and organizing a meaningful first event had led to a room full of people who genuinely wanted to learn more

about aerospace medicine. That was exactly what I had hoped for when I first started thinking about the club.

Looking back, the most rewarding part of this process has been knowing that future students will have an easier starting point than I did. They will not have to search for everything alone. They will have a club, a community, access to speakers, and a visible place on campus where aerospace medicine is part of the conversation. In that sense, starting the Aerospace Medicine Club was not just about creating something for the present. It was about building something that will continue to help students long after I am gone.

Aerospace medicine can seem like a distant field when there is no obvious path toward it. Starting this club showed me that the interest is already there, waiting to be brought together. Sometimes all it takes is one person deciding to build the thing they wish they had found.



MEET AMSRO: Grayson McBee is a medical student at OSU Center for Health Sciences and founder of the school's Aerospace Medicine Club. He hopes to do a NASA clerkship and has a strong interest in a future in aerospace medicine. His interests, outside of aerospace medicine, include collecting Pokémon cards, going golfing, cooking, and watching the OKC Thunder win the NBA championship.

Small Signals

-Hoang D. Nguyen

“Brief narrative on routine, monitoring, and sustained effort, with a personal lens tied to endurance training and systems thinking.”

Hue lights shift from light blue to full brightness over the course of an hour. Haptics on my watch buzz twice, pulling me out of sleep.

Before getting out of bed, I say a short prayer.

I don't feel like getting on the bike today.

I check TrainingPeaks. I check my sleep score. I run through the reasons I could justify taking a rest day, even though I already know I won't. My legs are still heavy from yesterday.

I lose twenty minutes to my phone before moving.

I mix sugar, lemon juice, and salt into a leaking Gatorade bottle. I dim the lights back to dark blue. Bib on. Cycling cap. I clip in, boot up Zwift.

And I start pedaling.

**This part usually goes unnoticed.
There's no finish line here.
Just the work that has to get done anyway.**

I connect my smart trainer and heart rate monitor. The warm-up is where I start paying

attention. Cadence and watts find their flow. My legs feel tight, but everything else is steady.

The watts ramp into Zone 2. My Watopia avatar keeps moving, unfazed.

I know that once the ramp is over, I'll settle in. The doubts I started the day with fade, mile by mile, until they're somewhere behind me.

A Ride On pops up from a stranger. A small boost of morale for simply starting. The fan pushes cool air across my face.

The effort doesn't change.
The numbers don't move.

But something shifts internally.

Some days the work is the same, but the experience isn't. And that difference matters more than I used to think.

My legs know before the drop in watts.

The body recognizes when something is unsustainable. There's a depleting anticipation. You can push through it for a while, but eventually cadence slips. ERG mode compensates, and the effort starts to collapse in on itself.

I've learned that catching things early doesn't feel impressive, but it keeps the ride from unraveling.

Over time, I've noticed I work best when things are accounted for. A task list with checkmarks keeps the day from drifting. What's happened happened. What's next is clear. Once it's set up, it keeps things moving without needing constant emotional input.

That same way of thinking is what made aerospace medicine catch my attention.

I don't know exactly where that interest will lead. What I do know is that I'm drawn to work that values monitoring over heroics, early adjustment over late correction, and preparation that feels invisible because it works. For now, that means paying attention. To the body. To the system. To the small signals that make sustained effort possible.

Ride On.



MEET AMSRO: Hoang D. Nguyen is a medical student at the University of Texas Medical Branch, John Sealy School of Medicine in Galveston. He is currently interested in psychiatry, with additional interest in aerospace medicine and human performance. Outside of medical school, he trains as an endurance athlete and enjoys film.

HOUSTON, WE HAVE A WORKSHOP: Training Engineers for the Medicine of Tomorrow!

- Cristina Liberati, MD

As human spaceflight pushes toward longer-duration and deep-space missions, understanding how the body adapts to the space environment becomes increasingly vital. In this evolving landscape, integrating multidisciplinary expertise is essential to ensuring both crew safety and mission success.



The design, development, and operation of human-rated systems depend on close collaboration among engineering, life sciences, and medical teams. However, these disciplines often approach problems from different perspectives, with distinct frameworks, terminology, and priorities. Such differences can create communication barriers that hinder effective collaboration and limit the translation of physiological insights into spacecraft design and critical countermeasures.

To address this gap, our team is developing targeted space medicine focused workshops designed to enhance cross-disciplinary

understanding of human physiology in space. Our initial steps involved a quality improvement (QI) project to evaluate the initial implementation of our workshops at Embry-Riddle Aeronautical University (ERAU), in Daytona Beach, Florida.

Participants of the QI project were recruited from ERAU and all participants were undergraduate students at ERAU. Workshops were available to all students for free. A total of 4 workshops have been organized at the time of this writing. The workshops topics ranged from the fundamentals of space physiology, NASA's integrated risk framework (RIDGE - Radiation, Isolation/Confinement, Distance from Earth, Gravity, and Closed/Hostile Environments), to immune dysregulation, microbial adaptation, and the specific physiological effects on human body of microgravity after prolonged spaceflight.



At the beginning and at the end of each workshop, time was allocated for the students to complete a pre- and post-workshop assessments evaluating baseline and acquired knowledge as well as feedback.



Based on preliminary analysis, the initial two workshops successfully engaged undergraduate students. Knowledge assessments conducted before and after each workshop revealed meaningful improvements in participants' understanding of space medicine and physiology. Students were overwhelmingly positive about the workshops expressing interest in attending additional workshops if offered.

Our workshops were never just a starting point; they are the foundation of a deliberate effort to shape a new kind of engineer, one who understands not just the mechanics of spacecraft, but the human beings who will live

and work within them. Our immediate focus is on analyzing insights from our most recent workshops, which will directly inform the design of a series of advanced sessions. These workshops will build sequentially, potentially exploring topics such as applying space medicine concepts to team communication, designing equipment for long-duration missions, and integrating human-centered design principles into aerospace engineering. Each session is a stepping stone toward something greater.

Our larger vision is the development of a formal, scalable curriculum, one that could take shape as an undergraduate minor, online courses, or professional certificate programs embedded within engineering education. The goal is to make interdisciplinary knowledge not an afterthought, but a foundation.



The demand for engineers who can bridge technical expertise with an understanding of human physiology and team dynamics has never been more urgent. Our early results make one thing clear: there is an engaged, motivated audience ready to take this journey. The future of human spaceflight will be built by interdisciplinary teams, and we are proud to be

helping train the people who will take us farther than we have ever gone before.

We warmly welcome opportunities for collaboration and encourage interested individuals to contact us:

liberaticristina@gmail.com or

www.linkedin.com/in/cristinaliberati321



MEET AMSRO: Cristina Liberati is a child neurology resident at Boston Children's Hospital – Harvard Medical School (HMS) and future neuromuscular fellow at Mass General Brigham – HMS and her interests focus on the effects of microgravity on the neurological system and an integrative approach that brings together medicine, physiology, and engineering to advance human health on Earth and in space.

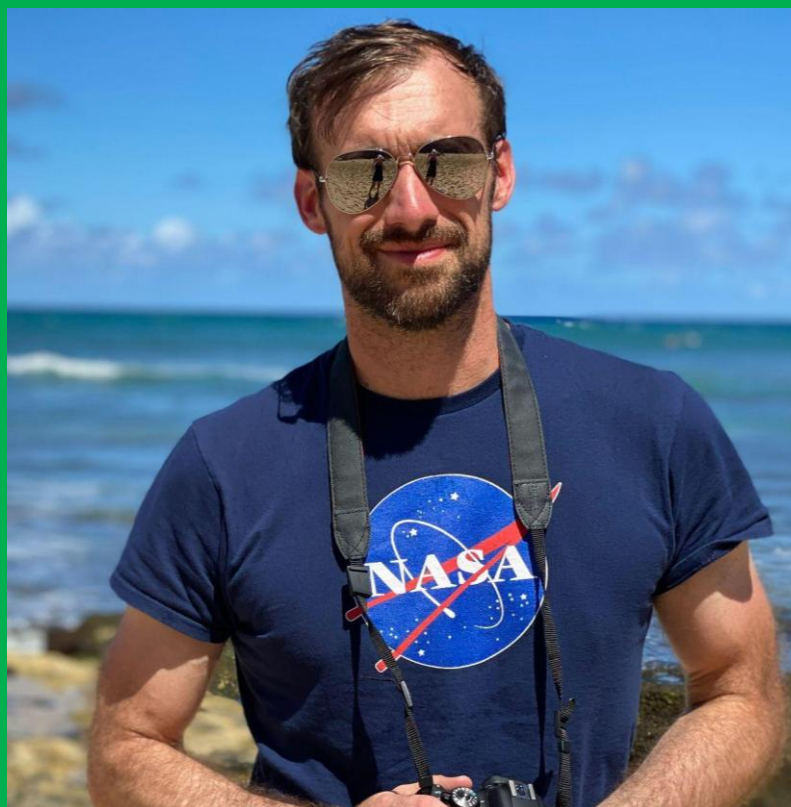
MEET FRIENDS OF AMSRO AND ARTICLE CONTRIBUTORS

Emel Sen Kilic, PhD



Dr. Emel Sen Kilic is an Assistant Professor of Aerospace Physiology at ERAU, where she teaches courses including Aerospace Medicine and Therapeutics and co-leads the SPACE Lab, developing innovative countermeasures against infectious diseases in both terrestrial and spaceflight environments.

Eric J Richardson, PhD



Eric Richardson is a counselor and researcher passionate about interdisciplinary research that bridges clinical practice, public health, and systems-level innovation that can improve health both here on Earth and for those that will embark on space exploration.

Noemi Liberati, MS



Noemi Liberati is an aerospace engineer and currently works as an assistant professor in the Department of Engineering Fundamentals at ERAU in Daytona Beach, Florida, where she focuses on aerospace engineering education and the development of effective teaching methods for foundational engineering courses.

Beyond the Moon: A Journey of Resilience and Discovery

-Ivan Alexis Martinez Diez-Muro

The Artemis II mission represents more than a return to crewed lunar exploration—it represents persistence, calculated risk, and the willingness to push forward despite uncertainty. As a student pursuing a future in medicine and space-related research, I see Artemis II as a reflection of resilience at both the human and scientific level. That idea has shaped my own journey.

My interest in space began early. Attending space camp as a child exposed me to the possibilities of human spaceflight and the complexity behind it. It was the first time I understood that space exploration wasn't just about rockets—it was about people, physiology, and survival in extreme environments. That experience stayed with me and continues to influence the way I approach both science and medicine today.

Years later, my academic path has not been linear. I've faced setbacks, including health challenges that disrupted my education. But much like the Artemis program—which was built on lessons from past missions, failures, and redesigns—I learned to rebuild with intention. Resilience, in my case, has meant returning to the fundamentals, strengthening my discipline, and continuing forward with a clearer purpose. Artemis II reinforces that setbacks are not endpoints, they are part of the process of achieving something meaningful.

This mindset is directly reflected in my

research. As a co-principal investigator and first author on a Student Spaceflight Experiments Program (SSEP) proposal, I worked on a project titled Dark Adsorption in Space, which investigates cactus-modified TiO_2 films for water purification beyond Earth. Our proposal was recognized as Top 3 and received honorable mention.



The goal is to develop a biodegradable, safe, pectin-based biopolymer system capable of purifying water in microgravity environments. This has direct implications for long-duration missions like Artemis, where sustainable life-support systems - especially water recycling - are critical. Artemis II, as a steppingstone toward extended lunar presence and Mars missions, depends on innovations like these to ensure crew safety and mission success.

In addition, my work as a research assistant on the HIBERIA project explores human hibernation as a strategy for long-duration

space travel. Hibernation has the potential to reduce metabolic demand, preserve physiological function, and mitigate the psychological and physical stressors associated with extended missions. Artemis II represents an early phase of human return to deep space, but research like HIBERIA addresses the next frontier—how we sustain human life on missions that last months or years. Being part of this research has deepened my understanding of human physiology under extreme conditions and reinforced my desire to contribute to aerospace medicine.

What connects all of these experiences - space camp, academic setbacks, and research - is resilience. Artemis II is not just about reaching the Moon; it is about proving that we

can prepare, adapt, and continue moving forward despite challenges. My journey mirrors that principle. I have learned to persist through uncertainty, to rebuild after setbacks, and to stay committed to long-term goals even when the path is difficult.

As we move into a new era of space exploration, missions like Artemis II remind us that progress is not immediate - it is earned through consistency, innovation, and resilience. I aim to carry those same values into my future career in medicine and research, contributing to the advancement of human spaceflight and the well-being of those who will push its boundaries.



MEET AMSRO: Ivan Alexis Martinez Diez-Muro, a bilingual (English/Spanish) Health Sciences student at the University of South Florida, graduating Fall 2026, and an aspiring physician-scientist. His path to medicine has been shaped by resilience, including overcoming significant health challenges that strengthened his commitment to patient-centered care. He has clinical experience as a medical scribe in a cardiology practice and has shadowed physicians in orthopedic surgery, bariatric surgery, and anesthesiology. He has also volunteered in hospital settings supporting patient needs and mentored a university student academically. His interests extend into research and innovation. He participated in the NCESSE Student Spaceflight Experiments Program (SSEP), developing a project on dark adsorption in microgravity using cactus-derived materials, and has been featured several times in USF news. He is currently preparing to retake the MCAT and plans to apply to medical school in the 2027-2028 cycle, with the goal of integrating clinical care, space medicine and medical research to improve cardiovascular outcomes.

Dark Adsorption in Space: Testing Cactus-Modified TiO₂ Films Beyond Earth

-Riva Nathani

I have come to know about aerospace medicine not through a telescope but rather through an inquiry into the essential elements of life in some of the most demanding places on earth. As a biomedical sciences major at the University of South Florida, I have always been intrigued by the biological and chemical limitations of humankind to continue living; however, it wasn't until my involvement as co-principal investigator of the Student Spaceflight Experiments Program (SSEP) and my participation in this experience that I realized that many of the greatest complexities associated with spaceflight have already been resolved by widely available natural solutions.



The SSEP experiment I worked on, "Dark Adsorption in Space," has helped me to focus on how the future of human spaceflight will rely greatly on the maintenance and longevity of the support systems providing for the crew's health.



The emphasis of our research was on an essential consideration for a long-term operation: sustainable methods of purifying potable water. Traditional methods of purifying water on Earth involve different combinations of mechanical and/or chemical processes. We were able to take advantage of the common prickly pear cactus (*Opuntia ficus-indica*) and its mucilage to enhance the properties of TiO₂ films. We found that the mucilage was a biodegradable stabilizer that enabled the TiO₂ films to effectively remove contaminants under complete darkness. Leading this project has taught me that innovation is interdisciplinary; therefore, we need to develop a connection between nanoscience and fluid mechanics to fully understand the effect of microgravity on dye adsorption without buoyancy-driven convection.

Although this research was primarily a technical effort, it has also taught me about resilience. Scientific inquiry, like the Artemis missions that will return humanity to the moon, does not usually follow a straight line; I spent many hours in the lab at USF optimizing the data “mole bridge” (the data connecting point) and confirming that our experimental protocols were ready for the ISS. During my time as a research student, whether navigating the complexities of stoichiometry or managing the logistics of a high-stakes experiment, I had many “light bulb” moments that have strengthened my commitment to pursuing a career in clinical medicine. I want to be on the cutting edge of aerospace medicine to take laboratory findings and apply them as medical interventions that will improve the health of those pushing human limits.

In an age of new beginnings within the realm of space exploration, I have come to realize that achievement arises from commitment and consistency to serve. Being in a laboratory and having the privilege of being president of my student organization has reaffirmed to me that a leader helps others and develops a

community that cares for one another. I will incorporate these values into my career in medicine and research by supporting those who are going to be the next generation of pioneers exploring the stars through creating sustainable, reliable, and innovative life support systems for them. Through studying ancient methods of filtering water/natural filters, we are beginning to decipher the secrets we need to unlock to travel to outer space.



MEET AMSRO: Riva Nathani is presently an undergraduate student pursuing a major in biomedical sciences and a minor in psychology at the University of South Florida's Judy Genshaft Honors College. She also has experience in running an organization called Hearts in Service, where she is the founder and president of the student-based organization, which is dedicated to providing services that focus on cardiovascular health by conducting research and providing mentoring opportunities. Riva has had the opportunity to gain significant aerospace research experience. She was a co- principal investigator and co-author on the NASA SSEP Mission 21 project, "Dark Adsorption in Space." In the area of aerospace, she investigates sustainable methods to purify water in microgravity conditions. Her research has been shared in publications such as the USF CAS Chronicles and presented at the Florida Undergraduate Research Conference (FURC) and the ONEUSF.

Aerospace Medicine Rotation at Army Department of Aviation Medicine

- Zack Casella

During March and April 2026, I had the opportunity to complete an aerospace medicine elective rotation with the Army Department of Aviation Medicine at Fort Rucker in Alabama. Even though I was completely civilian, this experience provided invaluable exposure to the operational and clinical aspects of aerospace medicine and further strengthened my passion for pursuing a career in the field.

Throughout the rotation, I worked alongside flight surgeons and aerospace medicine professionals within the aviation clinic, where I participated in aeromedical evaluations, waiver considerations through AERO, and the unique challenges involved in caring for aviators. One of the most impactful aspects of the rotation was seeing how aerospace medicine extends beyond traditional clinical care and requires physicians to balance patient health with operational readiness, mission requirements, and aviation safety standards.



Practicing my flight simulation skills over the beautiful island of Hawaii

In addition to clinical exposure, I participated in several aerospace physiology and operational medicine experiences. I had the opportunity to complete altitude physiology training and personally track my own hypoxia symptoms during chamber exercises, which provided firsthand insight into the physiologic limitations pilots may encounter in flight environments. I also got to experience water egress training while trying to escape from a “submerged helicopter” while flipped upside down in a pool.



The rotation also exposed me to the broader interdisciplinary nature of aerospace medicine. I attended educational conferences, participated in discussions surrounding return-to-flight considerations, and presented topics including traumatic brain injury in aviation medicine and meningitis management in aviators.

Outside of the clinic, Fort Rucker provided an inspiring atmosphere for learning. Being surrounded by Army aviators, flight training operations, and professionals dedicated to human performance and mission readiness further solidified my interest in aerospace medicine and operational medicine research. Overall, my preceptors and RAMs were so welcoming and supportive towards me that it truly made it a conducive learning environment for me.

This rotation was one of the most influential experiences of my medical education thus far. It deepened my appreciation for the complexity of aerospace medicine and strengthened my desire to continue contributing to the field through clinical care, research, mentorship, and advocacy. I am incredibly grateful to the faculty, flight surgeons, and RAMS at the Army Department of Aviation Medicine for their mentorship and willingness to teach throughout the rotation.



Spending the morning on how to use night goggle equipment in the field



MEET AMSRO: Zack Casella is a fourth-year medical student at PCOM Georgia with a strong interest in aerospace and aviation medicine, academic medicine, and clinical research. Zack has been actively involved in research examining the use of hyperbaric oxygen therapy in complex neurological and vascular conditions. In addition to his research pursuits, Zack is passionate about medical education and mentorship. He founded his institution's Aerospace Medicine Club to increase student exposure to the specialty and promote awareness of career opportunities within aviation and space medicine. Zack aspires to pursue a career in aerospace medicine with long-term goals of contributing to research in human spaceflight physiology, while educating the next generation of students interested in this rapidly evolving field.

Fly me to Bordeaux

- Clara Sophie Rosahl

I'm feeling grateful and hence obligated to share the weightless joy, since the ASMRO community has always been a home to me for shared aerospace excitement.

I had the chance to participate in two parabolic flights last year, one in 0 gravitation force and one in lunar gravitational force. As for probably many of us, it had been a little dream of mine for a long time to do this, and it was indeed an unforgettable experience (as reflected in my vestibular system's reaction, unfortunately, as well; the sacrifices you make).



Suddenly feeling weightless. Plus, getting to compare the two “weightlessnesses,” where, in 0g, you immediately float up, sometimes ridiculously uncontrolled, and in lunar g, you still need to jump up a little bit to have a quick float, but, in turn, can easily do push-ups on your fingertips. However, either one is only

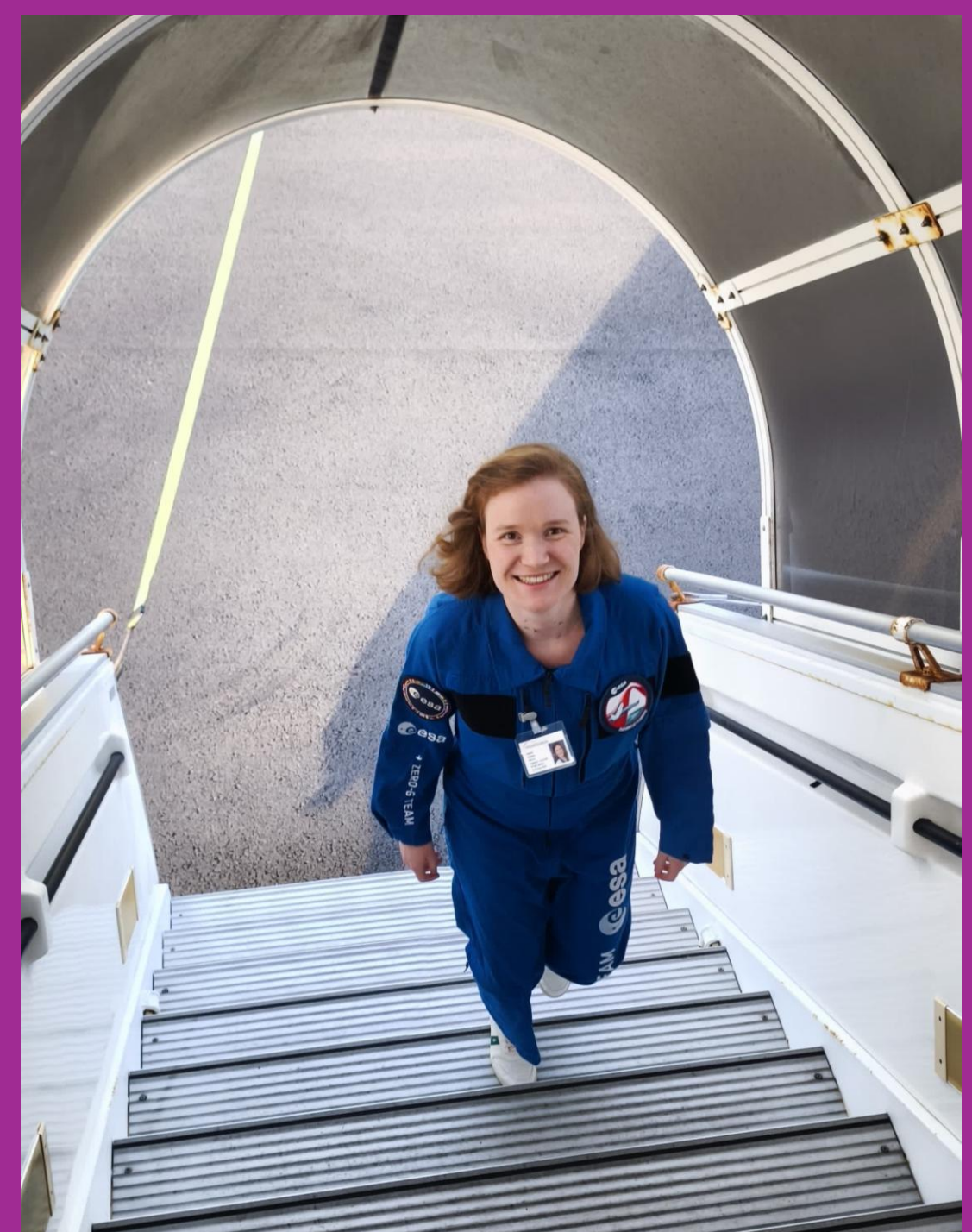
possible once you have found your sense of self again after three to four seconds of total sensory confusion for each parabola anew. Still, the brain's adaptation mechanisms are fascinating. I mean, seconds!

How did I get to do this? A good friend of mine from an ESA Space Physiology Course in Belgium eight years ago, whom I kept in touch with over the years, made an effort with his Canadian PI to be allowed to pick test subjects (instead of recruiting random ones in the Bordeaux area). He knew I would be so excited to participate, and he was more than right. The team measured the jugular vein flow with a special ultrasound technique to gain more insights into jugular vein thrombus formation in microgravity. Over the two flight campaigns, both the researchers and the test subjects became one amazing, very special international team.



I am tempted to say the “lesson” is, “Persevere in your chosen area of interest and keep pushing,” but I do not like that piece of advice so much anymore. Yes, I kept in touch with my friend and kept my interest in aerospace, but only because I enjoyed doing so and only by finding ways to adapt the intensity of my aerospace medicine involvement to my current life, and not by “pushing through.”

”So, instead, I want to encourage you to be self-respecting and confident enough to step away from a topic or hobby or even a job if it is becoming heavily connected with performance pressure in your head, leaving little room for the joy it started with. It is okay to take a break from something or step away or change involvement and watch from the sidelines for a bit. Only for most people, it happens quietly, so it’s not visible for us to learn from. And then, when and if it feels right, it is okay to come back on your own terms, Alysa Liu style, quietly or loudly.



MEET AMSRO: Sophie is a second-year Family Medicine resident in Erfurt, Germany. She completed her doctoral thesis at the German Aerospace Center (DLR) in Cologne, developing a novel ultrasound-based method for muscle quantification. Passionate about providing peers with a network and opportunities in aerospace medicine, she co-founded the Young DGLRM, the students’ and residents’ group within the Germany Society for Aerospace Medicine. When floating in microgravity is not an available option, she goes hiking, sings or plays tennis with friends instead.

From Call Room to Mission Control: Residency Training as a Terrestrial Analog for Neurologic Performance

- Lilla S. Simon, MD & Paul Wright, MD

20:00: The night shift begins.

An elderly patient loses his ability to speak. A decision regarding thrombolytic therapy must be made within minutes for a patient with an acute stroke. Down the hall, another patient continues to seize despite the use of multiple antiseizure medications and now requires intensive care intervention and life support. Hours later, devastating news must be delivered to a family member. By 03:00, several new neurological consultations begin to accumulate in the emergency department.

These are the realities of overnight residency training. Despite fatigue, circadian disruption, food and nutritional inconsistencies, compounded by sustained operational stress; physicians are expected to make rapid decisions, maintain situational awareness, and deliver compassionate care while lives hang in the balance.

At first glance, residency training and human spaceflight appear to share little in common. One takes place within the controlled environment of a hospital, while the other unfolds hundreds of miles above Earth. Yet both environments place extraordinary demands on neurologic performance. Each requires individuals to function effectively despite sleep deprivation, circadian misalignment, cognitive fatigue, and prolonged operational stress.¹⁻³

Astronauts face additional neurologic challenges, including microgravity induced vestibular disturbances, cephalad fluid shifts,

space motion sickness, radiation exposure, and prolonged confinement.¹ Nevertheless, the overlap in core operational stressors raises an intriguing question: could residency training serve as a terrestrial analog for studying neurologic performance under extreme conditions?

Terrestrial analogs have become an essential component of modern spaceflight research. These environments are designed to replicate selected physiologic and psychological stressors encountered during space missions while remaining accessible and cost effective.⁴ Common examples include head down tilt bed rest studies, which simulate certain aspects of microgravity, and Antarctic research stations, which model isolation, confinement, and environmental extremes.^{5,6} Such analogs allow investigators to evaluate human performance and physiologic adaptation without the considerable logistical constraints of conducting experiments aboard the International Space Station.

Residency training may represent an underrecognized addition to this family of terrestrial analogs. Modern physician training schedules expose residents to varying degrees of circadian disruption through overnight call, extended duration shifts, rotating schedules, and frequent sleep interruptions.^{2,3}

Unlike many traditional analog environments, residency combines physiologic strain with continuous high consequence

decision making, emotional stress, procedural demands, and responsibility for patient outcomes.

From a neuroscience perspective, this creates a unique natural laboratory. Cognitive domains such as vigilance, reaction time, attention, and executive functioning can be measured using validated instruments such as the Psychomotor Vigilance Test.⁷ Manual dexterity and coordination can be assessed using the Nine Hole Peg Test, a widely accepted standard in neurologic performance measurement.⁸ Headache burden, another common manifestation of sleep disruption and physiologic stress, can be evaluated through validated survey instruments.^{9,10} Together, these measures provide an opportunity to characterize how circadian disruption influences neurologic performance in an operational environment.

The relevance of these questions extends far beyond residency training. As governmental and commercial spaceflight programs continue to expand, preserving human performance during long duration missions will become increasingly important. Future missions to the Moon and Mars will expose astronauts to prolonged

periods of circadian disruption, operational stress, isolation, and fatigue. Understanding how these factors affect cognition, coordination, decision making, and neurologic symptoms is critical to mission success and crew safety.

Residency training was never designed to replicate an aerospace mission. However, it offers a naturally occurring environment in which sleep deprivation, cognitive workload, emotional stress, and circadian disruption converge. Studying neurologic performance within this setting may provide valuable insights into human adaptation under physiologic strain while complementing existing terrestrial analog research.

In many ways, residency and spaceflight ask the same fundamental question: How well can the human nervous system perform when operating beyond its natural rhythm? The answer may help improve not only physician performance here on Earth, but also the success of humanity's next great journeys beyond it.



Meet AMSRO: Dr. Lilla Simon is a PGY-2 Neurology Resident at the Zucker School of Medicine at Hofstra/Northwell Vassar Brothers Medical Center with academic interests in headache medicine, operational neurology, and aerospace medicine. She is particularly interested in the effects of circadian disruption and operational stress on neurologic performance, cognition, and headache burden. Her developing work explores residency shift schedules as a potential terrestrial analog for studying human performance under physiologic stress. She is a member of the Aerospace Medical Association (AsMA) and the Aerospace Medicine Student and Resident Organization (AMSRO).

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An AMSRO Appreciation

- Cheryl Kam

I want to thank the AMSRO Diversity Committee for awarding me with the Trailblazer Scholarship in 2025 and helping to fund my trip to AsMA this year, especially Anaelle Ndoeye who was integral in organizing the administrative and communications parts of the trip for me.

My first AsMA was a truly memorable experience. This trip marked my first visit to the United States and my first time attending the conference, and what I found was an incredibly welcoming community of aeromedical professionals whose kindness, encouragement, and willingness to share their knowledge exceeded all my expectations. The conference showcased scientific research in a way that was both engaging and inspiring, with unique topics at every panel, lecture and presentation. It truly felt like a once-in-a-lifetime opportunity, although I hope it won't be my last time attending.

I'm grateful for the opportunity to meet my mentor, Andrew Lam, in-person, who was integral in orienting me around the conference and introducing me to the aeromedical community. Another highlight was getting to meet the Women in Aerospace Medicine (WAM) community, in particular, Dr. Sheyna Gifford, Mollie Scanagatta-Scola, Tristin Nunley, Stephanie Smith and Christine Rincon, all of whom I've had the privilege of working with on the WAM leadership board over the past few years.

Thank you to everyone who took the time to speak with me and share their experiences with me. I will treasure the knowledge, perspectives and friendships I have gained from this conference for a long time!



Left: Jody Greenhalgh and Cheryl at Stanford Medicine

Bottom: Cheryl visiting Garden of the Gods while in Colorado for 2026 AsMA-UHMS meeting.



Left: Cheryl visiting Rocky Mountain National Park while in Colorado for 2026 AsMA-UHMS meeting.



MEET AMSRO: Cheryl is the recipient of the AMSRO Trailblazer Scholarship for 2025 and the current President of Women in Aerospace Medicine (WAM). She is a pre-med who's passionate about mental health within the aviation community, and is actively serving on the Pilot Mental Health Campaign's Research and Data and Medical boards.

Tradipitant: The First FDA-Approved Pharmacologic Motion Sickness Countermeasure in Over Four Decades

- Nala Fakhro & Tom Diaz, PharmD

Space motion sickness (SMS) is a clinical syndrome affecting up to 70% of astronauts within the first few days of spaceflight, with symptoms including dizziness, vertigo, nausea, vomiting, and headaches.¹ These symptoms are often debilitating, precluding emergency procedures and extravehicular activity upon initial entry to the microgravity environment. The two leading hypotheses pertaining to the pathophysiology of SMS are: (1) vestibular receptor alterations due to headward fluid shifts, and (2) loss of tilt-related otolith signals due to sensory conflicts.² SMS remains an active research priority for NASA's Human Research Program.³

Currently, approaches to SMS management include both non-pharmacological and pharmacological countermeasures. However, non-pharmacological therapies such as virtual reality and stimulation training have limited benefit and do not provide adequate cessation of symptoms.¹ Of the many pharmacological countermeasures that have been explored in this environment, promethazine consistently demonstrates the strongest efficacy.^{1,4} As a histamine-1 receptor antagonist available in various dosage forms, promethazine has up to 90% initial response rate in flight, and remains NASA's 1st line treatment of choice.⁴ A concern with SMS agents include their adverse effect profile, with somnolence, lethargy, and cognitive dysfunction as the most common terrestrial effect. Both noteworthy and anecdotally, promethazine may not exhibit these sedating effects in the first few days of

spaceflight.⁴ Regardless, the search for alternative SMS pharmacological countermeasures may be warranted.

In December of 2025, the FDA approved tradipitant (Nereus), a neurokinin-1 (NK-1) receptor antagonist used for the prevention of vomiting induced by motion. While NK-1 receptor antagonists have been used in clinical practice since 2003 for chemo-induced and post-operative nausea and vomiting, this approval represents the first new drug class approved for motion sickness since transdermal scopolamine in 1979.⁵ Primary clinical trials in Motion Syros and Motion Serifos demonstrated how tradipitant significantly reduced the incidence of motion-related vomiting by half compared to placebo when administered 1 hour prior to a boat trip.⁶ Though none of the side effects were severe, the most commonly reported with the 85 mg dose were somnolence, headache, and fatigue, each occurring at a higher frequency than placebo (6-7% versus 3-5%).

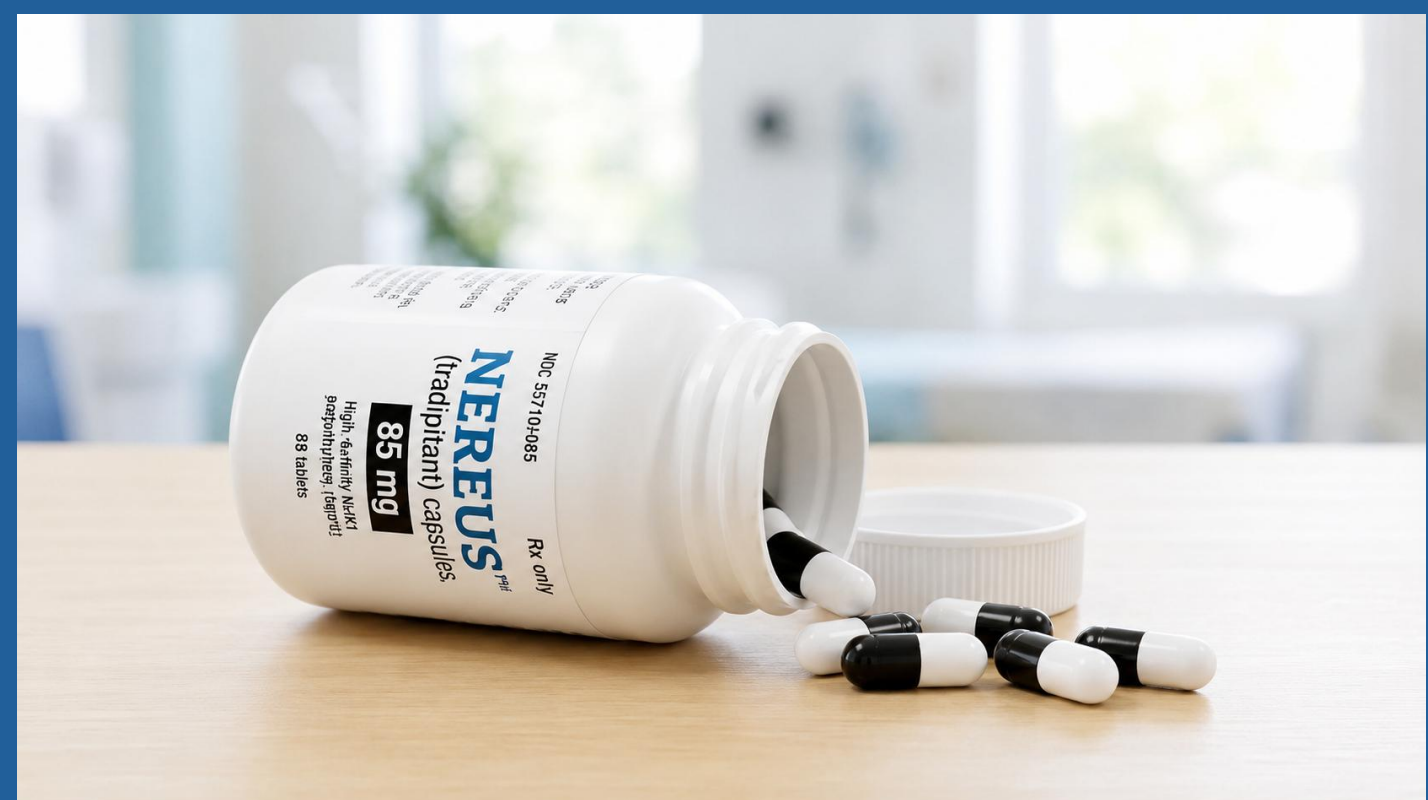


Image from: Vanda Pharmaceuticals Inc

As a selective antagonist of NK-1 receptors, tradipitant prevents the neurotransmitter Substance P from mediating emetogenic signals in response to stimuli in the brainstem and nucleus tractus solitarius.⁷ Tradipitant is only available as an oral capsule formulation, and is to be administered on an empty stomach at a dose of 85 mg or 170 mg in a 24-hour period.⁸ It reaches maximum systemic concentrations in ~1-2 hours, and is metabolized hepatically, carrying a drug interaction with strong CYP3A4 inhibitors.⁸ In terms of storage, it is recommended to be protected from light and moisture in a room temperature environment with minimal temperature excursions.⁸ However, at a \$255 cost per dose, there may be hesitancy in onboarding tradipitant for SMS symptoms. Alternatively, pathways such as standard prescription or \$85 per dose via a proprietary direct-to-consumer from the manufacturer,

Vanda pharmaceuticals, could pose as a solution if viable.⁹

For the aerospace industry, tradipitant's limited side effect profile can be quite attractive, though comparisons with the current standard of care will be necessary. Other considerations include potential pharmacokinetic alterations in the spaceflight environment due to gastric motility changes, the lack of alternative dosage forms, and the high costs. A distinction to consider is that tradipitant was studied solely in its ability to prevent vomiting associated with motion, which represents only one of the many symptoms of SMS. Despite these limitations, this milestone in the pharmaceutical industry presents the opportunity to explore repurposing currently existing antiemetic drug classes, like NK-1 receptor antagonists, as pharmacologic countermeasures for SMS.



Meet AMSRO: Nala Fakhro is an incoming P2 student at the Skaggs School of Pharmacy in the Anschutz Medical center in Colorado. She has a bachelors in Biochemistry from UC Denver and developed her interest in space medicine from her school's new space pharmacy club: The Student Aerospace Pharmacy Association (SAsPA). Her current career path goals include specializing in an ambulatory care setting alongside emergency/hospital care.

Meet AMSRO: Tom Diaz, PharmD graduated from the UNC Chapel Hill School of Pharmacy, completed two years in a pharmacy residency program at The Johns Hopkins Hospital, and is an incoming MICU Clinical Pharmacy Specialist at the Hospital of the University of Pennsylvania. He was the former AMSRO Parliamentarian/Historian and has completed both the NASA JSC and KSC Clerkships. His aerospace research interests include pharmaceutical stability, PK/PD, pharmacogenomics, and radiation countermeasures.



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From Lunar Habitat to Medical School: Lessons from My First Analog Astronaut Mission

- Daniel Bister

Three years ago, I spent nine days isolated inside a simulated lunar habitat in Poland as part of an analog astronaut mission. Like many of you reading this, I had been fascinated by space exploration and the growing field of space medicine, and I was eager to experience life in an extreme environment alongside like-minded space enthusiasts. What I was not expecting was how much this simulated experience would not only prepare me for medical school, but also offer a rare window into the medical, psychological, and operational challenges of spaceflight.

Our mission, named Astra 45, was conducted through the Analog Astronaut Training Center (AATC) in Krakow, Poland. The mission took place in an unassuming cabin nestled in the woods with its interior completely redone to resemble a lunar habitat. It included shared living quarters, a workstation, a hydroponics system, a robotics and 3D printer station, a gym, a restroom, and a small kitchen, among other features. I served as the Crew Medical Officer for our team of five and was responsible for the physical and mental well-being of each crewmember. Each day began and ended with health assessments, including vital signs every two hours, morning bioimpedance measurements, and mood and symptom assessments three times a day.

What initially seemed like a routine responsibility quickly became an evolving portrait of human adaptation to isolation and

extreme conditions. The cumulative impact of sleep deprivation, the lack of sunlight and fresh air, limited resources with no easy way to replenish them, and even restricted hygiene practices became increasingly apparent as the mission progressed. Maintaining the same level of personal performance and team cohesion required increasing effort each day. The experience now reminds me of the strain often seen throughout my rotations, particularly in settings like the ICU, trauma center, or overnight call. While no one experienced a major medical emergency, minor physiological and psychological stressors compounded with each passing day – an important lesson for future deep-space missions where crews will spend months or years in similarly isolated environments.



Aboard the Lunar Habitat serving as the Crew Medical Officer during mission Astra 45.

During the mission, I dedicated time documenting the organisms residing in our hydroponics system using our in-house microscope. There was also a noticeable increase in reports of vivid déjà vu and lucid dreaming among the crew, which prompted me to conduct a crew survey to better understand possible triggers. Our findings were consistent with published literature, particularly the association of sleep deprivation, heightened stress, and negative emotional states, which are factors believed to contribute to episodes of déjà vu through altered cognitive processing. I came to appreciate that subtle cognitive shifts may manifest before obvious performance problems develop, and that routine check-ins about sleep and mood can be as important as formal testing for maintaining healthy team dynamics and crew performance on long-duration missions. I also devised a cost-efficient orientation-perception training exercise using a fully rotational hammock, eye covers, and a surround-sound speaker system to evaluate how individuals adapt when visual and auditory cues are unreliable.

The most important responsibility, however, remained the health monitoring and maintenance of our crew. I observed sleep patterns shift, stress wax and wane, and minor complaints take on increased magnitude in our confined space. One misconception I had before the mission was that space medicine primarily dealt with rare medical emergencies in extreme environments. In reality, the greatest threats to mission success often seem far more

mundane (i.e., psychosocial stress, sleep disruption, and interpersonal conflict.) The mission taught me that prevention is often more important and manageable than treatment – a lesson that has been a guiding light throughout my medical training thus far.

As a medical student, I now recognize how many challenges of space medicine extend far beyond treating disease manifestations and into optimizing prevention. The analog mission taught me three valuable lessons that have prepared me for medical school. First, human factors matter: isolation, communication, and team cohesion can end a mission before it even begins. That is why structured debriefs, conflict-management skills, and psychological support are essential parts of mission design and even medical training. Second, prevention is key: small issues left unattended can quickly become mission-threatening in the absence of the resources on Earth. Thus, active surveillance, routine assessments, and early intervention are crucial. Third, spaceflight is never a one-man show. I came to appreciate the inherently interdisciplinary nature of space medicine, which requires close coordination among engineers, scientists, physicians, psychologists, and operations specialists.

That mission transformed aerospace medicine from a distant interest into a tangible career path. Since then, I have pursued research, leadership, and educational opportunities in the field, including having the honor of serving as

President of the Aviation and Space Medicine Interest Group at the University of Miami Miller School of Medicine and helping expand our programming for the student body. For students interested in aerospace medicine, analog missions provide a rare opportunity to experience firsthand many of the operational and human-factors challenges that future crews may face – and which you may face during your medical training. They let you test how you would practice medicine in these environments – an experience that can quietly but powerfully shape your career trajectory. While analog missions cannot perfectly replicate spaceflight, they offer an invaluable

window into the human side of exploration and the kind of medical practice we will need as we travel farther away from Earth.



Documenting microorganism samples from the hydroponics system.



Meet AMSRO: Daniel Bister is a third-year medical student at the University of Miami Miller School of Medicine with interests in interventional radiology, aerospace medicine, and medical innovation. He serves as President of the Aviation and Space Medicine Interest Group (ASMIG), where he organizes educational programming, research initiatives, and collaborations to promote student engagement in aerospace medicine. Daniel has participated in analog astronaut missions as a Crew Medical Officer and has contributed to research and scholarly work focused on human health in extreme environments, including spaceflight dermatology. His long-term goals include advancing minimally invasive medicine, space health, and technologies that improve healthcare delivery in challenging environments.

Women in Aerospace Medicine 2025-2026 Journey

- WAM



The 2025-2026 year for Women in Aerospace Medicine was full of incredible learning events and partnerships. Notably, WAM completed the journey toward becoming an official affiliate of AsMA and are thrilled for the opportunity to grow our reach. We also welcomed our new board members, who went above and beyond in all they did:

- President & Media Chair: **Cheryl Kam**
- Vice President & Fundraising Chair: **Tristin Nunley, MS**
- Treasurer: **Meghan Potila (Anderman), MS**
- Secretary: **Sandhya Pepala**
- Research & Education Chair: **Christine Rincon, MSN, RN, CCRN**
- Membership & Diversity Chair: **Dr. Onalenna Nako-Phuthogo, MD, MS**
- Newsletter Chair: **Anna Shipman**

We were honored to learn from so many speakers with diverse backgrounds this year at our virtual speaker events:

- **Rebecca Hall:** NASA Extravehicular Activity Flight Controller
- **Mamta Patel, Ph.D:** Founder and CEO of Vyoma Science and Engineering
- **Riyam Ojaimi, Ph.D:** Founder and CEO of Space Point
- **Christine Rincon, MSN, RN, CCRN:** Research Fellow with the Advanced Space Life Institute and Founder of The Space Nurse, LLC
- **Andrew Lam, MD:** Family Medicine Physician and Aerospace Medicine Resident (UTMB)
- **Jody Greenhalgh, OTR/L, MCP:** Occupational Therapist, Board Member of Stanford Medicine Alliance for Disability Inclusion & Equity

- **Tracie Prater, Ph.D:** Aerospace Engineer in the Habitation Systems Development Office at NASA Marshall Space Flight Center

Our speaker events also saw many partnerships, including a joint event with The Organization for Space Medicine, Engineering, and Design (OSMED) for Women's History Month and a two-day aerospace medicine international seminar held in collaboration with the Civil Aviation Authority of Botswana (CAAB) and Aeromed Prime Consultancy.

The Women's History Month panel with (OSMED) featured a panel of six women in aerospace medicine:

- **Alexandra Arce, MD:** a family medicine-trained physician who also works as an emergency physician and hospitalist in Texas; she has additional training in HIV medicine, hyperbaric medicine, and obesity medicine.
- **Shawna Pandya, MD:** an emergency medicine physician Virgin Galactic Delta class commercial astronaut candidate, and director of the IIAS Space Medicine Group
- **Kat Schmolly, MD:** a United States Air Force veteran, physician, and Genomic Medicine fellow at UCLA
- **Kate Flickinger, PhD:** an exercise physiologist in the University of Pittsburgh Department of Emergency Medicine
- **Jennifer Watne, BS:** an aerospace physiologist technician and instructor at The University of North Dakota
- **Christine Rincon, MSN, RN, CCRN:** Research Fellow with the Advanced Space Life Institute and Founder of The Space Nurse, LLC

The Aerospace Medicine International Seminar was organized and led by our Membership & Diversity Chair, Dr. Onalenna Nako-Phuthego. Dr. Nako-Phuthego and her team brought together national and international stakeholders, along with global aerospace and aviation medicine experts, to explore critical topics impacting aviation health, operations, and safety, which fosters stronger local and global collaboration.

We were also privileged to have several WAM speakers as well as a sponsored networking event at AsMA 2026. Many thanks to Science Systems and Applications, Inc. (SSAI) for sponsoring our networking social! SSAI's CEO, Dr. Shilpa Bahethi, MD, introduced attendees to SSAI's Aerospace Medicine Initiative, which builds upon their longstanding history of excellence in aerospace mission support.

We thank each and every one of you for supporting our journey to continue to promote diversity, representation, scholarship, and leadership in Aerospace Medicine. None of this would be possible without our members. For those considering joining us, visit our website by clicking [HERE](#), and connect with us on social media by following the links at the bottom of the website homepage.

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SSAI CEO Dr. Shilpa Bahethi, WAM President Cheryl Kam, WAM Vice President & Fundraising Chair Tristin Nunley, and WAM Founder Dr. Sheyna Gifford at the 2026 AsMA WAM Networking Social (sponsored by SSAI)



MEET WAM: President & Media Chair: Cheryl Kam | Vice President & Fundraising Chair: Tristin Nunley, MS | Treasurer: Meghan Potila (Anderman), MS | Secretary: Sandhya Pepala | Research & Education Chair: Christine Rincon, MSN, RN, CCRN | Membership & Diversity Chair: Dr. Onalenna Nako-Phuthego, MD, MS | Newsletter Chair: Anna Shipman

AMSRO Diversity Committee

This year, the AMSRO Diversity Committee continued its mission to promote representation, inclusion, and opportunity within aerospace medicine. We worked to increase awareness and accessibility for medical and pre-medical students by organizing panels featuring professionals across a variety of aerospace medicine career pathways. We are proud to recognize this year's Trailblazer Scholarship recipient, Tyrone Jacobs, whose leadership and commitment to advancing diversity in aerospace medicine reflect the values of this award.



Tyrone Jacobs Jr. is a pre-medical student with a background in aerospace and defense engineering. His interest in medicine was sparked by caring for family members during serious illnesses. He is currently completing medical school prerequisites, gaining clinical experience, and conducting neurosurgical research. Tyrone is passionate about aerospace and operational medicine, focusing on human performance and safety in high-risk environments. As a husband and father, he is dedicated to service and improving outcomes for patients with complex medical needs.

We would also like to highlight the recent work of former Diversity Committee Co-Chair and longtime committee member, Dr. Andrew Lam, who recently published an article on the demographic makeup of aerospace medicine specialists in the Journal of Aerospace Medicine and Human Performance. The full article is available [here](#) (click)

As we look ahead, we remain committed to broadening access to aerospace medicine for individuals of all backgrounds and experiences.

If you have ideas or would like to get involved, please complete the form [here](#) (click). We would be glad to have you join our efforts!

- Diversity Committee Co-Chairs: Anaelle Ndoeye, Gitika Gorthi, and Viraj Mithani

AMSRO Chapter Coordinating Committee

The Chapter Coordinating Committee (CCC) supports AMSRO by connecting chapters and regional chairs with national leadership, affiliating and maintaining currency of AMSRO chapters, and synchronizing speaking events. In short, this committee works behind the scenes to support the regional chapter system and increase engagement across the

regions. This year, we expanded our reach by affiliating 15 chapters. Looking ahead, we will continue to grow and will soon be seeking nominations for AMSRO regional chairs, so if you're looking for a way to get involved in AMSRO, keep an eye out for upcoming applications! Also, be sure to keep us in mind when your chapter changes leadership, so we can easily maintain your chapter's affiliation.

- Abby Shah & Ethan Naylor

AMSRO Podcast Committee

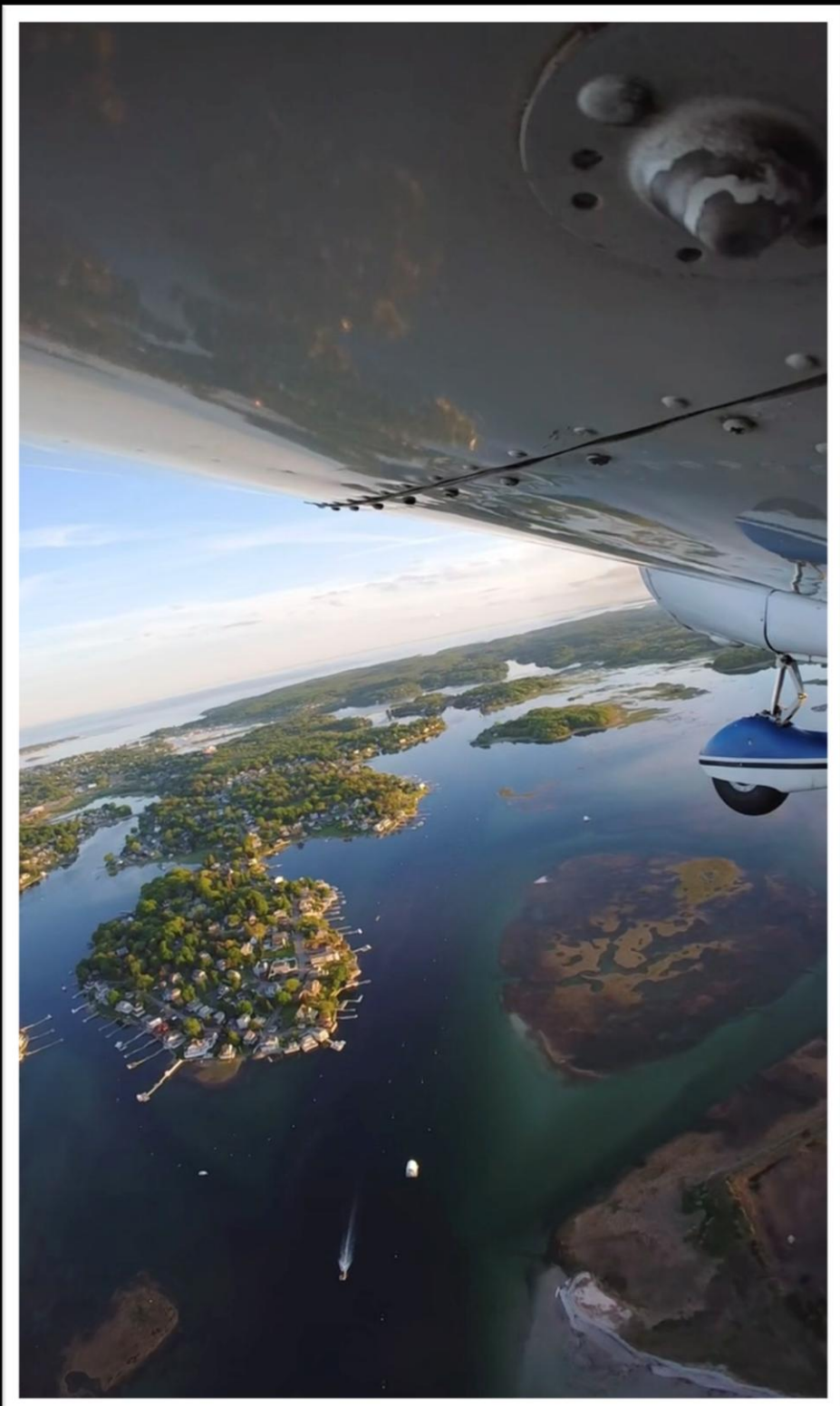
Hello! We are the new AMSRO Podcast Committee and we're excited to bring you ***Beyond Nominal***, our organization's podcast, releasing this June! Our goal is to improve accessibility to the specialty of aerospace medicine by providing a platform for students and residents to learn from experts, share stories, and gain valuable insights.

- Members:

Sarah Ditelberg (lead)
Stephanie Smith
Jordan Lu
Claire Cunningham
Aryaman Singh

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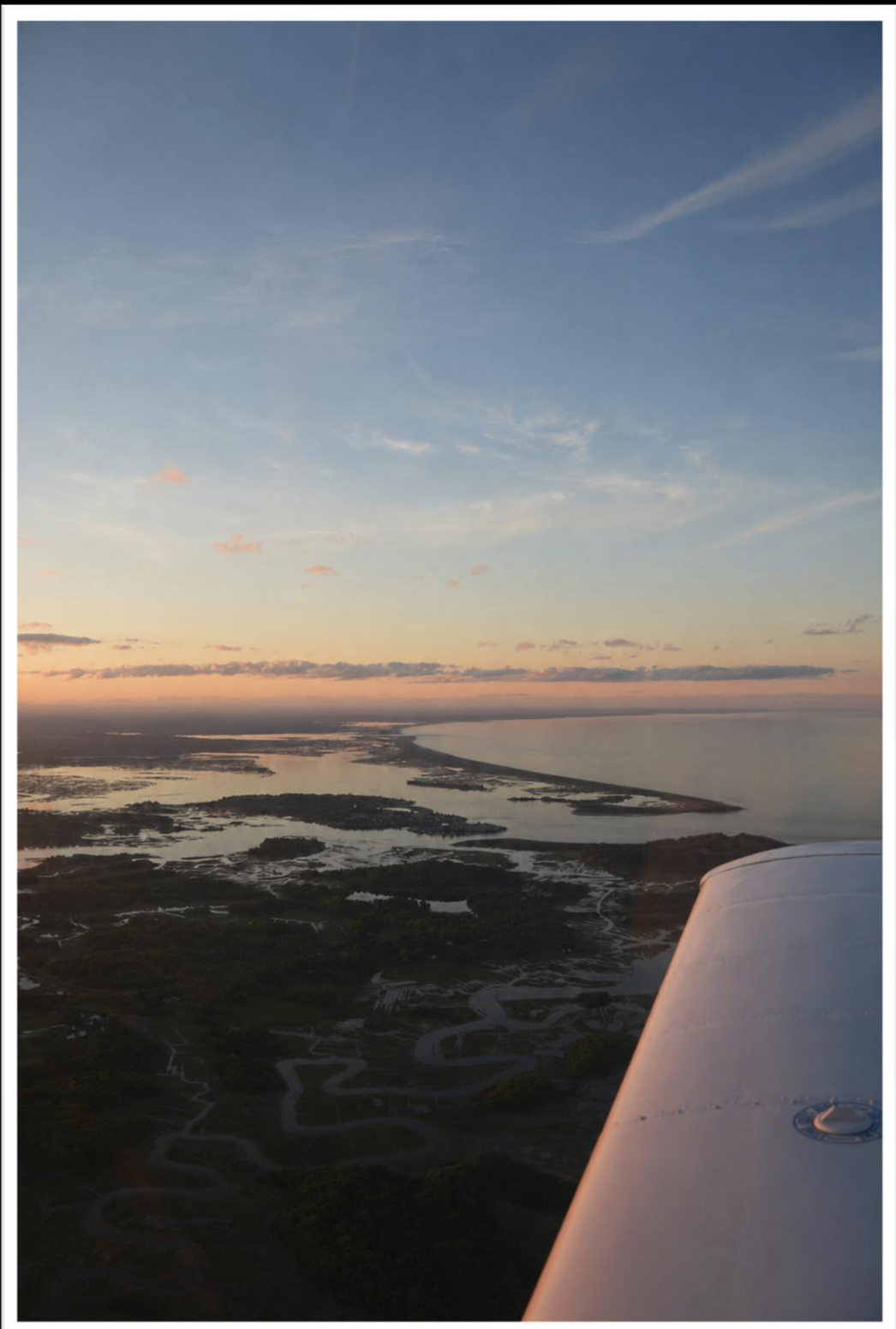
We are appreciative of AMSRO Member Maeve Alterio for sending these great photos to include in this addition of The Orbiter.



Aerial view over Gloucester, Massachusetts from a Piper Cherokee.



Waxing moon photographed with a Sony α6700.



Sunset along the Massachusetts coastline photographed from a Piper Cherokee.



AMSRO PHOTO ALBUM

We are appreciative of AMSRO Member Giselle Irio for sending these great photos to include in this addition of The Orbiter.



Giselle with previous AsMA President and current AMSRO faculty mentor, Dr. Kris Belland

Giselle with friends as AsMA-UHMS annual scientific Conference



AMSRO PHOTO ALBUM



AMSRO Member Dwyer Roche with other AMSRO members and friends.



AMSRO Member Riva Nathani with her research of Dark Adsorption in Space: Testing Cactus-Modified TiO₂ Films Beyond Earth



AMSRO Member Corey Morris with other Undersea & Hyperbaric Medicine Fellows at the 2026 AsMA-UHMS Conference in Denver, CO.



DUKE Dive Medicine Family



AMSRO PHOTO ALBUM



AsMA President Dr. Warren Silberman (right) delivering opening remarks at this year's Annual AMSRO Business meeting held at the AsMA-UHMS Scientific Conference. Also pictured are AMSRO president, Dr. Ryan Keller and AMSRO president-elect (center), Dr. Joe Butterfield (left).



AMSRO Members Dr. Lindsay Kingston (left) and Dr. Christina DeInnocentiis (center) receiving their award from AMSRO president, Dr. Ryan Keller (right), for their AMSRO Scientific Paper Award: Case Report.



AMSRO Member Dr. Clare McNerlin (center) receiving the Anita Mantri, PhD Memorial Award. She is pictured with nominator Dr. Ben Johnson (right) and AMSRO President, Dr. Ryan Keller (left).



Dr. Chris Borchardt delivering the keynote address at AMSRO's annual business meeting at this year's joint AsMA-UHMS scientific meeting.



FUTURE EVENTS

CAF Wings Over Houston 2026

Oct 31- Nov 1 | Houston, TX
(Ellington Airport)



3rd ICAM

Oct 1-3 2026 | Istanbul, Türkiye
(Hilton Istanbul Bosphorus)

35th Congress of the ICAS Sept 2026 | Sydney, Australia



NASA HRP IWS

TBD, 2027 | Galveston, TX

ASMA-UHMS 2027

May 23 -28 | Dallas, TX
(Hilton Anatole Dallas Hotel)



Event dates subject to change

If you would like your event listed here
in future editions of the *Orbiter*,
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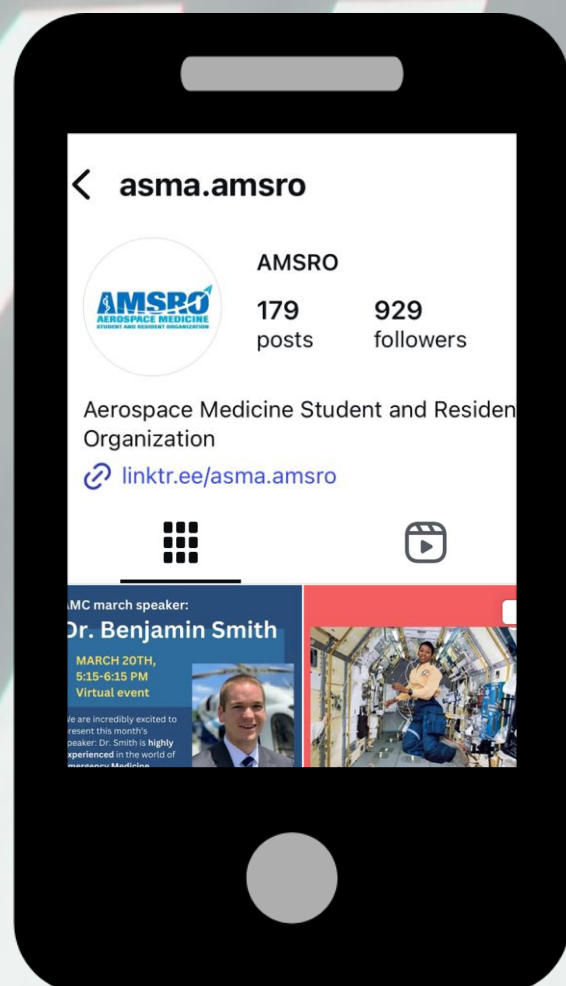
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