SCOPE

MAGAZINE OF NAVY MEDICINE RESEARCH & DEVELOPMENT

ISSUE 11 SPRING 2026

Celebrating 25 YEARS OF THE MILLENNIUM COHORT STUDY

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Editor's Desk

Welcome back to SCOPE, friends!

As spring wraps up, I'm reminded of three undeniable truths: I am not built for this D.C. heat, baseball is the best and NMR&D does way too much work to ever cover it all. But we try, and this past spring, things really heated up.

My favorite part of putting these issues together is the Q&A feature. Getting to spend an hour chatting with brilliant people I've never met is a true highlight, and this issue, celebrating 25 years of the Millennium Cohort Study, was no exception. It's hard to capture an hour of conversation in a few pages, but I hope our readers still learn something about the work and the passion of NHRC staff leading this vital, long-running effort.

To Rudy Rull, Sheila Castañeda, Hope McMaster and the NHRC team—you're awesome. Thanks for sharing your work and letting us celebrate this 25-year milestone with you.

— Tommy Lamkin

THE SCOPE

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SCOPE Issue 11 Spring 2026 is authorized for public release and is published by Naval Medical Research Command Public Affairs
503 Robert Grant Ave, Silver Spring, Maryland 20910

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On the Cover:

SAN DIEGO (Dec. 5, 2025) A Sailor assigned to USS Pierre (LCS 28) reunites with his family after returning from sea. Photo by IC2 Ulrika Mendiola

Capt. Russell Linderman (right) salutes Capt. William Howard (left) during a change of command officiated by Capt. Eric Welsh / Tech Sgt. Daniel Peterson

New CO Takes the Helm at NAMRU Dayton

By Zachary Wilson

Naval Medical Research Unit (NAMRU) Dayton held a change of command ceremony April 10, at the National Museum of the U.S. Air Force, where Capt. William Howard formally relinquished command to Capt. J. Russell Linderman. The ceremony was officiated by Capt. Eric Welsh, commander of Naval Medical Research Command (NMRC).

In remarks during the ceremony, Welsh praised Howard's leadership and the condition of the command he leaves behind.

"Capt. Howard leaves behind a legacy of excellence and a command that is stronger and more capable because of his leadership," Welsh said, while also expressing confidence in Linderman as he assumes command.

Howard used his farewell remarks to emphasize the long-term importance of military medical research and the command's role in supporting operational readiness.

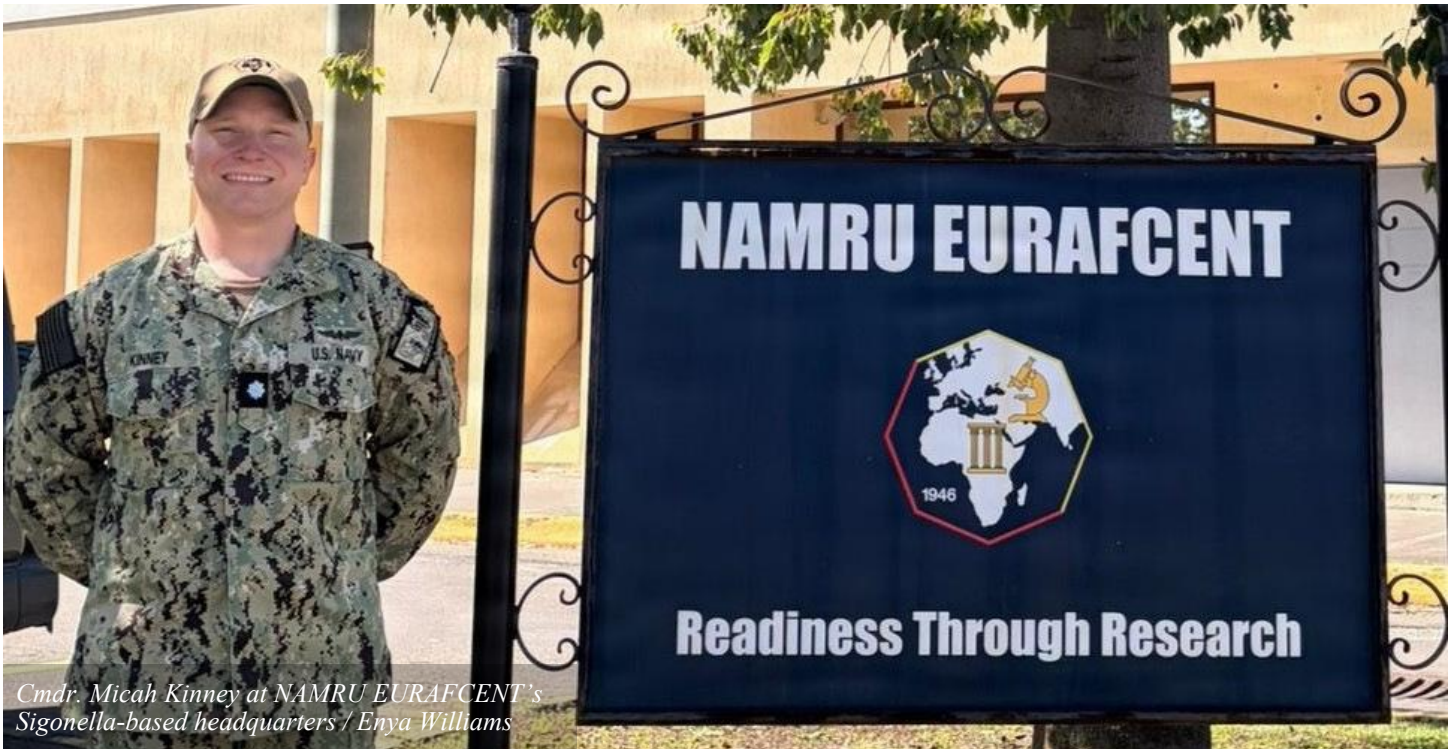
"Research is easy to overlook because it represents the future," he said. "Its successes are measured in accidents that never happen, diseases that never occur and lives that are not prematurely lost." He described his role over the past two years as keeping the command centered on its core research tasks and long-term goals.

Linderman, who previously served as NAMRU Dayton's executive officer, noted that his experience with the command's work predates his time in Dayton and shaped his understanding of its value to the fleet. In his remarks, he pointed to the real-world operational impact of the unit's expertise.

"I look forward to going together with you as we continue our mission to deliver world-class research and development products to enhance warfighter health, readiness and performance," he said.

NAMRU Dayton is home to the Environmental Health Effects Laboratory and the Naval Aerospace Medical Research Laboratory. Its mission is to enhance warfighter health, readiness and performance through environmental health effects, toxicology and aerospace medical research and development.

Marking a recent leadership transition, NAMRU Dayton continues to deliver operationally relevant science to support and protect warfighters in demanding operational environments. ■



Cmdr. Micah Kinney at NAMRU EURAFCENT's Sigonella-based headquarters / Enya Williams

NAMRU EURAFCENT Executive Officer Oversees Research into Operational Health Threats

By Stephanie Serna

Naval Medical Research Unit (NAMRU) EURAFCENT supports force health protection and warfighter readiness. The command identifies, studies and mitigates infectious disease threats that can degrade operational capability in forward-deployed and austere environments. By emphasizing early detection, surveillance and prevention, the command's work has and continues to provide combatant commanders with actionable medical information to strengthen mission effectiveness.

Cmdr. Micah J. Kinney has been the executive officer for NAMRU EURAFCENT since 2024. During his tenure, he has seen first-hand the positive impact that military medical research and development has on readiness.

"You can see tanks, ships and aircraft, but not pathogens," Kinney explained. "Disease can take service members out of the fight just as easily as battle injuries. If we can prevent illness before it impacts our forces, we preserve combat power and readiness, and enable personnel to return to the fight quicker."

"You can see tanks, ships and aircraft, but not pathogens"

Under Kinney's leadership at NAMRU EURAFCENT, the command has reinforced joint and multinational interoperability with Navy medical counterparts, U.S. Army and U.S. Air Force partners and with partner nations in Africa and the Middle East. Kinney has taken an active leadership role in building and formalizing these partnerships.

"As executive officer of NAMRU EURAFCENT, Cmdr. Kinney masterfully navigates the intense complexities of driving critical medical research across three distinct combatant commands," said Capt. Michael Prouty, commanding officer, NAMRU EURAFCENT. "By drawing on a wealth of operational experiences, Kinney provides the visionary leadership necessary to advance our scientific mission in these challenging environments."

Continued on page 23

John Florian supervises an ongoing research protocol in NSMRL's recently renovated GENESIS hypo/hyperbaric chamber / Emily Swedlund

NSMRL Chairs Five Eyes S&T Human Resources and Performance Group, Maritime Human Systems Performance Joint Panel

By Emily Swedlund

Naval Submarine Medical Research Laboratory (NSMRL) regularly partners with the fleet and with service members across the U.S. military to develop timely solutions that address maritime and multi-domain requirements. The command's research informs policies aimed at protecting the health of the undersea warfighter.

NSMRL's expertise also extends to international partnerships, ensuring U.S. allies abroad are prepared to address global concerns of shared interest.

John Florian, head of NSMRL's Warfighter Health and Protection department, oversees one such collaboration. Florian serves as chair for the Five Eyes Science & Technology (FVEY S&T) Human Resources and Performance (HUM) Group Maritime Human Systems Performance Joint Panel (JP2) and U.S. National co-lead.

FVEY S&T is an international organization that collaborates on scientific and technical defense research through information exchange, joint experimentation and partnerships. Member nations include the U.S., Australia, Canada, New Zealand and the United Kingdom. The HUM Group includes multiple joint panels focused on land, maritime and air human systems performance.

"As chair, Dr. Florian brings together the expertise, capabilities and research at NSMRL and across the FVEY nations to enhance undersea warfighter performance, lethality and interoperability for all member nations," said Capt. Tatana Olson, NSMRL commanding officer.

Continued on page 23

Alice LaGoy presents NHRC's CREW study at the Pentagon / Bernardo Fuller

NHRC Showcases CREW Fatigue Risk Monitoring System at Pentagon Lab Day

By Tommy Lamkin

Researchers with Navy Medicine Research & Development's (NMR&D) Naval Health Research Center (NHRC), showcased innovative fatigue-monitoring technology during the Department of War (DoW) Lab Day at the Pentagon on May 6.

NHRC scientists, in collaboration with the Massachusetts Institute of Technology (MIT) Lincoln Laboratory, highlighted the Command Readiness, Endurance and Watchstanding (CREW) System, wearable technology designed to address fatigue as a critical risk factor in naval operations.

Developed in response to recommendations to improve fatigue management following safety-related incidents, the CREW System enables near real-time identification of at-risk personnel and supports making informed operational decisions.

Fatigue presents an ever-present risk to Sailor readiness and operational decision-making. In the absence of methods to track fatigue and exhaustion, mission-critical tasks may not be conducted properly.

The CREW System uses wearable smart devices to collect individual sleep and fatigue data, producing actionable insights for Sailors and command leadership. Designed for operational environments with minimum internet connectivity, the system uses passive, offline data synchronization to function with or without internet.

The CREW System effort has relied on commercially available wearable devices, with the latest iteration using smart rings to capture sleep and fatigue data. The next iteration will expand on that approach to include smartwatches, increasing the range and accuracy of biometric data collected in operational settings.

Future systems could also incorporate applied artificial intelligence to enhance data processing and analysis, helping translate biometric data into actionable insights.

"The project is looking to develop and implement a passive, offline system that collects the wearable device data to inform decision-making and support readiness," said Alice LaGoy, the CREW study execution lead. "It supports both leadership at the command level and individual Sailors by giving them access to their own data."

"We find that providing individuals with their data is a key piece in driving engagement and helping Sailors better understand their personal health and readiness," LaGoy added.

Sponsored by the Office of the Undersecretary of War for Research and Engineering (OUSW(R&E)), the DoW Lab Day event brought together organizations from all services, including multiple entities from across the Navy Research and Development Establishment (NR&DE). Participants included warfare centers, laboratories and research commands working to deliver advanced capabilities to the DoW.

During the event, Pentagon personnel and senior leaders engaged directly with CREW researchers, exploring how wearable technology could be integrated into broader readiness initiatives.

"It's been a great experience being here," LaGoy said. "We've had a lot of different viewpoints and good questions about future directions for the technology and where else this capability could fit."

NMR&D leadership, also in attendance, emphasized the importance of connecting research with operational needs.

"Pentagon Lab Day showcased how the DoW Science & Technology Ecosystem NR&DE is delivering cutting-edge innovations to the warfighter," said Jill Phan, NMR&D science director. "We're proud NHRC was selected to demonstrate CREW alongside MIT Lincoln Laboratory, giving leaders a hands-on look at how it can help assess operational readiness and support safer Navy operations."

"Pentagon Lab Day showcased how the DoW Science & Technology Ecosystem NR&DE is delivering cutting-edge innovations to the warfighter"

Researchers say the CREW System data infrastructure provides a secure means to transmit biometric data, enabling integration with shipboard systems and supporting future readiness analytics, including and beyond sleep and fatigue management.

DoW Lab Day showcases the latest technology explorations happening across the department's network of laboratories, warfare centers and engineering centers. The one-day pop-up exhibition in the Pentagon apexes allows leadership to tour the groundbreaking research being pursued by the department's scientists and engineers, and review the innovations being engineered for future battlefields.

LaGoy and CREW's MIT collaborators / Bernardo Fuller

NMR&D, a global collective of eight commands, conducts research in support of Navy, Marine Corps and joint U.S. warfighter health, readiness and lethality, across a broad spectrum of activity from basic science in the laboratory to field studies in austere and remote areas of the world to investigations in operational environments. NMR&D studies infectious diseases, biological warfare detection and defense, combat casualty care, environmental health concerns, directed energy health effects, aerospace and undersea medicine, medical modeling, simulation, operational mission support, epidemiology and behavioral sciences.

NHRC, part of NMR&D, supports Navy, Marine Corps and joint U.S. warfighter readiness and lethality with research and development that delivers high-value, high-impact solutions to the health challenges the U.S. military population faces on the battlefield, at-sea, home and abroad.■

Lt. Cmdr. Dawn Weir (right) receives her end of tour award from Capt. Nicholas Martin, commanding officer, NAMRU INDO PACIFIC / Abdullah Safuan

NMR&D Junior Officer of the Year Lt. Cmdr. Dawn Weir: Overseeing Military Health from Malaysia to Maryland

By Sidney Hinds

The Sailors of Navy Medicine Research & Development (NMR&D) seek solutions to safeguard service member health from every corner of the globe. Their efforts span eight commands, six continents and over a dozen partner nations.

Two years ago, Lt. Cmdr. Dawn Weir, a microbiologist with Naval Medical Research Unit (NAMRU) INDO PACIFIC, opened one of NMR&D's newest frontiers on behalf of warfighter readiness.

Weir established the command's Malaysia detachment at the U.S. Embassy in Kuala Lumpur in 2024, bridging the gap between military medicine and international diplomacy. In this role, she managed a research portfolio spanning Southeast Asia and Oceania, leading seven multinational teams to advance infectious disease surveillance and diagnostics.

Weir researches the many infectious diseases that can threaten the lives and readiness of U.S. service members at home and abroad.

"Through our research, we maintain vigilant surveillance of the health threat landscape throughout the INDO PACIFIC," said Weir, "including Malaysia. These efforts are closing critical force health protection gaps to mitigate threats to forward-deployed Forces."

In a key milestone of Weir's tenure, she secured two landmark cooperative research and development agreements, including a five-year partnership in Borneo with Universiti Malaysia Sabah.

Southeast Asia, specifically Malaysia, includes some of the highest risk regions for zoonotic spillover events, in which viruses, bacteria, parasites or fungus are transmitted from animal to human populations.

"By building these strategic and long-term partnerships, we obtain a greater understanding of infectious disease threats in a geographic area of the INDOPACOM area of responsibility (AOR), where significant knowledge gaps exist," Weir said. "The intended results will improve medical readiness and inform force health protection policy to service members in the AOR."

This work provides data intended to enhance Force Health Protection, warfighter medical readiness and force lethality, and advances global biosecurity.

"The most rewarding aspect of my tenure was the opportunity to forge genuine, enduring partnerships with our host nation colleagues"

"The most rewarding aspect of my tenure was the opportunity to forge genuine, enduring partnerships with our host nation colleagues," Weir explained. "By navigating complex diplomatic hurdles where previous efforts had stalled, we advanced INDOPACOM security cooperation and fortified a 'whole-of-government' strategy that positions the U.S. as the partner of choice in a contested region."

Weir was recently selected as the NMR&D junior officer of the year. Her work, both within the U.S. and abroad, is a testament to the opportunities available through the U.S. Navy and the many avenues for doing work on behalf of the nation.

With her tour in Malaysia concluded, Weir is looking ahead to lending her talents to the NMR&D mission stateside as part of Naval Medical Research Command in Silver Spring, Maryland.

"I am looking forward to returning home to my family," Weir said, "and settling back into life with my husband and our two cats."■

Weir receiving her Junior Officer of the Year award; also pictured are NMRC's Jill Phan, science director; Capt. Eric Welsh, commander and HMCM Christopher Cariss, command master chief / Aleece Williams

Darrin Frye, chief science director of NAMRU San Antonio, presented the command's research capabilities at a panel during the annual AIM Health R&D Summit / Burrell Parmer

NAMRU San Antonio Leadership, Research Scientists Participate in Annual AIM Health R&D Summit

By Burrell Parmer

Leadership and research scientists assigned to Naval Medical Research Unit (NAMRU) San Antonio, joined by members from the U.S. Army Institute of Surgical Research (USAISR) and U.S. Air Force 59th Medical Wing (MDW), participated in the annual Academia Industry Military (AIM) Health Research & Development (R&D) Summit, held at the Henry B. Gonzalez Convention Center on May 6.

Designed to promote cross-sector collaboration in the development of life-saving battlefield technologies, the one-day summit brought together top innovators from across academia, industry and the military in order to accelerate the research, development and commercialization of transformative medical technologies.

Opening ceremonies began with the presentation of the colors by the University of Texas at San Antonio (UTSA) Reserve Officers Training Corps Honor Guard, followed by opening remarks from Rene Dominguez, president and CEO of VelocityTX.

Remarks were received by the Honorable Gina Ortiz Jones, mayor of San Antonio followed by UTSA President Taylor Eighmy and William Briggs, deputy administrator of the U.S. Small Business Administration.

The morning keynote address was delivered by Paul Biddinger, chief preparedness continuity officer, Mass General Brigham Integrated Healthcare System on "Medicine, Preparedness and Resilience."

Five tracks exploring the frontiers of military and civilian medical innovation were featured:

- Translational Approaches in Regenerative Sciences and Modeling
- Enabling Long-Duration Mission Healthcare and Crew Survival
- Integrated Strategies for Peak Performance and Health
- Modernizing Medical Workforce Development
- Innovative Technologies in Low-Resource Settings

Darrin Frye, chief science director of NAMRU San Antonio, joined by fellow chief scientists Sylvain Cardin (USAISR) and Debra Niemeyer (59th MDW), participated in a Research & Development Mission and Capability of San Antonio -based Military Labs panel.

"AIM 2026 provided a fantastic opportunity to engage with military R&D and medical experts on research spanning from the seabed to space," said Frye. "The event was especially impactful this year due to its high-quality sessions and networking opportunities."

Following lunch, attendees listened to a talk from NASA Astronaut and retired U.S. Marine Corps Col. David Hilmers, a professor at Baylor College of Medicine, on "Lessons from Space, Leadership for Earth."

Towards the end of the summit, NAMRU San Antonio researchers participated in a poster session briefing military-relevant research projects.

Juan Curbelo (right) of NAMRU San Antonio won first place in the science poster session at the annual AIM Health R&D Summit / Burrell Parmer

"This event provided a vital, high-energy and collaborative workspace for our entire team to showcase their innovations and learn from industry and academic partners who share our mission of warfighter health readiness and lethality"

"It was a tremendous honor for our NAMRU San Antonio team to present their research at this year's AIM Summit," said Frye. "This event provided a vital, high-energy and collaborative workspace for our entire team to showcase their innovations and learn from industry and academic partners who share our mission of warfighter health, readiness and lethality."

Collaborating and working alongside a wide range of research and development partners keeps Navy Medicine Research & Development (NMR&D) abreast of best practices and advances in medical knowledge.

NAMRU San Antonio, part of NMR&D conducts gap-driven combat casualty care, craniofacial, and directed energy research in support of Navy, Marine Corps and joint U.S. warfighter health readiness and lethality while engaged in routine and expeditionary operations. abroad. ■

U.S. Ambassador Bernie Navarro poses with staff at NAMRU SOUTH / Kahoma Villaizan

U.S. Ambassador Visits NAMRU SOUTH

By Dr. Henju Marjuki

Bernie Navarro, U.S. Ambassador to Peru, visited the NAMRU SOUTH laboratory in Iquitos on May 20, reaffirming the longstanding partnership between the two nations in advancing infectious disease research and regional health security.

Navarro met with scientists and support personnel, and received briefings from local staff on current biosurveillance and infectious disease research efforts throughout the Amazon basin. The visit highlighted how NAMRU SOUTH monitors emerging and re-emerging infectious diseases in one of the most biodiverse and epidemiologically significant regions in the world.

"For more than 40 years, this command has maintained a continuous presence in the Peruvian Amazon," explained Lt. Cmdr. Jose Garcia, science director for NAMRU SOUTH, "working closely with local partners to strengthen public health preparedness, disease outbreak detection and biomedical research collaboration."

"Our strategic location in Iquitos enables rapid identification and characterization of pathogens that may pose risks not only to Peru, but also to the broader region and worldwide community," Garcia added.

NAMRU SOUTH operates under Chief of Mission authority through the U.S. Embassy in Peru and is co-located with the embassy in Lima. The command also employs locally employed staff through the embassy, integrating Peruvian nationals into the unit's day-to-day operation alongside U.S. personnel.

Navarro presented two local NAMRU SOUTH staff with "Extra Mile Awards," in recognition of their contributions to the command mission.

The awards underscored the role that Peruvian scientists, technicians and support personnel play in the success of NAMRU SOUTH's mission and strengthening the enduring partnership between the U.S. and Peru. ■

NAMRU Dayton's Lt. Cmdr. Travis Landry / Zachary Wilson

NAMRU Dayton Spotlight: Driving Warfighter Health

By Zachary Wilson

Most people are not fortunate enough to have an accident clearly dictate their purpose in life. For Lt. Cmdr. Travis Landry, senior medical officer at Naval Medical Research Unit (NAMRU) Dayton, this purpose was dictated to him after falling out of a helicopter.

At least in a technical sense. While serving as a 0331 Machine Gunner in the U.S. Marine Corps in 2001, Landry broke his ankle fast-roping from a helicopter during raining. It took four months for the injury to be properly diagnosed.

"At the time, I said, 'I can do a better job than that,'" he recalls.

That single moment catalyzed a determination to accomplish his goal. After four years in the infantry – "I graduated from the Marine Corps" as he likes to say – he transitioned to a new life as a civilian. Landry began working as an EMT while he was earning his undergraduate degree at the Metropolitan State University of Denver, followed by attending medical school at Rocky Vista University in his home state of Colorado. In 2012, he returned to the military, this time to the Navy, as an osteopathic medicine doctor, driven by his personal mission to provide the highest level of care for military service members.

Seeking a Unique Navy Experience in Dayton, Ohio

Before arriving at the Naval Aerospace Medical Research Laboratory (NAMRL) at NAMRU Dayton, Landry built an extensive operational resume. He served on cruisers, destroyers and amphibious transport docks, operating in highly regimented environments where the mission dictated the day.

When it came time for his next orders, Landry was looking for a new challenge. Knowing the Navy offered a unique brand of adventure, he took a different approach to his career progression.

“I said, 'What's the weirdest thing that I can do?' I looked, and there was a billet in Dayton, Ohio. I said, 'What does a Navy guy do in Dayton, Ohio?' I was up for the adventure.”

“What does a Navy guy do in Dayton, Ohio? I was up for the adventure”

The transition from shipboard medicine to a premier research facility was a culture shock at first. Instead of the strict hierarchy of the fleet, he found himself leading a dynamic blend of government employees, principal investigators (PIs), research assistants and civilian contractors. As the Department Head of Acceleration and Sensory Sciences, his daily environment shifted from executing structured operational tasks to constantly generating new ideas and pushing the boundaries of aerospace medical research.

A Dual Role: Clinical Care and Groundbreaking Research

Today, Landry’s day-to-day responsibilities at NAMRU Dayton are incredibly diverse. On the clinical side, he maintains his operational skills by conducting physicals and supporting recruiters heading back to the fleet. Notably, Landry provides essential medical care for a large, displaced population of Navy personnel in the Dayton area who are far from traditional Navy Military Treatment Facilities (MTFs), ensuring that these sailors maintain their readiness even while stationed away from the fleet. On the research side, he plays a critical role in human subject safety. Before any study begins, he evaluates participants to ensure they qualify, reviewing their medical histories and medications to guarantee that the research will cause no harm and that the data collected will be accurate. “When policy needs to change, we need data to drive that decision-making,” he explained. Whether researchers are determining the exact level of color vision required for a specific aviation role or finding ways to return injured warfighters to the front lines faster, his medical oversight ensures the science is safe and sound.

Data-Driven Policy for Aviator Resiliency

One of the efforts Landry is most excited about right now is a comprehensive aviator resiliency study. Sparked by recent public concerns regarding the long-term well-being of military pilots, the study aims to look at retrospective data to identify any significant health differences between aviators and ground crew, as well as variations across different aircraft platforms. The scope of the project is massive, branching beyond the Navy and Marine Corps to include Air Force and Army data.

“It feels like we're going to be able to get a good wrap on this question and determine what's going on,” Landry said.

By looking at all aspects of long-term wellness, the team at NAMRU Dayton hopes to identify specific areas for further research and develop tangible solutions to mitigate risks for aviators across the joint force.

The Ultimate Mission: Warfighter Support

When not overseeing clinical trials or treating patients, Landry can be found unwinding with a science fiction or fantasy novel, a break from the heavy technical reading his job requires. Whether he reading a novel, evaluating a research protocol or conducting operational screenings, Landry’s foundational experience in the Marine Corps infantry is never far from his mind. It informs his definition of what it means to "support the warfighter." “I want to make sure those who are commit to service have the ability to go home, play with their kids, and have a future,” he said. “As a caregiver and a physician, I want to bring all those people home and make sure they’re safe...knowing that we can mitigate risk as best we can and provide as much safety to our forward-deployed members.”■

OVERSEAS NAMRUS

STRENGTHEN GLOBAL INFECTIOUS DISEASE SURVEILLANCE ACROSS COCOM AORs

BY NMR&D PUBLIC AFFAIRS

An Aedes aegypti mosquito

U.S. service members undertake missions in every corner of the globe to protect the interests of the nation and its allies. A critical component of that presence abroad is the ability to ensure that our warfighters and those that support them remain healthy and resilient in the face of an ever-evolving landscape of health risks.

Operating under Navy Medicine Research & Development (NMR&D), Naval Medical Research Units (NAMRU) EURAFCENT, INDO PACIFIC and SOUTH form a worldwide network focused on early detection of infectious disease threats and rapid scientific response in regions where outbreaks are most likely to emerge. The missions of these commands strengthen global health security and warfighter readiness through forward-deployed surveillance, scientific collaboration, vaccine and therapeutic development and outbreak response operations across multiple overseas areas of responsibility (AORs).

"Navy Medicine's research units operate as a globally-distributed network of laboratories conducting infectious disease surveillance and applied research in close partnership with host nations and allied health systems," said Capt. Guillermo Pimentel, deputy commander, Naval Medical Research Command.

Each of NMR&D's overseas laboratories represent decades of sustained collaboration and are uniquely positioned to identify emerging disease threats at their source while translating field observations into operationally-relevant medical insight for the joint force.

Indo-Pacific AOR Partnerships Grow and Strengthen Regional Surveillance

NAMRU INDO PACIFIC, headquartered in Singapore, maintains a broad network of partner-nation laboratories and surveillance sites throughout Southeast Asia and Oceania. The command's research focuses on multiple diseases of operational relevance, such as dengue, malaria, influenza and other respiratory and gastrointestinal pathogens that pose a risk to force readiness.

"Navy Medicine's research units operate as a globally-distributed network of laboratories conducting infectious disease surveillance and applied research in close partnership with host nations and allied health systems"

Recent initiatives have expanded the command's scientific partnerships in Malaysia through collaboration with the University of Malaysia Sabah and the National Defence University of Malaysia, reinforcing regional infectious disease surveillance and research capacity. NAMRU INDO PACIFIC also recently established a detachment at the Australian Defence Force's Malaria and Infectious Disease Institute in Brisbane, executing critical projects alongside operational forces at the Marine Rotational Force – Darwin and Exercise Balikatan, 2026.

"These efforts deliver actionable, region-specific information to senior leaders at USINDOPACOM, PACFLT, and MARFORPAC, all aimed at reducing the impact of infectious diseases to the warfighter," said Capt. Nicholas Martin, commanding officer of NAMRU INDO PACIFIC

Martin emphasized that these partnerships remain critical to efforts in delivering and maintaining early warning capabilities to senior leaders and in supporting regional health security.

"We continue to build on decades of collaboration"

NAMRU SOUTH Continues Long-Standing Regional Mission

NAMRU SOUTH, headquartered in Lima, Peru, oversees a decades-long mission of infectious disease surveillance, applied research and scientific collaboration across eight countries in Central and South America.

Laboratories in Iquitos, Peru and Soto Cano Air Base, Honduras work in partnership with military allies, to detect emerging diseases including dengue, malaria, diarrheal diseases and antimicrobial-resistant infections, closer to where they originate and evaluate medical countermeasures in operationally relevant environments.

"We continue to build on decades of collaboration," said Capt. Hak Auth, commanding officer of NAMRU SOUTH, "serving not only as the U.S. Navy's largest overseas medical research lab but also as forward-deployed scientific ambassadors supporting regional and global health security."

Forward-deployed Surveillance by NAMRU EURAFCENT Supports Operational Readiness

NAMRU EURAFCENT supports operations across the EUCOM, CENTCOM and AFRICOM AORs, focusing on infectious disease threats in austere, deployed environments.

NMR&D Fact File

The command conducts surveillance and applied research on operationally relevant pathogens, ensuring early detection and mitigation of disease threats that can degrade mission effectiveness.

"Our work demonstrates the value of forward-deployed infectious disease surveillance in enabling early detection and response across multiple operational theaters," said Capt. Michael Prouty, commanding officer of NAMRU EUR-AFCENT.

Prouty said those capabilities directly support warfighter readiness in environments where rapid identification of biological threats remains essential to mission success.

Recent NMR&D efforts have expanded international collaboration through formal agreements and scientific exchanges designed to improve interoperability, surveillance coordination and operational medical research across multiple regions, including new partnership initiatives in the Middle East and Africa.

"Our work demonstrates the value of forward-deployed infectious disease surveillance in enabling early detection and response across multiple operational theaters"

Emerging Infectious Disease Threats : A Global Concern

Pimentel has emphasized how recent outbreaks continue to demonstrate the operational impact infectious disease threats can have on both military readiness and civilian populations worldwide. He pointed to major global health events over the past two decades, including respiratory disease pandemics and the 2014–2015 Ebola outbreak in West Africa, where he was forward deployed during the response effort.

"That experience reinforced the importance of sustained surveillance networks and rapid scientific adaptation," he said. "Our overseas laboratories help ensure the joint force and our partners are better prepared before emerging infectious disease threats turn into operational threats."

He added that ongoing Ebola surveillance and research in parts of Africa continues to demonstrate the importance of early detection, international partnerships and laboratory capabilities.

"Emerging infectious disease threats remain a persistent operational reality," he said. "These overseas laboratories ensure the joint force and our partners abroad are better prepared before outbreaks escalate into larger operational challenges."

Across all three overseas NMR&D commands, NAMRU scientists collaborate with host-nation researchers, international partners and academic institutions to produce peer-reviewed infectious disease research that informs both military medicine and global public health. These partnerships support a continuous pipeline of field surveillance-to-laboratory validation and scientific publication, helping translate operational findings into actionable medical knowledge that enhances force health protection worldwide.■

Military Tropical Medicine students working with NAMRU SOUTH collect Anopheles mosquito larvae from a stream in order to practice surveillance activities / Kahoma Villaizan

Staff Sgt. Jason Stokes, an instructor with the Animal Health Branch, Division of Veterinary Science, U.S. Army Medical Department Center and School, participates in a usability test of the Rugged Ozone Sterilization System Model M1 (ROSS M1) / Burrell Parmer

NAMRU SAN ANTONIO

CONDUCTS USABILITY TESTING OF

PORTABLE OZONE STERILIZER

STORY AND PHOTOS BY
BURRELL PARMER

During the month of April, research engineers assigned to the Combat Casualty Care & Operational Medicine Directorate, Naval Medical Research Unit (NAMRU) San Antonio, visited with dental and veterinary science instructors to test the usability of the Rugged Ozone Sterilization System (ROSS) Model M1. The ROSS M1 is a portable device with the capability of sterilizing medical instruments on the battlefield or in austere environments which will help in the treatment and recovery of wounded warfighters.

Created through a partnership with SteriO3, and funded through Naval Medical Research Command's Navy Advanced Medical Development program, the ROSS M1 will enable combat medics, corpsmen, dentists and surgical personnel to sterilize the instruments used for dentistry and surgery utilizing a process that would sanitize the medical instruments within an hour.

To maintain medical and military readiness, the ROSS M1 has been tested by NAMRU San Antonio's research engineers on its capability to effectively eliminate a broad spectrum of pathogens, including bacteria and fungi.

To further assess the ROSS M1 on its usability, research engineers visited with Soldiers and civilian personnel assigned to the U.S. Army Medical Center of Excellence (MEDCoE), April 2.

Staff Sgt. Guadalupe Vivar, Preventive Dentistry Specialty Course, was the first of several MEDCoE personnel to test the ROSS M1.

Andres Martinez Murillo (left) and Tarea Burton (right), explain the ROSS M1 / Burrell Parmer

"This type of portable sterilizer can be very useful in the field, especially in Role 1 or Role 2, it's fast and convenient when an autoclave is not readily accessible"

"This type of portable sterilizer can be very useful in the field, especially in Role 1 or Role 2," said Vivar. "It's fast and convenient when an autoclave is not readily accessible."

Role 1 is the initial, frontline medical support in military operations, providing immediate life-saving care, triage and stabilization near the point of injury.

A Role 2 medical facility provides advanced trauma management, damage control resuscitation and surgery closer to the battlefield than Role 1, bridging the gap between frontline medics and theater hospitals.

The ROSS M1 be used for the sterilization of medical instruments for veterinary purposes as well.

According to Staff Sgt. Jason Stokes, an instructor with the Animal Health Branch, Division of Veterinary Science, U.S. Army Medical Department Center and School, the ROSS M1 provides a way forward on what the Army is looking for regarding portable ruggedized equipment and the ability to operate at a higher level in a field environment.

"We are looking at prolonged field care, especially if there are large casualty rates," said Stokes, during NAMRU San Antonio's visit. "We will have to be able to maintain a patient for longer periods of time because we can't predict the frequency of medical evacuation air support. So, the ability to sterilize instruments and use them on patients reduces a lot of risk for infection, which makes their chances for receiving prolonged field care and survival much better."

"Currently, steam autoclaves are being used at a Role 2 and being that the portable ozone sterilizer can be powered from a Single Channel Ground and Airborne Radio System (SINCGARS) radio battery or through cables connected to a vehicle such as a M1195, the portable ozone sterilizer can almost be used in any environment if hydrogen peroxide is available," Stokes said.

"We are looking at prolonged field care, especially if there are large casualty rates"

Lastly, NAMRU San Antonio researchers visited with dental specialist instructors assigned to Echo Co., 264th Medical Training Battalion supporting the Medical Education and Training Campus (METC), April 16.

"The equipment is versatile and lightweight. Due to its small size, it is easier to transport than what we currently have which takes at least two Soldiers to carry and takes up a lot of space," explained Staff Sgt. Erisa Sablan, of Guam. "Having an alternate source of power such as a battery is very beneficial but it would be helpful to know how many sterilization cycles can be executed within one charge."

Staff Sgt. McKeitha Williams, of the 264th Medical Training Battalion, tests the ROSS M1 / Burrell Parmer

Staff Sgt. Erisa Sablan, of the 264th Medical Training Battalion, tests the ROSS M1 / Burrell Parmer

Additionally, Staff Sgt. McKeitha Williams, another dental specialist instructor with Echo Co., thinks having an alternate power source for a portable ozone sterilizer is usable and durable for dental specialists in the field.

"Having two sources of power is a benefit, as our current equipment only uses A/C power," said Williams. "It would be great to be able to sterilize instruments while transiting the battlefield and still carry on with the mission."

After each test, the subjects completed a feedback form, which will be used by NAMRU San Antonio research engineers to improve the ROSS M1.

"We conducted usability testing with these three organizations in order to get a better understanding of what changes need to be made to the ozone sterilizer in order for it to be the best version when ready for deployment," said Andres Martinez Murillo, lead biomedical engineer with NAMRU San Antonio. "We wanted their opinions and thoughts on what was good or bad about the device and any ideas that they had to make it better."

"We are fortunate to have organizations such as MEDCoE, METC, and the Animal Health Branch here at Joint Base San Antonio because their instructors are the experts"

According to Martinez Murillo, it is important to conduct this type of testing because medics, corpsmen and dental specialists are the types of service members who will be using the device in forward-deployed environments. His team wants to know of any issues with the ROSS M1 before it is ready for distribution.

"Once we process all the information provided to us, we will give our recommendations to SteriO3 for modifying the sterilizer for further development as they get ready for the manufacturing of the prototype," Martinez Murillo said. "We are fortunate to have organizations such as MEDCoE, METC and the Animal Health Branch here at Joint Base San Antonio because their instructors are the experts."

The next steps in the research process of the ROSS M1 are Food and Drug Administration studies that SteriO3 will be performing and NAMRU San Antonio's further testing of the ozone sterilizer's capabilities to sterilize 3D-printed tools and single-use disposables for prolonged field care scenarios in the future.

Navy Medicine Research & Development (NMR&D) employs highly qualified medical researchers and works alongside a wide range of research and development partners to keep abreast of best practices and advances in medical knowledge on behalf of Navy Medicine to increase warfighter lethality.

NAMRU San Antonio, part of NMR&D, conducts gap-driven combat casualty care, craniofacial and directed energy research in support of Navy, Marine Corps and joint U.S. warfighter health readiness and lethality while engaged in routine and expeditionary operations level in a field environment. ■

Kinney continued from page 4

NAMRU EURAFCENT, part of Navy Medicine Research & Development, supports military exercises to ensure research efforts remain aligned with operational requirements. The command has also enhanced research delivery during Kinney's tenure through its laboratory at Camp Lemonnier, supporting disease surveillance and increased force health protection through important studies, such as an enhanced treatment for traveler's diarrhea.

"We have to continually evaluate how to employ new technology that can operate in challenging and resource-constrained environments," Kinney said. "That is essential to conducting disease surveillance and research where our forces operate."

He also underscored the importance of maintaining scientific rigor and staying ahead of emerging infectious disease threats.

"We are a learning organization," he explained. "We must constantly understand what is new and what has not yet been explored, as well as stay current on the most up-to-date information before someone else gets there first. We work closely with Navy Medicine Readiness Training Command Sigonella and colleagues across Naval Medical Forces Atlantic and Pacific as one team in Navy Medicine. At the end of the day, we work together to support the fleet and the joint force."

"I'm proud of our team," he added. "There's strong cohesion and partnership within the command. People feel heard, and we strive for transparency as decisions are made."

Kinney maintains an open-door policy and emphasizes transparency and accountability in decision-making processes. He encourages input from Sailors, officers and civilian personnel, reinforcing that mission success depends on every member of the team.

For Kinney, the challenges overcome and milestones achieved reinforce a simple truth: "Everyone has ownership in the mission," he said. "Whether collecting field samples or working in administration, every role contributes to protecting the force. I hope people take pride in what we are doing — we are protecting the health and furthering the readiness of the force together."

"When you accomplish something," he added, "the struggle is worth it."■

Five Eyes continued from page 5

Florian is also a liaison between the HUM JP2 and the U.S. Naval Maritime community, identifying opportunities for collaborations within JP2 focus areas, providing leadership and oversight for panel missions, and representing JP2 at HUM executive meetings.

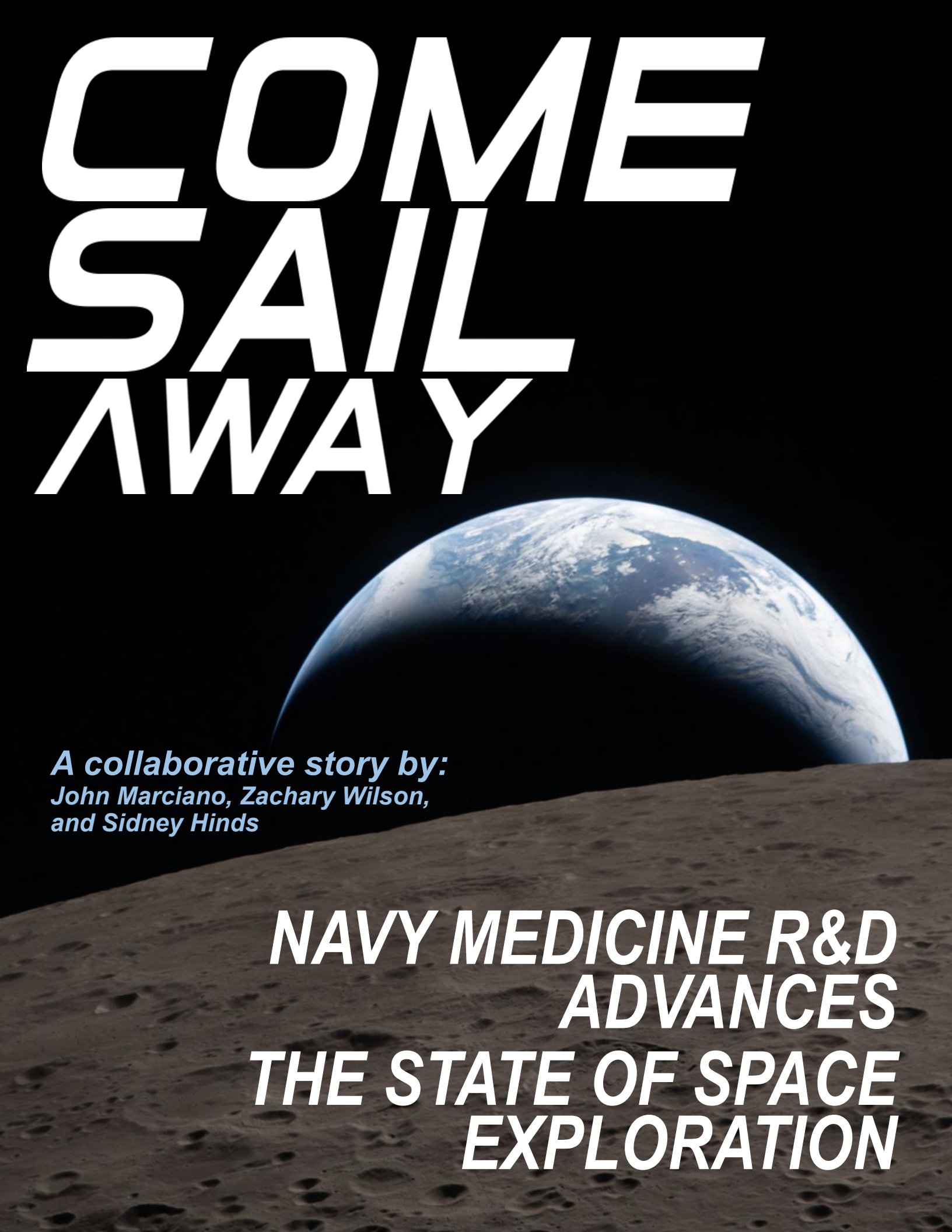
In September 2025, the FVEY S&T principal members met to review the program and determine the recipients of the 2025 FVEY S&T Awards. JP2, under Florian's leadership, received the Team Achievement Award for their outstanding collaboration with the FVEY S&T Maritime Group and their contributions to the development and experimentation of 3D anti-submarine warfare (ASW) visualization tools.

"This award affirms JP2's dedicated efforts to enhance warfighter readiness and lethality in the maritime domain," said Florian. "We remain committed to pushing the boundaries of innovation to support a lasting asymmetric advantage for the U.S. and our FVEY partners."

Within HUM, JP2 members collaborate on issues related to maritime human systems integration, training and human performance at sea. Additional focus areas include control space decision support, human autonomy integration, simulation-based training, submarine and surface operations and endurance and deep diving. Technical and joint panels within HUM are expected to establish and monitor major collaborative projects in priority areas of defined mutual national interest.

"Dr. Florian's leadership within FVEY S&T is directly enabled by the strong relationships he and NSMRL have built with the scientific and operational undersea communities," explained Olson. "These relationships are critical to understanding the operational challenges and priorities of the undersea warfighter." ■

COME SAIL AWAY



A collaborative story by:
John Marciano, Zachary Wilson, and Sidney Hinds

NAVY MEDICINE R&D ADVANCES THE STATE OF SPACE EXPLORATION

On April 1, four astronauts soared into space aboard the Orion spacecraft, on a NASA-led flight to bring humans closer to a return to the Moon's surface. This mission, the Artemis II, a flyby of the Moon, was the first crewed flight to travel beyond low-earth orbit since 1972.

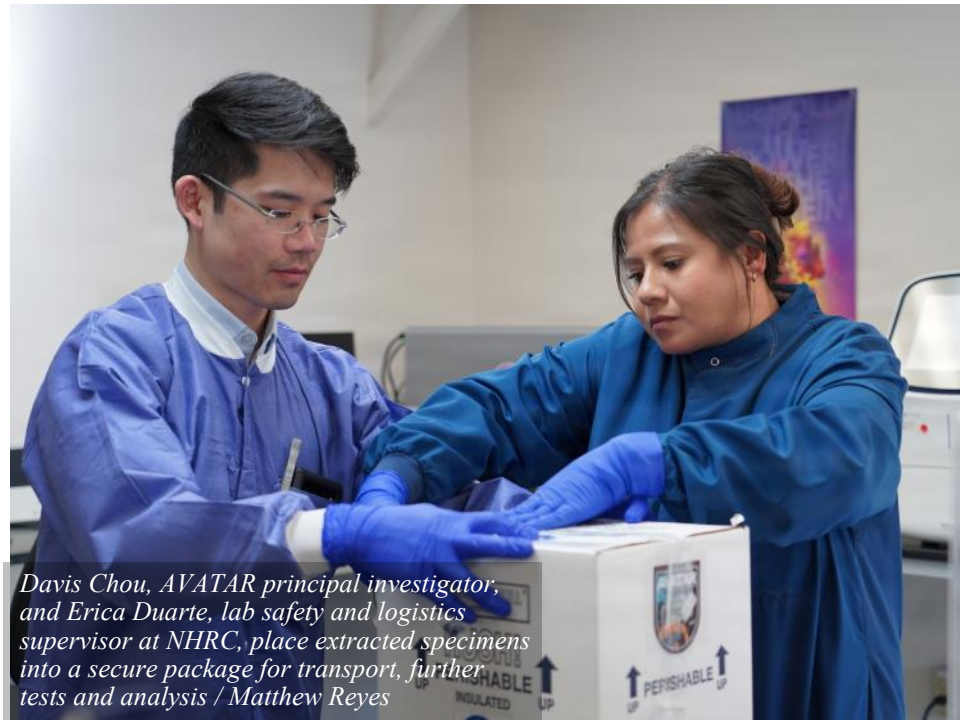
Astronaut health ranks at the forefront of the practical and engineering concerns facing such space endeavors. For astronauts traveling to the Moon, the body must transition between Earth gravity, microgravity during transit, the Moon's partial gravity and even deep space radiation, conditions that can create sensory conflicts affecting balance and spatial orientation.

U.S. Navy researchers with Naval Health Research Center (NHRC) and Naval Medical Research Unit (NAMRU) Dayton are working alongside NASA and other partner organizations to further these efforts to put boots back on the moon.

Examining Astronaut Health

Following the splashdown and recovery of the Orion spacecraft on April 10, a team of NASA, Harvard and Space Tango scientists met the craft's naval recovery vessel, the amphibious transport dock ship USS John P. Murtha (LPD 26), to secure the Orion payload and bring it to NHRC labs to begin analysis of the A Virtual Astronaut Tissue Analog Response (AVATAR) investigation.

AVATAR uses organ-chip technology to study bone marrow during the journey around the Moon,



Davis Chou, AVATAR principal investigator, and Erica Duarte, lab safety and logistics supervisor at NHRC, place extracted specimens into a secure package for transport, further tests and analysis / Matthew Reyes

which will help NASA understand the effects of deep space radiation and microgravity on human health in space and on Earth.

"From early planning through on-the-ground execution, the team's expertise and laboratory support ensured a seamless operation. NHRC continues to be an invaluable partner to NASA"

These organ-chips, made using cells taken from the astronauts, are self-contained systems housing living human cells to mimic the function of human organs.

NHRC's involvement leverages its capabilities in operational health personnel, its lab facilities and its strategic location. Command staff worked closely with NASA and the Space Tango team to ensure all equipment and lab facilities were ready before Artemis II splashdown. Timing was critical, from retrieving the Orion spacecraft payload to extracting and analyzing the avatar cells.

Jason Rexroat, with Space Tango, transports the organ chips to NHRC's operational laboratory / Danielle Cazarez

USS John P. Murtha (LPD 26) returns to port after recovering NASA's Artemis II crew and the Orion spacecraft / Matthew Reyes

"Our collaboration with NHRC exceeded expectations," said Lisa Carnell, director of NASA's Biological and Physical Sciences Division. "From early planning through on-the-ground execution, the team's expertise and laboratory support ensured a seamless operation. NHRC continues to be an invaluable partner to NASA."

"Understanding the body's response to extreme environments like space can inform how to protect U.S. service members in unique and demanding operational settings on Earth"

This research, part of NASA's "know before we go" [farther into space] strategy, aims to protect astronaut health on long-duration missions to the Moon and Mars, personalize medical treatments for astronauts and improve health protection on Earth.

"The analysis of the AVATAR experiment aligns directly with our core capabilities," remarked Capt. Kellie L. McMullen, NHRC commanding officer, "as understanding the body's response to extreme environments like space can inform how to protect U.S. service members in unique and demanding operational settings on Earth."

Looking ahead to Moon Landing

While researchers in San Diego review the results of the Artemis mission, NAMRU Dayton is looking ahead at preparing astronauts' return to the Moon.

Working alongside Air Force Research Laboratory's 711th Human Performance Wing (HPW), Johns Hopkins University School of Medicine and NASA's Human Research Program, NAMRU Dayton researchers are examining motion sickness and how the human body adapts to acceleration and changing gravity environments.

The study, StableEyes with Active Neurophysiology Monitoring (SWAN), has been underway for several years and requires volunteers who have both a current aviation medical clearance and Tricare health insurance coverage, due to the challenging nature of the motion profile.

Research participants experienced controlled acceleration profiles in the 711th HPW's centrifuge, simulating spaceflight deconditioning effects on key balance and coordination systems. After the centrifuge, and while experiencing this temporary deconditioning effect, volunteers performed a series of tasks, including capturing measurements associated with motion sickness while wearing goggles that track head and eye movements.

"Having an aeromedical clearance notice from a competent flight medicine examiner ensures candidates have 'the right stuff,'" said Rich Folga, NAMRU Dayton's project manager for the SWAN study. "Our mandate for greater than minimal risk studies is that our subjects also need to have Tricare health insurance coverage. Additional subject screening is done to ensure the candidate is a good match for target study population based on their self-reported sensitivity to provocative motion stimulus."

A human-rated centrifuge at Wright-Patterson Air Force Base, Ohio, June 20, 2025. Five astronauts from NASA, the European Space Agency and the Canadian Space Agency completed centrifuge training, which simulates gravitational forces, or g-forces, experienced during launch and return to Earth. The Air Force Research Laboratory's 711th Human Performance Wing owns and operates the centrifuge. / Richard Eldridge

"Naval medical researchers at the lab contributed to astronaut training and physiological research during the Mercury, Gemini and Apollo programs"

A Legacy of Space Support

These projects are part of larger efforts to ensure that astronauts remain safe and effective during future lunar missions under NASA's Artemis program.

"Dayton has been at the center of aerospace medicine for decades, and aerospace in general since the invention of the aircraft," said Dr. Richard Arnold, director of NAMRU Dayton's Naval Aerospace Medical Research Laboratory (NAMRL). "Naval medical researchers at the lab contributed to astronaut training and physiological research during the Mercury, Gemini and Apollo programs."

In 2023, Lt. Anca Selariu, then with NAMRU INDO PACIFIC, took part in NASA's inaugural Crew Health and Performance Exploration Analog (CHAPEA) mission from June to July of 2024. The four-person CHAPEA crew took part in a simulated expedition to the surface of Mars, to collect critical data for future human expeditions to space.

"To contribute to the ultimate stage of discovery for humankind as a result of all of these accumulated experiences is just extraordinary," Selariu said. "I hope this mission will be the stepping stone for the first humans on Mars someday." ■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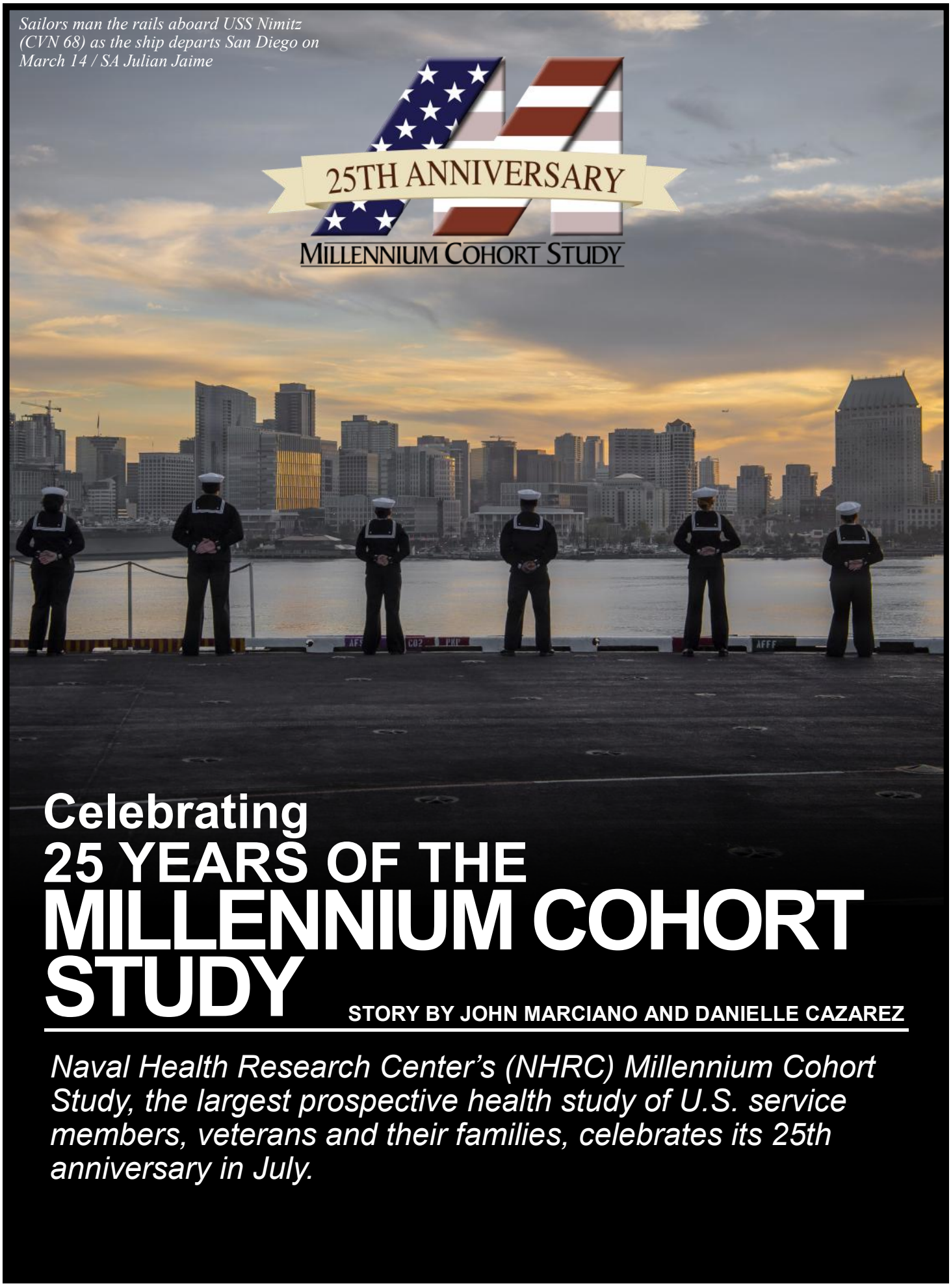


Sailors man the rails aboard USS Nimitz (CVN 68) as the ship departs San Diego on March 14 / SA Julian Jaime

Celebrating 25 YEARS OF THE MILLENNIUM COHORT STUDY

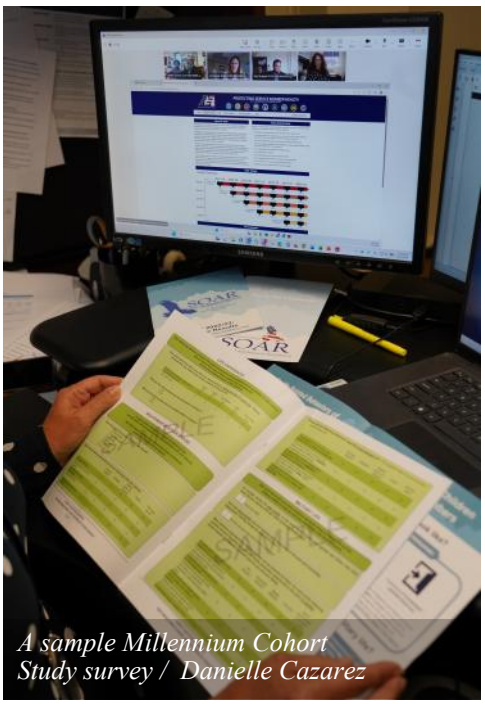
STORY BY JOHN MARCIANO AND DANIELLE CAZAREZ

Naval Health Research Center's (NHRC) Millennium Cohort Study, the largest prospective health study of U.S. service members, veterans and their families, celebrates its 25th anniversary in July.


U.S. NAVY
MARINES
U.S. SPACE FORCE
THOMPSON
BAXTER

The largest cohort study in U.S. military history, the Millennium Cohort Study has documented the long-term physical and mental health of more than a quarter of a million U.S. service members and veterans, providing robust, long-term data on the health effects of military service.

The study, started in 2001, has guided evidence-based policy and clinical practice guidelines across the U.S. Military and the Department of Veterans Affairs (VA). The study's longitudinal data, collected through recurring surveys and linked to comprehensive administrative records, has informed policy on the long-term health effects of deployment and service. Findings have informed current clinical practice guidelines in areas such as management of chronic multi-symptom illness, insomnia and obstructive sleep apnea and have contributed to the guideline development for post-traumatic stress disorder and major depressive disorder.



A sample Millennium Cohort Study survey / Danielle Cazarez

"The Millennium Cohort Study is an irreplaceable resource for our nation's military and veterans' health systems," said Rudy Rull, the study's principal investigator. "Its 25-year legacy offers an in-depth look at the health journey of our service members and veterans, and there is still much more to discover about the long-term effects of their service."

"For over two decades, the Millennium Cohort Study has been our steadfast commitment to understanding the long-term health of our nation's armed forces and veterans"

The 1999 National Defense Authorization Act (NDAA), Section 743, mandated "a longitudinal study to evaluate data on the health conditions of members of the armed forces upon their return from deployment." The Millennium Cohort Study has addressed this mandate by surveying over 260,000 participants every 3-5 years. Researchers are currently finalizing the study's seventh data collection cycle, while planning the next enrollment of new service member participants.

"The success of the Millennium Cohort Study rests on the commitment of its active duty, reserve and guard participants across all branches," said Sheila Castañeda, the study's deputy principal investigator. "The dedication of our participants has been vital to understanding the health challenges of military life, from the stresses of deployment and integrating back to civilian life."

As the study enters its next quarter century, researchers are looking forward to focusing on emerging areas of operational importance, such as brain health and cognitive function, long-term physical health (such as cancer and cardiovascular disease) and environmental and occupational exposures.

"For over two decades, the Millennium Cohort Study has been our steadfast commitment to understanding the long-term health of our nation's armed forces and veterans," said Rear Adm. Rick Freedman, Acting U.S. Navy Surgeon General. "This research is a testament to our promise to care for those who serve, providing invaluable insights to their health needs while honoring our commitment to the lifelong well-being of our service members and their families."

The Millennium Cohort Study is expected to continue to enroll and follow up with participants through 2068. For more information, please visit: www.millenniumcohort.org.

NHRC, part of Navy Medicine Research & Development, supports Navy, Marine Corps and joint U.S. warfighter health readiness and lethality with research and development that delivers high-value, high-impact solutions to the health and readiness challenges the U.S. military population faces on the battlefield, at-sea, at-home and abroad.■

Millennium Cohort Study Overview

Photo by Seaman Recruit Chase McDaniel

The Millennium Cohort Study is a long-term research project mandated by Congress and sponsored by the Department of Defense to examine how military service impacts the health and well-being of service members and veterans.

Established in 2001

The study was originally planned to last 21 years, following service members through their military careers until 2022. Because physical and mental health conditions related to service can appear at any time during or after service, the study was extended through 2068 to track the long-term effects of military service over a lifetime.

Impact that Matters

Findings from this study help shape policies and programs that directly impact service members and veterans. From improving health care and support services to strengthening military readiness, the experiences shared by study participants play a key role in making a difference.

A Trusted Commitment

With more than a quarter of a million service members enrolled since 2001, the Millennium Cohort Study is the largest and longest-running DoD research effort focused on the strength, health, and well-being of those who serve.

By the Numbers

260,000+
Participants
From all U.S service branches and components.

25+
Years of Data
A 25-year commitment to understanding long-term health.

180+
Publications
On a wide range of topics in military and veteran health.

Your participation. Their future.

The dedication of our participants makes this work possible. Together, we are building knowledge that leads to better care, stronger policies, and healthier futures for generations to come.

Photo by Chief Petty Officer Mike DiMestico

Key Policies and Programs

Informed by Millennium Cohort Study Findings

Federal Policies

- Congressional hearings and reports related to veteran transition, military sexual trauma (MST), veteran suicide prevention, presumptive disability and toxic exposure, burn pits and toxic exposure, combat deployment, and alcohol use.
- Department of Veterans Affairs ruling "Presumptive Service Connection for Respiratory Conditions Due to Exposure to Particulate Matter."
- Establishment of the VA Airborne Hazards and Open Burn Pit Registry.
- 2020 National Defense Authorization Act (NDAA), Sec 748 Reports to Congress on Women in the Armed Forces from the Millennium Cohort Study.

VA/DoD Clinical Practice Guidelines

- Updated guidelines for asthma, hypertension, headache, PTSD and acute stress disorder, depression, chronic multisymptom illness, substance use disorder, suicidality, obesity, chronic insomnia disorder, obstructive sleep apnea, and tobacco use.

Reports and Recommendations

- Government Accountability Office reports related to MST, substance use disorder, veteran transition assistance, post-deployment support, suicide, burnpits, respiratory health, toxic exposures, and health outcomes.
- Tobacco cessation and prevention recommendations from the U.S. Surgeon General.
- National Academies of Science / Institute of Medicine reports on airborne hazards and open burn pit registry, respiratory hazards due to exposure to particulate matter, PTSD, substance use disorders, and post-deployment well-being.

Why does it matter?

One of the goals of the Millennium Cohort Study is to conduct research that improves the lives of service members and veterans through informing policies.

What are policy impacts?

The contribution research makes to real-world improvements (shaping behaviors, policies, services, and public understanding). This includes changes to military and veteran policy, programs, services, or clinical guidelines that are directly linked to our research.

What Do Participants Say About the Study?

We surveyed over 25,000 participants from the Millennium Cohort Study and asked about their experiences in the study. Here's what just a few said...

> I am very proud to be part of this survey since the beginning, and I hope that the effort you have put in will be beneficial for future veterans.

> I consider this study to be a very valuable tool to assist current and future service members and veterans, I am honored and happy to participate.

> I think the survey is a good source of information to helpful health officials to see how the effects of combat effect people and find ways to resolve the issue.

> Thank you for providing this service I feel it is making a difference and will continue to make a difference in the future.

> Stressing to others the importance of this research and more like it so we can better understand what our military goes through over the years.

> I love the idea of [being] helpful in the future with my participation.

> I believe that these studies are helpful and will help service members in the long run.

Graphics provided by the Millennium Cohort Study

The Long Watch

By Tommy Lamkin & Sidney Hinds

As part of our celebration of the Millennium Cohort Study's 25th anniversary in this special issue, the SCOPE spoke with the Millennium Cohort Study's Dr. Rudy Rull, principal investigator; Dr. Sheila Castañeda, deputy principal investigator; and Dr. Hope McMaster, principal investigator for the Family Study and Study of Adolescent Resilience, to discuss its impacts and future.

Aleece Williams

This interview has been edited for brevity and clarity.

Tommy Lamkin: Thanks for sitting down with us today. Let's start with the basics. What exactly is the Millennium Cohort Study, and what was the catalyst for its creation?

Dr. Rudolph Rull: The catalyst for MilCo was a growing awareness of health concerns that arose in the aftermath of the Vietnam War—particularly with Agent Orange exposures—and later the Gulf War in the early 1990s.

After Desert Storm, there was a lot of concern around exposures to things like chemical warfare agents and the oil well fires, and that led to an understanding at the highest levels of government that we needed a long-term study to follow service members and veterans over time, as opposed to just taking a snapshot of their health at one specific point in time.

Eventually, in 1999, the National Defense Authorization Act (NDAA) officially mandated a study of post-deployment health, which became the Millennium Cohort Study, and we enrolled our first participants in 2001. The NDAA also mandated designating certain DoD labs as Deployment Health Research Centers, including the Naval Health Research Center in San Diego, where the Millennium Cohort Study would be developed, launched and maintained.

TL: It's funny, when I took this job in public affairs, I had no idea the Navy did this sort of research. I was a surface Navy guy, a total dummy when it came to the medical research world. But even so, I had definitely heard of the Millennium Cohort.

Laughter

Dr. Hope McMaster: We've worked hard to make sure the fleet and our stakeholders know about us. We're really the go-to for answering these kinds of complex, long-term health questions.

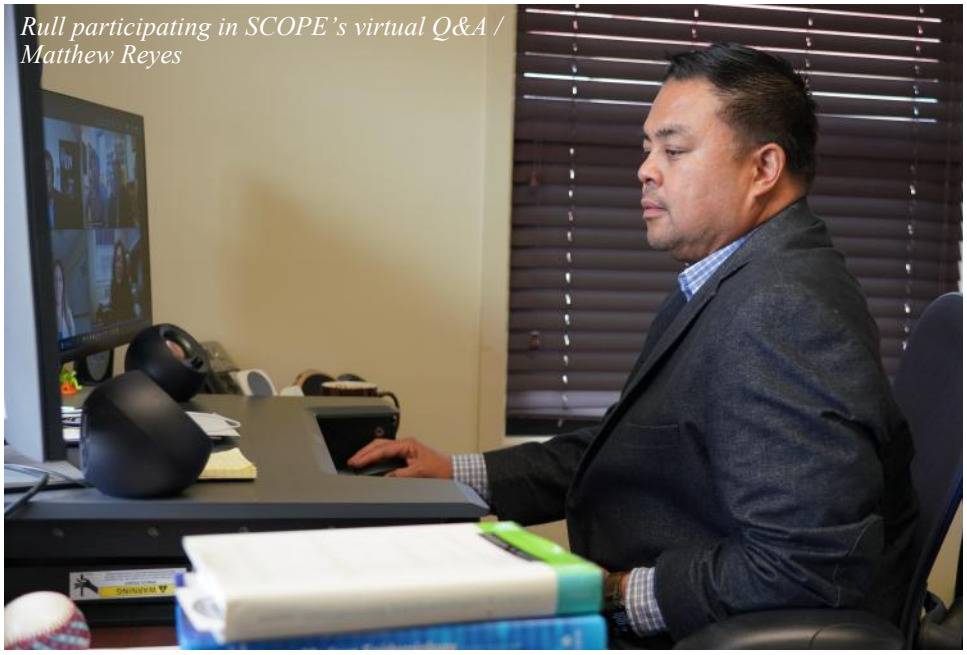
When I first came to work at NHRC after a PCS move 16 years ago, Millennium Cohort was primarily focused on journal publications for knowledge transmission. Since then, we've vastly expanded our capabilities and knowledge products to address the specific needs of our stakeholders in the Departments of War and Veteran Affairs (VA).

TL: I want to get into the mechanics of this, because tracking thousands of people over decades sounds like a logistical mountain. How exactly does the study work?

RR: It's a pretty involved process. When service members first enroll and provide their informed consent to participate, they take a comprehensive baseline survey about their health, military experiences, exposures and health behaviors. Then, approximately every three years, we send them a follow-up survey to collect updated information. A crucial part of this design is that we follow these service members through their entire military career and into post-service civilian life. We make sure we stay in contact so we're able to locate them even after they've left the service.

The Millennium Cohort Study was originally planned for 21 years, but in 2013 the DoD recognized its immense value and extended it to continue follow-up through 2068.

To make the survey data even more robust, we link it with data from various other military and VA databases—deployment rosters, healthcare data and mortality data. This lets us build a comprehensive, objective picture of service member health over time.



Rull participating in SCOPE's virtual Q&A / Matthew Reyes

TL: Are you still actively enrolling new people?

RR: We are. Right now, we operate on a cadence of enrolling new panels of participants about every six years; we're looking to have our next enrollment of service members in 2028.

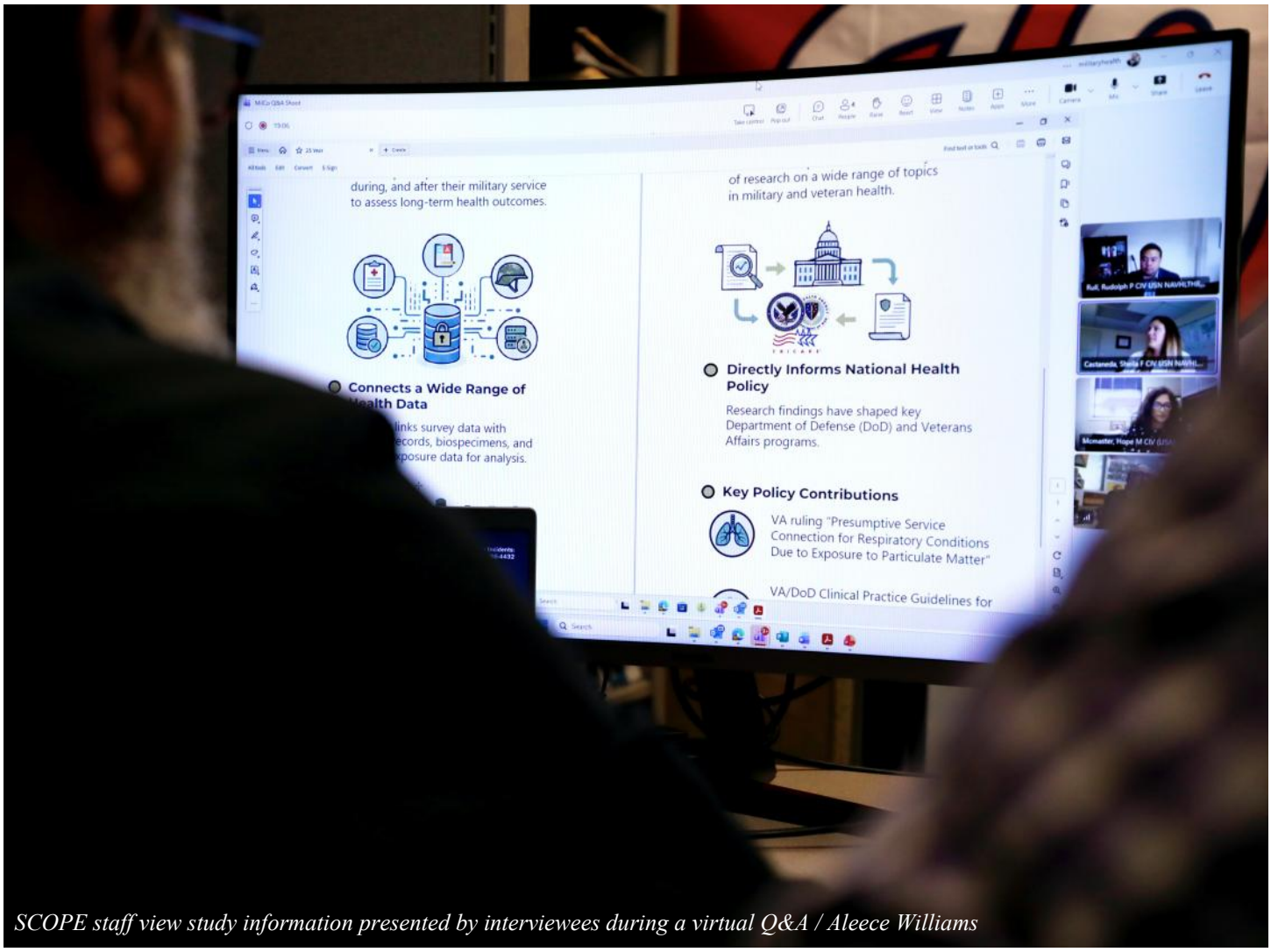
The first panel in 2001 was a broad cross-section of all service members at various stages in their careers. What we've done since is really focus on enrolling those with one to five years of service. The thought was to recruit those who are more likely to deploy and recruit them as early in their careers as possible. The average age for the entire cohort today is in the mid-40s, but that first panel enrolled in 2001 is now in their 50s and 60s.

TL: The timing of that first enrollment, in the summer of 2001, seems incredibly significant in hindsight.

RR: Yes, it was serendipitous. Just two months after launching our first enrollment, 9/11 happened. This positioned the study perfectly to track the long-term health effects of the new wave of deployments to Iraq and Afghanistan.

Because of that, the cohort was set up to start tracking the health of service members exposed to modern battlefield hazards, like burn pits. Our research was among the very first to systematically report on the increased respiratory symptoms and adverse health outcomes following these deployments.

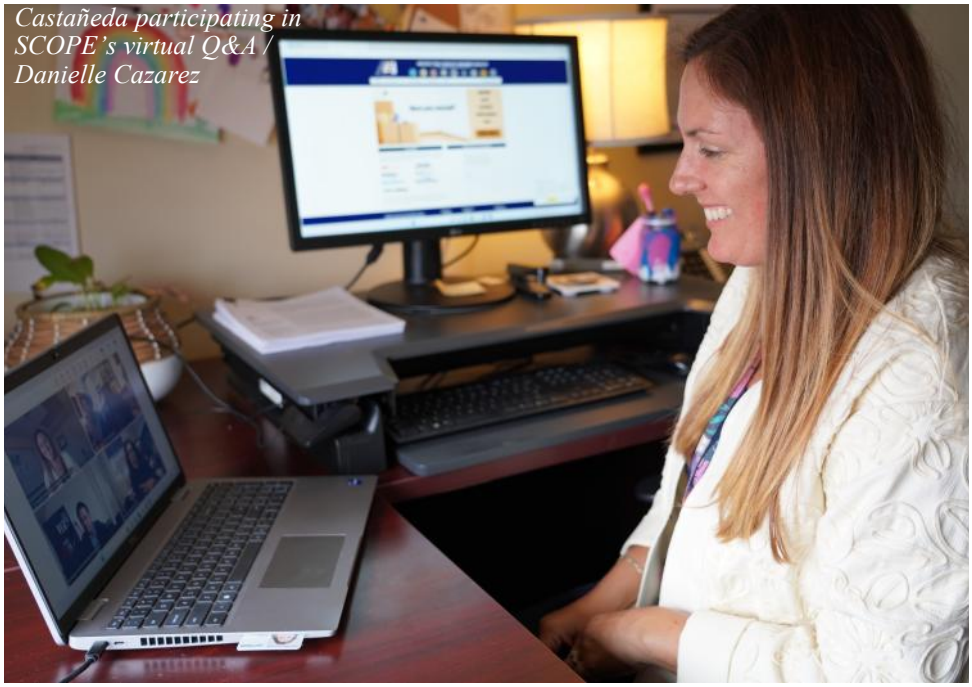
Dr. Sheila Castañeda: Our work on respiratory health and burn pits is probably one of our largest areas of impact. We've influenced the establishment of the VA's Airborne Hazards and Open Burn Pit Registry and, more recently, presumptive service connections for respiratory conditions and particulate matter exposure. Our findings are cited in reports by the Government Accountability Office and the National Academies of Science, Engineering, and Medicine.



SCOPE staff view study information presented by interviewees during a virtual Q&A / Aleece Williams

Sidney Hinds: So the study evolves based on what you find and what's happening in the world?

RR: It's a combination of both. The core elements of the survey are military experiences, including deployments, health behaviors and health outcomes. But we also add and remove items over time as priorities change. For example, in recent surveys, we've asked more about topics like traumatic brain injury, blast exposures and suicide.


Castañeda participating in SCOPE's virtual Q&A / Danielle Cazarez

We are also responsive to our sponsors and stakeholders. We get inquiries about specific concerns such as sexual trauma experiences or exposures among firefighters to the forever chemicals (e.g., PFAS) in aqueous film-forming foam (AFFF), and these requests may come from as high as Health Affairs or Congress. We're able to look at a wide range of topics due to our longitudinal design, survey data collection platform and linkages with databases. We don't have to reinvent the wheel and can readily address questions from military leadership as they emerge.

SC: Just to illustrate what Dr. Rull mentioned, the 2020 NDAA had a specific section that required reports to Congress on women in the armed forces, and it specifically directed the Millennium Cohort Study to provide those reports.

HM: And along those same lines, Congress requested a study on the impact of depression and post-traumatic stress disorder on family members under the Support the Resiliency of Our Nation's Great (STRONG) Veterans Act. We used results from the Millennium Cohort Family Study and the Study of Adolescent Resilience to write the report answering this call.

TL: The study has also grown beyond the uniform to include military families. How did that evolution come about?

HM: The Millennium Cohort Family Study was a logical extension of the work we were already doing. As the operational tempo increased in the early 2000s, there was a need to better understand how that increase was impacting military families. U.S. military leadership saw an opportunity to fund a study that could leverage the existing infrastructure of the Millennium Cohort. It was an efficient way to benefit from the relationships and the trust that our team had already established.


McMaster participating in SCOPE's virtual Q&A / Danielle Cazarez

TL: So this is a different population, but it's directly connected to the main study?

HM: Exactly. The Family Study recruits the spouses of the service members engaged in the Millennium Cohort Study. The experience of military life for the service member and spouse have couple-level crossover effects. It's an important dynamic to understand. Since 2011, we've enrolled over 28,000 spouses across two panels. We survey our service members and spouses in coordinated, repeating cycles and we also enroll new panels of participants at the same time. Our methodology is very similar.

In 2022, we launched the Study of Adolescent Resilience, or SOAR. We started with service members enrolled in the Millennium Cohort Study who had children aged 11 to 17. The service members filled out the SOAR parent survey, provided contact information for their adolescent child and possibly a co-parent, and then we asked the adolescent child and the co-parent to complete surveys as well. This gives us "triadic" data—three different perspectives within the same family.

We continue to survey adolescents until they are around 25 years old - Into emerging adulthood. This allows us to better understand how the service member's military experiences impact the well-being of the adolescent as they move through various developmental stages, and how adolescents impact the service member. It's all connected.

TL: With twenty-five years of continuous work, multiple generations of participants and all these interconnected family studies, how would you sum up the Millennium Cohort Program today?

RR: It's a comprehensive look into the lives of service members and their families throughout their careers and beyond. They all have experiences to share, and by collecting them, we can provide leadership with insights for improving the wellbeing of former, current and future service members and their families.

Sidney Hinds and Tommy Lamkin, SCOPE staff, learn about the MILCO study during a virtual Q&A / Aleece Williams

HM: It's a national treasure. It's a historical record of military life, and it is an honor to be its steward. Surviving for twenty-five years is no small feat, and it just goes to show the quality and importance of the work we're doing.

TL: What is the team that manages all off these projects like? It sounds massive.

RR: It's a very big group. We are staffed both for research, as well as study and survey operations. We have an IT infrastructure for collecting and managing the data, coordinators who develop our rollout plans and data managers who get the data ready for research. On the research teams, we have a staff of epidemiologists, psychologists, biostatisticians and data analysts who really get into the data, conduct analyses, interpret results and disseminate the findings. From the front end to the back end, we rely on an incredibly talented and dedicated staff.

HM: They're true public servants. They care deeply about what they're doing. They're not looking for the paycheck; they're looking to do meaningful work with their lives, and it shows.

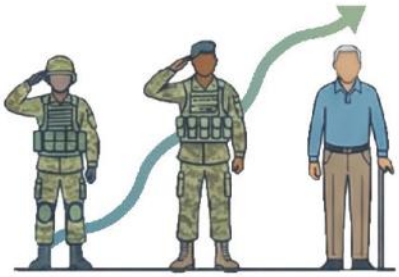
TL: Dr. Rull, Dr. Castañeda, Dr. McMaster—thank you so much for taking the time to talk with us and teach us about the Millennium Cohort study.

The Millennium Cohort Study:

A 25-Year Mission to Improve Military & Veteran Health

25TH ANNIVERSARY
MILLENNIUM COHORT STUDY

WHAT MAKES THE STUDY UNIQUE?



Tracks Health Over a Lifetime

Follows participants at the start of, during, and after their military service to assess long-term health outcomes.

Connects a Wide Range of Health Data

Securely links survey data with medical records, biospecimens, and military exposure data for analysis.

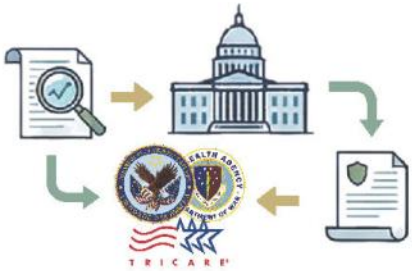
Comprehensive Sample

Includes all military branches, all components, and veterans.

25 YEARS OF HIGH-IMPACT SCIENCE

Scientific Publications

The team has produced a vast body of research on a wide range of topics in military and veteran health.



Directly Informs National Health Policy

Research findings have shaped key Department of Defense (DoD) and Veterans Affairs programs.

Key Policy Contributions

- VA ruling "Presumptive Service Connection for Respiratory Conditions Due to Exposure to Particulate Matter"
- VA/DoD Clinical Practice Guidelines for the treatment of asthma, headache, PTSD, depression, substance use disorder, and many more.
- 2020 NDAA, Sec 748 Reports to Congress on Women's Health in the Armed Forces

SCOPE

OP-ED

Before We Knew Better: Readiness, Service and the Human Cost of Military Life

This SCOPE OP-ED is not an official news release and does not reflect the views or opinions of the Department of the Navy. The views reflected in this article are the sole opinions of the author.

By Tommy Lamkin

I joined the Navy before the Millennium Cohort Study existed.

I served through a period when many of the things we now openly discuss – sleep deprivation, mental health, operational stress, family readiness, environmental exposure and long-term health outcomes – were either poorly understood or simply accepted as part of military life.

Back then, exhaustion was normal.

Before the attack on USS Cole in October of 2000, shipboard watchstanding requirements were already demanding. After the Cole, and especially after 9/11, force protection requirements changed almost overnight. More watches. More armed security. More hours.

What did not change was the expectation that Sailors would complete a full workday regardless of how much sleep they'd gotten the night before. I remember standing armed watches, in-port, bridge and combat watches at-sea, from 0000 to 0400, and still reporting back to work at 0630 for a full day.

At the time, fatigue was treated as an individual problem, not a readiness issue. Having to break up your sleep into 2 or 3 shifts was common. There were no real conversations about fatigue management, sleep cycles or circadian rhythm. I don't think I even heard the term "circadian rhythm" until I was already a chief. When I first heard it, I thought someone was talking about cicadas.

I was a junior Sailor sleeping in a middle rack in a crowded berthing compartment, and I was late for watch more times than I care to admit. Every few nights, someone would come into the berthing in the middle of the night to wake me up because I had overslept again.

This was a problem for the first class in the rack below me, an old-school Sailor named Davidson. I remember him confronting me and saying that every time somebody came looking for me in the middle of the night, they woke him up too.

One night, someone came down to wake me up for watch again. I remember mumbling, "yeah, I'm getting up," and then immediately falling back asleep. A few minutes later, the person came back and I was still in my rack.

That was the last straw for Da-

Me on my first ship, maybe 2000.

He exploded, grabbed me out of the rack, and made it very clear that if I did not start getting up on time, he was going to drag me to the bridge himself every single time.

I thought I was just undisciplined, immature and bad at managing my responsibilities.

Maybe part of that was true, but looking back now, I also see a ship full of Sailors operating on chronic exhaustion without fully understanding what fatigue was doing to us physically and mentally.

None of us; not me, not Davidson, our leadership — really understood fatigue as a readiness issue.

Today's fleet talks openly about fatigue risk and protected sleep schedules in ways we never did back then. According to research from the Millennium Cohort and broader military health studies, sleep disruption and chronic fatigue are linked to increased stress, exacerbated mental health concerns and reduced operational performance. What we once normalized as "just part of the job" is now recognized as something measurable and consequential.

Behavioral Health

Mental health may be the clearest example of how dramatically the culture has changed.

When I was a young Sailor, severe stress, depression and suicidal ideation were viewed through disciplinary lens instead of a healthcare lens. Mental health issues were career-ending problems.

Me marching a few hundred Sailors down State Steet in the Chicago Memorial Day Parade, 2009.

My bunkmate in "A" school was sent home for mental health reasons. On my first few ships, sailors that I knew personally were discharged over issues that today would likely lead to treatment, recovery and continued service.

And over the course of my career, I lost Sailors.

The warning signs were not always obvious to us. We simply did not know how to recognize them in the way leaders are increasingly trained to look for today. Looking back now, many of us confused silence for resilience because that was the culture we inherited.

My first two duty stations were back-to-back sea duty assignments, including an 11-month deployment on my second ship leading into the second Gulf Wars. The operational tempo was relentless. Sailors struggled, even if we did not always have the language to express it at the time.

Some went home early. Others were processed out entirely. Most of us simply kept going.

Years later, it became personal.

15 years into my career, I realized something was wrong with me. I did not understand it at first. Sitting at my desk one day, I searched online for a depression self-assessment quiz. I answered the questions honestly, and the result told me something I probably already knew deep down: I needed help.

At that point, I was also struggling with thoughts of suicide, not something I recognized clearly at the time, and not something I had the vocabulary or comfort to bring forward in a direct way. Like many Sailors, I continued working while trying to function through it.

What followed was therapy, psychiatry, medication, group sessions and limited duty (LIMDU).

One conversation from that period has stayed with me ever since. A chief I knew and would consider a friend for many years eventually told me, "I knew you were depressed. I could tell."

My immediate thought was simple; 'if you knew, why didn't you ask?'

That moment fundamentally changed how I viewed leadership and readiness.

I was fortunate to later work for a master chief, while on LIMDU, who handled my situation with professionalism and dignity. He made sure I had time for appointments, but more importantly, he gave me the space to stabilize and rebuild without making me feel like I had to justify recovery. In a culture where mental health still carried stigma, that mattered more than I can fully explain.

Leadership, at its best, does not remove standards. It removes unnecessary friction from recovery.

In many ways, what we eventually learned about mental health care mirrors something we already understood in shipboard engineering: routine maintenance is not optional, and it is not a sign of failure. It is what allows systems, and people to continue operating safely over time.

My final operational deployment looked very different from my first. Our commanding officer understood that operational effectiveness required recovery time. He protected downtime where possible. Sundays sometimes included morale events, steel beach picnics or simply enough breathing room for sailors to reset mentally before another demanding week.

Me throwing out the first pitch at a Norfolk Tides game. I include this because when I was going through therapy, and depression hit me hard, I found little to no enjoyment in things or people in my life; baseball was something I could hang on to. It was my getaway, be-in-the-moment therapy.

I remember once suggesting that we streamline our large all-hands warfare qualification ceremonies because they took so long. His response completely changed my perspective.

He explained that on a ship with thousands of sailors, he would only personally know a small fraction of them. For many Sailors, receiving a warfare pin and shaking the CO's hand for a few seconds might be their only direct interaction with him during deployment.

It wasn't about ceremony for ceremony's sake. It was about presence.

Even small things mattered in that environment. When he said "lights out," it meant lights out. Not as a slogan, but as an expectation tied to discipline, recovery and respect for the crew's time.

Looking back, I do not think the Navy changed because people suddenly became different. It changed because we finally started rewarding leaders who had already been quietly leading that way.

The changes were not limited to mental health or fatigue.

Over time, the military also became better at recognizing long-term physical health impacts that many service members had simply accepted as normal. Early in my career, I had never heard anyone talk about sleep apnea. Years later, and down in my last chief's berthing, we had a section jokingly become known as "CPAP row," with a bunch of guys sleeping with the help of masks and hoses every night.

What changed was not the condition itself. What changed was awareness, screening, diagnosis and long-term health tracking.

Environmental and Occupational Hazards

In my first year in the Navy, I was exposed to asbestos and entered into long-term monitoring as a result. At the time, that was just one of many hazardous exposures Sailors routinely accepted as part of shipboard life.

We worked around constant machinery noise, jet fuel, exhaust, solvents, hydraulic fluids, paint, cleaning chemicals, welding fumes and poorly ventilated engineering spaces. Hearing protection standards existed, but enforcement was inconsistent in many high-noise environments. A lot of it depended on the command, the workspace or simply the culture of the shop.

Much of it was normalized.

You did your maintenance, cleaned your spaces, stood your watches and kept moving. Most of us did not spend much time thinking about what years of repeated exposure to those environments might mean later in life.

Over time, the military became better at studying and tracking those risks. Research efforts like the Millennium Cohort Study and Navy Medicine R&D have contributed to broader understanding of long-term health outcomes of military service.

That does not eliminate the hardships of military life, but it does mean those conditions are more likely to be recognized and treated instead of dismissed as weakness or simply "part of the job."

Studying these costs matters.

Family readiness

Family readiness is another area where the culture changed dramatically over the course of my career.

Military family life was hard but that was not uncommon.

Like many service members of my generation, I deployed repeatedly, missed holidays and birthdays, spent long stretches away from home and completed a geographic bachelor tour separated from my family due to operational requirements and assignment structure. When my oldest child was born, I did not meet her until she was eight days old.

At the time, experiences like that were viewed less as circumstances that required mitigation and more so as expectations of service.

When I first came into the Navy, there was a phrase you heard constantly: "your family didn't come in your seabag."

I probably heard it a thousand times. It was repeated so often that it became part of the background noise of the culture. The implication was clear: family responsibilities existed outside the boundaries of duty, and Sailors were expected to compartmentalize accordingly.

My family at my retirement ceremony in Norfolk, Virginia, 2019

But that is not how life works in practice.

A service member who is worried about their spouse, children, finances or life back home is not operating at full readiness, no matter how motivated they are.

Over time, that understanding began to shift institutional thinking. What had long been treated primarily as a personal issue gradually became recognized as a readiness issue. Policies around parental leave, dual-military families, deployment support and command responsibility for family readiness evolved in response to lived experience across the force and to the growing body of military health research, including longitudinal efforts such as the Millennium Cohort Study.

Again, that shift did not eliminate the challenges of military family life, but it changed how the institution framed them: not as distractions from readiness, but as factors that directly shape it.

My wife and I were a dual-military family early in our careers, and at the time, pregnancy policies and family support systems looked very different than they do today. She ultimately left the service after becoming pregnant, something that would likely be handled very differently in today's force.

From a leadership and policy perspective, that evolution matters because today's military increasingly recognizes that supporting families is directly tied to retention, stability and operational effectiveness.

Me and my wife Trish at a Khaki Ball in Virginia in 2012

I now see that continuity from the retiree side of military medicine. Even in retirement, I continue to experience care through military health systems, and I see firsthand how family members are increasingly integrated into the broader readiness and wellbeing framework.

Family readiness is service member readiness.

At the same time, not every service member retires into long-term military healthcare benefits. Many continue their care through the U.S. Department of Veterans Affairs after leaving service. We need efforts that ensure the long-term effects of military service continue to be studied long after someone takes off the uniform.

It Pays to Know, and We Know through Research

One thing I have come to appreciate over time is that even though I never personally participated in the Millennium Cohort Study, I still benefited from what it helped reveal.

As the study tracks service members over time, it connects the dots between operational tempo, sleep deprivation, mental health outcomes, environmental exposures and long-term health data. Those connections have been explained in academic journals and presented at conferences, but they also inform policy, clinical practice and how leaders began to think differently about readiness.

The Sailors and Marines serving today operate in a force that places far greater emphasis on mental health, sleep, nutrition, physical fitness, environmental exposure monitoring and family support than the force I entered decades ago. Not because military service became easier, but because military medicine and leadership became better at understanding the human side of readiness.

That progress matters.

Not because my experience was unique, but because it was common enough that it needed to be studied.

The military will always demand sacrifice. Some aspects of service will always carry physical and emotional costs that cannot be fully eliminated.

Understanding those costs does not weaken readiness.

It strengthens it.

We used to think fatigue was normal. We thought silence was strength. We used to think family stress existed separately from mission performance.

Now we understand those assumptions were incorrect.

I am grateful that work like the Millennium Cohort Study helped ensure the next generation will not have to learn those lessons the hard way. ■

Tommy Lamkin is the public affairs officer for Naval Medical Research Command and the editor-in-chief of the SCOPE magazine. A long time communications professional and writer, he served more than two decades in the U.S. Navy aboard four ships, one carrier strike group, and three shore commands — mostly in Norfolk, Va.

My last day in unform (and shaving) 2019

LOOKING Aft

with André B. Sobocinski

Historian, Bureau of Medicine and Surgery

Charting the Deep: The Birth and Foundations of Undersea and Diving Medicine Research in the U.S. Navy, 1900-1922

The commissioning of USS Holland (SS-1) in October 1900 was a game-changer for the Navy. Although not the first submarine in naval history, the Holland's launching—and its integration into the fleet—signaled a new dimension of naval warfare and a paradigm shift on how future battles would be fought and won. The appearance of submarines—and with them, submarine rescue/salvage—also posed new physiological and psychological challenges for Sailors necessitating the two interconnected fields of undersea and diving medicine research.

The advent of early gas and diesel-powered submarines posed new health hazards and systematic threats to its crews. Personnel aboard those early submarines faced the gamut of occupational hazards from exposure to gas tank vapors, poor lighting and air quality, change in air pressure, vibration of diesel engines to the danger of exploding storage batteries and even asthenopia or eyestrain from "prolonged use" of periscopes.

As early as 1911, forward-thinking medical officers like Passed Assistant Surgeon I. Franklin Cohn, USN, outlined the harmful effects of gasoline fumes, the risk of carbon monoxide poisoning, temperature control and "depressing influences" in submerged environments. Later in 1916, Passed Assistant Surgeon Ralph W. McDowell countered Cohn's assessment, writing to the Navy Surgeon General William Braisted that "special care" needed to be taken in selecting personnel for submarine duty and specifically their "temperamental qualifications" and psychological readiness—an early blueprint for psychological screening.

The advent of early gas and diesel-powered submarines posed new health hazards and systematic threats to its crews

The efforts of McDowell and Cohn culminated in the first formal medical guidance for service aboard submarines, appearing in the 1922 edition of the Manual of the Medical Department of the United States Navy. Although medical personnel (specifically independent duty corpsmen) were not yet attached to submarines, physicians and corpsmen assigned to submarine activities were required to instruct submariners in first aid with special emphasis on artificial respiration, treatment of oil and acid burns, protection of eyes from electric flash and protection of ears from increased air pressure.

In the first decades of the twentieth century, habitability and ventilation aboard remained focal concerns for submarine service. In his paper, "Report on Respiratory Vitiation of Air in Submarines" (1912), medical officer Cmdr. Ernest W. Brown helped usher the field of submarine hygiene while bringing greater attention to the medical aspects of habitability. Brown had conducted the first Navy study on carbon dioxide and oxygen consumption aboard submarines and helped pave the way for the work of Dr. Eugene Floyd DuBois, a reserve physician and physiologist who pioneered air purification systems aboard the submarines. To prove the efficacy of these systems, DuBois embedded aboard the USS S-10 in 1919, monitoring and analyzing the submarine's air for four consecutive days during a historic run that broke all existing submergence records.

Submarine Duty in World War I

In 1916, the Naval Yard at New London, Connecticut, was redesignated as a submarine base. Passed Assistant Surgeon Ralph W. McDowell was assigned as one of its first "submarine medical officers," and was tasked with weeding out those "unfit for the mental rigors of submarine warfare." In a 1917 report to the Navy Surgeon General, McDowell famously articulated the psychological archetype that was required for undersea service:

"Not only should officers be given a special physical examination with higher requirements, but special attention should be given to their temperamental and physical qualities. In addition to a liberal amount of good sound judgement, the following named qualities are, in the writer's opinion, necessary: mental and physical alertness, self-reliance, coolness, self-control, attention to detail, appreciation of the necessity for effort and ability to inspire confidence in men."

Conversely, McDowell disqualified candidates exhibiting "mental or physical weakness, lack of attention to detail, indecision, poor judgment, laziness, carelessness and . . . lack of stamina."

The Advent of Diving Medicine

In his book Naval Hygiene (1918), Navy Surgeon James Chambers Pryor identified five reasons for diving operations: recovering of human remains, underwater repair of ships, clearing ship propellers "which have been fouled," recovery of torpedoes in target practice and recovery of lost property.

With the advent of submarines, Navy Medicine began to look deeper into the physiological issues diving posed during salvage operations. Salvage dives spurred Navy Medicine to explore how to prevent nitrogen narcosis and decompression sickness ("the bends") that resulted in crippling pains and sometimes paralysis and death.

Early Navy divers—the so-called "hard hat" or "helmet divers"—were burdened with the onerous apparatus that could weigh over 175 pounds. To be sure, diving in this era was completely distinct from swimming. As outlined in the first edition of the Naval Diving Manual (1916), the regulation diving apparatus included dress (made of rubber between layers of cotton twill), gloves, overalls, a tinned copper breastplate that would be worn over the shoulders, a copper 4-windowed helmet, an air hose, air control valve, weights (for "negative buoyancy"), telephone equipment for communicating with the surface and manual air pumps.

Because the diver was dependent on air pumped from the surface, deeper dives demanded higher air pressures to counteract ocean depth—exponentially increasing the risk of gas bubbles forming in the bloodstream during ascent.

On March 25, 1915, the submarine USS F-4 sank in 51 fathoms of water (306 feet) off Honolulu, with the loss of her 21 crewmembers.[1] An experimental diving group—a forerunner of the Naval Experimental Diving Unit—based at Brooklyn, N.Y., was sent to Hawaii to help salvage the submarine USS F-4 in what was considered the Navy's first deep dive salvage operation. The divers were accompanied by Passed Assistant Surgeon Harry Garrison and Passed Assistant Surgeon George Reuben Williamson French (1883-1955).[2] French would later detail the historic dive in the article, "Diving Operations in Connection with the Salvage of the USS 'F-4'" published in The Naval Medical Bulletin in January 1916.

As the Navy's first diving medical officer, French was responsible for conducting diver physicals, serving as a medical attendant in diving operations like the F-4 salvage and in case of the bends (caisson disease) would oversee the application of recompression chambers.

A Foundational Legacy

The adoption of the submarine and the descent of the hard-hat diver forced the Navy to acknowledge that technological superiority means nothing without human endurance. Through the meticulous atmospheric studies of Cmdr. Brown, the rigorous psychological screening parameters of Dr. McDowell and heroic deep-water interventions of Dr. French during the USS F-4 disaster, Navy Medicine helped bridged the gap between mechanical innovations and human physiology while laying a foundation for the future of undersea and diving medicine research.

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1) Naval medical personnel stationed at Naval Hospital Pearl Harbor would help oversee the recovery effort as well as the identification and disposition of the remains. In his report of the recovery effort, Surgeon William Seaman, USN, would recommend that all naval personnel (especially those serving aboard submarines) wear aluminum identifications (i.e., "dog tags") around their ankles and that the heels of all Sailors' shoes be marked with their initials.

2) In 1912, French had worked with pioneering Warrant Gunner George Stillson at the Brooklyn Navy Yard developing new techniques and experimenting with new diving equipment off the USS Walke (DD-34) paving the way for the establishment of the Navy Experimental Diving Unit a decade later. ■

SCOPE NEWS

Established 2021 ***"A closer look at Navy Medicine Research & Development"*** **Vol I Issue XI**

LIMA, Peru (May 20, 2026) NAMRU SOUTH participates in the 2026 U.S. Embassy Games to foster partnership, connection and teamwork among agencies and sections. — *Milagros Gozalo*

ACCRA, Ghana (March 25, 2026) Members of NAMRU EUR-AFCENT, Global Emerging Infections Surveillance leadership, and Ghana and Egypt Detachment teams pose for a photo during a science engagement at the Noguchi Memorial Institute for Medical Research. — *Courtesy photo*

◄ CAIRO (March 12, 2026) Staff from NAMRU EUR-AFCENT's logistics department pose for a photo after concluding Operation Spring Clean. Cleanup operations, conducted regularly, help increase readiness and the logistical preparedness of the command. — *Stephanie Serna*

SAN DIEGO (April 20, 2026) Cmdr. Nikolas Matos Makris, NHRC director for administration, recites the Oath of Office given by Capt. Kellie McMullen, commanding officer of NHRC. — *Danielle Cazarez*

SILVER SPRING, Md. (April 1, 2026) NMRC and WRAIR leadership came together for the Sexual Assault Prevention and Response Month, proclamation signing. This event brought together service members to support victims of sexual assault/harassment and foster a safer environment for U.S. warfighters and their counterparts. — *Aleece Williams*

DAYTON, Ohio (May 11, 2026) Lt. Cmdr. Travis Landry provides a capabilities demonstration of the Disorientation Research Device, or Kraken, to Col. Dorinda Mazza, 88th Air Base Wing vice commander, during a visit to Naval Medical Research Unit Dayton. This research directly supports Landry's personal mission to mitigate risks and provide as much safety as possible for forward-deployed U.S. service members. — *Zachary Wilson*

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ANCHORAGE, Alaska (March 25, 2026) Rebecca Weller, a research physiologist with Naval Health Research Center, inspects 350-pound ice blocks carved out by the Alaska Dive Search and Rescue team. Through cold water immersion studies, NHRC develops life-saving strategies that enable the warfighter to overcome the initial, lethal shock of entering frigid water. — *Matthew Reyes*

GROTON, Conn. (May 18, 2026) NSMRL staff participate in the Career Day at Teachers Memorial Middle School. Volunteers spoke with students about the different career fields available in the Navy, specifically representing Navy physicians, physiologists and psychologists. They answered questions about how their positions enhance the health and readiness of U.S. service members. – *Emily Swedlund*

SAN ANTONIO (April 1, 2026) NAMRU San Antonio celebrates The 133rd Chief Petty Officer Birthday at the Battlefield Health and Trauma Research Institute. Cutting the cake are retired Navy Chief Petty Officers Michael Arnold (left) and Henry V. Buckley. — *Burrell Parmer*

SAN ANTONIO (May 18, 2026) The Defense Health Agency held its annual Promote Professional Engagement amongst Military Laboratories (ProPEL) Science Symposium at the VelocityTX Innovation Center. The event brought together military medical professionals, researchers, students and academic partners to explore the latest in defense health innovation. Attendees heard from several San Antonio Centers of Excellence, to include presentations on point of injury, prolonged field care/early interventions and more. — *Burrell Parmer*

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