



Naval Medical Research Unit San Antonio
JBSA Fort Sam Houston, Texas



Science Quarterly

Volume 1, Issue 4

Fall 2015

NAMRU-SA MISSION

"To conduct medical, craniofacial, and biomedical research, which focuses on ways to enhance the health, safety, performance, and operational readiness of Navy and Marine Corps personnel and addresses their emergent medical and oral/facial problems in routine and combat operations."

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NAMRU-SA BUILDS NEW COLLABORATIONS AT MILITARY HEALTH SYMPOSIUM

Flisa Stevenson, MS

SAN ANTONIO-- Naval Medical Research Unit-San Antonio (NAMRU-SA) investigators joined more than 1,700 military medical clinicians, scientists, and academia and industry leaders at the 2015 Military Health System Research Symposium (MHSRS) held in Fort Lauderdale, Florida, Aug. 17-20.

This is DOD's premier scientific annual meeting where research results are shared across the joint forces and future milestones are set for military medical research programs, centered on the needs of the Warfighter.

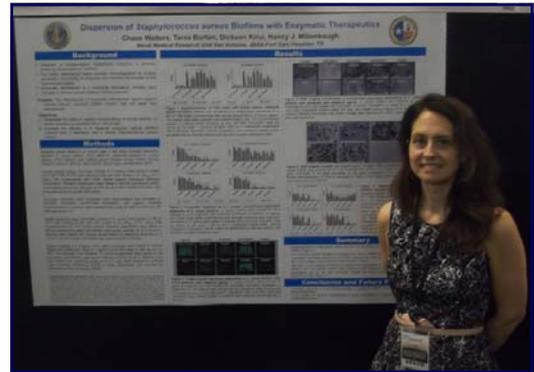
"NAMRU-SA investigators presented ten posters at the symposium and seized the opportunity to build new collaborations," said NAMRU-SA Commanding Officer, Capt. Elizabeth Montcalm-Smith.

Dr. Nancy Millenbaugh, Principal Investigator, in NAMRU-SA's Craniofacial Health and Restorative Medicine Directorate presented her findings on enzymatic therapeutics as a promising strategy to eradicate biofilms and improve treatment of bacterial infections.

Millenbaugh said, "MHSRS provides an invaluable opportunity to meet and talk face-to-face with researchers you might have never connected with, without this symposium."

As a result of meetings at MHSRS, Millenbaugh and other NAMRU-SA investigators connected with the Pain Research Task Area at the U. S. Army's Institute of Surgical Research (USAISR), also located at Joint Base San Antonio. USAISR has capabilities and laboratory models that would complement NAMRU-SA's capabilities and there is a mutual interest in collaborations on joint projects and future proposals.

Montcalm-Smith said, "Other



Dr. Nancy Millenbaugh, Principal Investigator, in NAMRU-SA's Maxillofacial Injury and Disease Department presented her poster, "Dispersion of *Staphylococcus aureus* Biofilms with Enzymatic Therapeutics" at the 2015 MHSRS Symposium. (Photo by Dr. Luis Martinez, NAMRU-SA)

researchers are interested in the accomplishments at NAMRU-SA and want to partner with us on future projects."

Other potential collaborations seeded at MHSRS include the Center for Regenerative Medicine at Oregon Health & Science University, Department of Dermatology & Cutaneous Surgery, Miller School of Medicine at University of Miami, and the Materials Branch/Applied Concepts in Materials Chemistry Division, at Naval Research Laboratory in Washington, D.C.

"It is easy to see why NAMRU-SA has a good reputation", said research advocate, Capt. Francisco R. Leal. He was interested to hear what NAMRU-SA researchers were investigating such as the mercury collection and filtration system, new methods of sterilization that could potentially be used in the operational environment, and craniofacial wound healing projects.

(Continued on page 2)

MEET NAMRU-SA'S 2015 NREIP SUMMER INTERN, EBONY MILLER



Ebony Miller, Navy reservist and second year graduate student at San Diego State University (SDSU) in San Diego, was one of 75 graduate students selected to participate in a 10-week paid internship with the Naval Research Enterprise Intern Program (NREIP).

Miller's internship was in conjunction with the Naval Medical Research Unit San Antonio's (NAMRU-SA) Department of Biomaterials and Environmental Surveillance. Her project was performed under the guidance of Dr. Amber Nagy and her immunologist and lead technician, Ms. Ann Marie Foushee.

Miller's project investigated the potential health effects associated with inhaled dental laboratory materials. Specifically, she tested the biocompatibility of dental

materials that contain nano-sized particles (particles with 1 dimension less than 100 nanometers in size).

To culminate her 10 weeks at NAMRU-SA, Miller presented a poster of her research to the NAMRU-SA Command.

(NAMRU-SA at MHSRS Continued from page 1)

"With Capt. Leal as an advocate, NAMRU-SA can look forward to building stronger connections with dental officers to better serve their needs and understand their issues," said Montcalm-Smith.

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NAMRU-SA AT THE 2015 NAVY BALL

Naval Medical Research San Antonio (NAMRU-SA) along with 11 other Navy commands and detachments around San Antonio, TX, area collaborated to celebrate the U.S. Navy's 240th year of excellence, honor and service, during the 2015 Navy birthday ball held at the Omni Hotel, and Resort, Oct 10.

Capt. Denise Smith, commanding officer, Navy Medicine Training Support Center hosted the San Antonio 2015 Navy Ball. NAMRU-SA staff filled several tables at the gala event attended by hundreds of Sailors, spouses, veterans and their friends.

The ball events included a formal colors presentation,



NAMRU-SA Commanding Officer, Capt. Elizabeth Montcalm-Smith (left) with Capt. Denise Smith, Commanding Officer of Navy Medicine Training Support Center and host of the San Antonio 2015 Navy Ball, and Capt. Mark Goto, Executive Officer of NAMRU-SA rang in the Navy's 240th birthday. (Photo by Flisa Stevenson, NAMRU-SA Public Affairs)

a singing of the national anthem, a drill team presentation, a history of the Hospital Corps demonstration, and a Prisoner of War/Missing in Action remembrance ceremony.

The guest speaker for the evening was Fleet Master Chief April D. Beldo, Senior Enlisted Advisor to the Chief of Naval Personnel. Beldo talked about women's historical and expanding roles in the Navy.

After Beldo's speech, the ceremonial cake cutting and formal toasts, NAMRU-SA and other service members danced and enjoyed the festivities long into the evening.

NEW MURAL AT THE TRI-SERVICES RESEARCH LABORATORY HIGHLIGHTS JOINT RESEARCH BETWEEN MILITARY BRANCHES

Carrie C. Crane

Veterinary Science Department

SAN ANTONIO – A new mural was recently unveiled that highlights the unique joint research facility shared with the Navy, Army and Air Force in the Tri-Service Research Laboratory (TSRL). TSRL is located on Fort Sam Houston, Texas, Joint Base San Antonio (JBSA) and is approximately a 181,000-square-foot-research facility that houses a 45,000-square-foot vivarium. TSRL opened in 2011 and is unique among vivarium facilities across the DoD.

The Naval Medical Research Unit- San Antonio (NAMRU-SA) Veterinary Science Department and Vivarium are located in the Tri-Service Research Laboratory (TSRL) and the 15 member team provides a variety of services to support diverse research requirements. NAMRU-SA's expertise includes two laboratory veterinarians, as well as, the best veterinary science team in the area, and probably across the country. This support is available to all investigators, and it is all available under one roof.

The TSRL facility includes 40 research laboratories, three state of the art surgical suites, seven procedure rooms. The NAMRU-SA team works with researchers on protocols that include small to large laboratory models, and basic veterinary medicine to critical care procedures.

NAMRU-SA's veterinary science team provides critical support services to Navy specific research for traumatic hemorrhagic shock and resuscitation, blood replacement products, regenerative medicine, and various types of testing and evaluation projects.

"Every NAMRU-SA project conducted at TSRL is directed toward the development of a life-saving technology that will result in better outcomes for warfighters, and our veterinary science team plays a critical role," says Capt. Elizabeth Montcalm-Smith, Commanding Officer for NAMRU-SA.

NAMRU-SA has developed collaborations with the Air Force 711th HPW/RHD, as well as the 59th Medical Group and the U.S. Army Institute of Surgical Research to leverage their focus areas in hematology, blood banking, trauma-induced coagulopathy, and ischemia-reperfusion injury, all of which feedback into our own



The new (15' x53' feet) mural on the lobby wall at the Tri-Services Research laboratory is an image of "jointness" representing a unique DoD asset that supports research collaboration between the Army, Air Force, and Navy.

(Photo by Flisa Stevenson, NAMRU-SA Public Affairs)

work to improve the research we produce to care for the warfighters. NAMRU-SA is also in the unique position to have the Air Force and Army as day-to-day collaborators and office-mates at TSRL.

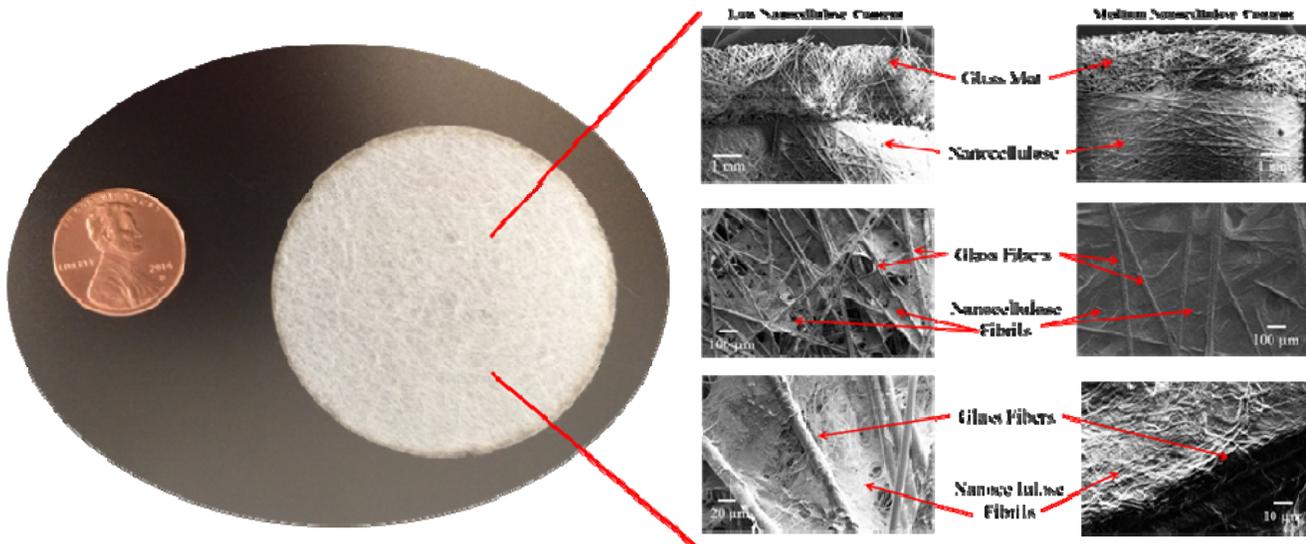
This daily interaction mirrors the camaraderie that occurs in operational situations and provides the necessary expertise and support to complement the research designation of each service.

Currently, NAMRU-SA is supporting the Air Force on several projects, including a bioeffects investigation. The Air Force 711th Group is a line unit which collaborates with the Navy to conduct the medical aspects of their research.

TSRL is truly a tri-service facility, and each service directs their own projects, aligned to the unique roles and missions. By working together under one roof, the best of the three services are able to focus on improving the delivery of effective products that are approved and available for use in the field or appropriate medical setting.

The staff at TSRL all share a common passion for the facility and the increased capabilities this tri-service environment creates for military research. The TSRL is significant to NAMRU-SA's mission and supports the Navy's research to optimize warfighter readiness and saves lives.

NAMRU-SA RE-DESIGNS CHAIRSIDE DENTAL FILTER



Nanocellulose 47mm diameter mat. To develop an amalgam separator that meets the proposed regulation standard, NAMRU-SA scientists created a two-step approach in designing the new filter material. The first phase will form a filter medium comprised of glass fibers interwoven with nano-structured cellulose. Inset is scanning electron microscope pictures detailing the medium's topography containing low (left) or medium (right) nanocellulose content.

Amber M. Nagy, Ph.D.

Although dental amalgam used to fill cavities by Navy dentists is a safe, durable dental restoration material it does contain mercury and metal alloys that raise environmental concerns.

It is the biological and chemical conversion of mercury into methyl mercury (a potent toxicant) that can bioaccumulate in fish and aquatic wildlife with a large release of amalgam dental waste into publically owned wastewater streams.

Navy researchers are aggressively investigating novel, more efficient dental wastewater management technologies in advance of the Environmental Protection Agency's (EPA) pending legislation outlining new dental effluent guidelines.

In a proactive effort to ensure excellence in environmental stewardship, the Navy has formally mandated the use of chairside dental amalgam separators for years, well ahead of the new guidelines.

While the Navy ensures that the dental amalgam separator devices used in dental treatment facilities (DTFs) are 95 percent efficient and comply with the International Organization for Standardization (ISO) testing, it is anticipated that DTFs will be required to install amalgam separators that reduce emissions entering publically owned wastewater streams by 99 percent.

Researchers from the Navy Medical Research Unit - San Antonio's (NAMRU-SA) Environmental Surveillance Program and Dr. Michael Daniele and Dr.

Joyce Breger from the Naval Research Laboratory's Center for Bio/Molecular Science & Engineering in Washington, D.C. began a collaboration to re-design amalgam separators.

Functionalization of this enhanced material will allow the nanocellulose to form a more complex filter matrix which will actively bond heavy metals, removing them from the waste water and retaining them within the filter matrix. If successful, this approach will not only remove metal contaminants, but also be effective against Bisphenol A (BPA).

To develop an amalgam separator that meets the proposed guidelines, a two-step approach is being utilized in designing the new filter material. The first phase will form a filter medium comprised of glass fibers interwoven with nano-structured cellulose.

The second phase will enhance the performance of the filter material by adding functional groups onto the nanocellulose fibers. Researchers propose functionalizing the nanocellulose filter matrix with thiol-groups to enhance the electrochemical attraction of metals with the filter medium. This functional filter medium is further processed into mats or cartridge unit constructs.

(Continued on page 5)

VISITORS AND TOURS

BUMED DIRECTOR OF TOTAL FORCE (M1) TOURS NAMRU-SAN ANTONIO

Flisa Stevenson, MS

The Senior Executive Service, Director of Total Force (M1) at the Bureau of Medicine and Surgery (BUMED) visited the Naval Medical Research Unit San Antonio (NAMRU-SA), August 10.

Dr. Andrew Jones, Director of Total Force (M1) received an overview of current projects to better understand the variety of medical research underway at NAMRU-SA to support our wounded warfighters.

Before a tour of the laboratories NAMRU-SA's Commanding Officer Capt. Elizabeth Montcalm-Smith, provided a command brief and summary of ongoing research efforts in combat casualty care and craniofacial health, including one of NAMRU-SA's innovative environmental stewardship and compliance projects, the novel chairside dental filter that captures mercury-containing amalgam waste, before entering any wastewater stream.

Dr. Amber Nagy, principal investigator and Head of NAMRU-SA's Biomaterials and Environmental Surveillance Department explained how the new chairside amalgam separator has been re-designed by Navy researchers to remove up to 96.7 percent of amalgam from dental wastewater and can be the first line of defense at dental treatment facilities to reduce mercury release.

Jones was pleased to learn that Navy dental facilities across the globe are being armed with this novel amalgam filter technology that may establish Navy dental facilities as models of environmental stewardship.

During the tour Dr. Jones was introduced to NAMRU-SA's interdisciplinary approach to team science and collaboration encompassing all projects.

Dr. Simecek, Head of the Combat Casualty Care Directorate described a current project that inspired NAMRU-SA's biomedical engineering team to construct a custom electrospinning apparatus, to create a nanofiber-based coating that proteins and antibiotics will be woven to create a biomimetic wound dressing.

Simecek also highlighted a non-antibiotic treatment option under investigation that uses lasers and gold nanoparticles to break up bacteria cells.



Dr. Amber Nagy, Principal Investigator and Head of NAMRU-SA's Biomaterials and Environmental Surveillance Department, talks about the new efforts underway to develop novel materials to increase the efficiency and specificity of contaminant removal from dental wastewater with, Dr. Andrew Jones, Director of Total Force (M1) at BUMED and NAMRU-SA commanding officer Capt. Elizabeth Montcalm-Smith. (Photo by Flisa Stevenson, NAMRU-SA Public Affairs)

"Innovations and advances in our projects to improve craniofacial wound management and infection control are emerging from internal, industry," Said Montcalm-Smith. "[As well as] academic and cross-service collaborations and our research teams are harnessing techniques, approaches, and perspectives from multiple scientific disciplines and therapeutic areas."

Dr. Jones also recognized how the collaboration and synergy of research efforts on the San Antonio Military Medical Center campus, where NAMRU-SA is located presents valuable opportunities to collaborate with other scientists, healthcare specialist, surgeons and dentists to support our wounded warfighters and reduce any duplicated efforts across Services.

"Innovations and advances in our projects to improve craniofacial wound management and infection control are emerging from internal, industry."

(NAMRU-SA Dental Filter Continued from page 4)

The NAMRU-SA environmental surveillance team is hopeful that development and functionalization of nanocellulose as an alternative, biocompatible filtration strategy can be incorporated into other practical applications that enhance the health, safety, and operational readiness of Sailors and Marines.

NAMRU-SA PRESENTATIONS & PRODUCTS

Paredes, R. M., Sooter, A., Dallelucca, J., Sheppard, F., (2015). Whole Blood Fixation and Cryopreservation Procedures Allow Cellular Analysis by Flow Cytometry for up to 15 Days After Cell Isolation.

Watters, C., Burton, T., Kirui D., Millenbaugh, N., (2015). Dispersion of *Staphylococcus Aureus Biofilms* with Enzymatic Therapeutics, Military Health System Research Symposium, Fort Lauderdale, FL.

Crossland, R., Macko, A., Aden, J., Fryer, D., Sheppard, F., (2015). Tissue Oxygen Saturation By Near Infrared Spectroscopy, An Early Non-Invasive marker of Mortality Risk in a Non-Human Primate (Rhesus Macaque) Model of Hemorrhagic Shock, American Association for the Surgery of Trauma, Las Vegas, NV.

Martinez, L., Grossman, H., Dory, R., (2015). Evaluation of the Effectiveness of a Portable Ozone Sterilizer System, Military Health System Research Symposium, Fort Lauderdale, FL.

Dory, R., Cox, D., Endler, B., (2015). Evaluation of Pelvic Stabilization Devices Using an Advanced human Tissue Equivalent Mannequin Model, Military Health System Research Symposium, Fort Lauderdale, FL.

Yuan, T., Jenkins, P., Digeorge-Foushee, A., Stahl, J., (2015). Fabrication and Characterization of Chitosan/Poly (ethylene oxide) Electron Scaffolds for Wound Dressing Applications, Military Health System Research Symposium, Fort Lauderdale, FL.

Nagy, A., (2015). Environmental Compliance Strategies in Dental Treatment Facilities: Evaluation of Nanoparticle Exposure in Area Dental Laboratories, Tri-Service Toxicology Consortium Teleconference, San Antonio, TX.

Saini, T., Aden, J., Simecek, J., Chan, R., (2015). The effect of hematocrit on platelet adhesion: Experiments and simulations, Military Health System Research Symposium, Fort Lauderdale, FL.

BLOGROLL

August 12, 2015 I Am Navy Medicine, Navy Medicine LIVE Blog-- The Official Blog of the U.S. Navy and Marine Corps Health Care. A few words from a Navy Medicine Research Dentist, Capt. Jonathan M. Stahl, DC. I serve as a full-time biomedical researcher at the Naval Medical Research Unit in San Antonio (NAMRU-SA).

<http://navymedicine.navylive.dodlive.mil/archives/9319>

July 14, 2015. Armed With Science- The Official U.S. Defense Department Science Blog. Navy researchers work to add antibiotics to Cranial Implants. By Capt. Jonathan M. Stahl.

<http://science.dodlive.mil/2015/07/14/navy-researchers-work-to-add-antibiotics-to-cranial-implants/>

IN THE MEDIA

October 2015. AFCEA Military City USA Radio Show. Interview conversation with Capt. Elizabeth Montcalm-Smith, Commanding Officer, Naval Medical Research Unit -San Antonio. Link to podcast of the interview (53;420 minutes): <http://www.militarycityusaradio.org/2015/10/03/captain-elizabeth-montcalm-smith-airing-oct-3/>

August 2015. NAMRU-SA was recently featured in the Summer 2015 issue of **CURRENTS** - The Navy's Energy & Environmental Magazine. Naval Medical Research Unit San Antonio Captures Mercury-Containing Amalgam Waste. Chairside Filter Acts as First Line of Defense at Dental Treatment Facilities. By Amy Cheatham and Amber Nagy.

<http://greenfleet.dodlive.mil/currents-magazine/currents-magazine-2015/currents-summer-2015/>

August 2015. Diagnostic Testing & Emerging Technologies— An online subscription newsletter. Military Could Use Hand-Held Spectroscopy for Pathogen Detection. By Lori Solomon.

COMMANDING OFFICER'S CORNER

Capt. Elizabeth Montcalm-Smith, PhD, MSC, USN

The top priority of NAMRU-SA is accomplishing the mission—the science. In our military medical research mission, development of new products involves collaboration with entities who have the credible capabilities to move forward together to achieve our operational commitments to support force protection and readiness.

This issue of the Science Quarterly leads with a story highlighting NAMRU-SA's ability to forge new collaborations across the services and with academic institutions during the annual Military Health Systems Symposium (MHSRS).

NAMRU-SA's experience at MHSRS continues to yield keen interest in our research projects and indicates that potential partners see the importance and value of NAMRU-SA's innovative work and how it benefits warfighters.

The Tri-Service Research Laboratory (TSRL) story on page three continues our collaboration theme and talks about the TSRL joint research facility shared by the Navy, Army, and Air Force. Located here on Fort Sam Houston, Texas, Joint Base San Antonio, and working under one roof, the best of the services are able to focus on improving the delivery of novel and effective products.

NAMRU-SA was designated to lead mercury abatement efforts for the Navy's dental treatment facilities in 2011. NAMRU-SA's redesign of chairside dental filters is a brilliant success story of a novel

solution to a complex problem. The redesigned dental amalgam filter will be an inexpensive, effective way to significantly reduce mercury burden into the public waterways.

In these few months into my tenure at NAMRU-SA, I was pleased to introduce BUMED Director of Total Force (M1), Dr.

Andrew Jones to NAMRU-SA's interdisciplinary approach to team science and collaboration encompassing all projects.

The articles in this newsletter are just a small sampling of the ground breaking projects under investigation by Navy researchers at NAMRU-SA.

I am honored to lead such an exceptionally brilliant and highly motivated staff who embrace a culture of collaboration, as they work to find research solutions to the critical needs of warfighters and the clinicians who treat them.



TAKING THE HELM OF NAVY MEDICINE'S COMBAT CASUALTY CARE & CRANIOFACIAL HEALTH RESEARCH

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