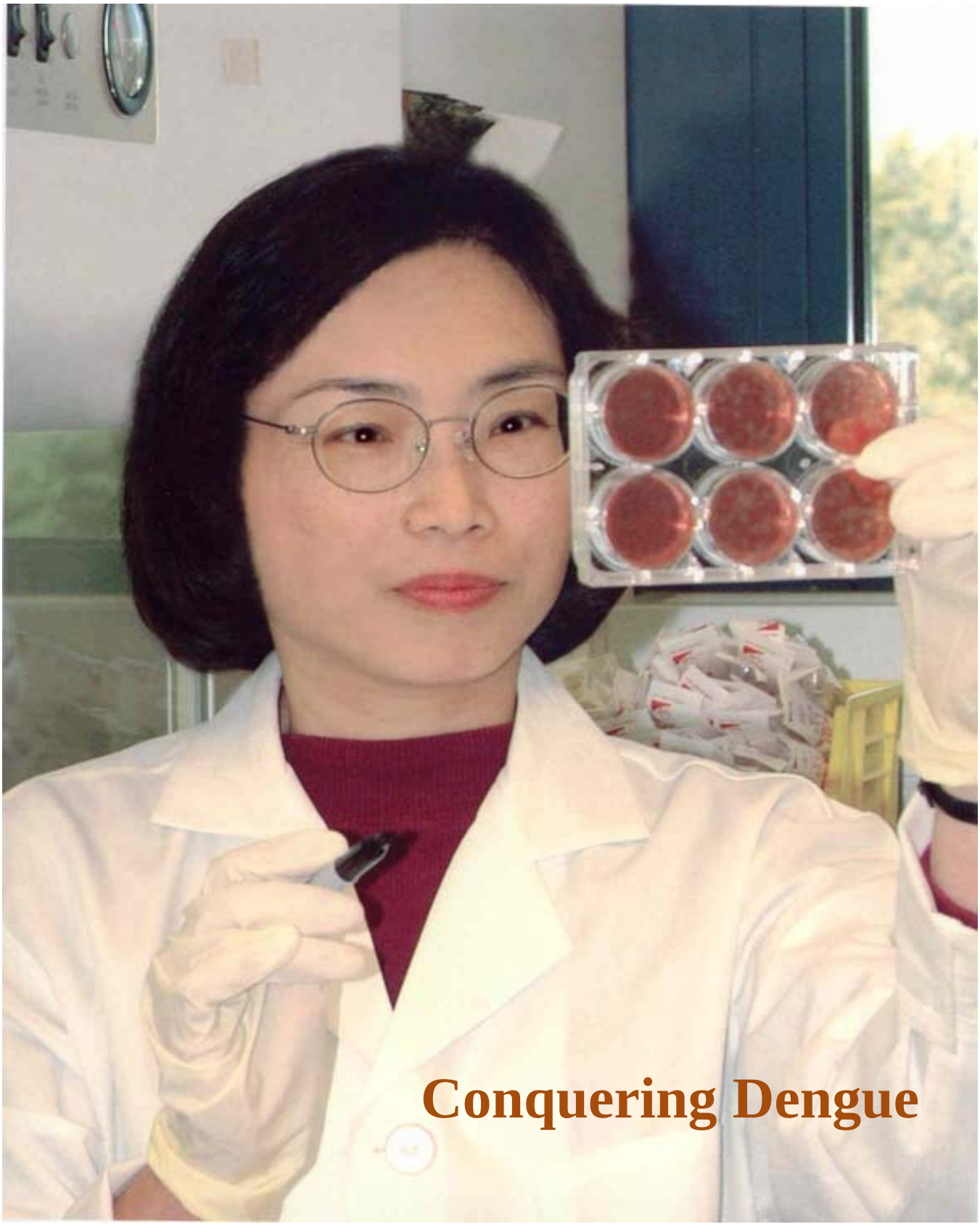
NAVY MEDICINE

May-June 2002



Conquering Dengue

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COVER: Dr. Shuenn-Jue Wu, senior biologist at the Naval Medical Research Center, is working to solve the mystery of how dengue viruses infect the body. Her goal: To develop an effective vaccine. Story on page 2. Photo by Phil Collins, MAVS/WRAIR.

Civilian Scientists Go to Sea

From the laboratory to the deckplate, Navy medicine's research programs support operational readiness, and many Navy researchers work closely with senior medical personnel afloat to carry out shipboard studies focused on health care delivery. But not all researchers have their sea legs. The Bureau of Medicine and Surgery (BUMED) has a program to help "land-locked" scientists and technicians see firsthand what work and life is like at sea.

Mark E. Cohen, Ph.D., a civilian research statistician from the Naval Dental Research Institute (NDRI), Great Lakes, IL, took advantage of BUMED's Scientist-to-Sea program to set sail aboard USS *Yorktown* (CG-48). *Yorktown* is the Navy's Smart Ship, a guided missile cruiser that carries the most sophisticated air defense system in the world today, the AEGIS Combat System.

Dr. Cohen said his experiences onboard were very educational from a technical perspective and extremely valuable in gaining an appreciation for the challenges and issues facing deployed Sailors. He boarded the ship in Pascagoula, MS, and spent 5 days in the Gulf of Mexico, as *Yorktown* participated in NORAD exercises and tested sonar equipment.

Dr. Cohen was impressed by the structured routine and discipline of the 360 crew members. "I had no assigned duties, so I was free to roam and observe. I spoke with the corpsman and discussed dental issues encountered onboard. In the engine room, I observed training drills simulating an emergency as crew members were faced with the challenge of compensating for loss of electrical generators, without allowing the whole system to shut down. Spending time on the bridge, watching the ship being navigated, and "shooting" Polaris with a sextant with the help of a chief, were certainly once in a life time experiences. I toured the missile compartments, watched the firing of the 5-inch and Phalanx guns from the bridge, and saw the crew do man-overboard drills. This program is certainly something unique, and unless you are in the military you would never get this opportunity. It was an adventure!"

As a storm approached, Dr. Cohen watched the crew assist the Coast Guard in rescuing four fishermen who were stranded more than 35 miles from shore in a disabled 24-foot open boat.

He added, "Even though it was only 5 days, and my kids are older than the young Sailors, I was able to begin to imagine the sacrifices that Sailors make when they leave their families for months at a time. I have a better understanding of not only what a Sailor does, but what a Sailor really is. This is certainly not a typical civilian job!"

CAPT J. Ragain, DC, the NDRI commanding officer, pointed out the benefit of the BUMED program for his staff "All the research conducted at the Naval Dental Research Institute must be militarily relevant and scientifically sound. The Scientist-to-Sea Program offers our scientists the opportunity to gain first-hand knowledge of the operational environment. The insight they gain by spending a few days at sea on the various platforms is invaluable to us as we develop our research programs. It is imperative that we get out to the fleet to ascertain the needs of the warfighter, as well as the requirements of the healthcare providers who support our Sailors and Marines."

NDRI is located on the Great Lakes Naval Training Center complex. For more than 50 years, NDRI researchers have investigated problems related to oral health, disease and injury, and have developed techniques and products to improve dental and medical care in the Navy. Researchers are currently leading the way in developing promising salivary diagnostic technologies that include non-invasive screening methods to detect medical conditions such as tuberculosis, dengue fever, and cholera. With the colocation of the Army Dental Research Detachment in 1996 and the Air Force Dental Investigation Service in 2000, Great Lakes is now the site for all DOD dental research. For more information visit NDRI's website at http://bumed.med.navy.mil/ndri/. ❑

—Story by Doris M. Ryan, Medical Research and Development Division (MED-26), Bureau of Medicine and Surgery, Washington, DC.

Solving a Baffling Mystery

Getting Closer to a Dengue Vaccine

Photo by Phil Collins, MAVS/WRAIR

Dr. Shuenn-Jue Wu, a Senior Biologist (right) and Ms. Ravithat Putvatana (left), Senior Research Assistant at the Naval Medical Research Center are working to understand how dengue viruses infect the body.

One bite by a virus-infected mosquito while eating lunch at an outside café, and a young Marine stationed in an exotic city in the tropics spent 1 week in the hospital and 4 weeks in recovery with a high fever, rash, severe headache, and incapacitating muscle and joint pain. For him, it felt like the worst case of flu he ever had. For his medical team, it was dengue fever. He was lucky; this was his first infection with dengue virus. The next bite by a dengue-infected mosquito could cause dengue hemorrhagic fever (DHF), a more severe form of the disease that could be fatal.

There is no cure. Treatment is supportive—bed-rest, fluids, acetaminophen, and possible hospitalization. With aggressive monitoring of vital functions and prompt targeted treatment, the mortality rate can be maintained at 1 percent or less; however, illness is severe and recovery requires weeks.

Dengue is caused by one of four closely related virus types simply called dengue-1, dengue-2, dengue-3 and dengue-4. An infection by one provides life-long immunity against that virus type, but does not provide immunity against the other three virus types. For some unknown reasons, a second infection by one of the other three virus types is likely to cause the more severe form of disease, or DHF.

Dengue has been a mystery to scientists for years, confounding their efforts to develop a vaccine. Shuenn-Jue Wu, Ph.D., a senior Navy biologist, and a team of Navy and Army scientists are unraveling the interaction between the aggressive virus and the body's sentinel immune cells called dendritic cells. Her team discovered that the virus targets the dendritic cells, compromising their function in the body. The function of a dendritic cell is to capture invading pathogens, migrate from the skin to the regional lymph nodes, or from the blood to the spleen, and signal an immune response.

According to Dr. Wu, "Dengue is a complicated disease we don't fully understand. We were the first research team to study and prove that dendritic cells could be infected with the four types of dengue virus. By identifying dendritic cells as the first target cells we can now mimic a human dengue infection using tissue culture in the laboratory. We are further evaluating the role of dendritic cells in mediating the immune system during dengue virus infection. This research opens new windows of opportunity and we are excited about our potential to progress in developing an effective dengue vaccine."

Using donated blood from human volunteers, precursors in blood can be collected and dendritic cells grown in culture. The culture system is a model for researchers to test potential vaccines against dengue, to study the body's immune mechanisms for fighting infection, and to search for clues to solve the mystery related to the severity of a second dengue infection.

Dr. Wu published her original results in July 2000 in the highly prestigious *Nature Medicine* Journal, and a photomicrograph of infected dendritic cells from her article was featured on the cover of the July 2000 issue. Dr. Wu's work was recently recognized by the Association of Military Surgeons of the U.S. (AMSUS), a society of federal health agencies, and she was selected to receive the 2001 AMSUS Sir Henry Wellcome Medal and Prize.

The World Health Organization has noted a steady increase in the spread and incidence of dengue fever and DHF over the past 40 years and now dengue is globally recognized as a re-emerging infectious disease. Epidemics have been reported in the Americas, southern Europe, North Africa, the eastern Mediterranean, Asia, and Australia, and on several islands in the Indian Ocean, the south and central Pacific, and the Caribbean.

For the U.S. military, the history of dengue has its own story. Dengue infection was a major cause of incapacitating febrile illness among American troops deployed in the Philippines, Asia, and the Western Pacific during World War II. In Vietnam dengue was the main cause of illness in personnel admitted to hospitals who were initially diagnosed with fever of unknown origin. In Somalia, for "Operation Restore Hope," dengue was one of the main causes of febrile disease. When the Army deployed troops in Haiti for "Operation Uphold Democracy," dengue was the leading cause of fever-related hospital admissions. The development of a safe and effective vaccine against all four types of dengue virus to protect deployed troops in dengue endemic areas is among the Department of Defense's highest priorities. ❑

—Story by Doris M. Ryan, Medical Research and Development Division (MED-26), Bureau of Medicine and Surgery, Washington, DC.

New Medical Department Flag Selections

CAPT Brian G. Brannman, MSC, is currently assigned to the staff of the Chief of Naval Operations as Director, Medical Resources, Plans and Policy Division (N931).

CAPT Brannman was born in National City, CA. Following graduation from high school in Manhattan, MT, he enlisted in the Navy as a hospital corpsman. He earned his undergraduate degree in health services administration from Southern Illinois University, Carbondale, IL. In 1979, following completion of a graduate degree in management from Webster College, he received a direct appointment into the Medical Service Corps.

During his first commissioned assignment at Naval Regional Medical Center, Long Beach, CA, CAPT Brannman served as military personnel officer, administrative assistant to the director for administration, and chief of outpatient administration. In May 1982, he reported to USS *Belleau Wood* (LHA 3), where he served as medical department head. During the assignment, CAPT Brannman achieved qualifications as a surface warfare medical department officer.

CAPT Brannman attended the Naval Postgraduate School at Monterey, CA, from June 1984 to December 1985 where he earned a master of science degree in administrative science (financial management). He subsequently was assigned to the Naval Medical Command where he served in the Fiscal Systems Division (MEDCOM-13) and later in the Budget Division (MEDCOM-11). In June 1988, he joined the staff of the Chief of Naval Operations, Resource Readiness Appraisal Division (OP-81), as an assistant to the executive secretary of the Medical Blue Ribbon Panel. Following completion of the Blue Ribbon Panel in September 1988, he reported as the medical program analyst in the General Planning and Programming Division (OP-80) where he served until June 1990. In July 1990, he reported to Naval Hospital Long Beach, CA, where he served as director for administration.

Returning to Washington in July 1992, CAPT Brannman was assigned as deputy budget officer at the Bureau of Medicine and Surgery. In June 1994, he reported to the Office of the Secretary of Defense, where he was the director of programs, on the staff of the Deputy Assistant Secretary of Defense (Health Budgets and Programs). Beginning in July 1996, CAPT Brannman served as executive officer, Naval Hospital Bremerton, WA, and concurrently as commanding officer, Fleet Hospital, FIVE. He deployed with Fleet Hospital FIVE to Haiti from February to August 1997 in support of "Operation Restore Democracy/Exercise Fairwinds."

During CAPT Brannman's last assignment, he served as commanding officer, Naval Hospital Okinawa, Japan.

CAPT Brannman's awards include the Legion of Merit, the Defense Meritorious Service Medal, the Meritorious Service Medal (four awards), the Navy Commendation Medal (two awards), the Navy Achievement Medal, the Armed Forces Service Medal, and various service and unit awards. ❑

CAPT Thomas K. Burkhard, MC, is Fleet Surgeon, Commander in Chief, U.S. Naval Forces Europe.

CAPT Burkhard graduated cum laude from Harvard College in 1969 and was commissioned a line ensign through the NROTC program.

His first duty station was aboard the minesweeper USS *Whippoorwill* (MSC-207) homeported in Sasebo, Japan on which he performed coastal patrols in South Vietnam. In 1971, he attended the Staff Mine Warfare Course at Naval Schools Mine Warfare in Charleston, SC, and subsequently was assigned to the school as an instructor. At the conclusion of the Vietnam War, he was attached to the staff of Commander, Mobile Mine Countermeasures aboard USS *New Orleans* (LPH-11) where he participated in "Operation ENDSWEEP" clearing mines from North Vietnam waters.

Resigning his line lieutenant commission in September 1973, he entered duty under instruction at the University of Connecticut School of Medicine and was commissioned an ensign, United States Naval Reserve. Graduating in 1977, he reported to Naval Regional Medical Center, San Diego where he completed his internship in 1978 and a diagnostic radiology residency in 1981. He was awarded the Outstanding Senior Resident Award in Diagnostic Radiology. Following residency training, he was stationed at U.S. Naval Hospital, Guam where he served as radiology department head and director for ancillary services. In 1984, he returned to Naval Hospital, San Diego as a staff radiologist and was awarded the "Golden Ray Award" by the radiology residents as the outstanding teacher. Upon completing an imaging fellowship in 1986, he became assistant chairman of radiology and division head for computerized tomography/ultrasound/body MRI. Subsequently, he held the positions of director for ancillary services, medical director, and deputy commander at Naval Medical Center, San Diego. From 1994 to 1996, he was the deputy commander at National Naval Medical Center, Bethesda. He commanded Naval Hospital Camp Pendleton from January 1997 to July 2000 at which time he assumed his current position as Fleet Surgeon, Commander in Chief, U.S. Naval Forces Europe. CAPT Burkhard served as the Surgeon General's Advisor for Radiology from 1992 to 1995. He was appointed clinical associate professor of radiology/nuclear medicine, Uniformed Services University of the Health Sciences in 1994 and has co-authored 15 radiology peer reviewed articles. He received a certificate in medical management in 1997 from Tulane University and the American College of Physician Executives, and was named a certified physician healthcare executive in 1998 by the American College of Physician Executives.

His awards include the Legion of Merit with one star, Meritorious Service Medal, Navy Commendation Medal, Navy Achievement Medal, Combat Action Ribbon, Navy Unit Commendation, Meritorious Unit Commendation, National Defense Service Medal with one star, Vietnam Service Medal with two stars, Humanitarian Service Medal, Navy and Marine Corps Overseas Service Ribbon with three stars, Philippine Unit Citation, and Republic of Vietnam Gallantry Cross Unit Citation. ❑

Guantanamo Bay Reflections

Spiritual Readiness and the New War

CDR Kelvin C. James, CHC, USN

Since 11 September 2001, much attention has been placed on how different our world is because of the catastrophic events of that day. As our military forces postured to fight an illusive enemy, we waited daily in anticipation to hear of the capture of those responsible. As a consequence of those efforts, approximately 300 detainees were rounded up in Afghanistan and transferred to the naval base at Guantanamo Bay, Cuba (GTMO). Shortly after the arrival of the first detainees, a decision was made to request the services of SPRINT (Special Psychiatric Rapid Intervention Team) from Naval Medical Center Portsmouth. Our tasking was to assist in training personnel assigned to Joint Task Force-160 on topics pertaining to stress management, suicide prevention, and spiritual self-care. Our team arrived on 22 January to begin our work in training, evaluating, and making recommendations to Joint Task Force-160 concerning morale, quality of life, and the psychological/spiritual issues affecting the service men and women involved in the operation. Particular attention was paid to those personnel who were in direct contact with the detainees, such as Navy medical personnel, Army Military Police guards and Marine Corps perimeter watchstanders.

Photo by PH1 Shane T. McCoy

LT Abuhena Mohammad Saiful-Islam, Muslim chaplain and Imam for the detainees.

The portion of the SPRINT training I was responsible for conducting was entitled "Spiritual Readiness/Self Care." My goal was to ensure that the spiritual needs of all personnel were met as well as to show how, in this new war, we are directly confronted with spiritual issues of good and evil, which must be effectively addressed in order to understand the insidious destructive nature of our present enemy.

At Camp X-Ray detention site, the troops were aware that the detainees being guarded were potentially dangerous and that the detention process was a necessary part of our war against terrorism. They were con-

fronted with the incongruity in seeing these same potentially dangerous individuals bow reverently in prayer five times a day and spend hours reading the holy text of the Qur'an. With the introduction of an imam to the operation, LT Abhena Saif Ul Islam, a Navy chaplain, who circulated among the troops, it became clearer to all that the problem was not the legitimate and honorable tenants of Islam but in misguided beliefs. Ultimately, as President George Bush has pointed out in numerous speeches, this is a fight against evil in our world, not against religion.

Interpreted in this way, our present situation has specific elements of a spiritual struggle which require both a spiritual and empirical understanding. It correlates with the nature of our being as body, mind, and spirit. Clearly, we know how to keep our bodies strong through exercise and to cultivate our mental capacity through academic pursuits. But what about our spiritual dimension? I believe we must exercise our spirituality in positive, healthy ways as part of our total health and emotional well-being. One cannot exist without the other.

Healthy spirituality incorporates not only positive spiritual imagery, language, and beliefs but actions which better humanity and the human condition. Its focus is on helping others rather than hurting them. It is humanitarian in emphasis and not given to gross exaggerations, extremist beliefs, or hurtful acts. Positive spirituality utilizes the precepts and ideals from spiritually healthy, faith-based, and value-based belief systems and institutions which hold in common the admonition to show dignity and respect to all people at all times.

Healthy spiritual development is nurtured through relationships which foster love, acceptance, forgiveness, and a sense of well-being. This involves connecting with others who care about us and are invested in our emotional and spiritual growth. It begins in our family of origin but can be enhanced as we go through life through participation in practices such as prayer, worship, scripture study, spirituality groups, and meditation.

As a part of my ministry, I encouraged the troops to be informed about their spiritual traditions and the practice of their faith because it can make a positive difference in all they do. My words were met with great enthusiasm. Many of the Soldiers, Sailors, Marines, and Coast Guard personnel asked about having scriptures available to read and inquired daily about the various worship services conducted throughout the base.

As special religious and cultural advisor to Joint Task Force-160, Chaplain Abhena Saif Ul Islam provided invaluable exposure, explanation, and training to the troops at every level. Additionally, the cooperative presence, availability, and effectiveness of the Joint Service and base support ministry teams, composed of chaplains, religious program specialists, chaplain assistants, and religious lay leaders underscored the principles of teamwork and cooperative pluralism among people of different beliefs, demonstrating there can be unity in diversity.

Our troops carried out their duties admirably and treated the detainees in the most humane way, exhibiting the highest respect for the differences of culture and faith. They led by example and were more powerful as a living model than anything we could have said.

Unquestionably, our armed forces and homeland security initiatives are committed to dismantling the terrorist network responsible for this present war as those responsible for the attacks on 11 September, and any other acts of terrorism, are brought to justice. As one young married Seabee told me, "Chaplain, I know I'm building these detainment units for a good cause. And God knows that these people had to be stopped. I'm going to continue to do my part so that my little girl can grow up and board a plane safely to fly wherever in the world she wants to go. That's why I'm here."

In conclusion, when I think of the impact that SPRINT had upon the young men and women stationed in GTMO, I am reminded that our success was predicated on the fact that we operated as a team in every way. By adopting a holistic approach to our training and in evaluating the needs of the troops, we were able to bring to the table the rich perspective and expertise of our various disciplines to address the needs of the whole person—body, mind and spirit.

It was an experience I will always remember, because from it I witnessed first hand the positive results that can occur when working in a highly stressful military environment with a team of exceptionally gifted individuals totally committed to professional excellence in all they do and are. The level of cooperation and professionalism at GTMO also underscored the special partnership that exists between the military medical community and the chaplain community in support of military operations throughout the fleet and the world in MTFs, on deployment platforms, and in units of all kinds. Working beside my medical colleagues at Camp X-Ray gave new meaning to Navy medicine's motto: Charlie-Papa … Steaming to Assist. ❑

CDR James is the Deputy for Pastoral Care Services and staff chaplain at Naval Medical Center, Portsmouth, VA.

Rescue at Any Depth
Navy DMOs Support Undersea Habitat

Photo by NOAA/NURC/UNCW and Mark Ward

Aquarius in Wilmington, NC, after refurbishment and just prior to relocation in the Florida Keys

CDR Ross S. Levine, MC, USN

This past year, Naval Diving and Salvage Training Center (NDSTC) and National Undersea Research Center (NURC)/University of North Carolina at Wilmington (UNCW) entered into a formal agreement whereby NDSTC provides a diving medical officer (DMO) for the medical support of saturation diving missions in the habitat *Aquarius*.

Aquarius is an underwater ocean laboratory located in the Florida Keys National Marine Sanctuary. The laboratory is deployed 3-1/2 miles offshore, at a depth of 60 feet, next to spectacular coral reefs. Scientists live in *Aquarius* during 10-day missions using saturation diving to study and explore our coastal ocean. *Aquarius* is owned by the National Oceanic and Atmospheric Administration (NOAA) and is operated by the NURC/UNCW.

When the possibility of Navy DMOs acting as the diving medical experts for some "civilian" underwater saturation missions down in Key Largo, FL, was first mentioned, I thought the likelihood of getting all the details and legal issues worked out was quite small. But with the persistence of Craig Cooper (NURC), the support of Barbara Moore and Steven Miller of UNCW, and the support of NDSTC Commanding Officers CDR Mark Helmkamp and then CDR Jon Kurtz, the proposal became a reality and a unique training opportunity.

We just completed our first season of cooperation with *Aquarius* and it was an outstanding success: seven saturation missions and seven DMOs gaining new experience in saturation diving medicine. *Aquarius*' personnel were exceptionally pleased and said, they "never were as comfortable or had such excellent medical support prior to our involvement."

Each mission is divided into three phases: training, saturation, and decompression. Every phase has its own particular medical issues that require attention and/or may be problematic. I would like to briefly discuss each of these phases.

Phase one is training. The crew prepares the habitat for the mission and the scientists are trained in standard and emergency procedures for living in and diving from the habitat. During this phase, the DMO reviews the health records and dive physicals of all potential aquanauts and determines their suitability for saturation. Our agreement requires that the diving candidates be pre-screened by NOAA/UNCW to ensure they meet NOAA standards for diving. These standards are close to the intent of Navy diving standards but may not meet their exact letter. For example, one candidate had a total hip replacement in the last year. Though probably not a candidate for Navy diving as his original problem was Degenerative Joint Disease and not Avascular Necrosis, we saw no reason to disqualify him as an Aquanaut.

There was a circumstance where one of the DMOs did disqualify a candidate. Upon screening his record and physical examination he discovered a history of 2mm ST depression on a recent exercise stress test, and a calcium CT scan which revealed 2 different 50 percent LAD lesions. The cardiologist felt his chances of a major cardiac event were "low." His exercise tolerance was adequate for routine diving. If he experienced chest

Photo by NOAA/NURC/UNCW

Aquarius is deployed at a depth of 63 feet adjacent to deep coral reefs in the Florida Keys National Marine Sanctuary

pain or an arrhythmia during a bounce dive, he could likely be surfaced quickly and treated. The same might not be true if he were saturated at 45 feet. Not only would it take 16 hours for him to surface, but, defibrillation in the habitat is not currently possible. Hence, this candidate did not saturate and the team was pleased with our decision.

Phase two is the actual saturation that lasts from a minimum of 6 days to a maximum of 14 days depending upon the mission. In this phase the scientists become saturated with air at a habitat depth of 45-47 feet (depending on tide). From here they conduct their scientific mission. This includes multiple "excursions" outside the habitat for a maximum of 360 minutes per day. Upward excursions are possible, but ascent and time are limited and generally not performed. Similar to diving from 1 atmosphere, downward excursions are limited depending upon depth.

During this phase the DMO is responsible for assuring diver fitness is maintained throughout the dive and for any medical treatment deemed necessary during the mission. While the DMO does not live in the habitat and saturate, it is during this phase that the DMO makes daily "habitat calls" to check on the aquanauts. Typical problems during this phase include treatment of cuts and bruises, upper respiratory infections, and a plague of ear infections and skin disorders secondary to the high humidity and perfect primordial petri dish conditions. Obviously, more severe problems are possible. Serious trauma or decompression illness secondary to an accidental blowup or upward excursion is possible, but not likely.

Phase three is decompression. Prior to this phase the scientific work ends and all excursions outside the habitat are completed by 1000 hours the day of decompression. Typically the DMO makes a final visit to the aquanauts for any final issues or problems. At the same time a diving medical technician (DMT) from the topside crew enters the habitat. He administers oxygen when the aquanauts begin their decompression with three 20-minute 100 percent oxygen periods, and he helps "drive" the chamber (the habitat) for the remainder of decompression. Decompression begins at 1600 and ends at 0800 the following morning—a 45-foot ascent over 16 hours. Now at 1 atmosphere in the habitat, but still 45 feet below the surface, the aquanauts re-pressurize in a short "bounce dive" back to 45 feet. Then they don scuba gear and swim to the surface.

While the DMT functions as the inside eyes and hands, it is ultimately the DMO who is responsible for diagnosis and treatment of any decompression illness that occurs while traveling back to 1 atmosphere. Due to the painstakingly slow ascent, the likelihood of barotraumas, POIS (pulmonary over inflation syndrome), or AGE (arterial gas embolism) is virtually negligible. On the other hand, Type I or II decompression illness is possible.

While research and saturation diving still takes place at the Navy Experimental Diving Unit in Panama City, FL, the Navy has not regularly been involved in platform saturation diving since the Sealab project in 1969. As a result, this aspect of diving medicine has been virtually lost from the repertoire of the current generation of Navy DMOs. (Coincidently, the Navy was involved with a 41-day saturation mission on USS *Monitor* this past summer.) The opportunity provided by our agreement with *Aquarius* is invaluable from both a professional skill and an experience point of view.

This season, we look forward to expanding our involvement with the habitat by sending additional personnel for training and support of these missions. More ambitiously, we hope this will be the beginning of a long and fruitful relationship that may be the launching platform to get the Navy involved once again with platform saturation diving. ❑

For further information about training in diving medicine or these missions, please contact Dr. Ross Levine in the medical department at Naval Diving and Salvage Training Center: 850-235-5247; DSN: 436-5247. Email: CDR-Ross.S.Levine@cnet.navy.mil.

Dr. Levine is Senior Medical Officer at the Naval Diving and Salvage Training Center, Panama City, FL.

Space is the Next Port of Call for Navy Docs

NASA Photo

CAPT Lee Morin

In this time of transition for our nation, the military has been thrust to the forefront of the news. The media routinely highlights the works of our naval forces stationed 24 hours a day onboard ships, in remote field locations, and at shore stations around the globe. But how much media coverage focuses on our shipmates training to serve in an environment considered by many to be out of this world?

For a few successful Navy professionals, their skills, career experiences, and a little luck cultivated an opportunity that most of us have probably dreamed of at some point. Their ship actually flies and their duty station is with the National Aeronautics and Space Administration (NASA).

CAPT Lee Morin, MC, CDR Laurel Clark, MC, and CAPT Dave Brown, MC, three of the Navy's finest flight surgeons, are participating in two of this year's missions with the Space Shuttle program as mission specialists.

Traditionally, the Navy's role is identified as an integral part of our national defense. Navy astronauts, however, are part of the offense due to the research they conduct as part of the space program. Much of the work done on the ground seeks to answer tough questions or find solutions to scientific problems. While all astronauts share common experiences in training, their missions, STS-110 and STS-107, have distinctly different flavors.

Brown and Clark are scheduled to launch in July aboard STS-107. During their 16-day mission, the focus will be on research and the Navy doctors will be very busy. As mission specialists, they have overall responsibility for payloads and experiment operations, as well as training in the details of the onboard systems. Their medical expertise makes them well suited to conduct what NASA refers to as "life science" experiments.

NASA will be flying bone cells and prostate cancer cells together for the first time, looking at the biochemical signals between them that enhance or are involved in the transmission of prostate cancer early and aggressively to bone. The hope is that the experiment and observation will offer an understanding of this process in order to help advance the development of a therapy. "Prostate cancer doesn't kill people, it's the bone metastases that kill people," Clark said.

Brown will spend some time conducting physical science experiments related to combustion research and soot emissions. In a microgravity environment, combustion does not act in the same way as on earth, allowing researchers a different perspective on

its basic characteristics. "In microgravity, a flame has no distinct shape, because gravity is what gives it the shape that we are familiar with," Brown explained. By studying soot emissions, researchers hope their findings help identify methods that can be used to curb their rapid expansion. "People throughout the world burn fires and our projects will hopefully help with the reduction of soot, which is a major pollutant," he said.

STS-107 will be bustling with activity for the entire duration of its mission, with many projects on board. Medical research will also look at protein turnover and calcium kinetics when humans are exposed to microgravity. Four crew members will be studied before, during, and after the flight, to try to answer the question of why microgravity contributes to bone loss.

Another medical experiment will grow stromal bone cells inside a bioreactor. This equipment is also used on earth to grow cell cultures. "The advantage of growing the cells in space is that it more closely replicates the production of cells in the human body," Clark explained. Other studies will assess the effects of antibiotics on different strains of bacteria at a cell and cell culture level.

"We will also be doing some research for a group of Dutch scientists who are trying to treat patients who have trouble with their blood pressure when they stand up," noted Brown. This condition, known as orthostatic hypertension, affects astronauts for a few hours after a flight. The Dutch scientists will examine the astronauts immediately after landing to help further their studies related to this problem.

In contrast to STS-107 and its research focus, with STS-110, Morin and other members of the crew concentrated on the continued construction of the International Space Station (ISS). Time in orbit was much shorter, with only 10 days to complete assigned tasks.

NASA Photo

CDR Laurel Clark

The STS-110 orbiter *Atlantis* spent the majority of its time in orbit docked with the ISS to facilitate the addition of new structural elements. The crew installed the first piece of a large truss that will eventually be hundreds of feet long and hold the solar arrays that provide electrical power for the station modules. This first section just fit in the shuttle's cargo bay, at about 40 feet long, and weighed about 30,000 pounds.

Installing the truss required the performance of four extra-vehicular activities (EVA) or space walks. Morin made two EVAs, installing two struts that help support the main truss. Other related tasks included installing configurations and cables along with fellow mission specialist, Jerry Ross. The EVA with Ross marked a small milestone in NASA history. "Our space walk was the first with two grandfathers," he remarked.

Working in space presents a whole new set of challenges for astronauts. Morin is quick to point out that working in microgravity does have some connections with his medical past. "It's a lot like sterile technique in the

operating room, where you have a protocol that you follow in terms of levels of protection and handling of equipment," he said. "Actions must be very disciplined, almost deliberate, even when you're getting tired."

Losing equipment while floating in space can pose a great risk to the mission. "Space debris is a real hazard, because with orbital mechanics, it may be moving away from you and a half hour later, it comes back and bangs into you," he said. "In addition, you may lose a critical tool to do your job."

To help compensate for these difficult working conditions, NASA has designed every dial, knob, and tool to be user friendly and efficient. They also acclimate astronauts to EVA-like conditions by training them in the Neutral Buoyancy Laboratory (NBL) at Johnson Space Center. The lab houses a large water tank that helps to simulate microgravity conditions, and is named after a fellow Navy flight surgeon and astronaut, the late CAPT M.L. "Sonny" Carter. "Other people who have been in space have said that you feel right at home after this training," said Morin.

Morin also continued the further development of on-orbit exercise equipment that aims to help people stay fit while living in microgravity. Additionally, he acted as the crew medical officer, tending to any medical needs that arose.

"One great challenge in rendering medical treatment in space is how the patient is restrained in a microgravity environment. To administer CPR, you basically stand on the ceiling and push down against the patient's chest," he explained.

Some may ask what the advantages of doing research in space are, especially considering that time is limited, quarters are tight and costs are high.

NASA Photo

CAPT David Brown

Brown offered some interesting insight, "Science typically tries to control variables and change one, but in microgravity you can actually eliminate some variables. By eliminating variables, it allows researchers to understand very basic fundamental physical principles and that's why you go to space," he said.

Before being assigned to a specific mission, astronauts spend years in training and evaluation. As an example, Clark, Brown, and Morin were selected as part of the 1996 astronaut class, but 2002 marked the first time any of them traveled in space. The application process includes a stack of paperwork and competition is fierce.

Naval personnel have been a large part of the astronaut program, with 96 out of 310 astronauts selected coming from the Department of the Navy, according to NASA records. Seven of those have been flight surgeons. "Navy involvement in the space program dates back to the original seven astronauts in 1959," said Duane Ross, manager of the astronaut selection office at NASA. In fact, the first American in space, the late Alan Shepard, retired as a Navy rear admiral.

When evaluating candidates, NASA looks at applicants who can bring a broad base of skills and abilities. "The thing we look at when we evaluate a candidate is good opera-

tional experience and how applicable the experience may be," explained Ross. "Just a clinician is probably not what we're looking for. Doc Brown flew jets, Laurel did a lot of work with divers, and Lee is an absolute genius and can build just about anything."

To say this trio is an accomplished group is certainly not an overstatement. Each one of them brings a diverse skill set gathered from working in very challenging environments.

Morin appears to have an insatiable appetite for education. To complement his doctorate of medicine degree, Morin's educational background includes a doctorate of microbiology and a master of public health. He is qualified as a diving medical officer as well as a submarine medical officer. During his career, Morin has developed software used in a multi-lingual voice translator and he wrote much of the 5,000 plus pages of software that STS-110 employed.

Operational experience has been familiar territory for Clark. She has been on numerous deployments, including one to the Western Pacific. Clark also spent time assigned to Submarine Squadron Fourteen in Holy Loch, Scotland. Her military qualifications are diverse, including radiation health officer, diving medical officer, submarine medical officer, as well as naval flight surgeon. Medical accomplishments include advanced trauma life support provider and hyperbaric chamber advisor.

From the time he was a young boy, Brown dreamed of flight. "I still remember my first airplane flight, watching the wheels while we rolled down the runway so I could tell the exact moment we were airborne," he noted. After joining the Navy as a physician, Brown completed flight surgeon training and spent some time on deployment in the Western Pacific. In 1988, Brown was the only flight surgeon to be selected for pilot training in a 10-year period. He graduated number one in his class and earned his designation as a naval aviator. During his career, CAPT Brown has logged over 1,700 hours in high performance military aircraft. He also owns two airplanes and operates them from an airstrip located behind his home.

For Clark, Brown, and Morin, the choice to apply to the program was natural once they found they met the criteria of a qualified applicant. "Once I was aware of the space program, it was an easy thing to apply," Clark said. For Brown and Morin, the space program was a logical transition in their careers. "I was a flight surgeon, then flew jets, so I saw the space program as the next greatest challenge," Brown explained. All three are very satisfied with their choice to join one of the world's leading scientific and operational communities. "I felt that if I had never applied, I would always wish that I had," said Morin.

As missions draw near, personal time for astronauts becomes very limited. "Once you get assigned, you set aside pretty much all of your hobbies and interests to get ready for the mission," said Morin. Clark shared an analogy that most Navy personnel can understand. "It's like the time before a deployment. You're not thinking about your recreation time or softball team."

Each had a uniquely different answer when recalling a favorite point in the training program.

• For Clark: "Going to Russia to train for weightlessness in their 0G aircraft. That was wonderful."

• For Brown: "Riding bicycles through the tulip fields outside Amsterdam during our time training with Dutch researchers."

• For Morin: "Seeing the vehicle that we were actually going to fly, climbing around on it in bunny suits, and realizing that it wasn't a model."

Although it may take years to return to space after their missions are over, the three Navy doctors look forward to the opportunity. CAPT Morin sums it up best, "We'll worry about first things first, but I hope I get a chance to go again. Right now, there are over 100 astronauts and the number of flights will only be about four per year."

The space program may seem like a lofty goal to some, but for Laurel Clark, Dave Brown, and Lee Morin, their hard work and success throughout their careers helped to open doors in ways they never imagined. "I feel very fortunate to be where I am. Some of it was due to career choices but some of it is simply good fortune," Clark noted.

When asked what advice they would pass on to Navy colleagues or anyone who might want to follow in their footsteps, one should reference the emphatic philosophy of Dave Brown for guidance. "If you get an idea in your head that there is something you really want to do, just go do it. You have to live your life today and do the things that are right for you," he said. "If the path opens up to other things, then that's great. But don't ever underestimate yourself."❑

—Story by Brian Badura, Public Affairs Specialist (MED-00P3), Bureau of Medicine and Surgery, Washington, DC.

Medical Surveillance Programs for Homeland Defense

CDR Scott Sherman, MC, USN
CAPT Robert Brawley, MC, USN
MAJ Julie Pavlin, MC, USA
CDR Brian Murphy, MSC, USN

Since the tragic attacks of 11 September, the Military Health System, civilian caregivers, and public health professionals have been given a mandate to try to enhance the nation's ability to rapidly detect disease outbreaks. Capturing health surveillance data can help to identify the "who, what, when, and where" if disease rates start to increase. Several systems are starting to emerge. Three types of these systems are currently in use in Navy hospitals and operational units and can be quickly adapted, as appropriate, to track trends in local patient populations to enhance homeland defense measures.

One of the classic problems in epidemiology is how to sort out the "normal" background rate of disease from "epidemic disease," disease that is occurring at an elevated rate in the population. Accordingly, the first three generally accepted steps in almost any epidemiological investigation are to establish a case definition, confirm the presence of the epidemic using this case definition, and then to verify the diagnosis in patients that appear to fit the case definition. As the remainder of the outbreak investigation is completed, the object is to find the key places to intervene to interrupt the outbreak. In the United States the Centers for Disease Control and Prevention (CDC) has an Epidemic Intelligence Service (EIS) that specializes in these types of "disease detective" investigations - see http://www.cdc.gov/eis/. The EIS was initially formed to prepare a cadre of public health officers to learn to sort out "man-made" versus "naturally occurring" epidemics, an important cold war concern at its founding in 1951.

Because of the nature of military service, the Navy also has a cadre of personnel that can perform these same epidemiological investigations. Preventive medicine technicians, environmental health officers, preventive medicine physicians, infection control practitioners, and infectious dis-

ease physicians have received additional training in detecting and instituting preventive measures to stop intentional or naturally occurring epidemics. Small numbers of these personnel are attached to various commands. Outside consultation can be obtained by calling the Navy Environmental Health Center (NEHC) or one of its subordinate public health units the Navy Environmental and Preventive Medicine Units (NEPMUs) located in Norfolk, San Diego, Pearl Harbor, and Sigonella. (see http://www-nehc.med.navy.mil/).

For analysis of probable epidemics, commands can directly ask for a small investigation team from their local NEPMU. If the need is for a robust capability, then OPNAV-931 can be asked to task the deployment of a Preventive Medicine Mobile Medical Augmentation Readiness Team (PM-MMART). Several of these deployable 12-person teams exist around the world and offer a comprehensive package of epidemiology, environmental health, microbiology, entomology, and industrial hygiene capability. These teams have the ability to rapidly identify a wide range of biological, radiological, and chemical threats using standard military test kits, portable mass spectrography, and polymerase chain reaction (PCR) or immunochromatographic test kits.

During our last combat campaigns in Operations Desert Shield/Storm, Navy preventive medicine personnel attached to the Marines started the modern era of disease surveillance in military units by implementing a system that was adopted by a wartime Commander-in-Chief (CINC) to monitor disease and injuries in his theater. These personnel were the first to show that disease and non-battle injury (DNBI) surveillance information could be effectively captured and used each week to guide public health interventions in a large deployed ground force. This early system used a "stubby pencil" method to capture information that was entered into a spreadsheet program and then briefed to key operational decision makers.

New patient complaints were totaled and grouped each week in each unit by "plain language" syndrome category (i.e. respiratory, diarrhea, dermatological, ophthalmologic, STD, fever, etc.). This system was the first to document the mission-aborting diarrhea and respiratory disease rates in some operational units early in the campaign. The impact of DNBI on mission readiness set the framework for subsequent line decisions to take appropriate force health protection actions and establish preventive medicine priorities of action. The success of this system in protecting elements of the 1st Marine Expeditionary Force during Desert Shield/Storm and subsequent operations in Operation Restore Hope was the basis for subsequent DNBI surveillance requirements for operational forces. The Navy physician who spearheaded these efforts, then LCDR Kevin Hanson, received the first-ever Chairman of the Joint Chiefs of Staff Award for Military Medicine from GEN Colin Powell acknowledging the importance of this medical information to line decision-making.

In response to the September terrorist attacks and the October anthrax bioterrorism events, epidemiologists at NEHC developed a modification of this operational DNBI surveillance system, called the Rapidly Deployable Surveillance System (RDSS). RDSS was designed to enable Navy MTFs to quickly establish an "active" syndromic surveillance system for acute infectious diseases that could potentially be caused by biological warfare agents. Naval Medical Center Portsmouth was the first command to implement RDSS and now has ongoing surveillance in 14 area locations. The basic approach in RDSS is to count the number of people presenting in the emergency department and the primary care clinics each day in five syndromic categories (consistently using either chief complaint or final diagnosis)—dermatological, respiratory, infectious gastrointestinal, ophthalmologic, and unexplained fever. At the end of each shift or at least once each day these numbers are tallied for each clinic and then shared with the clinic personnel and the preventive medicine department. If unusual changes are noted an attempt is then made to explain what may be happening and to alert the patient care staff to look for an explanation of the trends.

The benefit of the system is that it can be tailored to meet each hospital or clinic's needs and it provides some teaching value since it is based on the JCS-required system for certain deployed units. Its major limitation is that it requires some additional effort on the part of the infection control and preventive medicine staff to track the data, and the clinics may have to modify their patient processing procedures to effectively capture the appropriate syndromic counts.

Unknown to many hospitals and clinics in the wake of 11 September, a passive electronic data capture system called ESSENCE that had been

running in the National Capital Region (NCR) was expanded to include all DOD medical treatment facilities. The Electronic Surveillance System for the Early Notification of Community Based Epidemics (ESSENCE) was developed in 1999 by the Department of Defense's Global Emerging Infections Surveillance and Response System (DOD-GEIS) (see http://www.geis.ha.osd.mil/) in response to its mandate under Presidential Decision Directive NSTC-7 on emerging infections.

ESSENCE started with a goal of establishing a sensitive, specific, timely, standardized, flexible health indicator surveillance system for the National Capital Region. Since its implementation, ESSENCE has focused on the acquisition, statistical analysis, and posting via secure website the aggregated daily Ambulatory Data System (ADS) data from about 104 MHS primary care clinics and emergency rooms in the NCR.

Each day since the fall, expansion ESSENCE has extracted all ADS data submitted from all MTFs throughout DOD. This includes ADS data from 121 Army, 110 Navy, 80 Air Force, and 2 Coast Guard installations worldwide. For each ADS-coded visit, these records include an ICD-9 code, the date the visit occurred, the MTF, and several other pieces of information. Each of these records is tabulated by MTF, date, and "syndrome group." These procedures are performed anew daily for each MTF and for each ESSENCE-defined geo-cluster. The total count of visits for a particular day is compared to a threshold calculated from that particular MTF's or cluster's historical experience. When the count exceeds the threshold, that MTF and syndrome group is posted on the ESSENCE site. This is a secure, password-protected site that is available to appropriate medical personnel by contacting the NEHC Preventive Medicine Directorate to obtain the URL and password for ESSENCE, they can be reached at 757-953-0710/0707, the DSN prefix is 377.

At the present time, data from all MTFs are visible to all users enabling quick comparisons for similar problems in other MTFs in the same region.

ESSENCE's principal advantages are that it is currently up and running, shows data from all DOD treatment facilities (enables regional comparisons), and requires no additional "active" surveillance work to implement. Its principal limitations are that it relies on ADS data that is only as good and timely as the ADS coding and then the system process that enters them. As an example, it is possible that ADS records may not be entered until Friday, say, for visits that occurred on Tuesday, or even longer after the visits occurred. It may be that these "late" ADS records push the MTF count for several days ago over the threshold of concern resulting in a new "alert" level for the past Tuesday that may be several days delayed before it is recognized.

The third system that is currently active in two MTFs and has been involved in extensive testing in certain deployed operational units is the Medical Data Surveillance System (MDSS). This software was developed jointly by the Naval Health Research Center (NHRC) and the Space and Warfare Command Systems Center (SPAWAR) San Diego. This product draws on the same type of data as the ESSENCE system, but does it from within the MTF. For ambulatory encounters the patient identifier and the ICD-9 code are captured and mapped to a plain language category description similar to the ESSENCE system. Using signal processing approaches borrowed from quality control, sonar and infra-red imagery communities, the program detects burst and trend statistical changes in the diagnoses or numbers of patients presenting for care and then color-codes "alerts" based on the site's recent history (5-8 previous days) using a trend analysis sub-program called Dynamic Changepoint Detection (DCD) developed at SPAWAR Systems Center San Diego by Jamie Pugh.

MDSS color codes a display of the original input data based on the combined output of these statistics. Red and black coding alerts the user to the probability of a statistically significant event. Yellow coding is a caution warning that an outbreak may be emerging and should be watched. The color-coding system also marks the estimated start and end of potential events, thereby providing investigative information to the staff. In addition to these ESSENCE category maps, MDSS can "reverse engineer" an estimate of certain key symptom groups, "ill-defined" symptom clusters, and operational unit disease and non-battle injury (DNBI) category counts. MDSS also allows for 2x2 contingency table analysis, data export to a spreadsheet, and summary reporting of notifiable diseases.

The principal advantages of MDSS are its use of color-coded (based on severity of trend) automatic alerting threshold and change detection algorithms, flexibility to accept user modi-

fications, ability to adapt to SAMS or other individual clinical data feeds, ability to locally "drill down" to the individual patient encounter record, and removal of some time delay and potential firewall problems since it only operates within its MTF. Its principal limitations are that it requires additional network server capacity and a separate system install at each facility that wants to use it, reliance on ADS data mentioned in the ESSENCE limitations, and it does not allow for wide geographic comparisons between MTFs (unless their ADS data is maintained by the same computer system or is moved to a central server).

Whether your command chooses the active "shoe leather" epidemiology approach of the RDSS, the passive global online monitoring of the ESSENCE system, or the MTF-based analytic capabilities of the MDSS program, one of these methods—or some combination of them—can quickly move your MTF and Navy medicine into a key role to enhance homeland defense. Implementation of these systems now, when coupled with aggressive monitoring of sentinel laboratory results and the reporting of notifiable diseases through the local community public health system, NEHC, and your cognizant NEPMU, will give Navy medicine the information it needs to identify unusual outbreaks of natural or man-made disease at the earliest opportunity. We will then be able more effectively to target interventions to protect our patients and communities and Navy medicine's goal of Force Health Protection. If you've been looking for a legitimate medical use for those ambulatory care "bubble sheets," now you've got one! ❑

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Consolidated Medical Check-In

Putting Prevention and Readiness First

LCDR James C. Gay, NC, USN
LT Kelly Newman, MSC, USN

No one would argue that there are a lot of administrative and clinical demands placed on primary care providers and their staffs. Intended to benefit patients and clinicians, the balance between demand, readiness issues, documentation, prevention, and the patient's goals can seem contradictory and overwhelming. In addressing this apparent conflict, we developed and implemented a consolidated medical check-in process that streamlined these requirements while maintaining prevention, medical readiness, and patient centered care at the forefront.

Originating in Rota, Spain as a means of documenting new arrival screening, the check-in process at that time was primarily a means of verifying Overseas Screening. This check-in process was further developed by Naval Hospital Cherry Point and became the enrollment tool for their Family Practice Clinic.

In Okinawa the operational component and the electronic Health Evaluation and Assessment Review (HEAR) survey were added to provide a complete health maintenance process called the consolidated medical check-in. An SF-600 overprint is the documentation tool. Similar screening tools developed for units with and without the HEAR are available upon request by contacting LCDR Gay at gayjc@OKI10.med.navy.mil or LT Newman at or newmanka@OKI10.med.navy.mil.

Implemented at the Futenma Branch Medical Clinic, the consolidated medical check-in process was greeted with significant and early success. Subsequently, the process was adopted by all branch medical clinics on Okinawa as a USNH Okinawa Population Health Improvement Working Group initiative. When tailored to meet local operational requirements, this process has proven to be a highly effective tool for managing the healthcare of active duty personnel and their family members. Units have passed their Functional Area Inspections with minimal preparation, medical readiness has significantly improved, chronic medical conditions are addressed when the patient reports, and the patients are very satisfied. The following delineates this process step by step:

- All newly arriving patients are given a 45-minute Primary Care Manager (PCM) appointment as their check-in.
- New labels are printed for bar code tracking of the health record and the "full registration" and demographic information is entered into the Composite Health Care System (CHCS).
- Sections 1-7 of the Adult Preventive and Chronic Care Flow Sheet (DD Form 2766) are updated.
- The patient takes the electronic HEAR Survey. If unavailable, an interview is conducted.
- While the patient is taking the survey a nurse or hospital corpsman screens the medical record for the documented medical history, required immunizations, ongoing therapy, deficient screening exams, and required readi-

ness tests. Health record maintenance is completed and if the patient does not have a health record, one is created. Privacy acts are signed and occupational health screening reports updated.

• PCM by name and TRICARE paperwork is completed and forwarded to the TRICARE office. This is important for personnel transferring between commands on the island.

• The hospital corpsman or nurse then reviews the HEAR survey results and health record with the patient. Any deficiencies such as required labs and immunizations are corrected the same day. Patients are routed through the lab, immunizations, physical exams, audiometry, preventive medicine, and appointment clerk as indicated. These sections have been physically reorganized to streamline patient care (one stop shopping). If conditions requiring a medical officer evaluation are identified, a PCM appointment is made. If deemed urgent, the patient is seen that same day.

• The screening tool or HEAR survey is filed in the health record.

• Mandatory training in smoking cessation, environmental risk factors, STD prevention, and prophylaxis, cancer prevention, drug and alcohol dependence, and depression, is conducted and documented.

• Patients receive a tour of the clinic and are given age appropriate Put Prevention into Practice (PPIP) handouts including a list of local health resources and support groups. The patient is also informed as to clinic hours and policies as well as how to access the clinic. This includes local websites, phone systems, and appointment policies.

• The medical record is then sent to the provider assigned as PCM for review and concurrence. Based on the credentials of the provider and the health needs of the patient, the appropriateness of the PCM assignment is reviewed and corrected if needed.

• The patient is advised to schedule a regular appointment during their birth month for routine health maintenance, testing, and immunizations, referred to as their "birth month review."

• Once the check-in process is completed, the record is filed in the records room. If the patient is an active duty member, the record is reviewed by his or her unit corpsman and readiness data entered into the unit Snap Automated Medical System (SAMS).

The benefits to the unit are that personnel are always operationally "Ready" without the need for mass immunizations or catch up programs. Time away from the unit to accommodate recurring, predictable health maintenance tests, and immunizations is reduced to one visit per year. Chronic health needs are addressed when the member reports and early intervention is afforded for acute problems. Numerous health concerns were also detected that would not otherwise have been addressed.

The clinics noted that the demand for acute care decreased significantly while access to appointments as measured by TRICARE access standards increased. Episodic care decreased with pro-active and preventive care. This change in demand allowed the clinics to increase the time afforded providers for routine appointments with a significant increase in provider satisfaction. Compliance with Ambulatory Data System (ADS) coding, real time patient documentation, and provider to patient contact increased dramatically.

This highly innovative check-in process effectively marries operation and preventive health requirements and assists with the implementation of OPNAV 6210.3 PREVENTIVE HEALTH ASSESSMENT. The end result is increased operational readiness, higher quality patient visits with their PCM, and a decrease in man-hours lost to visits with medical. In addition, both provider and patient satisfaction were increased. It is anticipated that a current and accurate baseline health status will facilitate post deployment evaluations of active duty personnel.❑

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Navy Medicine in the Forgotten War

Korea 1950-1953

Part IV

CAPT Eugene H. Ginchereau, MC, USNR

The Panmunjom peace negotiations, which had begun on 25 October 1950, continued throughout much of 1952 without the resolution of seemingly irreconcilable issues. Agreements on the military demarcation line and demilitarized zone, and the repatriation of prisoners of war (POWs) remained unsettled. Of the two, the transfer of POWs was the most intractable since many of the prisoners in the United Nations Command (UNC) internment camps refused to be repatriated to North Korea. The Communists insisted on the transfer of all POWs; the UNC countered that the transfer should be voluntary. The deadlock on this issue led to a suspension of the peace talks on 28 September 1952.

The deadlocked talks coincided with the military stalemate. UNC superiority in firepower and logistics

Photos from BUMED Archives

Medical personnel provide emergency treatment to a Marine shot through the throat at a receiving hospital near Seoul.

LT J.H. Smith, DC, USN, prepares to extract a Marine officer's lower molar.

was evenly matched by Communist superiority in manpower. Each faced the other over a line that stretched across the waist of the Korean peninsula, roughly coinciding with the 38th Parallel, the pre-war partition line between North and South Korea. Neither side was willing to commit men and material to large-scale offensive operations as conducted in 1950-1951. The conflict became a war of position, a type of warfare that resembled the trench warfare of World War I. Under the direction of General Mark Clark, who replaced General Matthew Ridgway as UNC Commander in May 1952, United Nations forces executed incessant small unit actions to consolidate and protect the main battle line. These short fierce encounters with the enemy in raids on outposts, ambushes, and patrols led to many casualties in 1952.(*1*)

Marine Operations in West Korea

During March 1952, the 1st Marine Division transferred from eastern to western Korea to anchor the left flank of the U.S. Eighth Army and to block any Communist Chinese and North Korean advance on Seoul. As part of I Corps, the Division defended approximately 35 miles of frontline entrenchments. In early August, while attempting to protect the strategic positions assigned to it, the Division fought the Battle of Bunker Hill, a series of intense firefights on and around Hill 122. On 13 August 1952, the first of four hospital corpsmen to receive the Medal of Honor for heroism in western Korea was killed in action. Hospitalman John E. Kilmer died heroically protecting a wounded Marine from exploding mortar shells.(*2*,*3*)

Besides the large number of wounded Marines requiring evacuation and treatment during the Battle of Bunker Hill, Navy doctors, nurses, and hospital corpsmen were confronted with an increasing number of heat casualties. The high temperature and humidity of the South Korean summer combined with vigorous activity and use of the heavy armored vest caused many Marines to experience heat exhaustion.Despite this added risk of wearing the vests, few Marines were willing to abandon the protection that had saved the lives of at least 17 Marines in the battle.(*4*)

The Battle of Bunker Hill was followed by a period of continuous combat that lasted until November when winter forced a lull in the fighting. 1952 ended in Korea much as it had begun—stalled negotiations and stalemate on the ground.

John J. Muccio, U.S. Ambassador to South Korea (right), CAPT Edwin B. Coyle, MC, USN, commanding officer of the hospital aboard USS *Repose* (AH-16), and LT Roberta Ohrman, NC, USN, look in on a Marine patient.

Advances in Combat Casualty Care

By 1952, the men and women of Navy medicine were operating the most advanced, effective system of combat casualty care ever deployed in warfare. This achievement translated into plunging death rates for wounded Marines. In fact, the death rate of 2 percent for wounded Marines participating in the Battle of Bunker Hill was the lowest for any battle fought by the Marines since the war began.(*5*)

Many innovations in medical evacuation and treatment interacted synergistically to lower the morbidity and mortality rates of the wounded as the Korean War progressed. Helicopter transport of the wounded introduced during the first year of the war became the preferred method of evacuation from the battlefield. Most wounded Marines were able to receive definitive surgical care within 10 minutes of being wounded.

Blood for treatment of shock was available in large amounts. In October 1952, a record number of 1,328 pints was transfused. During the war, an average of 700 pints per month for every 1,000 casualties was used.(*6*)

The regimental clearing and collecting companies were converted into frontline surgical hospitals in 1952. These field hospitals operated within 4 miles of the main battle line, offering sophisticated on-call surgical procedures. Laparotomies, thoracotomies, craniotomies, and arterial repairs were routinely performed. Between 1 January 1952 and 1 January 1953, 2,247 major operations and 3,235 minor operations were completed at the front.(*7*)

The frontline surgical hospitals were supported by hospital ships—floating treatment facilities with medical and surgical capabilities equivalent to a large naval hospital. Equipped with helicopter platforms, the hospital ships, like their land-based counterparts, could expeditiously receive and treat the most complex of combat wounds. During their service in Korean waters, Navy hospital ships treated approximately 20,000 casualties.(*8*)

Surgeons became more knowledgeable and skilled in the techniques of wound care. Early debridement and delayed closure became the standard for extremity wounds. This new approach produced satisfactory wound healing in 95 percent of the cases and reduced the rate of amputation to a minimum.(*9*)

The first field vascular repair program in the history of warfare was created. The availability of fresh homologous arteries allowed vascular surgeons to repair popliteal artery injuries at the front and dramatically lower the amputation rate of legs, a common complication of these wounds. The substitution of arterial grafting of the injured popliteal artery for simple ligation reduced the rate of amputation from 70 percent or more to 37 percent.(*10*)

The management of serious head wounds became an intractable problem after the introduction of the armored vest. Marines who otherwise would have died of chest wounds were surviving and presenting to frontline surgeons with complicated neurosurgical injuries. The need for

prompt surgical intervention compelled Navy neurosurgeons to redefine combat neurosurgery by performing the most difficult neurosurgical procedures ever attempted in a combat zone.

An Election of Hope

Americans prayed that the Christmas of 1952 would be the last Christmas of the war. They were beginning to sense that the country was involved in a meaningless war that seemed to have no end. Discouragement, frustration, and anger grew as did the daily casualty count.

Disgruntlement over the impasse in Korea contributed significantly to the victory of GEN Dwight D. Eisenhower in the presidential election of November 1952. Eisenhower had promised during the election, "If elected, I will go to Korea," and he did in December 1952. With "Ike" in charge, many believed that the war would end soon.

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1. Between April 1952 and December 1952, the 1st Marine Division experienced 7,841 casualties (960 deaths). See LCOL Pat Meid, USMCR and MAJ James M. Yingling, USMC. Operations in West Korea. In *U.S. Marine Operations in Korea, 1950-1953*, V. (Washington, DC: Historical Division, Headquarters, U.S. Marine Corps, 1972), p. 573.
2. Ibid, p. 127.
3. John E. Kilmer was a distant cousin of Joyce Kilmer, the World War I poet who was killed in action 30 July 1918. See Meid and Yingling, P. 127.
4. Meid and Yingling, p. 140.
5. Ibid, p.140.
6. *The History of the Medical Department of the United States Navy, 1945-1955*. NAVMED P-5057, p. 172.
7. Ibid, p. 171.
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Marines turn captured North Korean medical equipment over to Navy medical personnel.

Navy Medicine Seeks Articles

While many quality articles are submitted to *Navy Medicine*, we are constantly looking for greater diversity. Because Navy medicine is a dynamic, changing institution, we would especially like this journal to provide an opportunity for the free exchange of ideas, opinions, and innovations. There is no one topic that assures publication, but here are some general topics we would like to see more of:

1. ***Research*** - cutting edge research of both a professional and clinical nature. We are also interested in research articles geared for the lay reader.

2. ***History*** - historical articles related to Navy medicine.

3.***Unusual experiences*** - first person accounts of current events, such as the "War Against Terrorism" or other deployments, and natural disasters. Third person accounts are also encouraged as they generally add a broader perspective. Even if these articles are not published, informative pieces will be accessioned into the BUMED Archives for research purposes.

4. ***Opinion*** - thought-provoking editorials and opinions on whatever you feel is important: for example, downsizing - how do current military reductions affect Navy medicine; the future - what does the future portend for Navy medicine (fleet health support, dependent care, TRICARE, Readiness, Optimization, Integration, etc.), and the individual corps.

5. ***Professional/Clinical articles*** - when writing professional/clinical articles, remember that the aspect of care or innovative practice should be unique or particularly relevant to Navy medicine, i.e., treatment of tropical diseases which afflict Navy personnel during deployments.

Editorial Guidelines

Text

Submissions should be 1,000 to 2,000 words double-spaced. Include a 3-1/2 inch disk in one of the following formats: WordPerfect 6.1 or Microsoft Word. Please be sure to include the full name, rank, and affiliation of all authors, a contact telephone number, military address, and email address. In the case of more than one author, please provide all of the above information for all the authors, but select one contact representative.

Illustrations

Photos should, whenever possible, be black and white 8" x 10", captioned, and with photographer noted for credit purposes.Quality photography is essential. Snapshot photos, Polaroids, or those not properly focused and exposed cannot be used. Exceptional photos related to any aspect of Navy/Marine Corps medical practice are always in demand for possible cover use. No color slides and/or large transparencies please. Digital images must be made with high resolution quality equipment. Whenever possible digital photos should be printed in hard copy format on quality photographic paper.

Tables and figures should be fully marked and camera-ready. References should be properly footnoted, and the manuscript should have a bibliography if outside sources were used. For the proper format of references and bibliographies please consult a recent copy of *Navy Medicine*. ❑

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Feature

Women's History Month Keynote Speaker is RADM Bonnie Potter

Photo by Aveline Allen

On Tuesday, 26 March, BUMED's Multinational Awareness Committee hosted its annual Women's History Month Program. The theme was "Women Sustaining the American Spirit," and the speaker was RADM Bonnie B. Potter, MC. RADM Potter is the first Navy woman physician to be promoted to flag rank.

VADM Michael Cowan, Surgeon General of the Navy, opened the program which featured highlights from the lives of four women in military history: Dr. Mary E. Walker, Virginia Hall, Dr. Edith Cavell, and Dr. Elizabeth Blackwell.

RADM Potter opened her address by pointing out that being asked to speak at women's history celebrations "is a great opportunity to learn more about our history, and the many achievements of women over the years, while also recognizing some of the obstacles they had to overcome along the road to success."

RADM Potter recalled applying for a Navy Health Professional scholarship 30 years ago and looking forward to going to sea as a general medical officer as her father had done in World War II, only to find upon graduation in 1975 that because of her gender she was ineligible to serve aboard ship. She also spoke of her concern whether a career for her as a female Navy physician was even possible.

Dr. Potter went on to profile some women who were ground breakers in the military:

Deborah Sampson, who disguised herself as a man and joined the Continental Army during the Revolutionary War. Sampson enlisted under the name of Robert Shirtliffe, served for 3 years, and was wounded twice, caring for her own wounds to avoid detection. Only after she contracted brain fever and was rendered unconscious did a physician discover her true gender. To protect her secret, he cared for her in his own home. Years later, a special bill was passed awarding Sampson a pension for her services as a revolutionary soldier.

Then there is the story of the legendary Lucy Brewer, who is said to have been the first woman Marine. A Massachusetts farm girl who ended up in Boston during the War of 1812. Brewer was inspired by the Deborah Sampson story. She also disguised herself and joined the Marine Corps as George Baker, serving on the USS *Constitution* and participating in some of the bloodiest sea battles of the war.

Dr. Potter spoke of Dr. Elizabeth Blackwell, the first woman to receive a medical degree in the U.S., and Dr. Mary E. Walker, only the second woman to graduate from a U.S. medical school. Unable to join the Union Army as a physician during the Civil War, Dr. Walker enlisted as a nurse. Two years after her enlistment, she was finally granted assistant surgeon rank, becoming the first female medical officer. Dr. Walker was awarded the Medal of Honor for her Civil War service.

There was not much advancement for women in the military until after 1900. Dr. Potter pointed out that significant strides were made with the creation of the Army Nurse Corps in 1901 and the Navy Nurse Corps in 1908. In her own experience, at least, she didn't have to pretend to be a man or serve as a nurse, despite the fact that the doctor's lounge in one treatment facility where she worked was actually the men's room.

Change took a huge leap in 1972 when Chief of Naval Operations, ADM Elmo R. Zumwalt, Jr., issued his Z-Gram #116 which stated: "My position with respect to women in the Navy is that they have historically played a significant role in the accomplishment of our Naval mission. However, I believe we can do far more than we have in the past in according women equal opportunity to contribute their extensive talents and to achieve full professional status. Moreover, the imminence of an all volunteer force has heightened the importance of women as a vital personnel resource. I foresee that in the near future we may very well have authority to utilize officer and enlisted women onboard ships."

The Navy has not been the same since, nor will it be again. Zumwalt authorized:

- command ashore for women.
- the entry of enlisted women into all ratings.

• assigning a limited number of women to the USS *Sanctuary* (AH-17) as a pilot program.

• accepting applications from women officers for the Chaplain and Civil Engineer Corps.

• directing increased opportunity for women's professional growth by directing the assignment of women to the full spectrum of billets.

• equalizing the selection criteria for naval training by opening midshipmen programs to women at all NROTC campuses.

• the selection of women to the National War College and Industrial College of the Armed Forces.

But the most dynamic impact of Z-Gram #116 was that its ultimate goal was the assignment of women to ships at sea. Since that day, the destiny of women in the Navy has traveled forward, if not in leaps and bounds, steadily with major milestones:

• In 1973 CAPT Alene Duerk, Director of the Nurse Corps, became the first woman to be promoted to flag rank.

• There are now 270 female Navy pilots, with over 7,000 women in aviation ratings.

• Women now attend the Naval Academy.

• Over 20,000 women are now assigned to 150 ships.

• Women are now selected for command at sea and assigned to combatant ships.

• Women now comprise 14.6 percent of the active duty Navy force.

When Dr. Potter is asked about her secret to success, she likes to refer to GEN Colin Powell's now famous response: "There are no secrets to success. Don't waste your time looking for them. Success is the result of perfection, hard work, learning from failure, loyalty to those for whom you work, and persistence."

Dr. Potter doesn't measure success by rank or position, but rather by doing the best we can and liking ourselves in the process. Success is measured by demonstrating honesty, integrity, and commitment. Success is assured when we don't wait for things to be handed to us but by "blooming where we are planted" and walking through the door of opportunity when it opens. Success means doing the right thing in the face of adversity and finding balance in our lives. But most importantly, Dr. Potter defines success not as a destination but an unending journey.—JMH

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In Memoriam

RADM Walter Welham, MC, USN (Ret.), who served as executive director of the Association of Military Surgeons of the United States (AMSUS) from 1970 to 1984, died 24 March 2002. He was 94.

A native of Philadelphia, PA, Dr. Welham attended the University of Pennsylvania, and in 1935 graduated from Temple University Medical School. He entered the Navy Medical Corps in August 1936 and was assigned to Naval Hospital Philadelphia.

Beginning in January 1939, RADM Welham instructed submarine medicine courses at the Deep Sea Diving School, Washington, DC. He next served as medical officer on the staff of Commander Service Squadron SIX. In July 1941 he reported as assistant medical officer with the Experimental Diving Unit, Washington, DC, where he was on duty when the United States entered World War II.

During World War II, RADM Welham served in both the Pacific and Atlantic theaters as a senior medical officer. In the closing years of the war he reported as medical officer on the staff of Commander Submarine Force, U.S. Pacific Fleet.

Other tours of duties included medical officer on the staff of Commander Submarine Force, U.S. Pacific Fleet and U.S. Atlantic Fleet, and senior medical officer at the U.S. Naval Academy, Annapolis, MD.

On 16 August 1963 Dr. Welham became Assistant Chief of the Bureau of Medicine and Surgery for Research and Military Medical Specialties. In October 1964 he assumed duty as Fleet Surgeon on the staff of the Commander in Chief, U.S. Pacific Fleet.

In 1970 RADM Welham was elected to direct AMSUS, an organization established in 1891. He held that post until 1984.

RADM Welham's awards include the American Defense Medal; campaign medals for the Asiatic-Pacific Theater with campaign star, and the European-Mediterranean Theater; World War II Victory Medal; National Defense Medal; and the Legion of Merit.—ABS

BUMED Archives

Bertha Evans St. Pierre (right) and Margaret Nash celebrate their liberation in March 1945.

And Then There Were None

CAPT Bertha Rae Evans St. Pierre, NC, (Ret.) died on 22 October 2001, shortly after celebrating her 97th birthday. She was the last survivor of the 11 Navy nurses held captive by the Japanese in the Philippines during World War II.

CAPT St. Pierre graduated from Good Samaritan School of Nursing and joined the Navy 4 years later upon the recommendation of her brother E.E. Evans, a Navy doctor. After a 6-month indoctrination program at Naval Hospital Mare Island, CA, that consisted of on-the-job-training with a senior nurse on one of the hospital's wards, she did a 2 year stint at Naval Hospital San Diego. She then entered The George Washington University, Washington, DC, to study nutrition. While on assignment at Naval Hospital Cañacao, the Philippines, St. Pierre and 11 other Navy nurses soon found themselves at war. On 10 December, the Cavite Navy Yard was bombed to rubble and she and the entire hospital staff worked day and night to treat hundreds of civilian and military casualties.

After the Japanese captured the Philippines, St. Pierre and 10 of her fellow Navy nurses became prisoners of war and were interned at Santo Tomás and then Los Baños prison camps for 3 arduous years.* Despite the lack of food and medicine, she continued to work in the prison hospitals treating many fellow internees until the Los Baños prisoners were liberated in a dramatic rescue in February 1945.

Following liberation, St. Pierre returned home and remained in the Navy, retiring in 1955.

She subsequently married and moved to Portland, OR, to be near her family.

Like her fellow nurse POW comrades, Bertha Evans St. Pierre survived her captivity because she never lost sight of her mission—to care for her patients regardless of the circumstances. Following World War II, former Navy Nurse Corps Superintendent, CAPT Sue Dauser, said of St. Pierre: "Every nurse I have spoken with who was imprisoned with her never misses an opportunity to speak of their admiration. She seems to have been the one person who has won the hearts of them all."

CAPT St. Pierre was awarded the Bronze Star for her World War II service.—ABS

*LT Ann Bernatitus made it to Bataan and was successfully evacuated from Corregidor before the island fell to the Japanese. She was the only Navy nurse in the Philippines to elude capture.

Book Review

The New Biological Weapons: Threat, Proliferation and Control by Malcolm Dando. Lynne Rienner Publishers. London, United Kingdom, 2001. 181 pages.

Many current books on biological and chemical weapons typically devote a single chapter to the future of weapons of mass destruction. This book looks at the theoretical aspects of bio-weapons research that could have an impact in the future.

Dr. Dando is a professor of international security at the University of Bradford in the United Kingdom. Although his specialty is international relations and arms control, he received his undergraduate degree in biology. He has had a lifelong interest in chemical and biological weapons (BW), writing two previous books, *Biological Warfare in the 21st Century* in 1994, and *A New Form of Warfare* in 1996. With a grant from the United States Peace Institute, this third book explores a new generation of biological weapons. These are agents that not only target bio-regulators within the human body controlling respiratory rate but also disrupt nerve transmitters that control information and responses emitted from the brain and spinal column.

The author also discusses dual use technology such as the quest by pharmaceutical companies to find efficient means of delivering medicine aside from injection. This has led to comprehensive research into the manufacture of drugs to be inhaled and absorbed through the lungs. The bio-weaponeer is not far behind actual developments in medical science. Delivering life-saving drugs effectively by inhalation also means an opportunity to develop a BW agent that is efficiently absorbed through the lungs. There are many current forms of BW that cause harm only if inhaled. The book contains many examples of dual-use technology, so a nation claiming to open a factory to develop pharmaceuticals also has the technology to mass-produce BW agents.

Mapping the human genome (DNA) opens the door to curing diseases prevalent in certain ethnic groups. It can also stimulate research in ethnic BW weapons as a means of conducting ethnic cleansing.

The first chapters look at a historical development of two types of BW—toxins and bio-regulators. Among the items highlighted is the search for an agent that is easy to produce and store, is robust upon dispersal, and has known predictable effects on the victim. The United States found two toxins that met these characteristics *botulinum toxin* and *staphylococcal enterotoxin B* (SEB). Botulinum is a killer and SEB an incapacitator. Research on these substances began as early as 1943.

The United States abandoned its BW program in the 1970s but third world nations intent on a BW program have seized upon both this research and that done by the former Soviet Union, providing these nations with a head start; many technical problems have already been overcome. In 1991 a UN Special Commission report on Iraq found 122mm rocket and artillery shells along with Al-Hussein missile warheads filled with botulinum, anthrax, and aflatoxin.

The research in botanical bio-regulators emerged from studying plant defoliant during the Vietnam War. Basic herbicides could be developed to target plant hormones that stimulate stem elongation, cell division, and growth, as well as germination of seeds.

This new realm of potential research in BW using genetic engineering is of grave concern. The author points to a U.S. Defense Department technical annex located in the 1997 publication *Proliferation: Threat and Response* to further articulate this point. While mentioning classic BW agents of concern, it highlights the enormous potential of altering this technology with the use of modern molecular biology. Among the set of new agents that could be produced through advances in genetic engineering are: micro-organisms resistant to antibiotics, standard vaccines and therapy; micro-organisms with enhanced aerosol and environmental stability; and immunologically altered micro-organisms able to defeat standard identification, detection, and diagnostic methods.

The author cites the writings and lectures of Soviet defector Ken Alibek, former head of the Soviet BW program. Alibek attended a 1989 meeting in which a speaker announced successful animal trials of inserting a myelin toxin in a bacterial host. The infected animal developed both the disease and a paralysis resulting from the toxin attacking the myelin sheath around the nerves. A single genetically engineered agent had produced the symptoms of two different diseases, one of which could not be traced.

The book continues with potential research in altering human bio-regulatory peptides that control blood pressure, respiration, body temperature, and a dozen other functions. Although in a theoretical and research stage as far as BW development, the Canadians have expressed concern regarding former Soviet experimentation in this field. Malcolm Dando points out these potential misuses of biological technology and the drive by unstable regimes to develop such weapons. He highlights Iraqi interest in ethnic weapons and postulates the fixation with aflatoxin as a means of causing long-term liver damage to the Kurds—a form of primitive and subtle ethnic genocide. The final chapter makes a compelling argument regarding the inadequacies of current arms control treaties. Such agreements have not kept pace with technological development, thus making the complex issues of enforcement even more challenging. ❑

—LT Aboul-Enein is studying at the Joint Military Intelligence College in Washington, DC. He is a designated Middle East Foreign Area Officer.

Navy Medicine 1945

Photo courtesy of LT Youssef H. Aboul-Enein, MSC, USN

With the battle for Okinawa not yet won, a wounded Marine is transferred from jeep ambulance to a waiting "grasshopper" aircraft for evacuation.