

# Outlook

Naval Medical Research and Development Command



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## CDR ANGUS RUPERT (NAMRL) WINS FY95 ACCELERATED RESEARCH INITIATIVE AWARD

On 4 March 1993, a distinguished panel of scientists met at NMRDC to review four research proposals competing for FY95 funding as a 6.1 Accelerated Research Initiative (ARI). The panel was chaired by Robert Shope, M.D., head of the Arbovirus Research Unit at Yale University. The panel members were Robert Kennedy, Ph.D., Essex Corporation; Robert Sheridan, M.D., Shriners Burns Institute; Geoffrey Duyk, M.D., Ph.D., Harvard Medical School; Yvonne Maddox, Ph.D., National Institute of General Medical Sciences; John L. Ferguson, Ph.D., Armed Forces Radiobiology Research Institute; and Joel L. Davis, Ph.D., Office of Naval Research.

These experts were challenged with judging the proposals' scientific quality and recommending one as NMRDC's FY95 ARI. After studying the written proposals, listening to the four individual investigator's oral presentations, and asking the investigators clarifying questions, the panel chose Dr. Rupert's proposal, "Virtual Environment Displays in Acceleration Environments," and recommended a three-year, \$550K per year award.

### Virtual Environment Displays in Acceleration Environments

Virtual environments are synthetic environments that can be influenced by the interactions of the user; for example, a pilot might control the motion of remote physical objects or influence the events of a flight simulation. The military is interested in this technology for uses including flight training, wrap-

around displays in vehicles shielded from hazardous external environments, and control displays for telerobotic vehicles.

The concern addressed in Dr. Rupert's proposal is that human perceptual and motor responses may be very different in virtual-*dynamic* environments than in virtual-*static* environments (the standard condition for virtual

Cont. on page 3

## NEXT ARI AWARDS

The next ARI awards will be made in FY94 for funding beginning FY96.

In response to requests from a number of investigators, the ARI schedule will be as follows.

ARI preproposals (1-3 pages) will be due 1 July 1993.

NMRDC's selection of preproposals to be developed into full ARI proposals will be announced on 1 August 1993.

Full ARI proposals will be due on 15 December 1993.

The ARI competition will be held in early March 1994.

For more information on the next ARI award contact Ms. Chris Eisemann, Associate Director for Research Management commercial 301-295-0882 or DSN 295-0882.

## "... FROM THE SEA" Preparing For The 21st Century

On September 28, 1992, SECNAV, CNO and CMC signed a new Navy and Marine Corps policy paper which describes the Naval service's preparation for the 21st century. The strategy entitled "... From the Sea," was developed in response to the challenges of today's world. It shifts the focus from a global threat to a focus on regional challenges and opportunities. The new direction is structured to provide the nation with naval expeditionary forces operating forward from the sea, shaped for joint operations and tailored for national needs. This new strategy is a fundamental shift from open-ocean warfighting on the sea toward joint operations from the sea.

### Naval Expeditionary Forces

The restructured naval force must expand on and capitalize upon its traditional expeditionary roles. Naval expeditionary forces operating forward are swift to respond, on short notice, to crises in distant lands and are structured to build

power from the sea when required by national demands. Additionally, naval expeditionary forces are able to sustain support for long-term operations and are unrestricted by the need for transit or overflight approval from foreign governments in order to enter the scene of action.

### Shaped for Joint Operations

The Navy and Marine Corps are full partners in joint operations. As a highly sustainable force on scene, a naval force commander can contribute to the team concept by commanding the joint task force while the operation is primarily maritime and shift that command ashore at the discretion of the Unified Commander.

### Operating Forward

Naval forces operate forward to project a positive American image, build a foundation for viable coalitions, enhance diplomatic contacts, reassure friends, and demonstrate U.S. power and resolve.

Naval forces also contain crises through forward operations and rapid response with flexible and sustainable sea-based forces. If diplomacy fails, Naval forces can project U.S. combat power as required, but, if diplomacy prevails, Naval forces can withdraw without action or build-up ashore.

### Tailored for National Needs

Response to crises in the future will require great flexibility and new ways to employ our forces. Naval forces can continuously be tailored making "Expeditionary Force Packages" appropriate for the situation. The key is continuously tailoring our forces to anticipate and support national needs. The new direction of the Naval services signals major change in doctrine and philosophy.

Naval forces must be capable and affordable, supported by relevant concepts, doctrine and training. These changes will refine and implement the operational capabilities of expeditionary warfare so Naval forces can provide our Nation's leaders with a full range of options from humanitarian assistance to projecting massive combat power ashore.

The complete text of the Navy document, "... From the Sea," is available electronically through various bulletin boards. By electronic mail send your request via E-mail to Navy News Service at NCTAMSLANT.NAVY.MIL, and include your Defense Data Network or InterNet address (for more information call DSN 565-1038). Another way is by downloading from the "articles" or "miscellaneous" file areas of the CNO Bulletin Board. Registration is required to gain access to the CNO Bulletin Board. The modem numbers for the CNO Bulletin Board are 800-582-2355, 800-582-6940, 703-695-6198 or 703-695-6388 (For more information call DSN 225-5471).

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## ARI AWARD

environment testing). Initial studies indicate that using virtual reality displays under multiple acceleration forces distorts a pilot's perceptions of orientation and velocity. In order to develop techniques to minimize the distortions, this research will identify the conditions of the misperceptions and then identify parameters that cause these illusions.

### Navy Needs

Comments from *Navy Needs* experts indicate that addressing this problem is both important and timely. *This technology will increase exponentially in Naval aviation. Unless we fully understand the effects, we could wind up with very costly losses...the problem is very real and represents a present and future deficiency in our knowledge base.* [Note: Navy needs for all proposed research were ascertained by consulting medical and operational needs experts at BUMED, ONR, ONT, OAT, and NAVAIR. Much thanks to COL "Rusty" Rusthoven, ONR's USMC liaison, for coordinating this operational review.]

CDR Rupert's proposal is an excellent ARI investment. The advent of virtual reality technology and its projected outyear use in the Fleet make **now** the time to do this basic research. The work will have a dual use benefit for the Navy, DoD, NASA, and the civilian sector, with payback to the Nation in both wartime and peace.

This proposal ties directly to the DoD's recently announced S&T (see page 4) thrust in "Synthetic Environments" and will be closely coordinated with the Naval Safety Center, the Naval Training Systems Center, and NASA.

## VIEW FROM THE TOWER

by CAPT Edward T. Flynn, NMRDC Commanding Officer

**Will Rogers once said, "Even if you're on the right track, you'll get run over if you just sit there." That certainly seems to be the case today. The new administration and the forces of downsizing and budget cutting have changed our operating environment dramatically. I want to share a few of the high points with you.**

### The New Science and Technology Policy

President Clinton has emphasized three points. (1) Funding for science and technology will be preserved. (2) Programs that invest in dual use technologies will receive funding priority. (3) Domestic technology transfer is the name of the game.

We are in good shape. More than 80% of our funding is considered to be science and technology, (6.1- 6.3A). Almost all medical research by definition is dual use, it can be used equally by the civilian and military communities. And NMRDC is a leader in domestic technology transfer. We have more cooperative research and development agreements per dollar of funding than any other DOD or Government agency.

### The Budget Realities

The Navy will cut the budget by \$3 billion in FY94. The current plan is to reduce operations, mothball ships, close bases, and reduce the active duty force by approximately 10%.

For research and development, the strongest pressure will come on the 6.3B and 6.4 development accounts, but we have to expect some reductions in the science and technology accounts as well. Some of the out-year adjustments are already being made. For some, our reclamation has been accepted and the funds restored; for others not so; and for still others (for example inflation readjustment) no reclamation is possible. On the personnel side, our current FY94 projection is the loss of 14 officer and 18 enlisted

billets. So far the facilities picture looks bright. It's too early to predict what impact BRAC-III will have on NSMRL and NHRC, if any. Meanwhile, under BRAC-II plans are still in place for 100,000 square feet of new construction at NMRI and NDRI.

### Tri-Service Consolidation

With budget and personnel cuts looming on the horizon, it's only natural to think of preserving mission capability by consolidating and reducing overhead costs. Consequently, despite the ongoing success of Project Reliance, there is renewed discussion within DOD of a single Tri-Service medical research and development organization.

We are actively participating in these discussions to ensure that Navy needs and interests are preserved. As a result of our prior involvement with planned consolidation under the Assistant Secretary of Defense for Health Affairs, the DOD decision makers are very familiar with the strengths and versatility of our system. This has been strengthened by our outstanding success with the Joint Forward Laboratory (JFL) during Operation Restore Hope in Somalia. The JFL's efforts held the disease rate in our forces to an unbelievable low value.

With our on going strategic planning efforts, I am confident that we will make these new consolidation initiatives work to our advantage.

To sum up, I believe we are on the right track. But we need to remain flexible and keep moving if we expect to stay out ahead.

# THE NEW SCIENCE AND TECHNOLOGY STRATEGY

## Seven Thrusts Areas

by CAPT R.C. Carter, MSC, USN, NMRDC Director of Research and Development

The following is guidance from the Director, Defense Research and Engineering, Office of the Secretary of Defense. The Science and Technology (6.1- 6.3A RDT&E Program Elements) Program is focused on seven broad areas of capability.

These areas emphasize the need to minimize casualties, accommodate to a smaller force structure, improve joint operations, and retain the technological edge against all

potential threats. While there are other goals and activities that fall outside of these seven thrust areas, it is important to focus the science and technology program on those efforts which are most important, rather than simply provide a 'balance' across all possible investment options. Focus, not balance, is the watchword of the new science and technology strategy.

The seven thrusts represent the current assessment of the demands being placed on the Science and Technology Program by the users' most pressing military and operational requirements.

As national security requirements, operational needs, and technology evolve, additional thrust areas could be added and existing thrust areas might change. The planning process is a flexible one.

### The Seven Science and Technology Thrust Areas

#### Global Surveillance and Communications

The ability to project power requires a global surveillance and communications capability that can focus on a trouble spot, surge in capacity when needed, and respond to the needs of the commander.

#### Precision Strike

The desire for reduced casualties, economy of force and fewer weapons platforms demands that we locate high-value, time-sensitive fixed and mobile targets and destroy them with a high degree of confidence within tactically useful timelines.

#### Air Superiority and Defense

The need to defend deployed military forces, and help defend allies and coalition partners from the growing threat to high performance aircraft and ballistic and cruise missiles, and the need to maintain decisive capabilities in air combat, interdiction, and close air support require a strong effort in missile defense and air superiority.

#### Sea Control and Undersea Superiority

The ability to maintain overseas presence, conduct forcible entry and naval interdiction operations, and operate in littoral zones, while keeping losses to a minimum, presupposes a strong capability in sea control and undersea warfare.

#### Advanced Land Combat

The ability to rapidly deploy our ground forces to a region, exercise a high degree of tactical mobility, and overwhelm the enemy quickly and with minimal casualties in the presence of a heavy armored threat and smart weaponry requires highly capable land combat systems.

#### Synthetic Environments

A broad range of information and human interaction technologies must be developed to synthesize present and future battlefields. We must therefore synthesize factory-to-battlefield environments with a mix of real and simulated objects and make them accessible from widely dispersed locations. Integrated teams of users, developers, and/or testers will be able to interact effectively. Synthetic environments will prepare our leaders and forces for war and will go with them to the real battlefield.

#### Technology for Affordability

Technologies that reduce unit and life cycle costs are essential to achieving significant performance and affordability improvements. Manufacturing process and product performance issues are integral parts of the program. Advances are particularly needed in technologies to support integrated product and process design, flexible manufacturing systems that decouple cost from volume, enterprise-wide information systems that improve program control and reduce overhead costs, and integrated software engineering environments.

## Office of Naval Research NEW MISSION FOR OUR MAJOR SPONSOR

by CAPT R.C. Carter, MSC, USN, NMRDC Director of Research and Development

**"Support of Generic Industrial Technologies is a Primary Mission". Quote attributed to Clinton Transition Team and posted outside RADM Miller's door at the Office of Naval Research.**

This quote represents a radical change from the traditional Office of Naval Research (ONR) mission supporting academic basic research. What is desired now is research and development that creates jobs through technological innovation, reduces health care costs, improves productivity, contributes to the economic infrastructure of the United States, gives a rational basis for investing scarce resources in limitless alternatives for occupational and environmental health, provides a military force multiplier, and limits military casualties.

The NMRDC laboratory system is uniquely situated to respond actively to ONR's mission. Current research and development efforts reflect a long standing relationship between NMRDC and private industry. Through research sponsored by ONR, NMRDC has managed industrial participation through Advanced Technology Demonstrations in such areas as Liposome Encapsulated Hemoglobin, Wound Healing, and Freeze-Dried Blood. NMRDC's Broad Agency Announcements and Small Business Innovation Research Programs are other opportunities for support of industrial technologies.

NMRDC currently manages projects dealing with manufacturing technology (perfect-fit replacement teeth), industrial productivity (pilot selection), biotechnology applications (DNA amplification for transplant donor matching or identification of biological samples), and the development and testing of high-risk industrial technologies (vaccines, pharmaceuticals, diving decompression schedules, blood substitutes, a national marrow donor registry, non-invasive clinical

chemistry, resuscitation fluids produced on site from concentrates).

NMRDC's research on radiofrequency radiation bioeffects has affected the voluntary consensus of industrial standards for worker exposure. Epidemiological research (HIV, occupational/ environmental health) has been a unique contribution which has guided wise governmental and industrial investment decisions.

**The Navy Medical Research and Development Command is a leader in industrial technology sharing, with 19 Cooperative Research and Development Agreements in place and eight more in negotiation.**

In the context of this new mission for our major sponsor, every Navy medical research and development laboratory should strive to develop Cooperative Research and Develop-

ment Agreements. Patents and licenses on technologies previously patented should be a priority. Where there is benefit from doing so, NMRDC laboratories should collaborate with NMRDC industrial contractors, coordinated by the Research Area Managers.

Research Area Managers will continue to develop extramural programs with industrial performers who can do dual-use research and development that is relevant to the military and would not be supported by other funding sources (due to Navy-uniqueness, technology risks, lack of commercial incentives, or market gestation).

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**It has been said that luck is where opportunity meets preparation; if so, NMRDC is lucky indeed!**

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### **NAMRL'S NEW COOPERATIVE RESEARCH AND DEVELOPMENT AGREEMENT**

The Naval Aerospace Medical Research Laboratory (NAMRL), Pensacola, FL, has entered into a Cooperative Research and Development Agreement (CRADA) with Maxwell Safety Products, Ltd., of Smithtown, NY. This action is taken under the authority of the Federal Technology Transfer Act of 20 October 1986.

Under this CRADA, Maxwell Safety Products, Ltd. and the Bioengineering Division of NAMRL are working together to perform highly specialized tests regarding the effectiveness of

NAPTEX<sup>TM</sup> Radiofrequency Radiation (RFR) Protective Suits. Using the uniquely valuable "human-equivalent" model developed by NAMRL, a series of irradiation tests will measure specific absorption rates (a measure of energy absorption within the human body).

Reliable RFR Protective Suits are products that have been long-awaited and anticipated by industries that use RFR technology. The principal investigator for NAMRL will be Dr. Richard G. Olsen, Head, NAMRL Bioengineering Division.

## **NMRDC'S ISSUED PATENTS**

### **ELECTROMAGNETIC WARMING OF SUBMERGED EXTREMITIES**

Patent # 5,160,828

#### **Inventor**

**Dr. Richard G. Olsen**

This patent covers a device encompassing and warming the extremity of a worker in a cold wet environment. The device can take the form of a glove, sock and/or arm and/or leg warmer. The device contains a coil surrounding the extremity. The coil forms an envelope surrounding each extremity and each digit of an extremity. A water free, radio frequency (RF) transmitting zone encompasses the coil envelope. The coil, extremity and RF transmitting zone combine to provide a resonant frequency with the operating frequency with which the coil is driven. The combination warms the interior of the extremity. The RF energy is provided from a source carried at some other point on the subjects body. The entire combination on each extremity and the power source can be encompassed in a shield layer which absorbs or reflects RF energy into the extremity.

This patent is in the last stages of negotiations for a license.

### **A SMALL, SIMPLE, AND COST-EFFECTIVE SCHEINER-PRINCIPLE OPTOMETER WITH COMPUTER INTERFACE FOR AUTOMATED ASSESSMENT**

Patent # approved, pending

#### **Inventor**

**Dr. William B. Cushman**

The patent covers a Scheiner-principle optometer for automated assessment of accommodative state. The specific advantages of the instant invention over earlier ones are: (a) simplicity of design, (b) hand held, portable implementation, (c) light weight, (d) small size, (e) low manufacturing cost, and (f) the use of a monochromatic light source to eliminate the effects of chromatic aberrations to the subject's eye.

### **IMMUNO-DYE REAGENT AND ASSAY FOR DETECTION OF ENDOTOXIN**

Patent # 5,093,235

#### **Inventors**

**Dr. Taffy J. Williams  
Dr. Lee R. Che-Hung  
Akindele O. Johnson**

A novel immuno-dye reagent capable of detecting the presence of endotoxin in samples has been developed. The immuno-dye reagent comprises a solution of new methylene blue and an anti-endotoxin monoclonal antibody specific to a selected endotoxin. The immuno-dye reagent can be used in an assay to detect endotoxin by reacting the immuno-dye reagent with an endotoxin suspect pH adjusted sample, under hydrophobic conditions.

### **PROTECTIVE FOUR AMINO ACID EPI TOPE AGAINST PLASMODIUM VIVAX MALARIA**

Patent # 5,095,093

#### **Inventors**

**CAPT Stephen L. Hoffman  
Dr. Yupin Charoenvit  
LT Trevor R. Jones**

A synthetic peptide of the human malaria *P. vivax*, containing at least one repeat of a synthetic peptide having the amino acid sequence Ala-Gly-Asp-Arg (AGDR) which is a protective epitope found on the circumsporozoite (CS) protein of the sporozoites of the human malaria *P. vivax*. When a monoclonal antibody specific for this four amino acid sequence binds to the CS protein of the *P. vivax* sporozoite in vivo, infection is prevented. Also described are pharmaceutical formulations of these peptides.

### **SYSTEM AND METHOD FOR QUANTIFYING MACROPHAGE PHAGOCYTOSIS BY COMPUTER IMAGE ANALYSIS**

Patent # 5,162,990

#### **Inventors**

**Dr. Charles O. Odeyale  
Dr. Gregory R. Hook**

A method for rapidly quantifying phagocytic functions using computer image analysis. The method and algorithm involve sequential acquisi-

tion of bright field or phase contrast and epi-fluorescence video microscopic images of respective field, addition of the images, decision making, object referencing, morphological feature extraction, arithmetic operations, and statistical analysis. This invention provides significantly faster phagocytic functions analysis than manual microscopic examination and more detailed quantitative morphological data than flow cytometry.

### **PROTECTIVE MALARIA SPOOROZOITE SURFACE PROTEIN IMMUNOGEN AND GENE ENCODING**

Patent # 5,198,535

#### **Inventors**

**CAPT Stephen Hoffman  
Dr. Yupin Charoenvit  
LCDR Richard Hedstrom**

A protein antigen (SSP2) on the surface of *P. yoelii* sporozoites is disclosed as a candidate immunogen for vaccination against human malarial species. The use of this protein, which is distinct from the extensively characterized circumsporozoite (CS) protein, will also facilitate research into host immunological responses to malaria.

### **A MEMBRANE BASED DOT IMMUNOASSAY AND METHOD OF USE**

Patent # 5,200,312

#### **Inventor**

**Dr. John J. Oprandy**

Antigens or antibodies are detected using a novel membrane based immunoassay. Known antigens or antibodies which will form complexes with antigens/antibodies to be assayed are spot filtered with pressure through a membrane. The membrane, either by itself or attached to a base material as a test strip, is incubated with a test fluid. Consequently, the resulting antibody-antigen complex is incubated directly or after an intermediate anti-antibody incubation with enzyme conjugated immunoglobulin and exposed to substrate which produces a colored insoluble product if the test target is present.

# OWNERSHIP OF INVENTIONS MADE WHILE WORKING FOR THE GOVERNMENT

by A. David Spevack, NMRDC Intellectual Property Counsel

**In the recent case of FilmTec Corporation v. Hydranautics, a dispute arose over who owned an invention - the company that employed the inventor when the invention was conceived, or the inventor himself who perfected the invention after leaving the company.**

In the facts of that case, a researcher working under a government supported contract for Hydranautics conceived, and began work on an invention. After building the first embodiments of the invention, he left Hydranautics to start FilmTec Corporation.

At FilmTec he reproduced the experiments he had started under the government contract and went on to patent the invention in the name of his new company. In a lawsuit against Hydranautics, the Court of Appeals for the Federal Circuit said that it would be improper to put a narrow view on the title obtained to an invention. The Court held that the date of conception should be used to determine title to an invention, and that the broad concepts of this invention were made while the inventor was working at Hydranautics.

This meant that Hydranautics held title to the invention, while the government had a license to practice the invention by virtue of its contract with Hydranautics.

These facts apply to any person working for the government. Any invention that you either conceive of, or actually put into practice, while working for the government that relates broadly to the type of work you were hired to do, belongs to the government.

You are required to file an invention disclosure with the government and allow the government to make a determination of interest and rights. If the government declines to pursue the filing of an application, you may file at your own expense. If time is of the essence, it is a quick and easy procedure to actually file the patent application and later argue ownership.

In addition, it is the researchers' responsibility to bring any inventions made by government funded persons or corporations to the attention of the government patent attorney. The attorney will obtain the proper protection of the

government's interests.

For more information contact A. David Spevack, NMRDC Intellectual Property Counsel, Commercial 301-295-6760 or DSN 295-6760.

## UPDATE FROM THE INTELLECTUAL PROPERTY COUNSEL

### New Cooperative Research and Development Agreement and Patent Instructions

New Cooperative Research and Development Agreement (CRADA) and patent instructions were signed by NMRDC's Commanding Officer in January 1993. These instructions cover all aspects of how to recognize an invention, how to have an invention evaluated and how to report an invention to Counsel for preparation and filing.

Remember, the invention is not "secure" until the patent application is actually filed in the Patent and Trademark Office. Many of our patent applications are beginning to issue as patents (see page 6), and we have even managed to license the first of our patents.

Likewise, CRADA's are becoming another means of transferring technology and combining with industry to obtain useful research collaborations. When you receive your copy of the new instructions read them carefully. You might find them very useful for survival in this constantly changing research environment.

### A CRADA is Not an Agreement Under the Federal Acquisition Regulation

A CRADA is not an agreement under the Federal Acquisition Regulation. There is no need to advertise a CRADA or to look for competition when an industry collaborator approaches a government researcher and proposes an agreement. In a recent case (Chem Service v. EPA) a collaborator, who was not selected, challenged the award of a CRADA to one of his competitors without an equal opportunity for others to join in the same CRADA. The court dismissed the action because the court found that the Federal Technology Transfer Act (FTTA) was passed to ensure the transfer of technology developed by Federal agencies to the private sector and that the intended beneficiary of the FTTA is the economic health and well-being of the Nation as a whole and not the interests of individual businesses. The court found that Chem Service's interests, as a competitor of the selected CRADA cooperators, were not interests protected by the FTTA. The court found that CHEM Service was not an appropriate party to challenge the award of a CRADA.

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## PRESSURIZED SUBMARINE RESCUE MANUAL FROM NSMRL

The Naval Submarine Medical Research Laboratory (NSMRL), Groton, CT recently provided undersea medical officers and submarine crew rescue teams with a valuable manual, **Pressurized Submarine Rescue**, NSMRL Report No. 1178 (Harvey, C.A., Stetson, D.M., Burns, A.C., Weathersby, P.K., Parker, J.W. and Mole, D.M.).

NSMRL scientists conducted extensive pulmonary oxygen toxicity and decompression research to estab-

lish safe procedures for rescuing survivors from a pressurized submarine. These studies resulted in decompression tables for air, nitrox and trimix gas mixtures. Further work on decompressing with a trimix gas led to a 1.5 day decrease in decompression time when compared to standard saturation rates. Various methods of safe decompression from 132 fsw were explored.

The rescue manual provides information to help medical officers and

rescue team members deal with survivors of a disabled submarine. The manual reviews the concepts of pressure, hypoxia, hyperoxia, and atmosphere contamination. Factors affecting the decision of a submarine crew to either escape to the surface or await rescue are examined. Included are algorithms (decision trees) to be used with decompression procedures for a variety of pressurized and unpressurized rescue scenarios. The information in the manual also represents a synthesis of material from many sources. It provides a basis for judging the likely outcomes of rescue operations.

The manual is intended to supplement the Submarine Rescue Manual, ATP 57 and the Search and Rescue Instructions, ATP 10(D), Chapter 8.

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## UPDATE FROM NAMRU-3

### Symposium in London

January 6-7, 1993, NAMRU-3 co-sponsored a symposium in London with the Royal Society of Tropical Medicine and Hygiene and the Pathological Society of Great Britain and Ireland on Diarrheal Diseases. Currently, plans are underway for a symposium on hepatitis, possibly in January 1994.

### Scientific Sessions

NAMRU-3 participated in and co-chaired scientific sessions at the Ninth Afro-Arab Workshop and the International Congress on Schistosomiasis. Both events were held in Cairo during February 1993.

### Operation Restore Hope

NAMRU-3 continues to participate in Operation Restore Hope after LCDR Bachelor's return to the laboratory. All suspected cases of dengue fever are being worked-up using PCR technology. To accomplish this CDR W. Nelsen, MC, USN, from NMRI delivered the PCR technology to NAMRU-3.

### Ethiopia - Febrile Epidemic

NAMRU-3 is investigating the etiology of a large febrile epidemic in the Rift Valley of Ethiopia at the re-

quest of the World Health Organization. The Ethiopian government and Ministry of Health are very interested in collaborating with NAMRU-3, and a former NMRDC laboratory (NAMRU-5) is still in use by Ethiopian scientists. NAMRU-5 was established in Ethiopia in 1966 at the Central Laboratory and Research Institute in Addis Ababa, and later closed in the late 1970s and U.S. personnel were transferred to Cairo. The NMRDC Infectious Disease Steering Committee will soon discuss the desirability and potential of research effort (malaria, etc.) in this region.

### Cairo - Type E Botulism

The largest recorded outbreak of type E botulism (Cairo, Egypt, 1991), is finally reported in the Journal of Infectious Diseases (1993): 167 (Feb.)

### New Executive Officer

NAMRU-3's next Executive Officer will be CDR Jim Campbell currently at NRL, who will be arriving in the Summer of 1993.

### Position Available

NAMRU-3 currently needs an active duty (Army or Navy) Virologist and a Scientific Director. Anyone interested is encouraged to contact NAMRU-3.

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## NMRDC ID STEERING COMMITTEE

NMRDC is establishing an infectious diseases scientific advisory committee whose purpose would be to advise the Research Area Manager (RAM) for Infectious Diseases on matters pertaining to the Navy's infectious diseases research program and to provide NMRDC with guidance in the planning and implementation of a coordinated infectious diseases research program.

The Steering Committee will be chaired by the RAM for Infectious Diseases and three members from NMRI, and one member each from NAMRU-2, NAMRU-3, NMRI DET, USUHS and BUMED. Initially the committee will draft a charter, define the Navy's infectious diseases program, ensure the restructured Navy infectious disease program meets the Navy's needs and is aligned with the JTCG-2's Science and Technology objectives and assist in coordinating the FY94 infectious disease proposals submitted to NMRDC.



# ERGONOMICS FOR THE VISUAL DISPLAY TERMINAL (VDT)

by Kip Johnson, NMRDC Staff Assistant for Occupational Safety

When you hear of occupational illnesses, you may think of hearing loss for the jack hammer operator or metal fume fever for the welder. During the last few years, however, OSHA noted that a significant increase in occupational illnesses are being reported by workers who operate personal computers (VDTs) for long periods of time.

Complaints of eyestrain, fatigue, and musculoskeletal problems are common. Employees suffering from these symptoms tend to be stressed, less productive and frequently absent. Research has shown that these symptoms can result from problems with VDT equipment, work stations, and the office environment. Research shows that by using ergonomics, incorporating a few simple exercises as part of the work day, and modifying the VDT work station many symptoms can be prevented.

**Eyestrain and eye irritation** are the most frequently reported complaints of VDT operators. Improper office lighting and excessive glare of the VDT screen or copy text can cause discomfort. Light should be diffused from an overhead source and not directed to shine in the VDT operator's eyes. VDT screens should be aligned 90° from windows or outfitted with filter screens to reduce glare from other light sources.

Position the screen 20-26 inches

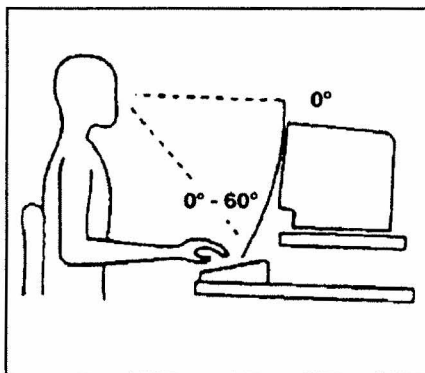


Figure 1

## Light fixtures:

- Equipped with cube or parabolic louvers (if indirect lighting is not used)
- Located to the side of screen

## Window:

- Parallel to light fixtures
- At right angle to screen face
- Block sunlight if terminal is less than 20 feet from window

## Wall:

- About 50% reflectance
- Matte finish

## Display screen:

- Adjusts to height and angle

## Keyboard:

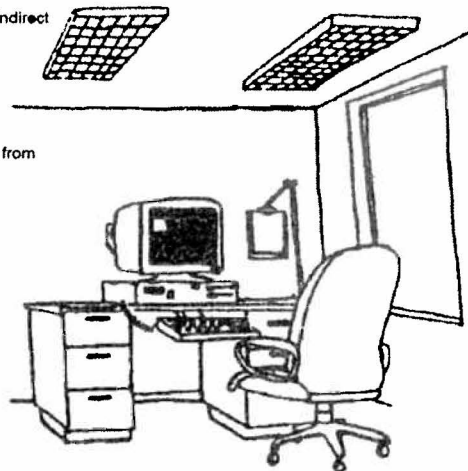
- Detachable

## Chair:

- Adjust for seat height.
- Adjusts for back rest angle

## Floor

- 15 - 20% reflectance



from your eyes. The viewing angle of the screen should be below normal line of sight (Figure 1). Use an adjustable document holder to place copy text next to the screen at the same distance and viewing angle. VDT operators should give their eyes periodic rests each hour while working on the VDT. Simply changing focus on items across the room or closing the eyes tightly for a few seconds will help.

**Fatigue** in the VDT operator is caused by sitting still at the work station for a considerable time and making small, frequent movements of the eyes, head, arms and fingers. By using ergonomics and designing the work station to fit the worker, fatigue can be prevented. An individual work station should provide the worker with a comfortable sitting position. The chair should be adjustable so the feet are flat on the floor and the knees are slightly higher than the thighs. A proper backrest should support the entire back including the lower region. The angle created by the thighs and back should be 90-110°. The preferred working position for most VDT operators is with forearms parallel to the floor and elbows at the side. The wrist should be in line with the forearm (Figure 2). A padded and detachable wrist rest can help keep the VDT operator's wrists and hands in a straight position while key stroking. Periodic rests with simple tensing

and relaxing the neck, shoulder and upper arm muscles can help prevent fatigue.

**Musculoskeletal and nerve disorders** such as cumulative trauma or repetitive motion disorders can affect VDT operators. Carpal Tunnel Syndrome (CTS) is one commonly recognized cumulative trauma disorder in VDT operators. CTS is caused by repetitive wrist-hand movement and exertion. This condition is further aggravated when the wrist-hand movement occurs when the wrist is not straight with the forearm. The tendons in the wrist and hand swell and put pressure on the median nerve which causes the uncomfortable tingling, numbness and pain in the wrist and hand. This can be reduced by limiting the activity that aggravates the tendons, by maintaining proper work posture or, as a last resort, by having surgery.

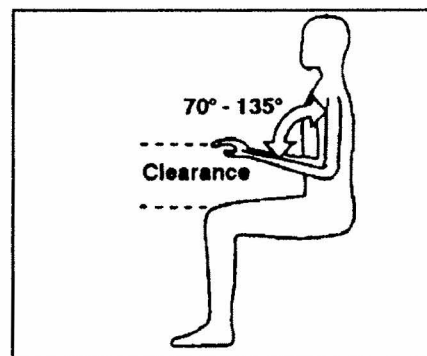


Figure 2

## NOTES FROM A COMMAND ORTA REPRESENTATIVE

by LCDR D.L. Dolgin, MSC, USN, Office of Research and Technology Application (ORTA) Representative, Naval Aerospace Medicine Research Laboratory ((NAMRL), Pensacola, FL

For those interested in technology transfer, there is a lot going on at NAMRL. In November 1992 I attended the Federal Laboratory Consortium for Technology Transfer (FLC) Fall Meeting along with 250 other representatives in Scottsdale, AZ.

At the opening of the FLC meeting, ORTA representatives were provided a working definition of technology transfer: *The process by which existing knowledge, facilities or capabilities developed under Federal research and development (R&D) funding are transferred (utilized) to fulfill actual or potential public or private domestic needs.* This definition set the tone of the meeting. The need for laboratory technologies to refurbish the economic bases of the U.S. also was emphasized throughout the meeting, along with the importance of laboratories changing their image and developing effective marketing techniques.

Gateway for Business is the theme of the next FLC National Technology Transfer Meeting scheduled for 19-22 April, 1993, in Pittsburgh, PA. The Host region is the Mid-Atlantic and the Host laboratory is DOE Pittsburgh Energy Technology Center. Companies looking for new products and processes or access to federal laboratory facilities will be attending.

Other news from the technology transfer front is that in August 1992, CAPT Patee (NAMRL) and I attended a Technology Transfer workshop at Eglin AFB. This workshop was jointly sponsored by the Air Force Development Test Center, Armament Directorate of Wright Laboratories, the University of Florida College of Engineering, and Okaloosa-Walton Community College. This workshop's purpose was to share the latest information on technology transfer and to discuss mutually beneficial ways to implement it.

As a result of the workshop, NAMRL agreed to participate in the Gulf Coast Alliance for Technology Transfer (GCATT). The GCATT is a consortium of twelve partners representing federal laboratories and state universities that establishes a framework for technology transfer and cooperation with private industry and other government agencies and provides a mechanism to promote cooperation between members.

Geographically, the GCATT includes the region between Tallahassee and Pensacola, FL, although the U.S. Army Aeromedical Laboratory in Fort Rucker, AL is also a partner. Given the variety of research organizations in this region, a collaborative effort could prove to be a cost effective way to promote, evaluate, and commercialize NAMRL's scientific accomplishments on a nationwide basis.

In January 1993, several NAMRL research capabilities and technologies were advertised in the Cooperative Technology Report. Highlighted NAMRL capabilities included, 1) Aviation Oriented and Related Personnel Selection, 2) Electromagnetic Radiation Measurement, 3) Therapeutic Use

of Radiofrequency Energy, 4) Thermal Physiology Testing and 5) Standards Development for Assessing Human Sensory System Performance. The Report is distributed to over 15,000 companies.

NAMRL is now connected to the ZYNCOM FLC Communication Network. ZYNCOM is an expanded FLC Electronic Communications System. It allows NAMRL access to the FLC data-base network of federal laboratory research programs and products. ZYNCOM also provides access to current technology transfer policy information and the network of regional/national meeting dates and topics.

Finally, NAMRL is about to complete a Cooperative Research Development Agreement (CRADA) between NAMRL and a commercial airline. CAPT Patee, LCDR Dolgin and Mr. A. David Spevack (NMRDC, Intellectual Property Counsel) worked closely with airline representatives in order to ensure that all details of the agreement proceeded smoothly and according to plan.

For more information contact LCDR Dolgin at NAMRL, Commercial 904-452-2244 or DSN 922-2244.

### WHAT IS ORTA?

To derive maximum return on our country's technological investments, Congress passed legislation to encourage the transfer of federally funded technology to the private sector. To promote this transfer, Congress mandated each Federal laboratory to create an Office of Research and Technology Applications (ORTA).

Navy ORTA representatives identify and assess potential technologies and ideas from their own laboratories that may be trans-

ferred to state and local governments, industry, or universities. These representatives also assist in domestic technology transfer efforts. An important mechanism to facilitate technology transfer is the Cooperative Research and Development Agreement (CRADA). A CRADA between a Naval laboratory and industry or academia enables the commercialization of Navy-developed technology, to the technological and financial benefits of both parties.

# JOINT FORWARD LABORATORY IN SOMALIA

by Kevin Sforza, Editor NNMC Bethesda Journal (February 1993)

Possible retaliation from rival factions in Somalia wasn't the only threat to American troops as they helped distribute food to the country's starving population. The forces also faced the danger of infectious diseases prevalent to that part of the world. To help combat the problem, the Naval Medical Research Institute (NMRI) established an infectious disease diagnostic laboratory as part of the Joint Medical Task Force in Mogadishu, Somalia.

"Infectious diseases in Somalia could have an impact on the mission of our troops over there," said Curtis Hayes, Ph.D., of NMRI's Infectious Disease Division. "The idea was to set up a diagnostic laboratory that would be able to rapidly diagnose any infectious diseases that occurred in deployed forces. This, in turn, allows the preventive medicine people to put measures into place preventing epidemics from occurring." A similar laboratory was set up during Operation Desert Shield/Storm, he added.

Three NMRI scientist made up part of the laboratory's team - LCDR Trueman Sharp, MC, USN; LCDR James Buran, MSC, USN; and LT Scott Thornton, MSC, USN. Other team members included LCDR Roger Bachelor, MSC, USN, NAMRU-3, Cairo, Egypt and LT Patrick Rozmajzl, MSC, USN, Navy Environmental and Preventive Medicine Unit No. 7, Naples, Italy. Diagnostic reagents also were supplied by the U.S. Army Medical Research Institute of Infectious Diseases, Fort Detrick, MD.

CAPT Louis Bourgeois, MSC, USN, from NMRI's Infectious Disease Division, said NMRDC (through NAMRU-3) sponsored infectious disease research in Somalia from 1981 - 1989. "In cooperation with the Somali Ministry of Health and the United Nation's World Health Organization, NAMRU-3 provided information on local infectious dis-

JOINT FORWARD LABORATORY	
The following diagnostic capabilities of the JFL were previously fielded to locations in Somalia in support of diarrheal diseases studies and studies of acute febrile illnesses performed by NAMRU-3 and NEPMU-7 teams from 1982 - 1990.	
<b>Malaria</b>	<b>Viral Disease</b>
Thin and thick smear and QBC diagnostic assay	IgM capture and IgG assays 1. Dengue (types 1,2,3,4) 2. Sandfly Fever viruses 3. West Nile Fever virus 4. Rift Valley Fever virus 5. Sindbis virus 6. Congo Crimean Hemorrhagic Fever virus
<b>Acute Diarrheal Diseases</b>	<b>Other Bacterial, Viral, Rickettsial and Parasitic Agents</b>
Identification and antibiotic susceptibility 1. Enterotoxigenic <i>E. coli</i> 2. Shigella species (Dysentery) 3. <i>Vibrio cholerae</i> (Cholera) 4. Salmonella species (Typhoid and Non-typhoid species) 5. <i>Campylobacter jejuni/coli</i> 6. <i>Aeromonas hydrophilla</i> 7. <i>Yersinia enterocolitica</i> 8. Rotavirus 9. Parasites: Giardia, Amoeba	1. Tuberculosis 2. Brucellosis 3. Relapsing Fever ( <i>B. Recurentis</i> , tick borne and louse borne) 4. Typhis (Epidemic, endemic and boutenouse fever) 5. Typhoid and Paratyphoid Fever 6. Rubella IgM 7. Mononucleosis 8. Streptococcos A 9. Gonorrhoea 10. <i>Staphylococcus aureus</i> 11. Schistosomiasis 12. Syphilis 13. Chlamydia 14. Respiratory Syncytial virus 15. Influenza A 16. Leishmania
<b>Acute Meningitis Pneumonia</b>	<b>Miscellaneous Testing Capability</b>
Identification and antibiotic susceptibilities and rapid diagnostic assays 1. <i>Neisseria meningitides</i> 2. <i>Streptococcus pneumoniae</i> 3. <i>Hemophilus influenzae</i>	Antibiotic sensitivity testing Blood culture
<b>Hepatitis</b>	
1. Hepatitis A IgM 2. Hepatitis B Core IgM 3. Hepatitis E (nonA, nonB), IgM and IgG	

ease problems that helped them develop health care and preventive medicine strategies for their countries. The experience helped us prepare for this mission," Bourgeois said. NMRI's three members left for Somalia with the first wave of medical assets during December 1992. "The laboratory, set up in December 1992, was originally located on the grounds of the old U.S. Embassy compound in Mogadishu," said Hayes. "It has since moved to the U.S. Army's 86th Evacuation Hospital at the International Airport in Mogadishu. It was a theater asset for the Joint Task Force Somalia, providing diagnostic support for the U.S. military

contingency and, initially, for some of the allied medical groups."

Hayes explained that medical personnel went into the area with the expectation of being self-sufficient. The various commands involved provided equipment such as incubators, microscopes, serological testing equipment, etc. Marines provided a dedicated generator when the laboratory was first set up in a tent on the Embassy compound. He added that the disease incidence among personnel is probably the lowest ever reported to a deployment of this magnitude, particularly in a tropical area like Somalia.

# UPDATE ON THE BASE REALIGNMENTS AND CLOSURES

by CAPT R.L. Chaput MSC, USN

Now is a good time to give you an update on the status of the Base Realignments and Closures (BRAC) of our biomedical laboratories. Severe DOD funding cuts will affect our Naval Medical Research and Development organization. We have been planning for just such changes in our strategic planning sessions. The upcoming BRAC-III will simply add more impetus for such changes.

The first major move will occur with our Electromagnetic Bioeffects program at the Naval Medical Research Laboratory, Pensacola, FL. This program will be relocated to Brooks AFB by FY96. We are currently working out the details of this major impact on the laboratory and community.

Other programs are also affected

by BRAC. Because of Congressional interest, the projected relocation of the biodynamics program to Wright Patterson AFB, Dayton, OH will not occur. The collocation of the Army Dental Program to the Naval Dental Research Institute, Great Lakes, IL is progressing. Funds for modifications of the building to accommodate the Army program are currently in the BRAC-II. Similarly, funds for MILCON of the blood laboratory and new animal facility at the Naval Medical Research Institute (NMRI), Bethesda, MD are in BRAC-II.

A DoD Inspector General review of all BRAC-II MILCON funds is currently underway. The results of this review are unclear at this time ... Stay tuned! The Army Blood Program will start moving from the Let-

terman Army Institute of Research, which is being closed by BRAC-I, to rented space in the Gillette Building, Rockville, MD in FY93. If all goes as planned with our MILCON, Army and Navy Blood Programs will be collocated at NMRI by FY97. The Army MILCON for a new WRAIR is also underway with plans for occupancy in FY97. At that time the Army and Navy Infectious Diseases Program will be collocated in the new facility.

Clearly with the Clinton administration's plan to significantly downsize the military, we can only guess at future impacts. All of our anticipated moves can be affected by decisions at the highest levels.

We will keep you posted in future issues of the OUTLOOK as events evolve.

## NOTES FROM A TECHNICAL EDITOR

by Kathleen S. Mayer, NAMRL Technical Publications Editor

A technical editor endeavors to polish the author's rough draft through reviewing the grammar, syntax, format, and style. Depending on the author's effort and writing skills, the polishing process may be minimal or extensive. Editing is a complex process, unique to each organization. The Jet Propulsion Laboratory, California Institute of Technology, Pasadena, devised a system to standardize their editing. In *The Levels of Edit*, their editors describe nine types of edit: coordination, policy, integrity, screening, copy clarification, format, mechanical style, language, and substance.

### Nine Type of Edits

- Screening identifies and corrects unacceptable text and graphics.
- Copy clarification improves the copy for keyboarders and graphics personnel.
- Format editing makes text and figures uniform throughout.
- Editing for mechanical style means having text and figures conform to accepted style manuals.
- Language editing is a comprehensive review of written ideas, fluency, parallelism, and conciseness.
- The substantive edit deals with the coherence of the individual parts; the meaningful content.

Authors who want to analyze their own writing can use available computer software style and grammar checkers. Although these software tools won't rewrite text or eliminate the need for "live" editing, they will help to identify problem areas. For assistance in manuscript writing or to find out what style and grammar software is available at your command, contact your technical editor.

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## UPDATE ON ASBREM

by CAPT R. L. Chaput, MSC, USN

There have been changes in the Armed Forces Biomedical Research Evaluation Management Committee (ASBREM) since the functions and organizational structure were outlined in the August 1992 OUTLOOK. Originally the ASBREM was co-chaired by the Assistant Secretary of Defense for Health Affairs (ASD(HA)) and the Deputy Director for Research and Engineering (DDR&E) with primary control being exercised by ASD(HA). Since then, management control over all biomedical research (except HIV) has reverted back to DDR&E. With that change, the primary leadership of ASBREM will now be exercised by DDR&E with ASD(HA) being the co-chair. The ASBREM members remain unchanged. Some of the members of the ASBREM Secretariat have changed, the current members are listed in the chart. Joint Technology Coordinating Groups (JTTCG) members are the same as listed in the August 1992 OUTLOOK.

There was a major ASBREM review of the scientific quality of the Infectious Diseases Program as well as a major assessment of program direction and future funding. The Army and Navy are working together through JTTCG 2 to establish a consolidated effort as reflected by the following draft vision statement:

*"The threat of infectious diseases to successful military operations will be reduced or eliminated by the development of effective countermeasures through the coordinated direction and execution of a consolidated Department of Defense Infectious Diseases Research Program. A successful program will be achieved by (1) a unified infectious diseases program with a singleness of purpose; (2) the promotion of the highest quality of science in the pursuit of relevant research objectives; (3) the recruitment, utilization and retention of the highest quality*

### ASBREM MEMBERS

USA	Maj. Gen. Richard T. Travis
USN	RADM Hugh P. Scott
USAF	Brig. Gen. George K. Anderson

### ASBREM SECRETARIAT

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ASD(HA)	CAPT John Jemionek	703-695-71116/7	DSN 225-71116/7
USA	COL Fraser Glenn	301-619-7376/7	DSN 343-7376/7
USN	CAPT Mike Parsons	301-619-7567	DSN 343-7567
USAF	COL John Tedor	512-536-2661	DSN 240-2661

*scientific personnel; (4) the establishment of an integrated and viable professional career path offering scientists the opportunities to excel in their fields and the option to pursue an executive leadership path, and (5) a wholly integrated management organization to provide program direction and oversight."*

ASBREM intends to use the

progress being made in the management of the infectious disease program as a model for the way other programs can be closely coordinated with those of our sister services. Clearly in these coming times of severe budget cuts we must become more efficient so that declining funds are applied toward the best research that addresses vital needs of the military and community as a whole.

## THE RESUSCIATION FLUIDS PRODUCTION SYSTEM

The Resuscitation Fluids Production System (REFLUPS) has completed testing and evaluation at Fort Sam Houston, San Antonio, TX and aboard the USS WASP.

Significant problems identified in the hardware and software will require product improvements. At a Special In-Process Review for Joint Service Flag Officers on 22 Dec 92, the decision was made to extend the contract to Sept 93 to make these improvements and conduct additional testing and evaluation.

A Pre-Market Application was submitted to the Food and Drug Administration (FDA) for use of REFLUPS in emergency military situations. The FDA has responded

to this application asking for additional data to demonstrate clearly that the fluids produced by REFLUPS in the testing and evaluation environments meet USP levels of purity. So far, all samples that have been tested have met these stringent requirements. This response from FDA is a positive indication that the system will be seriously considered for approval. It is expected that the complete approval process may take up to two years.

REFLUPS is anticipated to become operational in FY95. A meeting was held at N931 to verify sites and numbers of operational REFLUPS in support of a FY95 POM.

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## HM2 GAIL MARIA SEAMAN, USN NMRDC'S 1993 SAILOR OF THE YEAR

HM2 Gail Seaman, USN, from the Naval Biodynamics Laboratory (NBDL), New Orleans, LA is NMRDC's 1993 Sailor of the Year.

Since reporting aboard NBDL in 1992, HM2 Seaman has made invaluable contributions to the Command and its mission and gained the utmost respect from the highly diverse civilian and military staff. Her tremendous energy, creativity, and initiative have resulted in several new programs benefitting the laboratory, NBDL's personnel, the Navy and the surrounding New Orleans community.

HM2 Seaman's accomplishments were highlighted by receiving the unprecedented selections as Sailor of the Quarter for two consecutive quarters at NBDL. HM2 Seaman expertly serves as the Leading Petty Officer for the Biomedical Support Department. She has been instrumental in the successful, injury-

free completion of over 116 acceleration and ship motion research experiments.

In her off-duty hours HM2 Seaman continues working on her Associate Degree in Business Management and her involvement with community volunteer work.

In 1992 HM2 Seaman won the New Orleans Area Federal Women's Appreciation Award in the Military (Enlisted) for her exceptional performance and devotion to Federal service as demonstrated by her cooperation, competence, efficiency, special acts of service, leadership, and performance.

CAPT R. W. Rending, Commanding Officer, NBDL said, "Petty Officer Seaman serves as a model of excellence in professional and personal traits."



**HM2 Gail Maria Seaman, USN, NMRDC's 1993 Sailor of the Year is currently stationed aboard the Naval Biodynamics Laboratory, New Orleans, LA. HM2 Seaman has made invaluable contributions to the Command and its mission and gained the utmost respect from the highly diverse civilian and military staff at NBDL.**

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## CDR JAMES C. MCDONOUGH, MSC, USN NMRDC'S NEW DIRECTOR FOR ADMINISTRATION



**CDR James C. McDonough, MSC, USN  
NMRDC Director for Administration**

Commander James C. McDonough, MSC, USN reported aboard NMRDC in March 1993 as the new Director for Administration.

A native of Cincinnati, OH and Rockville, MD, Commander McDonough received his B.S. (Pre-Med) from Xavier University, completed his post graduate training in Industrial Hygiene at the University of Cincinnati, and received his M.S. (Medical Services Administration) from Widener University.

Entering the Navy as an Industrial Hygiene Officer in 1977, Commander McDonough was assigned to Naval Regional Medical Center Camp Lejeune, NC with Additional Duty to the Second Marine Division. From 1981-83 he served at the Philadelphia Naval Shipyard as the Industrial Hygienist to support the Service Life Extension Program for the USS Saratoga (CV-60)

and USS Forrestal (CV-59). In 1983 he was selected to be the Officer In Charge of the Shipyard Branch Clinic, and changed his primary sub-specialty to Health Care Administration. Following this tour in 1986, Commander McDonough served as the Director for Administration at Naval School of Health Sciences, Bethesda, and in 1990 reported to the Bureau of Medicine and Surgery (BUMED) as the Executive Assistant for the Operational Medicine and Fleet Support Department.

Commander McDonough's awards include the Navy Achievement Medal (3 awards), the Navy Commendation Medal (2 awards), and the Meritorious Service Medal. Commander McDonough, his wife Deborah and their three children James, Kathryn, and John reside in Rockville, MD.

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## MICHAEL D. REDDIX, ONT POSTDOCTORAL FELLOW, COMMISSIONED LIEUTENANT IN THE U.S. NAVY MEDICAL SERVICE CORPS

Dr. Michael D. Reddix, Office of Naval Technology (ONT) postdoctoral fellow, was commissioned a lieutenant in the U.S. Navy Medical Service Corps. Dr. Reddix received his B.A. and M.A. degrees at the University of West Florida and his doctoral degree at the University of Illinois. LT Reddix is currently assigned to the Naval Aerospace Medical Institute (NAMRL), Pensacola, FL.

During his two and one-half year ONT postdoctoral fellowship appointment in the Aviation Performance Division, NAMRL, Dr. Reddix completed several studies addressing low-level laser glare, laser protective eyewear, and progressive correction lenses on aviator target-detection performance. Dr. Reddix is the fourth of five ONT postdoctoral fellows at NAMRL who elected employment in the Navy's research community following their ONT postdoctoral fellowship appointments. This is in keeping with the ONT program's



Dr. Michael J. Reddix, ONT Postdoctoral Fellow at NAMRL accepts congratulations from NAMRL Commanding Officer (Acting) CAPT Jerry C. Patee, following commissioning as Lieutenant in the U.S. Navy Medical Service Corps.

goal of "significantly increasing the involvement of creative, capable and highly trained scientists and engineers from academia and industry in scientific and technical areas of interest and relevance to the Navy." The ONT postdoctoral program is administered by the

American Society for Engineering Education.

For information on the ONT postdoctoral fellowship program contact Christine Eisemann, NMRDC Associate Director for Research Management, commercial 301-295-0882 or DSN 295-0882.

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## NAMRL HOSTS ASHTON GRAYBIEL LECTURE



Robert E. Mitchell, CAPT, MC, USN (Ret), an authority in aerospace medicine, was the guest speaker at the NAMRL Ashton Graybiel Lecture. Dr. Mitchell has served this country as an officer, commanding officer, medical doctor, flight surgeon, aerospace scientist, and humanitarian.

The Naval Aerospace Medical Research Laboratory (NAMRL) hosted the fourth Ashton Graybiel Lecture in Pensacola. The invited guest speaker was Robert E. Mitchell, CAPT MC, USN (Ret), who is a recognized authority in aerospace medicine, and who served this country for almost 50 years as a naval officer, commanding officer, medical doctor, flight surgeon, aerospace scientist, and humanitarian. Dr. Mitchell's major research efforts have been the "Thousand Aviators" project (now in its 53rd year) and the "Repatriated Prisoners" Program. He has written extensively on medical issues and has authored numerous publications. He was an original member of the medical team working with Americans held hostage in Iran.

Dr. Mitchell received a standing ovation from the audience of active duty and retired flight surgeons, officers, aviation physiologists, and civilians for his presentation, "Aviation Medicine Research: A Historical Review," which chronicled significant events and accomplishments from 1759 to the present. Copies of the presentation are available as NAMRL Special Report 92-3, NAVAEROMEDRSCHLAB, ATT:Code 00A1, 51, Hovey Rd, Pensacola FL 32508-1046. The lecture series was established in 1988 to honor Dr. Ashton Graybiel, former Scientific Director of NAMRL. As a pioneer in the field of aviation medicine for more than 40 years, Dr. Graybiel made numerous significant scientific contributions. Today, his expertise, foresight, and creativity serve as benchmarks in aviation medicine research.

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## HIGHLIGHTS OF NMRDC RESEARCH

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### TISSUE OXYGEN PRESSURE AS AN INDEX OF WOUND HEALING

A current multicenter cooperative study funded by NMRDC and coordinated by researchers at the Uniformed Services University of the Health Sciences, Bethesda, MD, is evaluating the clinical utility of a new oximeter (Optode). The Optode provides on-line reading of the oxygen tension in subcutaneous tissues ( $P_{sqO_2}$ ) based on the principle of fluorescence quenching by oxygen. Studies are being conducted to compare readings obtained from the Optode with other indices of wound healing in patients recovering from severe injury when wound healing may be compromised. On-line measurement of  $P_{sqO_2}$  will identify patients, otherwise undetected, in whom the tissue pressure of oxygen has fallen to levels associated with impaired wound healing. The study involves three Level 1 trauma centers (the Medical College of Virginia, Richmond, VA; the Med Star Unit of the Washington Hospital Center, Washington, DC; and the Sinai Hospital of Baltimore, Baltimore, MD) and the Departments of Surgery at the University of California at San Francisco; the Uniformed Services University of the Health Sciences, Bethesda, MD; and the National Naval Medical Center, Bethesda, MD.

### HEMATOPOIETIC AND IMMUNE SYSTEM RECOVERY AFTER INJURY

Following severe trauma to the immune system and blood-forming tissues caused by damaging chemical, biological or radiation exposure in combat, patient survival and cell recovery depends on the ability of surviving stem cells to produce daughter cells and regulatory growth factors for the regeneration of all vital components. Biological proteins, such as the broad family of growth factors, are powerful regulators of tissue repair, particularly after traumatic injury. Researchers in the Immune Cell Biology Program at the Naval Medical Research Institute, Bethesda, MD are investigating specific regimens using human growth factors, lymphokines, cytokines, and other regulatory agents for the enhancement and modulation of blood forming tissues and immune system recovery. One achievement, a culture system derived to cause growth of stem cells in simple laboratory tissue flasks, indicates that it is possible to obtain at least a million-fold increase in the population of stem cells and other hematopoietic cells. This system should permit the development of a new form of transfusion therapy using autologous (self) stem cells. The stem cells remaining in the bone marrow of injured personnel can be cultured, rapidly cloned, and re-administered to restore bone marrow function.

### THE GENETICS OF MOTION SICKNESS

Motion sickness and vestibular disorientation are significant operational concerns for the Navy and Marine Corps. Current studies have documented an unacceptably high incidence of motion sickness in aircrew and shipboard personnel. Studies also have recognized that, in the underwater environment, sensory conflicts, body fluid redistribution, and nitrogen narcosis make Navy divers more susceptible to motion sickness. Researchers at the Naval Health Research Center, San Diego, CA; the Wayne State University School of Medicine, Detroit, MI; and the University of Michigan Medical School, Ann Arbor, MI are investigating a new approach to the problem of motion sickness. They are focusing on the cellular and molecular physiology of gene expression to determine if a predisposition to motion sickness is an inherited trait. Genetic differences in the complement of receptors on autonomic neurons of the central and peripheral nervous system could explain the differences in individuals' susceptibility to motion sickness. Preliminary findings show that a genetic polymorphism of the alpha-2 adrenergic receptor (encoded by chromosome 10) is associated with the development of motion sickness. This new approach can be used to understand the variations in human responses to other physical stresses in the operational environment, such as a predisposition to heat stroke or gravity-induced loss of consciousness.

### A NEW SYSTEM FOR COMPUTER IMAGE ANALYSIS OF MACROPHAGE PHAGOCYTOSIS

Current light microscopic examination and manual counting of particles in individual cells is the most common method of quantifying phagocytosis, but only a few cells can be analyzed and no quantitative morphometric data are obtained. Another method, flow cytometry, can quantify the phagocytosis of many cells in suspension, but cannot provide detailed morphometric data. Researchers at the Naval Medical Research Institute, Bethesda, MD have developed a new method and algorithm for rapidly quantifying phagocytic functions using computer image analysis of video light microscopic images. This new image analysis procedure provides significantly faster phagocytic function analysis than manual microscopic examination and more detailed quantitative morphological data than flow cytometry.