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Naval Medical Research and Development Command

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NMRDC'S TOP IR STUDIES PRESENTED AT IR/IED SYMPOSIUM

Scientists from eleven Navy R&D Centers attended the Navy's Third Annual Independent Research (IR)/ Independent Exploratory Development (IED) Symposium at the Johns Hopkins University Applied Physics Laboratory in Laurel, MD, on June 19-21, 1990. The Symposium, sponsored by the Office of the Chief of Naval Research (OCNR), provided a forum for the Navy's techbase community to showcase, to high level Navy and Department of Defense personnel, the *"BEST OF THE BEST"* from the hundreds of projects funded in the IR and IED programs during FY89.

Attendees included scientists/presenters, Technical Directors and Managers from the R&D Centers; officials from DOD, DON, the Office of Navy Research (ONR), and the Office of Naval Technology (ONT); and included ADM Miller (the new CNR), Mr. Gerry Schiefer (Director of Navy Laboratories), and Mrs. Genie McBurnett (Principal Deputy ASN (RDA)). *Cont. Pg. 2*

FIVE NEW RESEARCH EFFORTS TO BEGIN IN FY91 AND FY92

Based on the recommendations of two independent scientific review committees (March, 1989 and March, 1990), NMRDC selected five basic research new starts for the FY91 and FY92 programs and has successfully gained approval to fund these studies from the Office of Naval Research.

For the FY91 program, two proposals from NMRI received top priority for funding. Congratulations to the Diving Medical Department and CDR Peter Kent (NMRDC) for successfully proposing "The Physiology of Hydrogen Diving" and to Dr. Taffy Williams for his study on native proteins that protect against septic shock.

The top-rated FY92 selection was LT Steve Ahlers' (NMRI) outstanding proposal entitled "Cold-Induced Amnesia: Neurobiological Mechanisms", a study which will investigate the physiological bases of cold-related neurologic injury. Other funded studies include a septic shock proposal (Dr. Brian Parent's hepatic LPS receptors and Dr. K'Roly Meszaris' "magnetokinesis of sepsis"; both presented by Dr. Williams) and an elegant effort on the cytokine enhancement of angiogenesis presented by LCDR Rod Monroy. In addition to these studies, the proposals of Dr. Art Messier (NSMRL) and Dr. Barry Shender (Naval Air Development Center) were well received by the selection panel. Congratulations to all for your outstanding efforts and keep providing us your preproposals in your laboratory Five Year Plans!

SMALL BUSINESS INNOVATION RESEARCH PROGRAM

The Small Business Innovation Research (SBIR) Program brings together the Principal Investigator (PI) in the lab and small hi-tech companies with strong research and development capabilities in science and engineering to solve technical problems that can not be handled in the lab because the technical expertise is not available or the material and logistic resources are limited.

The intent of the SBIR program is to take advantage of small businesses' inventive and innovative capabilities, their cost-effectiveness, and their capability for developing research and development into new products.

Congressionally mandated, the SBIR program is a uniform three phase program. The first two phases help the PI meet research and development objectives. The PI who initiates the topic for consideration will be involved as a technical advisor and Headquarters will handle the administrative portion of the program.

Phase one involves a solicitation of proposals and awards contracts to determine the technical feasibility of the proposed effort in response to the stated requirements (not to exceed a 6 month time period). Phase two is the principal research or R&D effort (not to exceed a 24 month time period).

The third phase pursues commercial application of government funded research or R&D to stimulate technological innovation.

Recent NMRDC successes in the SBIR Program are the computer assisted instruction module under NOHIMS developed by R-K Research and Systems Design, Malibu, CA, and the improved cryopreservation of whole blood by Cryolife, Inc., Marietta, GA.

The DOD program solicitation publication listing NMRDC's topics is published annually and distrubuted nationally by the Defense Technical Information Center in Alexandria, Virginia. Current listings include a request for a proposal for exploratory development of the production of biosensor based techniques and equipment for essential clinical assays to be performed in the military field environment for Combat Casualty Care. A second request is for the advanced development of recombinant DNA cloning of enzymes essential for the enzymatic removal of carbohydrate antigens from human erythrocytes for the production of Type "O" red cells from Type "B" cells.

The program is paid for by NMRDC with Headquarters funds so there is no direct cost to the lab. Currently 3% of NMRDC's extramural budget is directed to the SBIR program. Funding comes from the appropriation categories 6.1 through 6.4.

The SBIR program operates with the absolute minimum of bureaucracy by decentralizing the management and operations to place responsibility and authority for the SBIR program where the technical knowledge of needs exists. As required by law, the solicitation process minimizes regulatory burdens and mandates timely receipt and review of proposals, peer review, proprietary information guidelines, selection of awards, data rights retention, title to government property, cost sharing and cost principles.

For more information on the SBIR program contact SBIR NMRDC Coordinator, Code 402.

NMRDC'S TOP IR STUDIES *cont. from Pg. 1*

CAPT J. Woody, CAPT A. Melaragno, CAPT R. Walter (NSMRL), Dr. M. Weiss (NBDL), and Ms. C. Eisemann represented NMRDC and our laboratories.

Three outstanding studies from NMRDC's FY89 IR program were selected for presentation at the Symposium. CDR Andrew Dutka (NMRI) discussed his work on the role of oxygen free radicals during decompression-related ischemia. He did an excellent job explaining his research in a context that was understandable to the audience of Navy engineers and hardware scientists. LCDR Michele D'Alesandro (NMRI) presented a poster, video, and slideshow of her study of changes in thyroid hormone receptors in personnel stationed in McMurdo, Antarctica. Dr. S. William Whitson's (NMRI) work on the biochemistry of bone repair received a great deal of interest. With a sheet of mineralized, cell culture-grown bone, he truly impressed the attendees with the quality and applicability of his work. All three studies actively reinforced NMRDC's scientific credibility among our Navy peers and helped maintain ONR's high appreciation for all our IR efforts.

Top awards this year ($ 5K to the research team and $ 50K to the Center) went to the Naval Air Development Center (IR) and the David Taylor Research Center (IED). Besides the incentive of a cash award, however, the Symposium offers in-house scientists a unique look at the "big picture" of current Navy research and development, provides an opportunity for developing inter-laboratory collaboration, and fosters a genuine sense of community with fellow researchers and technologists of the Navy's other R&D Centers.

Dates to Remember

Aug 1990

1 - DD1498s (FY91) due

Oct 1990

1 - Five Year Plans (FY91-FY95) due

5 - 3rd Interim Report (FY90) due

Nov 1990

29-30 - 6.2 Block Review (NMRDC action)

Dec 1990

31 - Annual Reports (FY90) due

For information concerning the calendar contact NMRDC Code 40B

NMRDC AND NSAP

In 1989, NMRDC joined the Navy Science Assistance Program (NSAP) to offer direct scientific support to the Fleet by developing solutions to serious technical problems affecting operational performance. This relationship between NMRDC and the Fleet through NSAP will allow the medical research community to better perform it's primary mission-- service to the Fleet and Fleet Marine Corps.

NSAP's on-site teams are technically trained civilians from Navy laboratories who are assigned to major Navy and Marine Corps commands as science advisors. These science advisors assist the commands in requesting research efforts to solve problems. The Office of Fleet Operations and Requirements correlates all NSAP medical research requirements at NMRDC. NSAP handles research requiring 12-24 months to complete with the research results going directly back to the commands for implementation and follow-up studies. The first NSAP requirement completed by NMRDC concerned the development of safe distance guidelines for divers in water near active sonar. This work was done by the Naval Submarine Medical Research Laboratory (NSMRL), Groton CT.

A recently completed NMRDC and NSAP project is the use of ice vests by sailors in the Persian Gulf. Researchers from the Naval Health Research Center (NHRC), San Diego, CA, in conjunction with scientists at the Navy Clothing and Textile Research Facility, Natick, MA, conducted field tests which showed that the use of a "cooling vest" (a cloth vest that carries 6-8 ice packs in inner pockets) by both engineering room and helicopter aircrew personnel helped maintain normal physiology and relative comfort during extended operational duties. The ice vests are now in use and may ultimately allow for extending the current standards which restrict the length of time sailors can work safely in hot operational environments.

Future NMRDC and NSAP projects include continued field testing of a water-gel burn dressing, developing methods for heating extremities during cold weather diving and solving performance problems associated with vibration in high speed boats.

For more information concerning NSAP programs contact NMRDC Code 406.

PATENT APPLICATIONS ON INVENTIONS

A. David Spevack, patent attorney for NMRDC, who assists employees in filing patent application on inventions, offers some general guidelines for determining what is an invention and who are the inventors.

Begin by answering two questions. (1) Have you added something new to a body of knowledge? (The new knowledge cannot be a principal of nature) and (2) Does this new knowledge solve a technical problem or add something new to your area of expertise? An invention can be the discovery of any new and useful process, machine, manufactured creation as well as improvements in existing technology or an area of expertise.

Who are the inventors? The inventors are those people who contributed to the definition of a problem which constitutes the basis of the invention and, once the problem is defined, those people who contribute to the solution of the problem. People who are not inventors are those who assist in carrying out the necessary tests and manipulations under the instructions of someone else.

After the invention and inventors are determined, the patent application process begins. The invention is described on Navy Form, Record and Disclosure of Invention NAVONR 5870 prepared in accordance with directive ONRINST 5870.1C. A copy of the directive and forms are available at your administrative office or from NMRDC Code 00L.

Information required on NAVONR 5870 includes a descriptive title of the invention, information about where the initial records of the invention are kept, identification of those who are aware of the invention, any publications or disclosures of the invention to people besides the inventors, other publications or patents that are related to the invention or which cover similar subject matter and a detailed description of the invention.

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PATENT APPLICATIONS *cont.*
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Once completed, the form should be signed, dated and a copy sent with an informal note to NMRDC Code 00L. At the same time the original of the form should be sent to your next level supervisor. This supervisor will review the invention disclosure and determine if it is in the interest of the Unit to file an application because the invention is related to an ongoing Navy project or because the invention might have commercial potential. After the supervisor's endorsement, the disclosure will be sent to the research director of your laboratory for a second endorsement. The invention disclosure, with endorsements, is sent to NMRDC Code 00L through channels.

When the patent attorney receives the copy of the disclosure, the case is informally docketed but not registered with ONR or entered into the official Navy case system. That occurs when the original version of the invention disclosure, with endorsements is received through channels.

For information concerning patent application contact NMRDC Code 00L.

HIGHLIGHTS OF NMRDC RESEARCH

CAFFEINE HAS VARIABLE EFFECTS ON DIVER HEAT LOSS

Diving medical researchers at the Naval Medical Research Institute, Bethesda, MD are attempting to comprehensively define the physiological effects of caffeine on divers in order to make operational recommendations for its use in various diving scenarios. Caffeine increases alertness, diminishes subjective fatigue, and improves the performance of certain mental and physical tasks. Caffeine also increases the risk for certain heart rhythm irregularities and promotes dehydration by stimulating urine production. The latter effects are highly undesirable for divers. Recent work has examined the effects of caffeine on diver heat loss. It was determined at a 5 mg/kg dose of caffeine increased the rate of heat loss during light exercise at the surface in 20C water when compared to placebo controls. However, no effect on heat loss was observed when the experiment was repeated in 31C water. At 1000 feet of sea water, the same dose of caffeine increased heat loss of subjects engaged in the same level of exercise in 31C water, but not in 20C water. These contradictory, and unexplained differential caffeine effects demonstrate the need for additional studies and for caution in the use of caffeine when diving.

NDRI DEVELOPED A RAPID SCREENING TESTS FOR PERIODONTOPATHIC BACTERIA

Investigators at the Naval Dental Research Institute, Great Lakes, IL, have developed monoclonal antibodies for use as rapid screening tests for periodontopathic bacteria. Monoclonal antibodies to Treponema denticola and Bacteroides gingivalis were developed by Dr. Lloyd Simonson and his research team. These antibodies were recently used to quantitively measure the Treponema denticola content of subgingival plaque from samples taken from periodontitis patients with probing depths of 6mm. The T. denticola content of the subgingival plaque in periodontitis patients demonstrated a two-fold elevation over healthy controls. This represents the first quantitative evidence of a positive relationship between a specific spirochete species and severe periodontal disease.

FIVE YEAR PLAN "NEW STARTS" - THEY'RE WORTH THE EFFORT

Each year, the NMRDC laboratories are asked to include new start preproposals in their Five Year Plans. These relatively short narratives (see the FY90 Guidance package for format) are intended to convey an idea of the directions the laboratories want to take in their research and development programs in the outyears. Recently, these preproposals have proven to be invaluable in allowing NMRDC to maintain a proactive and vital program management posture.

The availability of additional "new start" money varies, depending on the funding sponsor. Any of our sponsors, unexpectedly, and at any time during the fiscal year, may query for new studies because of reprogrammed or unexpended funds originally intended for other claimants. Some sponsors, such as the Office of Naval Research, build "new start" money into their programs each year. NMRDC is almost assured to gain these new funds, as long as the Command solicits solid, fore-front, Navy-relevant research projects and complies with ONR's stipulation requiring a scientific review and competitive selection among the proposals under consideration. We have now gone through two years of this selection process and cannot emphasize enough how important it is to have your basic research ideas included in the Five Year Plans. Although R&D preproposals can be discussed with the NMRDC Research Area Managers at any time during the year, including new research studies in the Five Year Plan is the best way to ensure that the new concepts are noted and entered into the review/selection process.

A second source of "new start" funding is from internal reprogramming. With budget reductions ever-threatening, NMRDC is convinced that our investment of sponsor funds must be consistent with project productivity. Efforts that provide only minimal product must be trimmed or terminated to allow reinvestment of funds into fresh, aggressive, Navy-critical studies In FY90, such terminations did make funds available for the initiation of a number of new efforts proposed by the laboratories in the Five Year Plans.