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FY 2003 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2002

BUDGET ACTIVITY: 3 PROGRAM ELEMENT: 0603729N
 PROGRAM ELEMENT TITLE: Warfighter Protection Advanced Technology

(U) COST: (Dollars in Thousands)

| PROJECT NUMBER & TITLE | FY 2001 ACTUAL | FY 2002 ESTIMATE | FY 2003 ESTIMATE | FY 2004 ESTIMATE | FY 2005 ESTIMATE | FY 2006 ESTIMATE | FY 2007 ESTIMATE | TO COMPLETE | TOTAL PROGRAM |
|---|-------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|-----------------|------------------|
| R2494 Disaster Management and Humanitarian Assistance | | 2,181 | | | | | | 0 | 2,181 |
| R2715 Distributed Simulation Warfighting Concepts | | 5,100 | | | | | | 0 | 5,100 |
| R2914 Warfighter Protection Advanced Technology | ** | 17,477 | 19,040 | 20,238 | 18,954 | 20,611 | 21,874 | CONTINUE | CONTINUE |
| R9030 Organ Transfer Technology | | 1,982 | | | | | | 0 | 1,982 |
| R9031 Damage Control Operational Concepts | | 1,685 | | | | | | 0 | 1,685 |
| TOTAL | ** | 28,425 | 19,040 | 20,238 | 18,954 | 20,611 | 21,874 | CONTINUE | CONTINUE |

**The Science and Technology Program Elements (PEs) were restructured in FY 2002. The work described in 2001 was funded in PEs 0603706N and 0603707N.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program supports the development and demonstration of advanced technologies for improved warfighter protection medical equipment, techniques, technologies and systems. These technologies enhance Navy and Marine Corps capabilities in Casualty Care and Management, Casualty Prevention, and maintenance of a Healthy and Fit Force. The goal of Casualty Care and Management is to maximize the continuum of care with lifesaving interventions as far forward as possible, in an increasingly lethal battlespace, with reduced infrastructure and logistics. Casualty Prevention includes enhancing warfighter situation awareness and countering threats from disease, battle and non-battle injuries. Healthy and Fit Force efforts preserve health and enhance fitness of ready forces against physical and psychological threats through the continuum of peace and war.

(U) Due to the number of efforts in this PE, the programs described are representative of the work included in this PE.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is budgeted within the ADVANCED TECHNOLOGY Budget Activity because it encompasses design development, simulation, or experimental testing of guidelines and prototype hardware to validate technological feasibility and concept of operations and reduce technological risk prior to operational use or transition to an acquisition program.

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B. (U) PROGRAM CHANGE SUMMARY:

| | <u>FY 2001</u> | <u>FY 2002</u> | <u>FY 2003</u> |
|---|----------------|----------------|----------------|
| FY 2002 President's Submission: | | 17,678 | |
| Adjustments from FY 2002 PRESBUDG: | | | |
| Congressional Plus Ups | | 11,000 | |
| Section 8123 Management Reform Initiative Reduction | | -253 | |
| FY 2003 President's Submission | ** | 28,425 | 19,040 |

** The Science and Technology PEs were restructured in FY 2002. FY 2001 efforts were funded in PEs 0603706N and 0603707N.

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(U) COST: (Dollars in Thousands)

| PROJECT NUMBER & TITLE | FY 2001 ACTUAL | FY 2002 ESTIMATE | FY 2003 ESTIMATE | FY 2004 ESTIMATE | FY 2005 ESTIMATE | FY 2006 ESTIMATE | FY 2007 ESTIMATE | TO COMPLETE | TOTAL PROGRAM |
|---|-------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|----------------|------------------|
| R2914 Warfighter Protection Advanced Technology | ** | 17,477 | 19,040 | 20,238 | 18,954 | 20,611 | 21,874 | CONTINUE | CONTINUE |

** The Science and Technology PEs were restructured in FY 2002. FY 2001 efforts were funded in PEs 0603706N and 0603707N.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program supports the development and demonstration of advanced technologies for improved warfighter protection medical equipment, techniques, technologies and systems. These technologies enhance Navy and Marine Corps capabilities in Casualty Care and Management, Casualty Prevention, and maintenance of a Healthy and Fit Force. The goal of Casualty Care and Management is to maximize the continuum of care with lifesaving interventions as far forward as possible, in an increasingly lethal battlespace, with reduced infrastructure and logistics. Casualty Prevention includes enhancing warfighter situation awareness and countering threats from disease, battle and non-battle injuries. Healthy and Fit Force efforts preserve health and enhance fitness of ready forces against physical and psychological threats through the continuum of peace and war.

B. (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 2001 ACCOMPLISHMENTS:

- (U) (\$4,792) Casualty Care and Management: FY01 accomplishments were funded in PE 0603706N and PE 0603707N.

Initiated FY01

- (U) Initiated the development of a hemostatic dressing with microbicidal agent.
- (U) Began to develop a pelvic clamp for hemostasis.

Continued FY01

- (U) Continued to develop novel resuscitation fluids, specifically ketone additive.
- (U) Continued to develop low volume resuscitation fluids, specifically the comparison of all Food and Drug Administration (FDA)-approved hypertonic crystalloids in hemorrhage.
- (U) Continue to develop low volume resuscitation fluids, specifically the evaluation of new FDA-approved low volume colloid fluid.

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Protection Advanced Technology

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- (U) Continued to develop intranasal ketamine for pain control.
- (U) Continued to develop ultrasound intra-operative cautery.
- (U) Continued to develop the casualty management coordination system.
- (U) Continued to develop novel oxygen carrying blood substitutes, pegylated liposome-encapsulated synthetic hemoglobin, and freeze-dried red blood cells.
- (U) Continued to develop a portable injectable water shipboard system.
- (U) Continued to develop novel resuscitation fluids such as gas diffusion.
- (U) Continued to develop a hollow fiber frozen red cell glycerolization/deglycerolization system enhancement.

Completed FY01

- (U) Completed freeze dried platelet research and transferred over to Army funding.
- (U) Completed the FDA approved algal polymer hemostatic field dressing.
- (U) (\$6,480) Casualty Prevention: FY01 accomplishments were funded in PE 0603706N.

Initiated FY01

- (U) Initiated evaluation of body armor-torso interaction biodynamics.
- (U) Began evaluation of laser technology and laser injury impact on operational performance.
- (U) Initiated Assessment Gz-tolerance in repeated high/Gz conditions.
- (U) Initiated studies of methods for enhanced maintenance of spatial orientation.
- (U) Initiated the development of a smart uniform with embedded physiological sensors.

Continued FY01

- (U) Continued the development of a laser event recorder.

Completed FY01

- (U) Completed the assessment of pharmacological interventions for decompression sickness/oxygen toxicity.
- (U) Completed guidelines for low frequency acoustic effects on human divers (transition).
- (U) Completed the development of criteria to evaluate new technology sensor based devices.
- (U) Validated new methods for neurotoxicant testing.
- (U) Completed investigations on the impact of thermal stress on operational performance.
- (U) Validated radio frequency induced current model in shipboard environment.
- (U) (\$433) Healthy and Fit Force: FY01 accomplishments were funded in PE 0603706N

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PROJECT TITLE: Warfighter
Protection Advanced Technology

Initiated FY01

- (U) Initiated the assessment and prevention of noise-induced hearing loss using antioxidants.

Continued FY01

- (U) Continued to develop tuned materials for hearing protection.
- (U) Continued efforts in occupational fitness for injury reduction.

Completed FY01

- (U) Completed investigations of the application of acoustic technology for hearing protection.
- (U) Completed the assessment of vibration characteristics and resonance frequencies in waterborne low frequency sound.

1. (U) FY 2002 PLAN:

- (U) (\$8,435) Casualty Care and Management:

Initiate FY02

- (U) Develop high intensity focussed ultrasound technology for hemorrhage location and hemostasis.
- (U) Develop hand-held portable ultrasound diagnostic imager evaluation in trauma.
- (U) Develop novel analgesics to reduce pain.

Continue FY02

- (U) Continue to develop novel resuscitation fluids: ketone additive.
- (U) Continue the development of low volume resuscitation fluids, specifically the comparison of all FDA-approved hypertonic crystalloids in hemorrhage.
- (U) Continue to develop low volume resuscitation fluids, specifically the evaluation of new FDA-approved low volume colloid fluid.
- (U) Continue the development of intranasal ketamine for pain control.
- (U) Continue with the development of the casualty management coordination system.
- (U) Continue to develop novel oxygen carrying blood substitutes; pegylated liposome-encapsulated synthetic hemoglobin; freeze-dried red cells.
- (U) Continue to develop a hemostatic dressing with microbicidal agent.
- (U) Continue the development of a pelvic clamp for hemostasis.
- (U) Continue to develop low-volume resuscitation fluids: gas diffusion enhancer.

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Complete FY02

- (U) Demonstrated an ultrasound intra-operative cautery device.
- (U) Completed the development of an injectable water shipboard system.
- (U) Complete the development of hollow-fiber frozen red cell glycerolization/deglycerolization system.

• (U) (\$7,828) Casualty Prevention:

Initiate FY02

- (U) Begin development of agile laser eye protection.
- (U) Begin development of Helicopter Aircrew Integrated Life Support Systems.
- (U) Initiate studies for development of an advanced multi-purpose diving system.

Continue FY02

- (U) Continue to evaluate laser technology and laser injury impact on operational performance.
- (U) Continue to assess Gz-tolerance in repeated high/Gz conditions.
- (U) Continue to enhance maintenance of spatial orientation
- (U) Continue to develop smart uniform with embedded physiological sensors.

Complete FY02

- (U) Complete the laser event recorder for a demonstration.

• (U) (\$1,214) Healthy and Fit Force:

Initiate FY02

- (U) Begin injury prevention/fitness optimization.

Continue FY02

- (U) Continue the treatment and prevention of noise-induced hearing loss using antioxidants.
- (U) Continue to develop occupational fitness for injury reduction.

Complete FY02

- (U) Complete demonstration of tuned materials for hearing protection.

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1. (U) FY 2003 PLAN:

- (U) (\$7,579) Casualty Care and Management: This effort intends to maximize care as far forward as possible with reduced infrastructure and logistics.

Continue FY03

- (U) Continue to develop novel resuscitation fluids, ketone additive.
 - (U) Continue to develop low volume resuscitation comparison of all FDA-approved hypertonic crystalloids in hemorrhage.
 - (U) Continue to evaluate low volume resuscitation study of new FDA-approved volume colloid fluid.
 - (U) Continue the development of usage of intranasal ketamine for pain control.
 - (U) Continue the development of a casualty management coordination system.
 - (U) Continue the development of novel oxygen carrying blood substitutes; pegylated liposome encapsulated synthetic hemoglobin; freeze-dried red cells.
 - (U) Continue to develop hemostatic dressing with microbicidal agent.
 - (U) Continue to develop a pelvic clamp for hemostasis.
 - (U) Continue to develop a low-volume resuscitation gas diffusion enhancer.
 - (U) Continue to develop a high intensity focused ultrasound technology for hemostasis.
 - (U) Continue to develop a hand held portable ultrasound diagnostic imager for evaluation of trauma.
 - (U) Continue to develop novel analgesics to reduce pain.
- (U) (\$10,167) Casualty Prevention: This effort intends to enhance warfighter situation awareness and counter threats from disease, battle and non-battle injuries.

Continue FY03

- (U) Continue to evaluate laser technology and laser injury impact on operational performance.
 - (U) Continue to assess Gz-tolerance in repeated high/Gz conditions.
 - (U) Continue to enhance the maintenance of spatial orientation.
 - (U) Continue to develop smart uniform with embedded physiological sensors.
 - (U) Continue to develop agile laser eye protection.
 - (U) Continue to develop the Helicopter Aircrew Integrated Life Support Systems.
 - (U) Continue to develop an advanced multi-purpose diving system.
- (U) (\$1,294) Healthy and Fit Force: This effort intends to preserve the health and enhance the fitness of ready forces.

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Continue FY03

- (U) Continue the assessment and prevention of noise-induced hearing loss using antioxidants.
- (U) Continue studies of occupational fitness for injury reduction.
- (U) Continue to develop strategies for injury prevention and fitness optimization.

C. (U) PROGRAM CHANGE SUMMARY EXPLANATION:

- (U) Funding: Not Applicable.
- (U) Schedule: Not Applicable.

D. (U) OTHER PROGRAM FUNDING SUMMARY:

(U) RELATED RDT&E:

(U) NAVY RELATED RDT&E:

- (U) PE 0602235N Common Picture Applied Research
- (U) PE 0602236N Warfighter Sustainment Applied Research
- (U) PE 0603236N Warfighter Sustainment Advanced Technology
- (U) PE 0604771N Medical Development

(U) NON-NAVY RELATED RDT&E:

- (U) PE 0602716A Human Factors Engineering Technology
- (U) PE 0602785A Manpower, Personnel and Training Technology
- (U) PE 0602787A Medical Technology
- (U) PE 0603002A Medical Advanced Technology
- (U) PE 0602202F Human Effectiveness Applied Research
- (U) PE 0603231F Crew Systems and Personnel Protection Technology

E. (U) SCHEDULE PROFILE: Not applicable.

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CONGRESSIONAL PLUS-UPS

This section describes the following congressional Plus-Ups appropriated in FY2001 and/or FY2002 whose efforts fall within the scope of this restructured program, or which were appropriated in this PE.

Biomedical Research Imaging Core - COH National Medical Center
Bone Marrow Program
Community Hospital Telehealth Consortium
Damage Control Operational Concepts - Distributed Damage
Disaster Management and Humanitarian Assistance
Distributed Simulation Warfighting Concepts
Fleet Health Technology
Medical Readiness Telemedicine Initiative
Medical Readiness Telemedicine Initiative Follow-On
Minimally Invasive Surgical Technology Institute
Mobile Integrated Diagnosis and Data Analysis System (MIDDAS)
Naval Blood Research Laboratory (NBL)
Nursing Telehealth Applications
Optical Imaging of the Brain
Optical Sensing System: Robot Eyes for Advanced Military Medicine
Organ Transfer Technology
Portable Production of Sterile Water for Intravenous
Robot Eyes
Rural Health
Rural Health Deployed Military Patient Records
Teleradiology Program
Vectored Vaccine Research

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1. (U) FY 2001 CONGRESSIONAL PLUS-UPS:

- (U) (\$32,900) Bone Marrow Program: Supported the National Marrow Program/Registry, funding research associated with transplantation. (Appropriated in PE 0603706N.)
- (U) (\$4,826) Disaster Management and Humanitarian Assistance: Provided support to U.S. Southern Command (USSOUTHCOM) by researching issues related to natural and man-made disasters in the Latin American and Caribbean area of responsibility, including the prevention or mitigation of causative or contributing factors, and the humanitarian response to those disasters. (Appropriated in PE 0603706N.)
- (U) (\$2,895) Fleet Health Technology: Supported Fleet Health Technology. (Appropriated in PE 0603706N.)
- (U) (\$8,738) Medical Readiness Telemedicine Initiative: Funds supported Navy Participation in the Joint Medical Operations (Telemedicine) Advanced Concepts Demonstration (ACTD). This ACTD is aimed at changing business practice in the delivery of medical services during warfare. (Appropriated in PE 0603706N.)
- (U) (\$3,861) Naval Blood Research Laboratory (NBL): Research at the Naval Blood Research Laboratory was centered around the test and evaluation of the safety and efficacy of frozen blood products. (Appropriated in PE 0603706N.)
- (U) (\$1,931) Optical Imaging of the Brain: Studied the basic theory of photon migration through tissues for analysis of prefrontal cortex activation in cognitive activity using picosecond pulsed and high frequency modulation of near infrared (NIR) light spectroscopy. (Appropriated in PE 0603706N.)
- (U) (\$996) Robot Eyes: Integrated an existing optical sensing system, Robot Eyes, (that performs automatic acquisition, processing, and perception and when necessary, reproduction of visual three-dimensional objects) with various devices, to include prosthetic devices that will have the capability to perform delicate tasks requiring precision manipulative skills. (Appropriated in PE 0603706N.)
- (U) (\$8,409) Rural Health: This program supported remote medical education, training and telemedicine in rural America. (Appropriated in PE 0603706N.)
- (U) (\$2,200) Rural Health Deployed Military Patient Records: Funds were provided to design, implement, and validate a healthcare information system with application in rural civilian and Navy deployed forces environments that increases the quality and reduces the cost of healthcare. (Appropriated in PE 0603706N.)
- (U) (\$2,911) Teleradiology Program: A collaborative research effort between the Uniformed Services University of the Health Sciences, the National Naval Medical Center, and the University of South Florida in computer aided diagnostics and digital x-ray imaging to develop advanced applications in digital mammography and telemammography. (Appropriated in PE 0603706N.)
- (U) (\$3,399) Vectored Vaccine Research: Funds addressed delivery methods for DNA vaccines, per vaccine program between industry and the Naval Medical Research Center. (Appropriated in PE 0603706N.)

1. (U) FY 2002 CONGRESSIONAL PLUS-UPS:

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- (U) (\$1,685) Damage Control Operational Concepts-Distributed Damage: Supports Damage Control Operations.
- (U) (\$2,181) Disaster Management and Humanitarian Assistance: Provides support to U.S. Southern Command (USSOUTHCOM) by researching issues related to natural and man-made disasters in the Latin American and Caribbean area of responsibility, including the prevention or mitigation of causative or contributing factors, and the humanitarian response to those disasters.
- (U) (\$5,100) Distributed Simulation Warfighting Concepts: Examine the warfighting and weapon system design concepts and their relationship to future aircraft carrier designs.
- (U) (\$1,982) Organ Transfer Technology: Pre-clinical and clinical investigations directed at demonstrating the induction of tolerance to transplanted foreign tissues in the recipient through use of certain immunological reagents.
- (U) Biomedical Research Imaging Core - COH National Medical Center: Funds will support the Biomedical Research Imaging Core. (Appropriated in PE 0603706N, \$3,965.)
- (U) Bone Marrow Program: Supports the National Marrow Program/Registry, funding research associated with transplantation. (Appropriated in PE 0603706N, \$28,645.)
- (U) Community Hospital Telehealth Consortium: Support for the Community Hospital Telehealth Consortium. (Appropriated in PE 0603706N, \$1,487.)
- (U) Medical Readiness Telemedicine Initiative Follow-On: Funds support Navy Participation in the Joint Medical Operations (Telemedicine) Advanced Concepts Demonstration (ACTD). This ACTD is aimed at changing business practice in the delivery of medical services during warfare. (Appropriated in PE 0603706N, \$7,632.)
- (U) Minimally Invasive Surgical Technology Institute: Support for the Minimally Invasive Surgical Technology Institute. (Appropriated in PE 0603706N, \$991.)
- (U) Mobile Integrated Diagnosis and Data Analysis System (MIDDAS): Support for the Mobile Integrated Diagnosis and Data Analysis System. (Appropriated in PE 0603706N, \$991.)
- (U) Nursing Telehealth Applications: An international effort by a consortium of military medical technicians, educators, researchers, and domestic rural health care providers to design and deliver a nurse training curriculum to remote international locations with special emphasis on emergency medical training and humanitarian relief. (Appropriated in PE 0603706N, \$2,577.)
- (U) Optical Sensing System; Robot Eyes for Advanced Military Medicine: Integrate an existing optical sensing system, Robot Eyes, (that performs automatic acquisition, processing, and perception and, when necessary, reproduction of visual three-dimensional objects) with various devices, to include prosthetic devices that will have the capability to perform delicate tasks requiring precision manipulative skills. (Appropriated in PE 0603706N, \$2,478.)
- (U) Portable Production of Sterile Water for Intravenous: The improvement of an existing prototype of a light-weight, man-portable, disposable device for producing water suitable for injection from potable water in the field. (Appropriated in PE 0603706N, \$991.)

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- (U) Rural Health: This program supports remote medical education, training and telemedicine in rural America. (Appropriated in PE 0603706N, \$6,740.)
- (U) Teleradiology: A collaborative research effort between the Uniformed Services University of the Health Sciences, the National Naval Medical Center, and the University of South Florida in computer aided diagnostics and digital x-ray imaging to develop advanced applications in digital mammography and telemammography. (Appropriated in PE 0603706N. \$991)
- (U) Vectored Vaccine Research: Funds would address delivery methods for DNA vaccines, per vaccine program between industry and the Naval Medical Research Center. (Appropriated in PE 0603706N, \$991.)

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