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RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)									DATE June 2001	
APPROPRIATION/BUDGET ACTIVITY RDT&E, Defense-Wide/BA2						R-1 ITEM NOMENCLATURE Medical Free Electron Laser PE 0602227D8Z				
COST (<i>In Millions</i>)	FY 2000	FY 2001	FY 2002						Cost to Complete	Total Cost
Total Program Element (PE) Cost	11.556	19.845	14.660						Continuing	Continuing
MFEL/P483	11.556	19.845	14.660						Continuing	Continuing

(U) **A. Mission Description and Budget Item Justification**

(U) **BRIEF DESCRIPTION OF ELEMENT**

(U) The MFEL program seeks to develop advanced, laser-based applications for military medicine and electronic materials research. Free electron lasers (FELs) provide unique pulse features and tunable wavelength characteristics that are unavailable in other laser devices. Thus, FELs broaden the experimental options for the development of new laser-based medical technologies.

(U) The majority of this program is focused on developing advanced procedures for rapid diagnosis and treatment of battlefield-related medical problems. Specific applications under investigation include soft tissue repair, hard tissue surgery, therapies for thermal and chemical burns, warfighter vision correction, and enhanced medical imaging. Laser applications will be clinically tested in unique program medical centers, leading to Food and Drug Administration (FDA) approval. There is high potential dual use for civilian medicine. Thus far, more than 30 clinical procedures have been developed in several medical specialties, including ophthalmology, orthopedics, thermal and chemical burn repair, and neurosurgery.

(U) A small part of this program is focused on electronic materials research. In this research, the high energy FEL beam is exploited for improved processing applications including more effective microstructure, surface cleaning and modification of transport properties of microelectronic substrates

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(U) The program is executed primarily extramurally, but a small amount of funding is awarded to DOD medical centers to facilitate technology transfer. Performers include 5 major university medical centers and approximately 10 applications groups. Awards are made competitively, following solicitation and peer review, for performance periods of up to 3 years. The program emphasizes the use of interdisciplinary teams of physicians, physicists, biologists, and engineers and collaborative interactions among the major MFEL centers.

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(U) **Project Number and Title: P483 MFEL**

(U) **PROGRAM ACCOMPLISHMENTS AND PLANS**

(U) **FY 2000 Accomplishments:**

(U) A competition for medical center awards was conducted during 1999 for awards beginning in FY 2000. Increased emphasis is being placed upon transition of research products for combat casualty care and military trauma centers by establishing collaborative projects between military medical sites and research centers funded under the program. Specific studies have included work to develop Optical Doppler Tomography to image in vivo blood flow, the development of two photon microscopy and OCT birefringence for cellular imaging of wounds and wound repair dynamics, successful use of an FEL for surgery on a lesion in a human brain, the development of methods for the specific photoinactivation of bacteria in wounds, new wound closure methods for delicate tissues such as those of the eye using photosensitive dye crosslinking, and development of a system based on Compton scattering for generation of monochromatic, tunable x-rays for use in medical imaging.(\$ 11.556 million)

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(U) FY 2001 Plans:

(U) Newly completed center awards will be in place for their first full year of funding. Emphasis will continue to be on military relevant laser medicine with increasing focus on endoscopic imaging for rapid battlefield diagnostics and wound diagnostics and treatment. Studies of the special problems associated with laser vision correction, exacerbated by a variety of the special demands of military operations, will be enhanced, as will means to alleviate such problems. Military relevant medical procedures introduced under this program will continue to be evaluated by, and transferred to, military medical centers, and the special capabilities and facilities available at such centers will be used extensively. (\$ 19.845 million)

(U) FY 2002 Plans:

(U) Center awards funded during the previous year will continue, with their primary focus continuing to be on militarily relevant laser medicine applications. Procedures developed under this program will continue to be evaluated for transfer to clinical application in the various military medical centers. Collaborative efforts with military combat casualty care research facilities will continue to be used to facilitate transfer of new methodologies. New research efforts will expand center programs with new applications for combat casualty care using innovative laser technologies not previously used. (\$ 14.660 million).

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(U) <u>B. Program Change Summary</u>	<u>FY 2000</u>	<u>FY 2001</u>	<u>FY 2002</u>	<u>Total Cost</u>
Previous President's Budget Submit	11.525	15.029	9.660	Continuing
Appropriated Value	0.000	20.029	0.000	Continuing
Adjustments to Appropriated Value				
a. Congressionally Directed Undistributed Reduction	0.000	-0.140	0.000	
b. Rescission/Below-threshold Reprogramming, Inflation Adjustment	0.031	-0.044	0.000	
c. Other	0.000	0.000	5.000	
Current President's Budget	11.556	19.845	14.660	Continuing

Change Summary Explanation.

(U) **Funding:** FY 2000 reflects adjustments for reprogrammings. FY 2001 reductions reflect Section 8086 adjustments. FY 2002 increase to fund new technologies in combat casualty care.

(U) **Schedule:** N/A

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(U) **Technical:** N/A

(U) **C. Other Program Funding Summary Cost** N/A

(U) **D. Acquisition Strategy:** N/A

(U) **E. Schedule Profile:** N/A

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