

Welcome To Beckman Laser Institute

Zhongping Chen

Beckman Laser Institute, Department of Biomedical Engineering

University of California, Irvine

WCU Program, Pusan National University, Busan Korea



BLI Founders



Drs. Arnold Beckman and Michael Berns

BLI MISSION STATEMENT

To conduct interdisciplinary basic and applied research on light interaction with biological systems leading to the development of new diagnostic, therapeutic and analytical technologies

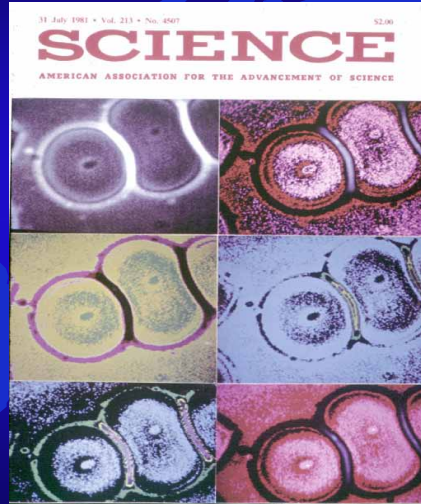


Bruce Tromberg, Director

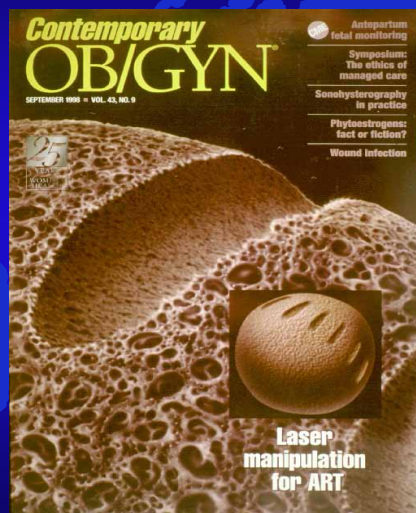
Research and Clinic Under One Roof



Basic Science



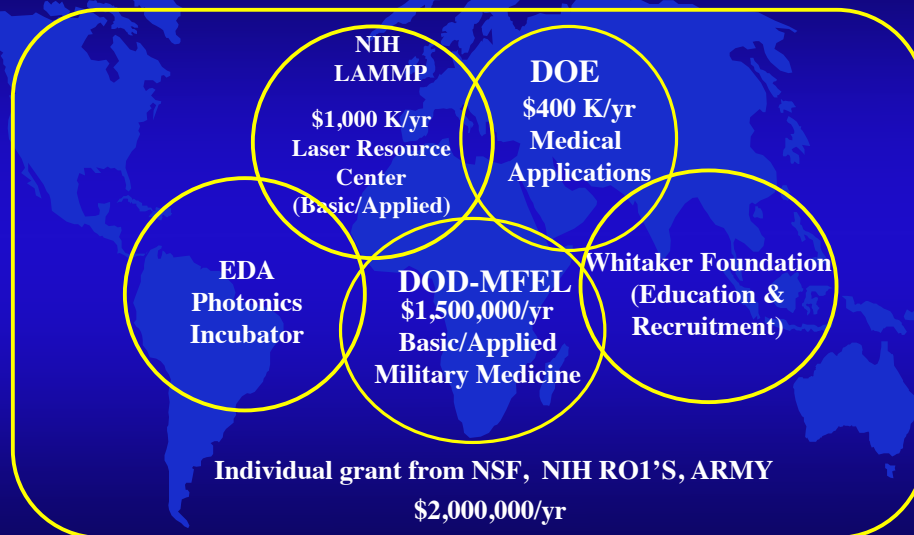
Clinical Medicine



National Designations of Excellence

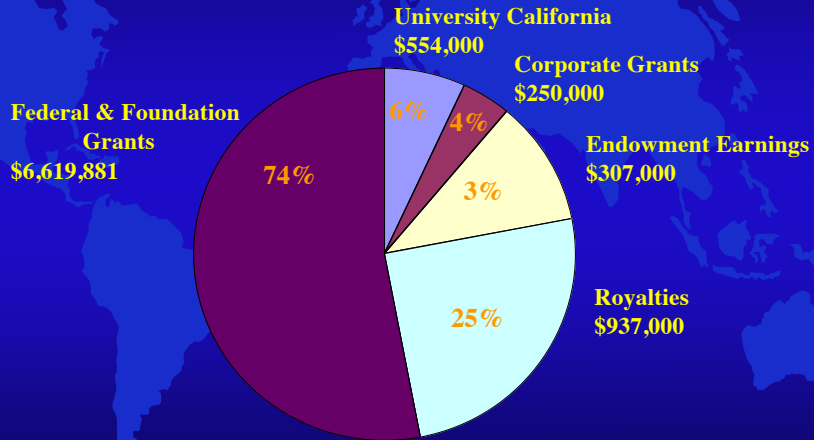
- | | |
|--|--------------------------|
| 1. National Institutes of Health
A Laser Biotechnology Resource (LAMMP) | 1979 - 2013 \$20,000,000 |
| 2. Department of Defense/Office of Naval Research
A Center for Free Electron Laser Biotechnology Research | 1986 - 2010 \$18,000,000 |
| 3. Department of Energy
A Center of Excellence for the Medical Application of Lasers | 1991 -2000 \$5,100,000 |
| 4. Department of Commerce/
Economic Development Administration
Medical Photonic-Based Defense Technology Incubator | 1996 -1999 \$1,000,000 |

Founding Sources



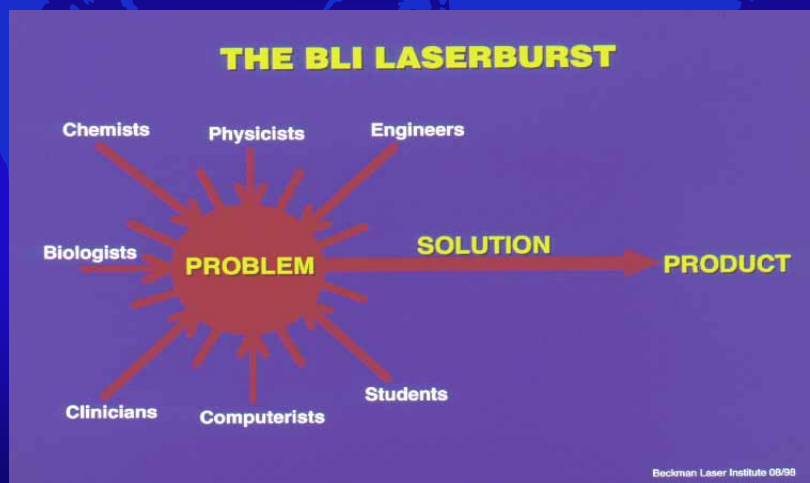
Operating Budget

2009/2010 TOTAL = \$9,248,000



*Excludes Photonics Incubator Capital Expense

Research to Clinical Applications



Technology Transfer

Beckman Laser Institute and Medical Clinic

Corporate Relations *

Allergan, Inc.	Heraeus LaserSonic	Pharmaceuticals, Inc.
Arrowhead Standard, Inc.	Hewlett Packard	Physical Optics Corporation
Baxter Health Care	Johnson & Johnson	PolyTech, PI
Beckman Instruments, Inc.	Laser Medics, Inc.	Premier Laser Systems
Candela Laser	Laser Scope, Inc.	Quadra Logic Technologies (QLT)
Canon, USA, Inc.	Lawrence Livermore National Lab	Quantel North America
Castlewood Spas, Inc.	L'Oreal	Reliant Laser Corporation
Cell Robotics	Los Alamos National Lab	Rockwell International
Chiron IntraOptics	Medical Optics	Sandia National Lab
Coherent, Inc.	Medtronic	Santa Barbara Focal Plane
Continuum Biomedical, Inc.	MetroLaser	Scientific Supply Company
CRI	Monsanto	Sharplan Lasers, Inc.
DUSA Pharmaceuticals, Inc.	Newport Corporation	SmithKline Beecham
EA Photonics	New Star Lasers, Inc.	Trimedyne, Inc.
Fonet, Inc.	NeXstar, Inc.	Carl Zeiss, Inc.
Fusion	PDT, Inc.	

* List comprised of all companies that are formally affiliated with the Institute and/or currently engaged in some form of joint activity (contract research, SBIR's etc.)

Beckman Laser Institute 05/98

Disclosure Filed

Therapeutic Medical Devices	29
Diagnostic Medical Devices	15
Cellular Technology	13
Drug Therapy	6
Total Disclosures	63

Partial list of patents filed

Beckman Laser Institute and Medical Clinic

Diagnostic Medical Devices Patent Filings

Laser Scanning Calorimeter (LSC)
Optical Trap Immuno-Sensor (OTIS)
Instrument for Non-Contact Measurement of Fluid Flow Velocity Profile
High Resolution Biosensor for In-Situ Microtherapy
Infrared Tomography for Diagnostic Imaging of Human Skin
Optical Doppler Tomographic Imaging of Blood Flow
Endoscopic PDT Light Applicator
Quantitative Optical Property Measurements in Turbid Media Using Frequency Domain Photon Migration

Beckman Laser Institute 06/96

Partial list of patents filed

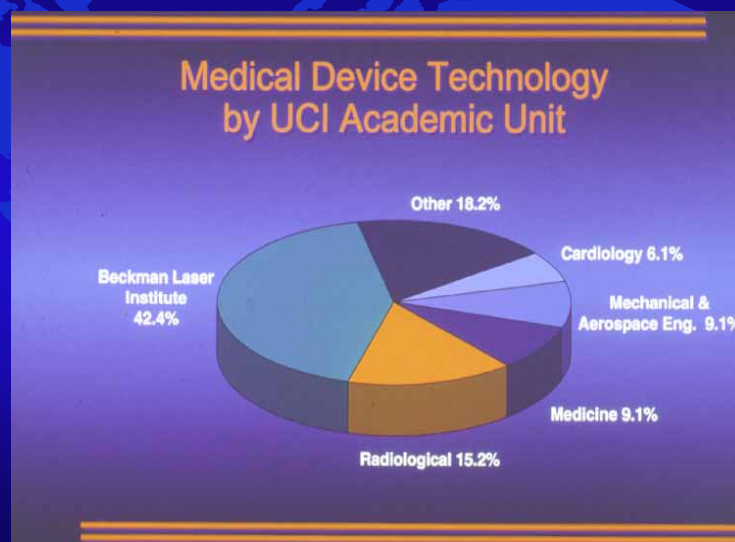
Prevention of Cutaneous Phototoxicity by Spectral Filtering
Skin Barrier Ablation by Lasers for Local and Systemic Drug Delivery
Application of Pulsed Laser Technology for Dental Therapy
The Use of Photosensitizers in Combination with Light to Treat Vascular Skin Disorders
Heat Activated Devices for Performing Surgery Through Flexible Ultra-Thin Microendoscopes
Dynamic Cooling of Biological Tissues During Laser Surgery
Vaginal Speculum for Photodynamic Therapy
Use of Lasers for Treatment of Endodontically Discolored Teeth
Intra-Uterine Device for Light Diffusion
Laser Facilitated Selective Ciliary Cyclodeconstruction

Beckman Laser Institute 06/96

TECHNOLOGY TRANSFER

Disclosures Filed	132
FY 05/06 Disclosures Filed	16
Patents Awarded	21
Patents Pending	14
Letters of Intent (Licensing)	15
Exclusive Licenses	4
Sponsored Research Agreements	4

TECHNOLOGY TRANSFER



Research Focus

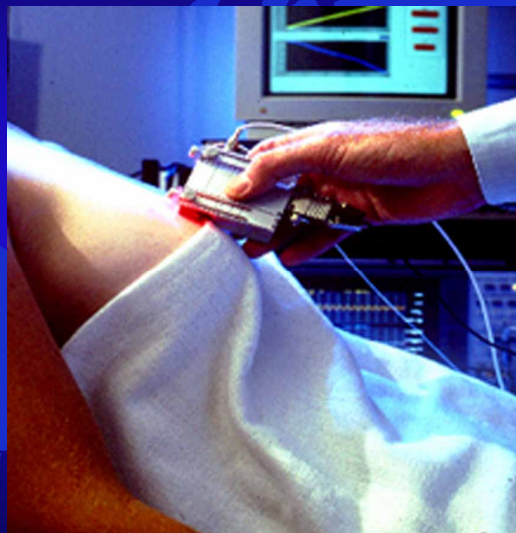
- Optical detection, analysis and manipulation of single cell molecules (confocal and two photon microscopy, laser trapping, and laser ablation)
- Non/Minimally Invasive Optical Tissue Diagnostics (optical coherence tomography, photon migration, etc.)
- Optical-based medical therapeutic systems (photodynamic therapy, etc.)

Research Program

Technology Development

1. *Multifunctional Optical Microscopy*
(*confocal, two photon, tweezers, scissors, etc.*)
2. *Optical Coherence Tomography (OCT)*
(*F-OCT, ODT, PS-OCT, Spectral OCT, etc.*)
3. *Frequency Domain Photon Migration*
(*FDPM*)

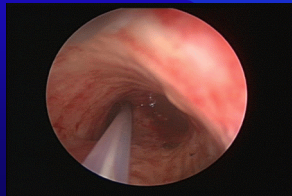
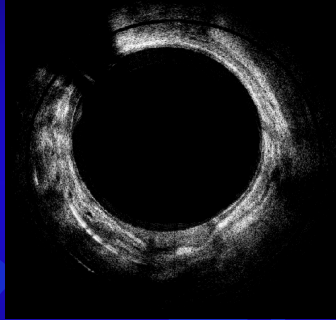
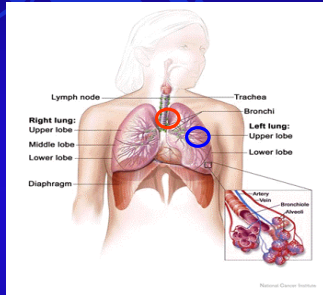
Breast Cancer Detection Using FDPM



Optical coherence tomography



In vivo 3-D image of human lower left lobe bronchus

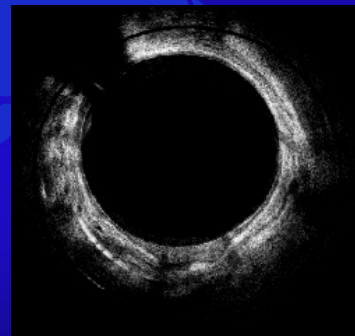
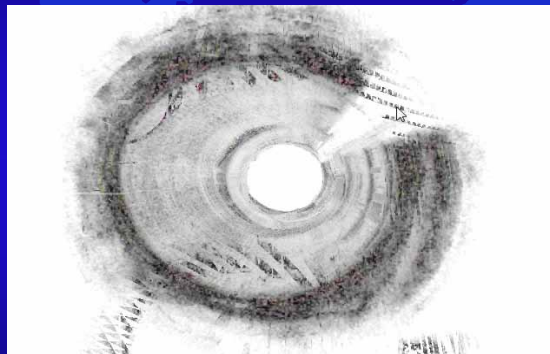


Real time display of OCT images with DSP

3-D reconstruction

J. Su, et al., JBO 13, 030506 (2008)

In vivo 3-D image of human lower left lobe bronchus



J. Yin, et al., J. Biomedical Optics, 14, 060503-1-3 (2009).

Connection with Korea

Trained Majority of Biophotonics Faculty in Korea University

1. Prof. Jeehyun Kim, Associate Professor, Electrical Engineering, Kyungpook National University, Daegu (Post Doc at BLI during 2004~2007)
2. Prof. Jong-in Yoon, Associate Professor (Dept Chair), Biomedical Engineering, Daegu Catholic University, Daegu (Post Doc at BLI during 2003~2006)
3. Prof. Chang-Seok Kim, Associate Professor, Nano Convergence Engineering, Pusan National University, Busan (Post Doc at BLI during 2004~2005)
4. Prof. Yechan Ahn, Assistant Professor, Biomedical Engineering, Pukyung National University, Busan (Post Doc at BLI during 2004~2010)
5. Prof. Byungjo Jung, Associate Professor, Biomedical Engineering, Yonsei University, Wonju (Post Doc at BLI during 2002~2005)
6. Prof. Jaegwan Kim, Assistant Professor, Medical Engineering, Gwangju Inst. of Science and Technology, Gwangju (Post Doc at BLI during 2006~2011)
7. Prof. Suc-Bei Moon, Assistant Professor, Physics, Kookmin University, Seoul (Post Doc at BLI during 2009~2011)
8. Dr. Sangwon Lee, Senior Researcher, ETRI, Daejeon (Post Doc at BLI during 2008~2010)

Connection with Korea

Trained Majority of Biophotonics Faculty in Korea University

1. Prof. Yongjin Shin, Professor (Dean of Natural Science), Physics, Chosun University, Gwangju (Visiting Scholar at BLI during 2003~2005)
2. Prof. Byungha Lee, Professor (Dept Chair), Medical Engineering, Gwangju Inst. of Science and Technology, Gwangju (Visiting Scholar at BLI during 2004~2005)
3. Prof. Min Yong Jeon, Professor, Physics, Chungnam National University, Daejeon (Visiting Scholar at BLI during 2006~2007)
4. Prof. Jin Seob Eom, Professor, Physics, Kangwon National University, Chunchon (Visiting Scholar at BLI during 2006~2007)
5. Prof. Junghwan Oh, Professor (Dep Chair), Biomedical Engineering, Pukyung National University, Busan (Visiting Scholar at BLI during 2005)
6. Taejung Eom, Senior Researcher, Advanced Photonics Research Inst., Gwangju (Visiting Scholar at BLI during 2009)
7. Eunjoo Jung, Senior Researcher, Korea Optics Technology Inst., Gwangju (Visiting Scholar at BLI during 2008)