

LASER

BECKMAN LASER INSTITUTE

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WINTER 2008

BLI HOSTS VBF CONFERENCE

The Vascular Birthmarks Foundation (VBF) and the Beckman Laser Institute (BLI) co-sponsored the 2007 Port Wine Stain and Vascular Birthmarks Conference on Friday and Saturday, November 2-3, at The Island Hotel in Newport Beach, CA. Normally held on

the East Coast, this was the second conference to be held on the West Coast. The medical conference was for families who are affected by birthmark disorders. A welcome reception for the families was held on Friday at The Island Hotel followed by conference presentations in the

adjoining ballroom. Topics covered included port wine stains, hemangiomas and research relating to these subjects. A special presentation was given by Stephen Dale, the sixteen year old founder of the Stephen Dale Project, whose specific mission is to make the world a better place for individuals living with facial differences.

BLI Founding Director, Dr. Michael W. Berns presented the newly formed Dr. Michael W. Berns Achievement Award. This award was presented to Dr. Martin C. Mihm, Jr., for his outstanding research contributions to the understanding, diagnosis and treatment of vascular birthmarks. Dr. Mihm is a Professor in the Department of Pathology at Harvard Medical School and Massachusetts General Hospital. He is the leading pathologist in the country studying vascular anomalies. Other awards presented were the VBF Day of Awareness Coco Award to Brian and Natalie Bolinger, the VBF Service Award to Andrea Giancarli, and the VBF Physician of the Year Award to Dr. Alejandro Berenstein. After the presentations and awards, breakout sessions



Dr. Michael W. Berns (left) presents the Dr. Michael W. Berns Achievement Award to Dr. Martin C. Mihm, Jr.

(VBF continued on p. 5)

Newsbriefs

INVITED PRESENTATIONS

Two BLI researchers gave invited presentations at the Frontiers in Optics 2007 Conference held in San Jose, CA, on September 16-20, 2007, which was sponsored by the Optical Society of America. Assistant Professor Anthony Durkin presented *Modulated Imaging in a Pre-Clinical Model of Wound Healing*, and Assistant

Professor Bernard Choi presented *Chronic, Wide-Field Optical Imaging of Blood Flow Dynamics*. Both talks were highlighted in the "What's Hot in Optics in Biology and Medicine" section of the conference.

BLI BECOMES A SPECIAL RESEARCH PROGRAM IN THE OFFICE OF RESEARCH

A change in the administrative status of the Beckman Laser Institute and Medical Clinic (BLIMC) became effective July 1, 2007. The

reporting relationship for BLIMC will be changed from the School of Medicine to the Office of Research where BLIMC will be housed as a Special Research Program. The Office of Research will become BLIMC's coordinating point for all administrative activities, including budget and finance, human resources, purchasing, and related administrative functions.

(News continued on p. 3)

Re-connecting with Arnold Beckman

by Michael W. Berns, Ph.D.,
Co-Founder

There are times that I feel removed and disconnected from the very person who served as my mentor in the formulation and creation of the Beckman Laser Institute. When that happens, I play a videotape of an interview (more of an open question and answer session) with Arnold Beckman in 1992. Listening to a 92 year-old Arnold Beckman not only re-connects me with him, but it reminds me of what he stood for, what he expected of me (and others), and reminds me of his sense of humor and wisdom. I'd like to share some of that with you.

The context of the session was actually a roundtable of about 20 Orange County CEO's and UCI senior administrators. It took place in the Beckman Laser Institute Library, September 29, 1992, over lunch and lasted for about 1½ hours. It was informal with people peppering Dr. Beckman with whatever questions were on their minds. It began with a question of how he invented the pH meter. With total clarity and enthusiasm, he explained how a friend of his came to him when he was a Professor at Caltech and asked if he could help measure the acidity of the soil around his lemon trees. Then Dr. Beckman recited the Nerst equation, followed by a dissertation of ion exchange and electronics. He was quick, clear, and totally spellbinding. He had the information and understanding at his fingertips – at 92! With complete humility, he explained that he never really was a businessman, that he didn't understand much science, and that the biggest concern with his decision to leave Caltech and run a company was that he would be perceived as "selling-out" by his academic colleagues.

At one point, he was asked a question about whether or not the government should set up an agency that is specifically charged with providing funds for "innovative" research because he (and others) felt that not enough money was being spent on

innovative research. He said you have to take risks, and that is the kind of research he wanted to support. His answer to the question was "no." That appeared to be the sum total of his answer, and then he cocked his head in typical "AOB" fashion and said, "Let me explain." Creating another government agency just means creating more layers of government bureaucracy, and soon the agency is convinced that it is important. He went on to say that, "Peer review should not be used to evaluate innovative ideas." I think the subtext of his statement was probably that peer review panels generally look for tried and true research, where there is both a track record and preliminary data. He felt that these are not the type of people who should be reviewing "innovative" grant proposals. His answer was typical of both his wisdom and his sense of humor. And, by the way, there was general gloom in the room that NIH was only funding down to the 10th percentile (about the same as today, 16 years later!).

Another entertaining exchange occurred when asked about the perception of academia by the rest of society. His answer was that it is unfortunate that "... much of society equates universities with football." He followed by saying that scientists need to be able to communicate in

"lay terms" what they do and that universities should be bombarding local newspapers with stories about the accomplishments of its faculty. He recounted how often he received requests for funding, and all that he was given were some reprints (which were entirely incomprehensible) accompanied by a plea for funds. He then segued into his feeling about how underpaid teachers are, stating that "we pay teachers \$40,000 a year to teach our children and some guy millions of dollars a year because he can hit a ball over a fence."

Finally, he responded to a question about supporting interdisciplinary research. That was an easy answer for him. He said that "disciplines are arbitrary definitions.... Nature doesn't categorize things." His sense was that interdisciplinary research is really what science in the 21st century will be all about. He reminded the audience that the key to the success of the five Beckman Centers/Institutes was their interdisciplinary approach.

How appropriate it is to be able to relive moments through technology with one of the men I most admire and cherish. Arnold O. Beckman's ideas and persona once again manage to keep me going until the next time I need him. ■

BLI Is Site For Lions Club Visit

On December 30, 2007, the Lions Club at the University of California, Irvine, hosted a visit from the Lions International President and a group of over 20 other dignitaries. This visit resulted from an effort by a number of faculty and graduate students at UCI who founded a Lions Club on campus with the eventual hope of establishing long term funding for hearing related research from Lions International. The International



Lions International President and dignitaries.

President attended with the express interest in learning about the hearing

(Lions continued on p. 5)

New Breast Health Research and Treatment Clinic

The Beckman Laser Institute and Medical Clinic and the Chao Family Comprehensive Cancer Center have opened a new Breast Health Research and Treatment Clinic at the Beckman Laser Institute on the campus of the University of California, Irvine. The Clinic meets each Monday afternoon and is staffed primarily by surgical and medical oncologists. Scientists and physicians work together in this state-of-the-art clinic to improve patient care and conduct advanced breast cancer research supported by the National Cancer Institute, the National Institutes of Health, the UC Irvine Medical Center, and the Beckman Foundation.

Patients are seen throughout the afternoon in multi-disciplinary consultations and eligible subjects are given an opportunity to enroll in clinical protocols. Patient care services currently include second opinion, risk analysis, post-surgical follow up, and chemotherapy consultations. Future plans include guided biopsies and surgical biopsies.

Advanced technologies developed at UCI are used in these sessions in a variety of ways. Ongoing clinical research studies include:

- monitoring and predicting response to pre-surgical neoadjuvant chemotherapy,
- detecting and diagnosing breast cancer in mammographically dense/high-risk subjects,
- evaluating side effects of chemotherapy such as cognitive changes and oral mucositis,
- characterizing rare breast cancer stem cells,
- evaluating metabolic syndromes.

Specialized University of California, Irvine (UCI) technologies used in these studies include: the Laser Breast Scanner (LBS), dynamic contrast enhanced MRI with laser scanning, optical coherence tomography (OCT), Brain Optical Imaging, and Laser Microbeams. As new services are offered, we expect to introduce recently developed intra-operative



Breast cancer neoadjuvant chemotherapy patient in Beckman Breast Clinic.

technologies for improving surgical guidance and lymph node characterization.

The clinic utilizes 650 square feet of dedicated translational research space, the “Advanced Technology Suite (ATS)” within the Beckman Laser Institute Clinic. The ATS has 3 separate private rooms joined by flexible partitions in order to accommodate up to 3 simultaneous studies, or allow use of a single open space. In addition to the portable state-of-the-art technologies that are wheeled into the ATS, the suite has also been equipped with optical tables, lasers for Photodynamic Therapy, a breast ultrasound, and various therapeutic lasers.

Dedicated, recurring multi-disciplinary translational clinics help facilitate our major clinical research activities: Vascular Lesions, Breast Cancer, and Micro-Endoscopic Tomography. Additional cancer clinics are under development in Melanoma and Oral Cancer. Although each clinic has its own unique characteristics, all combine multiple experimental protocols with patient care procedures and consultations.

The BLI Medical Clinic currently has approximately 3500 patient visits/year and translational clinics are expected to continue to play an important role in enhancing clinic utilization, improving protocol accrual, and strengthening our relationship with the community. ■

Newsbriefs *(cont'd from p. 1)*

FOUR GRADUATE STUDENTS ADVANCE TO PH.D. CANDIDACY

Four graduate students in biomedical engineering formally advanced to Ph.D. Candidacy. The formal advancement includes a written and oral presentation to a committee comprised of faculty members. Woong-Gyu Jung, under the supervision of Dr. Zhongping Chen, advanced in August 2007. His proposal was entitled “Three-dimensional Endoscopic and High Resolution Optical Coherence Tomography.” The three other graduate students, under the supervision of BLI Director Bruce Tromberg, are Jessie Weber, Sophie Chung, and Amaan Mazhar. Jessie advanced in April 2007. Her proposal was entitled “The Impact of Spatial and Spectral Frequencies in Modulated Imaging of Thick Tissues.” Sophie advanced in September 2007. Her proposal was entitled “Characterization of Water Molecular State in Thick Tissues *in vivo* Using Diffuse Optical Spectroscopy.” Amaan advanced in October 2007, and his proposal was entitled “Wide-field Spatially Modulated Fluorescence Imaging in Thick Tissue.”

BLI Co-Founder

Michael W. Berns, Ph.D.



Dr. Michael Berns

Dr. Berns was one of 72 new Fellows elected to SPIE-The International Society for Optical Engineering this year. Fellows are members of distinction who have made significant scientific and technical contributions in the multidisciplinary fields of optics, photonics, and imaging. They are honored for their technical achievement, for their service to the general optics community, and to SPIE in particular. More than 500 SPIE members have become Fellows since the Society's inception in 1955. "The annual recognition of Fellows provides an opportunity for us to acknowledge outstanding members for their service to the general optics community," says Kevin G. Harding, SPIE President.

Dr. Berns was recognized for signifi-

cant contributions in the areas of light interactions with cells and tissues. Since the 1960s, Dr. Berns has been a pioneer in biomedical optics, integral to such developments as microscopy tools for cell biology and pathology, computer enhancement of optical images, optical trapping, engineering of biomedical devices, and minimally invasive and remote sensing in humans and animals.

A Columbia University study recognized Dr. Berns as one of the top 5% of U.S. researchers for the amount of consecutive peer-reviewed funds received from the National Institutes of Health (NIH) over the past 25 years. He has 7 patents, more than 400 published research articles, and numerous honors. Dr. Berns is one of the few foreign members of the Royal Norwegian Academy of Arts and Sciences, received the University of California, Irvine Medal, and received an SPIE Lifetime Achievement Award in 2006 for his pioneering contributions to biomedical optics. In addition, he has served in many leadership positions in academics, international societies, and editorial boards of profes-

sional journals, including serving as an active member of the SPIE Journal of Biomedical Optics editorial board. Over the years, he has been an advisor for dozens of students, postdoctoral fellows, and junior faculty members.

**Brian Wong, M.D., Ph.D.,
Kristen Kelly, M.D., John Butler,
M.D., David Hsiang, M.D.
and Edward Nelson, M.D.**



Dr. Kristen Kelly

For the second consecutive year, Dr. Wong has been selected as one of the Top Doctors in Otolaryngology, Head and Neck Surgery in Orange County, which appears in the

January 2008 issue of Orange Coast magazine. Physicians in the "Top Doctors" listing are chosen on an annual basis by a selection committee who reviews nominations for the Orange County Medical Association's Physicians of Excellence

(Honors continued on p. 6)

Andrea Giancarli Receives VBF's "Service Award"



Andrea Giancarli

At the 2007 Port Wine Stain and Vascular Birthmarks Conference held at The Island Hotel in Newport Beach, California, the Vascular Birthmarks Foundation Service Award was presented to Andrea Giancarli of the Beckman Laser Institute for her tireless effort in assisting families with insurance issues regarding the treatment of their vascular birthmarks and tumors.

Andrea was hired as the Financial Billing Manager at the Beckman Laser

Institute Medical Clinic in 1997. Her expertise ranges from public relations to day-to-day administrative activities to insurance billing. She is also the Clinic Coordinator of the Vascular Birthmarks and Malformations Diagnostic and Treatment Center (VBMDTC) at BLI under the direction of Dr. J. Stuart Nelson. The VBMDTC is comprised of a multidisciplinary team of UCIMC medical specialists designed to provide accurate diagnosis and current treatment options for patients and their families who are affected by vascular birthmarks or malformations, including port wine stains, hemangiomas, arteriovenous malformations, and lymphatic malformations.

In presenting the award to Andrea,

Dr. Nelson noted that he often receives compliments from patients about the quality of service received at the clinic. "Because I do not have to worry about the day-to-day operation of the clinic, I am free to concentrate on just treating the patient. This also translates into a calm and comforting atmosphere for patients, staff, and doctors alike because they respond to Andrea's responsible, professional and friendly approach," said Dr. Nelson in explaining why she deserved such recognition and praise.

Andrea is married with two daughters, Stephanie, 9, and Jacqueline, 4. In her spare time, she enjoys being outdoors and likes going to the beach and playing tennis. ■

UCI To Participate In Sleep Apnea Study

The departments of Neurology, Biomedical Engineering and the Beckman Laser Institute are collaborating with ISS, Inc., to evaluate new technology for non-invasive brain imaging of patients who suffer from sleep apnea. A clinical trial grant was awarded to ISS by the National Institute of Neurological Disorders and Stroke to validate the non-invasive near infrared technology, OxiplexTS™. The three-year project targets brain oxygenation and brain vascular reactivity during sleep in persons who suffer from Obstructive Sleep Apnea Syndrome (OSAS).

The project involves a multi-site collaboration with several research centers: the Center of Sleep and Ventilatory Disorders of the University of Illinois Medical Center at Chicago (Chicago, IL); the Regional Sleep Disorders Center at Carle Foundation

Hospital (Urbana, IL); the Sleep Disorders Clinic at Stanford University (Palo Alto, CA); and the Center for Sleep Disorders at the University of California at Irvine (Irvine, CA).

The main objective of this project is the application of OxiplexTS™, a non-invasive tissue oximeter that provides absolute quantitative measurements of hemoglobin concentration and oxygen saturation in tissues, in Sleep Medicine and Medical Diagnostics. The standard diagnostic instrumentation used in Sleep Medicine does not supply the clinician with information on cerebral oxygenation and hemodynamics. The assessment of these parameters is crucial in OSAS: they are pivotal for the clinician in formulating treatment.

OxiplexTS™ utilizes near infrared light to probe brain tissue. In order to provide a 3D localization of the brain

oxygenation, low intensity light beams are carried to the head by as many as 32 distinct fiber optic cables. This technology is based on pioneering work in frequency domain photon migration by 2 NCRR Biomedical Technology Resources in the Department of Biomedical Engineering and the Beckman Laser Institute at UCI: the Laboratory for Fluorescence Dynamics (LFD) and the Laser Microbeam and Medical Program (LAMMP). Both LFD and LAMMP are partners in these and related studies.

For additional information, contact the Principal Investigator, Antonios Michalos, M.D., M.S., Director of Medical Research at ISS and Adjunct Senior Research Scientist at the College of Engineering of the University of Illinois at Urbana-Champaign, antonios.michalos@iss.com. ■

VB *(cont'd from p. 1)*

were offered by physicians for families to discuss specific issues.

On Saturday, short talks were given by various physicians: Dr. Martin Mihm, Jr. (pathology); Dr. Yupo Ma (genetics of hemangiomas); Dr. J. Stuart Nelson (port wine stains); Dr. Milton Waner (surgical management of hemangiomas); Dr. Alex Berenstein (treatment of malformations); Dr. Kamiab Delfanian (Klippel-Trenaunay diagnosis and treatment);

and Dr. Anne Comi (Sturge-Weber Syndrome diagnosis and treatment). VBF Founder Linda Rozell-Shannon also gave a talk entitled “The HRQ – Measuring the Impact of Hemangiomas on Maternal Stress.” After lunch, families were shuttled to BLI for clinic appointments where they could discuss their specific needs with doctors who specialize in their condition. Concomitantly at the hotel, two special sessions were offered: one on billing and insurance appeals, and the other on

birthmark cover-up.

This informative and supportive conference was made possible through the generous contributions of Patricia Beckman, Dr. Michael W. Berns, Dr. Bruce J. Tromberg and the Laser Microbeam and Medical Program, the Beckman Laser Institute, Inc., and Cynosure Corporation. ■

LIONS *(cont'd from p. 2)*

loss research at UCI and what projects are planned for the near future.

The tour began at Beckman Laser Institute where Dr. Hamid Djalilian and graduate student Jeff Carroll welcomed the guests and offered the first general talks. Mr. Carroll noted that BLI was selected as a site for the visit because of

the level of professionalism exemplified by its research and the dignified décor that the BLI library offered for such an important event. The tour continued to the laboratory of Dr. Fan-Gang Zeng, Hearing and Speech Director, Department of Head and Neck Surgery, at the medical school to hear about the work being done on cochlear implants and to meet two actual cochlear implant

patients who shared their experiences. After lunch and four more short talks by Dr. Fan-Gang Zeng, Dr. Vanessa Rothholtz, graduate student Matt Korn and Dr. Raju Metherate, the visit concluded with the invited guests expressing a desire to help find funding for future research projects. ■

(cont'd from page 4)

program. Nominees must meet at least seven criteria, including demonstrating physician leadership, involvement in physician education, and possession of unique skills within the field of nomination. Drs. Kelly (Dermatology), Butler (Surgical Oncology), Hsiang (Surgical Oncology) and Nelson (Medical Oncology) were also selected as other "Top Doctors" this year.

**John Butler, M.D.,
and Brian Wong, M.D., Ph.D.**



Dr. Brian Wong

More than 80 UC Irvine Healthcare physicians were listed as Best Doctors in America® by Best Doctors, Inc., an organization that bases its selection on survey results from other physicians. The Best Doctors database lists physicians selected through a comprehensive peer-review survey that asks "If you or a loved one needed a doctor in your specialty, to whom would you refer them?" Physicians listed in the database represent the top 3 to 5 percent of specialists in the country. Two of the UCI physicians named are affiliated with the Beckman Laser Institute. They are Dr. John Butler of Surgical Oncology and Dr. Brian Wong of Otolaryngology.

Henry Hirschberg, M.D., Ph.D.



Dr. Henry Hirschberg

BLI Faculty Researcher and Professor Emeritus of Neurosurgery, University Hospital, Oslo, Norway, Henry Hirschberg, has been awarded three grants. The first two are from the Nevada Cancer Institute Foundation and The Norwegian Radium Hospital Research Foundation for research entitled, "Selective opening of the blood-brain barrier by photochemical internalization." The overall objective of the research is to

investigate the utility of photodynamic therapy and photochemical internalization for the treatment of malignant brain tumors (gliomas). The first grant is a collaborative effort with former BLI postdoctoral researcher Steen Madsen, now Associate Professor and Chair of Health Physics at the University of Nevada at Las Vegas. The second grant is also a collaborative effort with Dr. Q. Peng, Department of Surgical Oncology, Norwegian Radium Hospital, Oslo, Norway.

The third grant is from The Norwegian Radium Hospital Research Foundation for "Treatment of malignant brain tumors using viral and non-viral pax6 gene therapy and photochemical internalization." This project is another collaborative effort with the Department of Surgical Oncology, Norwegian Radium Hospital; the Beckman Laser Institute and Department of Neurosurgery, University of California, Irvine; and the Department of Health Physics, University of Nevada, Las Vegas.

Matthew Brenner, M.D.



Dr. Matthew Brenner

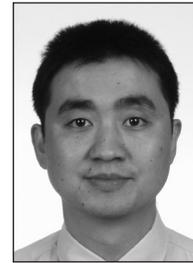
Dr. Brenner has been awarded a 5 year R01 grant from the National Cancer Institute of the National Institutes of Health for "High Resolution Optical Coherence Tomography for Early Airway Cancer Detection." This grant will focus on advancing development of real-time high-resolution endoscopic OCT technology directed at specific lung cancer applications where the need for flexible and rigid high-resolution optical endoscopy is well-defined: 1) evaluation and assessment of endobronchial cancer margins and 2) assessment of improved endobronchial cancer detection feasibility.

Jae Gwan Kim, Ph.D.

BLI Postdoctoral Fellow Jae Gwan Kim has received the Department of Defense Breast Cancer Research Program Era of Hope Postdoctoral Award. The grant is for 3 years and is entitled "Respiratory

Challenges in Breast Cancer: Potential for Enhanced Diagnostics and Therapy." Dr. Kim is part of Dr. Bruce Tromberg's lab.

Wangcun Jia, Ph.D.



Dr. Wangcun Jia

BLI Assistant Project Scientist Wangcun Jia has been awarded a 2007 Non-Student Research Grant from the American Society for Laser Medicine and Surgery (ASLMS) for "A Novel Approach to Port Wine Stain Treatment" using multiple cryogen spurts applied intermittently with multiple laser pulse exposures (MCS-MLP). Port wine stain (PWS) is a congenital, progressive vascular malformation of human skin. The current treatment of choice is single cryogen spurt (for epidermal protection) and single laser pulse exposure. Although this treatment produces some degree of PWS blanching, complete PWS removal is rare because large vessels can only be partially coagulated due to inadequate heating. MLP has the potential to induce complete coagulation of large blood vessels when heat generated by previous pulses accumulates in the vessel while the MCS actively maintains the epidermal temperature below the damage threshold. The primary purpose of the ASLMS Research Grant Program is to support research which can be applied to medical and surgical care of patients. Dr. Jia is a member of Dr. Stuart Nelson's lab.

Marlon Mathews, Ph.D.

OCTANe's Foundation for Innovation has given its inaugural \$20,000 Innovation Award to UCI postdoctoral student, Marlon Mathews. Dr. Mathews' research has led to the development of a device that can be safely inserted into the brain's blood vessels for imaging procedures. In addition to the money, Dr. Mathews receives a year's membership in OCTANe and business coaching and mentoring through the organization's LaunchPad program. Dr. Mathews conducts his research in biomedical optics and

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Laser Tweezers Used To Study Primate Sperm Cell Motility

Researchers at UC San Diego (UCSD) and UC Irvine (UCI) have found evidence that supports the theory that reproductive competition during the evolution of primate species has occurred at the level of sperm cell motility.

In a paper published online July, 2007, by the Journal of the Royal Society Interface, a team led by Michael W. Berns, co-founder of the Beckman Laser Institute, Professor of Biomedical Engineering at UCI, and Adjunct Professor of Bioengineering at UCSD, and UCSD Ph.D. candidate Jaclyn Nascimento reported that sperm cells from the more promiscuous chimpanzee and rhesus macaque species swim much faster and with much greater force than those of humans and gorillas, species where individual females mate primarily with only one male during a reproductive cycle.

Female chimps and macaques typically mate with several males in a social group so that a male with faster and stronger swimming sperm cells would in theory be more likely to successfully fertilize an egg.

“Rapidly swimming sperm cells would be evolutionarily favored when the mating pattern is polygamous, and this is consistent with our measurements of chimp and

rhesus macaque sperm,” said Nascimento.

The research team found significantly lower swimming forces and slower swimming speeds with human sperm, and the slowest of all belonged to gorillas. “Dominant silverbacks are known to effectively discourage other males from mating with the females in their harems, so faster sperm wouldn’t seem to be an advantage to them,” Nascimento said. However, the researchers were surprised that the speed and force of human sperm fell in between the gorillas and the chimps. “Maybe humans haven’t always been as monogamous as we had thought,” Berns said.

Beginning more than 35 years ago, scientists began using laser beams to trap individual atoms, microscopic particles, DNA molecules, and various cells. Dr. Berns has been a pioneer in the design of “laser tweezers” which rely on the momentum inherent in laser light: when the path of laser light bends as it passes through a small transparent object, such as a cell, some of the light’s momentum is transferred to the cell, effectively holding, or trapping, it. The brighter the laser, the more firmly the cell is held.

After attending a talk at the Center for Reproduction of Endangered Species

(CRES) at the San Diego Zoo about the theory that faster sperm could have an advantage in the reproductive success of polygamous primates, Berns decided to modify his laser tweezers so that after a cell was trapped, the light intensity could be reduced in a precise manner. Such a timed decay in laser brightness allows a trapped sperm cell to escape at the point at which its swimming force exceeds the trapping force. Initial experiments utilized dog sperm. It took five years to fine tune the system, and when the rare primate sperm was available, the system was perfect. The adjustable laser tweezers and sperm-tracking software allowed the team led by Berns and Nascimento to precisely and accurately measure swimming force and speed of hundreds of individual sperm cells from males of the four primate species.

“While biologists have been interested in this sperm competition question for years, it required the collaboration of biologists, physicists and engineers to design the right equipment to test the theory,” said Berns. ■

Arrivals and Departures

ARRIVALS

Even Angell-Petersen, Ph.D., joins BLI as a visiting assistant researcher from Rikshospitalet in Oslo, Norway, where he is a postdoctoral researcher. He is working at BLI with Dr. Henry Hirschberg.

Hosain Haghany is a physics graduate student working with Drs. Albert Cerussi and Bruce Tromberg on co-registering optical measurements with MRI using the laser breast scanner.

Ennjo Jung, M.S., has been hired as a junior specialist to work in Dr. Zhongping Chen’s lab on the development of a light

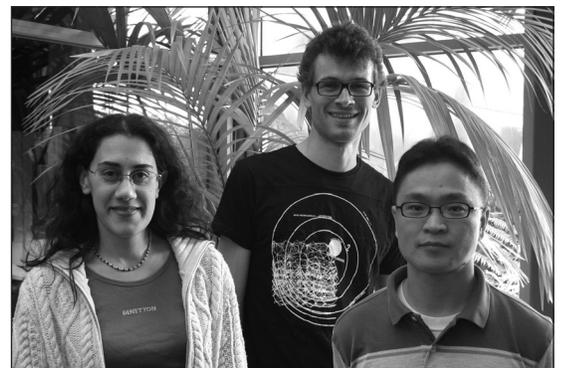
source for fiber sensors. He comes to BLI from the University of Seoul.

Chiara Polzonetti is working at BLI with Drs. William Mantulin and Edward Nelson on brain imaging to study the effects of chemotherapy on cognition.

DEPARTURES

Walfre Franco, Ph.D., a postdoctoral fellow in Dr. Stuart Nelson’s lab, accepted a job offer from Cutera Laser in San Francisco.

Myoung Rae Cho Ph.D., a visiting associate researcher, has left BLI and returned to Korea.



Pictured, from left to right, are Chiara Polzonetti, Even Angell-Petersen and Ennjo Jung. (Not pictured is Hosain Haghany.)

HONORS AND AWARDS

(cont'd from page 6)

neurosurgery at UCI's Department of Neurological Surgery and the Beckman Laser Institute.

The Innovation Award was established to recognize individuals who have developed an innovative idea, design, patent, product or discovery that serves as a strong example of the region's strength in biomedical or information technologies. The foundation received 41 proposals from 14 university researchers and 27 startups in Orange, Los Angeles, Riverside and San Diego counties. "Our hope is to increase public awareness of science and technology developed within Orange County and the surrounding region and to provide training and educational opportunities for researchers and entrepreneurs to bring their innovations to market," says Gary Augusta, head of both OCTANe and its foundation. The award was announced during OCTANe's 2007 Medical Device Conference held on November 15 in Costa Mesa.

Chris Raub

Chris Raub, a fourth year graduate student in Biomedical Engineering, received a 2-year fellowship, "The Ruth L. Kirschstein National Research Service Award for Individual Predoctoral Fellows," funded by the National Institutes for Health (NIH). Chris works in Dr. Steven George's lab and collaborates with the lab of Dr. Bruce Tromberg through the Laser Microbeam and Medical Program (LAMMP) facility at the Beckman Laser Institute.

Chris' research uses scanning laser microscopy to study the formation of scar tissue in the lung and airways due to diseases such as asthma. Asthma causes microscopic structural changes to collagen and elastin, the building blocks of lung and airway tissue, which may affect patients' ability to breathe and to recover from the cycle of tissue damage and inflammation that occurs during asthma. The multiphoton microscope at the BLI can noninvasively image the network of

collagen and elastin on the surface of airways, which may aid in diagnosis and monitoring of asthma. He is using engineered tissue combined with lung cells from organ donors, as well as a rabbit model of damage to asthmatic airways, to investigate the relationship between collagen, elastin, airway mechanical properties, and asthma severity, as well as the feasibility of using multiphoton microscopy as a clinical tool.

Allison Zemek

Allison Zemek, a Biomedical Engineering undergraduate student working with Dr. Brian Wong, has been named a Barry M. Goldwater Scholar for 2007-2009. Her winning essay, entitled "Innovative Applications of Lasers in Head and Neck Surgery," concerned current problems with cartilage reshaping faced by otolaryngologists and her research results at the Beckman Laser Institute to develop a more effective and safer way to repair damaged facial cartilage.



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