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Welcome to the re-designed LASER Newsletter. These pages reflect the bright, bold, and brilliant work that has been a hallmark of our research and clinical program since our founding more than 30 years ago.

In this issue, we introduce you to several of our talented students, staff, and faculty who are working to solve critical challenges in human health across academic disciplines. Our cutting-edge research and technology development in biophotonics and biomedical optics are enhanced through interdisciplinary collaborations and the availability of the BLI Medical Clinic for clinical trials. Many BLI discoveries are disseminated through our Photonic Incubator—one of the first technology transfer incubators in the UC system—which supports early-stage companies that transform emerging technologies into new methods and devices that impact patient care.

I invite your feedback about the new look, our research program, or any other topic. Join us on Facebook or visit our website (www.bli.uci.edu). Check back frequently; there’s much more on the horizon as we chart our course for the next 30 years.

Bruce J. Tromberg, Ph.D.
Director, Beckman Laser Institute
Deploying a Nano-probe to Identify Tumor Margins

Radoptics Nano-probe
Conceptual illustration of an erythrocyte-derived optical probe designed to aid identification of all tumor cells for resection.
Where is the tumor? How big is it? If an MRI or CT finds a large tumor, how do I know where the cancer ends and whether there are smaller tumors that can be identified—and eliminated?

Radoptics — a photonics company aiming to enhance cancer treatments by better defining tumor margins — has developed a biologically-derived optical platform to help physicians answer these questions. The company’s devices deploy an optical nano-probe to target and image tumors on the molecular scale. These nano-probes are hybrid structures composed of a membrane shell naturally derived from red blood cells (erythrocytes) that encapsulate indocyanine green (ICG), the only FDA-cleared near-infrared chromophore. These nano-probes are referred to as NIR erythrocyte-mimicking transducers (NETs).

Indocyanine green has been around for more than 50 years, but the way in which Radoptics plans to use the contrast agent is unique. By re-engineering the erythrocyte shell, NETs concentrate around the tumor and light up tumor margins. The company’s innovative probe design can also combine optical imaging and phototherapy in a single device, enhancing the surgeon’s ability to locate and treat the entire tumor.

Radoptics submitted a Small Business Innovation Research grant, entitled “Erythrocyte-derived optical nano-probes for image-guided identification of tumor margins and cancer resection,” to the National Institutes of Health to further develop this research. Dr. Anvari and his research team have exited Phase I studies with the device, and they intend to apply for a two-year Phase II study involving human subjects on the long road to commercialization.

The company’s long-term goal is to commercialize the NETs as fluorescent probes for intraoperative imaging during open surgery or in conjunction with endoscopic procedures. When deployed, these probes will aid visualization of tumor margins and tumor nodules less than 1 mm in diameter. This would provide physicians with a new tool for image-guided surgery that could reduce or eliminate recurrence and ultimately improve patient survival.

Bahman Anvari, Ph.D.

Dr. Bahman Anvari is Professor of Bioengineering at the University of California, Riverside and adjunct professor at the Beckman Laser Institute at UC Irvine. He pursued his postdoctoral research at BLI from 1993-1995 where he worked under the direction of BLI Medical Director Dr. J. Stuart Nelson and contributed to the development of the Dynamic Cooling Device, a cryogenic spray cooling technology used in conjunction with laser treatment of port wine stains and other dermatoses. He was a Research Assistant Professor at Harvey Mudd College prior to joining the Department of Bioengineering at Rice University.

Dr. Anvari is a Fellow of the American Institute for Medical and Biological Engineering (AIMBE), American Association for the Advancement of Science (AAAS), and the International Society for Optics and Photonics (SPIE).
Monitoring Cardiac Arrest and Resuscitation

Researchers at the Beckman Laser Institute are currently collaborating with Professor Yama Akbari, M.D., Ph.D., from the Department of Neurology at the UCI School of Medicine to optically monitor the brain’s response to cardiac arrest and resuscitation. Postdoctoral research fellow Robert Wilson and Biomedical Engineering graduate students Christian Crouzet and Mohammad Torabzadeh from the Wide Field Functional Imaging (WIFI) Laboratory under the supervision of Professors Bruce Tromberg and Anthony Durkin and the Microvascular Therapeutics and Imaging (MTI) Laboratory under the supervision of Professor Bernard Choi have developed a multimodal optical platform including Spatial Frequency Domain Imaging and Laser Speckle Imaging to assess cerebral blood flow and oxygenation in vivo.

This optical imaging technology has been incorporated into a clinically-translatable "animal intensive care unit" in Prof. Akbari’s laboratory, which has developed a novel animal model of cardiac arrest and resuscitation. This animal model is designed to mimic the environment found in the neuro-intensive care unit in the hospital in UCI Medical Center where Prof. Akbari takes care of patients. The animals are monitored as they would be in a hospital, with standard clinical measurements including blood pressure, heart rate, arterial blood gas, and electroencephalogram (EEG). Optical instrumentation from the WIFI and MTI labs allows the researchers to image the blood flow and oxygenation of the brain concurrently with the aforementioned clinical standard measurements. By measuring blood flow and oxygenation, the research team obtains information about the connection between perfusion, metabolism, and electrical activity in the brain in response to cardiac arrest.

MI Selected by Cove Fund I

Modulated Imaging, Inc. (MI), a company which began at the Beckman Laser Institute’s Photonic Incubator, was one of two startups selected by the Cove Fund I to move to the next stage after a pitch session on January 26. The Orange County Business Journal reported that MI will proceed to due diligence stage, according to Lead Fund Manager John Kensey.

MI CEO David Cuccia is seeking a $2.5 million investment to further develop a medical device that can screen diabetics for the risk of developing foot ulcers, the leading cause of lower limb amputations. The device uses optical imaging technology that can see 10 times deeper than a normal camera or by a visual inspection and measure key indicators of tissue health. The company anticipates Food and Drug Administration clearance for its clinical device, the Ox-Imager CS, by August 2016.

A fund of approximately $5.5 million, the Cove Fund I is comprised of three angel investors and provides startup money for new Orange County-based ventures. It invests a maximum of $250,000 in any given startup. The Cove Fund I is an independently-run venture fund related to The Cove, the leading resource in Orange County for entrepreneurs, business leaders, and financiers to come together and the home of UCI’s Applied Innovations.
This technology could provide valuable insight into the effectiveness of different clinical interventions on the recovery of brain function. These interventional techniques could ultimately translate to the intensive care unit to improve patient outcome following cardiac arrest and resuscitation.

Dr. Wilson was recently awarded a one-year grant from the Institute for Clinical and Translational Science (ICTS) at UCI to help fund this research (see Beckman Laser Institute LASER newsletter, Winter 2016).

Thursday, March 31, 2016, was National Doctors Day, a day set aside to express appreciation to those who care for our health and well-being. The UCI Medical Center celebrated this day by asking grateful patients to write a note about their favorite doctors. Three BLI Medical Clinic doctors received such accolades: Dr. J. Stuart Nelson, Dr. Kristen Kelly, and Dr. Brian Wong. One patient wrote to Dr. Kelly, “I am so fortunate to be a patient of [Dr. Kelly]. I feel safe in [her] hands, because of her expertise, [she] always makes me feel like I’m not just a patient, but special to her. Thank you.”
Beall Center Board Visits BLI

The Beall Center’s board of advisors, a group of 25 local business leaders, visited the Beckman Laser Institute on March 3, 2016. Prior to their board meeting, Bruce Tromberg gave a formal introduction to BLI, followed by demonstrations in the Advanced Technology Suite, Diffuse Optical Spectroscopy and Imaging (DOSI) lab, Spatial Frequency Domain Imaging (SFDI) lab, Laser Speckle Imaging (LSI) lab, and Optical Coherence Tomography (OCT) lab. Laser Associated Sciences, a start-up company housed in the Photonic Incubator, was also a part of the demonstrations.

Accompanied by BLI research staff, the Beall Center board members then enjoyed dinner at “The Bren” with a guest appearance by Chancellor Howard Gillman, followed by a conversation with UCI Athletic Director Mike Izzi and UCI men’s basketball assistant coach Ryan Badrtalei, and the Anteaters’ victory over Cal Poly San Luis Obispo.

BLI Represented at GHEI “Bench to Bedside” Symposium

The Gavin Herbert Eye Institute (GHEI) at UC Irvine hosted a full-day research symposium featuring the latest advancements where basic research is finding its way to a patient’s bedside. Dr. Roger Steinert, Director of GHEI, welcomed the participants to the Beckman Center. Under the sub-head “Laser and Technologies for Diagnosis and Treatments,” BLI Director Bruce Tromberg informed the crowd about biophotonics and the future of personal health care, followed by Dr. Eric Potma’s talk about his research on imaging the eye using non-linear optical microscopy.

Panel Speaker

Allen Sabio, Beckman Laser Institute’s Director of Contracts and Grants, was a panel speaker at the Lifecycle of an Award session on “Proposal planning - Logistics and compliance consideration: partnering for success.” The session was held on April 13, 2016, and sponsored by the UC Irvine Office of Research.

Keynote Speaker for 2016 AADR Annual Meeting

BLI Dental Director Petra Wilder-Smith was the invited keynote speaker for the 2016 American Association for Dental Research (AADR) meeting held on March 16-19, 2016, in Los Angeles, CA. Dr. Wilder-Smith’s topic was “New horizons for oral diagnosis: an optical approach.” The largest and most prestigious dental research meeting in the United States was attended by over 10,000 dental professionals, not only from the United States but also from several foreign countries.
BLI Alumni

Dr. Jiwen Li presented a Laser Microbeam and Medical Program (LAMMP) seminar on “Novel miniaturized endoscopic fiber-optic probes” on February 29, 2016. A homecoming of sorts, Dr. Li was a graduate student in the lab of Prof. Zhongping Chen from 2010-2015. She earned her Ph.D. in Biomedical Engineering from the University of California, Irvine, for “Development of an ultrafast integrated IVUS-OCT system and catheter for in vivo applications.” She recently joined the Optical Engineering Lab at the University of Western Australia in Perth, Australia, as a research fellow. Her current research interests include optical coherence tomography (OCT), microscope-in-a-needle, Doppler OCT, multimodality imaging, and ultrathin endoscopes.

BLI/BLI Korea Symposium

The Beckman Laser Institute (BLI) and BLI Korea held a symposium at the BLI on February 18, 2016. The all-day symposium consisted of research updates given by faculty and trainees from the BLI and BLI Korea and featured a keynote address by Quan Liu, Ph.D., Assistant Professor, School of Chemical and Biomedical Engineering, Nanyang Technological University, on “From optical spectroscopy to spectroscopic imaging.”

The collaboration with BLI Korea colleagues provides a platform for a wide-ranging flow of ideas and fosters collaboration on both sides of the Pacific. This partnership in the field of applied photonics is part of the program supported by the South Korean government.

The BLI / BLI Korea Symposium was scheduled following the annual SPIE conference in San Francisco, CA, and the capstone of the event was a celebratory dinner at the UCI Faculty Club.

White House Visit

BLI Adjunct Professor Robert Brown visited the White House on April 14, 2016, to meet with President Barack Obama and his Senior Science Advisor, Dr. John Holdren, to discuss the future of physics and physical sciences and the value and relevance to the U.S. economic and technology/military-leadership positions. Dr. Brown also recently joined the Advisory Board of the President of the University of Maryland, Dr. Wallace C. Loh. Dr. Brown serves as CEO of the American Institute of Physics in College Park, Maryland.

Congresswoman Mimi Walters Visits BLI

Mimi Walters, U.S. Representative for California’s 45th congressional district, attended the Biotechnology Innovation Organization/California Life Sciences Association (BIO/CLSA) Roundtable discussion held at the Beckman Laser Institute (BLI) library on May 3, 2016. Attendees included various CEO’s and representatives of biotechnology companies who are members of BIO and CLSA. The group’s discussion centered around government sponsored translational research in the life sciences and commercialization of biomedical technology. Interim Vice Chancellor for Research James Hicks, Ph.D., and BLI Director Bruce Tromberg, Ph.D., represented UC Irvine.
**J. Stuart Nelson, M.D., Ph.D.**

BLI Medical Director J. Stuart Nelson has received a sub-contract from the National Institutes of Health for “Erythrocyte-derived particles for near infrared phototherapy of port wine stains.” The R01 grant was awarded to UC Riverside Professor of Bioengineering Bahman Anvari. The purpose of the study is to find a better way to treat port wine stain (PWS) birthmarks in patients with darker skin or thick PWS by using a near-infrared laser and a novel encapsulated near-infrared dye. The erythrocyte particles will encapsulate the dye which will allow longer time for laser treatment.

**Bernard Choi, Ph.D.**

Associate Professor of Biomedical Engineering Bernard Choi has been awarded a one-year grant from the UCI Research Seed Funding Program for “Intraoperative blood-flow imaging during pediatric intestinal surgery.” Dr. Choi’s proposal was one of eight that was funded in Round 1, Track 1. The program’s inaugural launch drew a tremendous response with 101 applications in Track 1 alone, and it is anticipated that the grants awarded will catalyze an array of new research efforts across the campus.

**Bruce Tromberg, Ph.D., Kristen Kelly, M.D. and Mihaela Balu, Ph.D.**

BLI Director Bruce Tromberg, Professor of Dermatology Kristen Kelly, and Research Scientist Mihaela Balu have been awarded an R01 grant from the National Institutes of Health/National Cancer Institute for their research entitled “Quantitative multiphoton microscopy for non-invasive diagnosis of melanoma.” The three-year study is a collaboration between UC Irvine’s department of dermatology and the Beckman Laser Institute & Medical Clinic. Ultimately, this new technology could be used to image difficult to diagnose pigmented lesions in patients without having to perform biopsies.

**Joe Jing, Ph.D.**

Joseph Cong Jing defended his thesis “Visualization of Upper Airway Health Using Optical Coherence Tomography” on May 31, 2016. Dr. Jing works in the lab of Dr. Zhongping Chen. He will continue working at Beckman Laser Institute while he applies for various postdoctoral research positions.
Zhongping Chen, Ph.D.
The National Eye Institute at the National Institutes of Health (NIH) has awarded a multi-institute, 4-year R01 grant entitled “High resolution elastography of retina under prosthetic electrical stimulation” to Professor of Biomedical Engineering Zhongping Chen of the Beckman Laser Institute at UCI, and Dr. Qi Fa Zhou of the NIH Transducer Resource Center at the University of Southern California. The goal of this study is to develop and characterize novel tools for imaging the elastic properties of electrically-stimulated retina using phase-resolved optical coherence tomography (OCT).

Petra Wilder-Smith, D.D.S., Ph.D.
BLI Dental Director Petra Wilder-Smith has received a 2016 Campus-Community Incubator Proposal grant from the UC Irvine Institute for Clinical and Translational Science (ICTS) to develop a saliva-based oral cancer risk test for underserved populations in a community-based setting. The study team will work with the Concorde College of Dental Hygiene to 1) provide leading oral cancer screening to underserved populations; 2) instruct dental hygiene candidates about the latest developments as they launch their careers; and 3) develop a local pathway for clinical oral research. The ICTS Campus-Community Incubator Proposal provides small grants to foster collaborative research-oriented projects between university researchers and community organizations.

Li Qi, Ph.D.
Li Qi received his Ph.D. in Optical Engineering in February 2016 from the College of Engineering and Applied Sciences, Nanjing University, China, based on research done in the lab of Dr. Zhongping Chen at the Beckman Laser Institute. Dr. Qi is now working in Dr. Chen’s lab as a postdoctoral fellow on image processing and segmentation of optical coherence tomography.

Breyah Matthews
BLI 2015 Summer Research Student Breyah Matthews has received first place recognition for her poster presentation at the Beta Kappa Chi National Scientific Honor Society and the National Institute of Science (BKX/NIS) 73rd Joint Annual Meeting, held April 6-9 in Hampton, Virginia. Breyah is a sophomore electrical engineering major at Hampton University and presented a poster on work accomplished at the BLI last summer in the Brenner Lab with Drs. Matt Brenner and Sari Mahon. Her poster was entitled “Design of an Inhalation Exposure Chamber to test Hydrogen Sulfide Antidotes.” Breyah competed in a field of presentations by Engineering, Physics and Computer Science undergraduates, and fielded questions on her work from three judges.
Visiting Researcher

BETUL ILHAN, D.D.S., Ph.D.

Oral cancer has one of the leading causes of cancer deaths worldwide with a 5-year survival rate of 50-60 percent. This is primarily due to late diagnosis and the resultant progression of disease to an advanced stage. For advanced lesions, the survival rate decreases to almost 20%, and the treatment results in dramatic aesthetic and functional aftereffects from disfiguring surgery that impair a patient’s self-perception. Early detection of oral cancers can save lives, improve treatment outcomes, and influence the patient’s ability to interact normally with others in daily social life.

It is precisely the promise of early detection and the advancements being undertaken in BLI Dental Director Dr. Petra Wilder-Smith’s lab that attracted Dr. Betul Ilhan to travel from Turkey to work for one year in at the Beckman Laser Institute (BLI). Dr. Ilhan met Dr. Wilder-Smith through Dr. Joel B. Epstein of Cedars-Sinai Hospital in Los Angeles, CA, and had been following Dr. Wilder-Smith’s pioneering research for years. Through emails, Drs. Ilhan and Wilder-Smith planned several research projects, and when Dr. Wilder-Smith invited Dr. Ilhan to come and work at BLI, it was a chance that Dr. Ilhan simply had to accept. “Dr. Ilhan’s arrival from Turkey not only brings valuable insights into the specific nature of oral cancers in her home country,” said Dr. Wilder-Smith, “but her unique and cutting-edge expertise in saliva-based prediction and detection of oral cancers also expands our group’s research and clinical reach and impact.”

In Dr. Wilder-Smith’s lab, they are currently working on several projects focusing on advanced methods to identify, track, and treat oral cancers. Their primary research involves detection and validation of dysplasia and progression that will provide the basis for future extensive studies. Salivary diagnostics is a new and strong promising area of research. Saliva sampling that is inexpensive, non-invasive and patient compliant can give salivary biomarker screening the potential to categorize patients who are at risk of developing oral cancer in an easy and cost-effective manner. Dr. Wilder-Smith recently secured a grant from the UC Irvine Institute for Clinical and Translational Science (ICTS) to support this research. (See Honors and Awards, Petra Wilder-Smith, D.D.S., Ph.D.)
IN MEMORIAM

It is with great sadness that we announce the passing of Nathaniel “Nat” Brenner, a long-time supporter and friend of the Beckman Laser Institute (BLI). Growing up in New York, Nat’s college studies were interrupted when he volunteered to join the Army. He returned from World War II to earn a chemistry degree from Queens College. Nat married Joan in 1951, and they moved to Connecticut five years later. Working at the Perkin Elmer Corporation, Nat specialized in analytical instrumentation for spectroscopy and calorimetry, and was a noted early pioneer in the field of gas chromatography. Having developed a love for the game of tennis and after a particularly harsh Connecticut winter, Nat, Joan and their three children, Sari, Matthew and Martin, migrated west to a better climate, ending up in the small, new community of Irvine, California, in 1969. In 1976, Nat joined Beckman Instruments, where he worked as a marketing manager for scientific instruments and as General Manager for Spectroscopy Products.

Both Sari and Matthew attended UC Irvine. Nat offered a strong voice of support for the creation of the BLI, given his working relationship with Dr. Beckman, and his first-hand knowledge of the pioneering laser research work being accomplished in the Berms group at UCI. Sari Brenner Mahon, Ph.D., has been a BLI Project Scientist for 12 years and is the Assistant Director of BLI. Matthew Brenner, M.D., is a Professor of Medicine at UC Irvine who has led photonics-based translational pulmonary research at BLI for the past 30 years. Nat Brenner is survived by Joan, his children, Sari, Matthew and Martin, and their spouses, Donald, Jane and Laurel, respectively, 5 grandchildren and 2 great grandchildren. His friendship, support, intelligence, and wit will be missed by all.

Nat Brenner’s family has established a memorial fund at the Beckman Laser Institute to honor the life and memory of Nathaniel Brenner. The fund will support applications of photonics technologies in cancer diagnostics and treatment. Contributions can be made at: https://www.uadv.uci.edu/BrennerCancerResearchFund or by calling BLI Director of Development, Steve Siegel, at 949-824-8859.
A Fond Farewell

BLI bids a fond farewell to Tom O’Sullivan and Jennifer Ehren, who are heading back to Jennie’s home turf, the University of Notre Dame, where she graduated summa cum laude and was a Fulbright Scholar.

Jennie was awarded a National Science Foundation Fellowship and earned her Ph.D. at Stanford University where she developed therapeutics for the disease celiac sprue. Also at Stanford, Jennie met Tom O’Sullivan singing in their church choir. In 2009, she joined the Salk Institute in La Jolla, California, as a postdoctoral research associate in the cellular neurobiology laboratory, and she was awarded the George Hewitt Foundation Medical Research Fellowship.

After earning his Ph.D. in electrical engineering at Stanford University, Tom O’Sullivan joined the lab of BLI Director Bruce Tromberg as a postdoctoral fellow to work on the development and application of diffuse optical spectroscopy and imaging (DOSI) in cancer. He became director of the DOSI lab in 2014. During his time at BLI, all were impressed by his enthusiasm, intelligence, quick wit, wonderful singing voice and warm personality.

Tom recently accepted a tenure-track position as Assistant Professor at the Department of Electrical Engineering, University of Notre Dame. Tom, Jennie, and their 2-year old son, Elijah, left BLI at the end of May.

Before leaving, Tom said of his time at BLI: “I am incredibly grateful to have had the opportunity to work at BLI the past 5+ years. My colleagues and friends at BLI have helped me to grow both professionally and personally during this time. In addition to leaving prepared for the next stage of my career, I have made a number of great relationships that I know will last a lifetime. I believe that BLI is about to undergo an impressive period of growth that—although I’m sad to not witness in person—the effects of which will be felt throughout our field. I look forward to continue working and collaborating with you, and I wish you great health and happiness!”

Everyone at BLI wish Tom, Jennie, and their family all the best as they embark on this new personal and professional chapter.
Arrivals

Raylene Gonzalez
Raylene Gonzalez has joined BLI as support for Dr. George Peavy, Director of Comparative Medicine Programs. Raylene will organize all aspects of this year’s Conti Symposium on Veterinary Continuing Education.

Faezeh Talebi-Liasi
Medical student Faezeh Talebi-Liasi has joined Dr. Kristen Kelly’s lab as a fellow from the University of Washington. She will be at BLI for six months working on skin imaging protocols.

Departures

Nima Khatizbzadeh
Nima Khatizbzadeh, Ph.D., has completed his post-doctoral fellowship in the laboratory of Dr. Michael Berns and will be joining Abbot Medical Optics in Milpitas, CA, continuing his laser tissue engineering work in ophthalmology on cornea, cataract, and related issues. Nima came to BLI from UC Riverside where he worked in the lab of BLI contributor Bahman Anvari.

Zhonglie Piao
Zhonglie Piao, Ph.D., who recently earned his Ph.D. from the Cogno-Mechatronics Engineering department of Pusan National University, Korea, based on research done in the lab of Dr. Zhongping Chen at BLI, accepted a postdoctoral appointment at the Wellman Center for Photomedicine at Massachusetts General Hospital effective June 1, 2016.

Chris Campbell
Chris Campbell is departing for graduate school at the University of Notre Dame to conduct research in electrical engineering with Tom O’Sullivan. He started his BLI career working in the labs of Dr. Bruce Tromberg and Dr. Anthony Durkin before moving to Modulated Imaging, Inc. with Dr. David Cuccia and the team. Prior to joining BLI, Mr. Campbell served in the U.S. Air Force in both Afghanistan and Iraq.

FOUNDER’S COLUMN

Full Circle

I don’t know who coined the term, “Full Circle.” Being from New York, I instantly think of Yogi Berra because the former New York Yankee catcher was notorious for incongruous aphorisms about what might be expected and what actually occurs. But “full circle” at first glance doesn’t seem ironic so I doubt it was him. Then there is the movie “Groundhog Day” where Bill Murray woke up every morning and the same day replayed like a loop, seemingly forever. So while he seemed to be going in a circle, it was not the same as “full circle” which is coming back to the point from where you started, sort of like circumnavigating the globe, and ending up at the same point where you began.

After having navigated through myriad career goals, I am fully cognizant that I have now come full circle. Recently, I purchased a home on the campus of UCI in University Hills. I feel like I am back at my starting point, ramping up a research program at UCI. I will live walking distance from my lab, and I will be working with BLI Director Bruce Tromberg and the BLI team to raise money for the BLI building expansion and, yes, that does feel like “full circle” doing “bricks and mortar” fundraising again. Maybe Yogi did coin “full circle” as it applies to me. I could be basking on the beach of a Pacific island, retired, and sipping Mai Tais…but still connected via the internet.

Michael W. Berns, Ph.D.
Arnold and Mabel Beckman Professor
Co-Founder, Beckman Laser Institute
Publication Highlight

Long-range optical coherence tomography of the neonatal upper airway for early diagnosis of intubation-related subglottic injury


Learn More

The research team developed an imaging technology, long-range optical coherence tomography (LR-OCT), to acquire high resolution 3D images of the airway wall in pre-mature babies who have breathing tubes. Although the breathing tubes are necessary, they can cause damage to the airway, a condition known as subglottic stenosis, which can lead to scar formation and permanent airway damage.

The study showed that LR-OCT can reveal a positive correlation between the time that the breathing tube is in place and the extent of airway injury. Because the LR-OCT probe is less than 1 mm in size, it can be placed in the breathing tube without impacting its function. LR-OCT may ultimately aid in the early diagnosis of subglottic stenosis, help reduce the incidence of permanent airway damage, and eliminate the need for traumatic surgeries.

This clinical trial is registered with www.clinicaltrials.gov (NCT 00544427).

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