UC Beckman Laser Institute & Medical Clinic

THE CASE FOR SUPPORT



Cover photo: Eric Potma, Ph.D., professor of Chemistry

"The first time we started treating infants and young children with the [Dynamic Cooling] device, it was very satisfying to show parents the photographs of their child before and after the laser treatment and know that you've had a huge impact on their child's life."

- J. Stuart Nelson, M.D., Ph.D., Medical Director, UCI Beckman Laser Institute & Medical Clinic, professor of Surgery and Biomedical Engineering



Translating Scientific Discoveries into Lifesaving Technologies

Since its opening in 1986, UCI Beckman Laser Institute & Medical Clinic has become an internationally recognized leader at the forefront of optics and photonics in medicine. The field has exploded in recent years, with an estimated worldwide annual commercial impact of \$80 billion.

The Institute's visionary founders, Arnold O. Beckman, Ph.D., founder of Beckman Instruments, Inc., and Michael W. Berns, Ph.D., a UCI professor of cell biology, created an inspirational "laboratory benchtop to patient bedside" model that galvanized the scientists, engineers and clinicians who joined forces to advance a shared mission: Bring advanced lasers and optics technologies into medicine to improve the lives of patients worldwide.

Working under one collaborative umbrella, interdisciplinary teams have conducted highrisk, high-reward research that has led to the development of new scientific disciplines biophotonics and biomedical optics. At UCI, the Institute has contributed significantly to campus growth by helping to establish both the Chao Family Comprehensive Cancer Center and the Department of Biomedical Engineering.

The Institute has also launched the Photonic Incubator, one of the first incubators in the UC system. The Incubator has fostered the commercialization of groundbreaking technologies that have become the standard in medical care.

Reflecting on his long journey with the Institute, co-founder Berns said: "The path has led to something far greater than Dr. Beckman and I ever imagined. Next-generation tools based on the basic research being done at the Institute have been built, tested, patented and commercialized. Some are now in the hands of clinicians for routine use, while others are well on their way for detecting and treating devastating diseases like cancer and cardiovascular disease."

One of the most successful medical devices developed in the UC system, the Dynamic Cooling Device, was invented by the medical director of the Institute, J. Stuart Nelson, M.D., Ph.D., to treat infants and young children with disfiguring vascular birthmarks. The Dynamic Cooling Device has generated the second-highest UCI patent royalty income to date and has been incorporated into more than 25,000 laser systems worldwide.

"The first time we started treating infants and young children with the device, it was very satisfying to show parents the photographs of their child before and after the laser treatment and know that you've had a huge impact on their child's life," Nelson said.

Today, UCI Beckman Laser Institute & Medical Clinic unites the UCI Schools of Medicine, Engineering, Physical Sciences and Biological Sciences and UCI Beall Applied Innovation to bring the enormous power of cutting-edge optics and biophotonics technologies together with pioneers from diverse backgrounds to radically change healthcare.

With its thriving medical devices industry, Orange County relies on the Institute's skilled researchers and clinicians, who integrate basic research, clinical translation and commercialization. Novel technologies developed at the Institute strengthen UCI's impact on the local healthcare economy, while accelerating scientific advances across the globe.

enhance patient care and improve outcomes

Leading the Next Revolution in Medicine

New possibilities capture the imaginations of researchers at UCI Beckman Laser Institute & Medical Clinic. The Institute is poised to lead the next revolution in medicine.

Our talented students and distinguished academic leaders are already developing imaging technologies and medical devices that, in the foreseeable future, doctors and patients will be able to hold in their hands.

These technologies will not only enhance patient care and improve outcomes; they will also prevent many patients from getting sick in the first place. Someday, patients will use compact medical devices to track cardiovascular disease, identify the onset of infections, detect and treat cancers, monitor blood pressure and determine whether medications are working. When combined with information from genomics and other sources, these powerful devices will help people manage and optimize their own health — often, without having to leave home.

The mission of UCI Beckman Laser Institute & Medical Clinic is clear:

- **DISCOVER** new optics and photonics technologies for biomedical research.
- **CREATE** innovative, accessible methods and devices that transform healthcare.
- **EDUCATE** the next generation of scientists, engineers and physicians.

These technologies will enhance patient care, **improve outcomes**, and prevent many patients from getting sick in the first place.

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Mihaela Balu, Ph.D., associate researcher, UCI Beckman Laser Institute & Medical Clinic

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Building Strategic Partnerships

We invite you to join UCI Beckman Laser Institute & Medical Clinic as we unlock the potential of lasers and light to improve the lives of people in our community and around the world. Working together, we have the power to impact the future of medicine.

Please consider investing in our campaign priorities:

DISCOVER new optics and photonics technologies for biomedical research

Research Funding - \$1 million

The novel technologies that Institute research teams create have the potential to radically change the way we treat patients, diagnose disease, noninvasively monitor patient health and develop new therapies. Your support will help Institute researchers discover solutions to real-world medical problems in areas such as airway disorders, burns and wounds, cancer, cardiovascular disease, diabetes, exercise medicine, neurologic injury and disease, oral health, skin disease, trauma and critical care and vascular malformations. You may direct research funds to a faculty member or a research program.

groundbreaking discoveries

CREATE innovative, accessible methods and devices that transform healthcare

Seed Funding - \$500,000

Your contribution to seed funding will enable Institute teams to respond quickly and creatively to groundbreaking discoveries while exploring innovative, new directions in their collaborative work and developing emerging technologies.

EDUCATE the next generation of scientists, engineers and physicians

Graduate Fellowship Support - \$500,000

Many of the leaders and bright minds working in academic labs and companies around the world have trained at

the Institute. Your support for graduate fellowships will allow the Institute to recruit top students and provide them with the resources they need to succeed in UCI's challenging graduate programs.

"Developing technology and finding ways to translate it to clinical use is exciting, and when working with patients, I want them to feel this excitement too. They [patients] are a critical part of the research team. This gives them a stronger voice and their input ensures that our work will add value to their lives. Sometimes when you give patients this team-based perspective, it helps them to know that medicine is going to improve their lives and the lives of others down the road." — Robert Warren, Ph.D. '17, Hamamatsu Photonics K.K. Fellow '16

Bernard Choi, Ph.D., associate director, UCI Beckman Laser Institute & Medical Clinic and professor of Biomedical Engineering and Surgery and his student researchers

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on q = b 3 Jerry Spanier, Ph.D., research professor of Surgery and Vasan Venugopalan, Sc.D., chair and professor of Biomolecular Engineering

Frevolutionizing healthcare

Education, Outreach and Training Support

Your gifts to educational outreach will support student training programs, professional development courses and life-changing patient programs. Participants will have the opportunity to explore new frontiers of health with the pioneering faculty and clinicians at the Institute. High-priority projects include:

Virtual Photonics Career Development and Training Program Endowment – \$6 million

This intensive 12-day interdisciplinary biomedical research training and career development program is designed for undergraduate, graduate and post-doctoral students and for faculty members and industry professionals charged with finding novel solutions to major biomedical research problems. After completing the training, participants will receive long-term mentoring and both scientific and technical support from Institute teams. By endowing the program, you will ensure the longevity of this vital initiative.

"I can say, having sent students to this program every year, that this is the best biophotonics short course program in the country. The students in my group have not only enjoyed the experience, but come back with an intense pride about how much they have learned, and not just from expert lectures, but from their handson experiences in the demonstration laboratory exercises." — Brian Pogue, Ph.D., MacLean Professor of Engineering,

Thayer School of Engineering, Dartmouth

Undergraduate Student Science, Technology, Engineering and Math (STEM) Program Endowment - \$3.5 million

This eight-week summer training program introduces high-achieving, underrepresented undergraduate students to the breadth of UCI graduate programs in the fields of biomedical engineering, biophotonics and related STEM disciplines. By supporting the program, you will help prepare the leaders of tomorrow for careers in fields that are revolutionizing healthcare.

"I am so grateful for the opportunity I had to be part of the [Undergraduate Student STEM] program. It has definitely prepared me and encouraged me to pursue a Ph.D. in electrical engineering. Last year, I was accepted into the UCI Electrical Engineering and Computer Science program. This was a dream come true for me. Thanks to the program, my mentors and other program faculty and staff, my dreams are now a reality." — Breyah Matthews, Undergraduate Student STEM program participant '17, UCI graduate student

Vascular Birthmarks Conference Endowment - \$750,000

Every year, children and their families travel from as far away as India to hear from international experts about the latest advancements in the research, diagnosis and treatment of vascular birthmarks and malformations. During this annual two-day conference, children receive medical treatments and dental and orthodontic exams, while families attend sessions for social support, insurance assistance and more. Your donation to this conference will foster a community of support and offer hope for future breakthroughs.

"Jackson does normal kid stuff — he likes rock climbing, building Legos and playing with his dog. He'll be on maintenance [for his port-wine stain] at some point. I have a feeling that something big will happen within our lifetime." — Julia Samz, mother of Jackson, age 7, Institute Medical Clinic patient



Endowed Faculty Chair - \$2 million

An endowed faculty chair is a distinguished honor. Your gift to establish an endowed chair will recognize an accomplished researcher and clinical champion who works collaboratively in laboratories and classrooms. The chair holder will educate and mentor future generations of industry leaders, while ensuring that the Institute continues to attract world-renowned talent to complement and expand existing areas of expertise. Through such activities, the chair holder will enhance crossdepartmental collaborations that drive innovation and discovery.

Director's Excellence Fund - \$1 million

When you give to the Director's Excellence Fund, you will support the most vital needs of the Institute. Funding priorities include the purchase of cutting-edge laboratory equipment and much-needed facility updates that promote seamless collaboration and consistent communication between research teams.





By the Numbers

24 Faculty Members

Faculty span nine departments in the UCI Schools of Medicine, Engineering, Physical Sciences and Biological Sciences.

200 Researchers

Every year, over 200 people engage in research and training, including visiting scientists, postdoctoral and medical fellows, graduate and medical students, undergraduate students and high school students.

90,000 Patients

More than 90,000 patients have been treated in the Medical Clinic since it opened.

25 Protocols

The Institute has over 25 clinical protocols annually, evaluating biophotonics technologies in skin

diseases, cancer, cardiovascular disease, diabetes and metabolic disease, trauma and critical care, neurologic function, head and neck surgery and exercise medicine.

\$59 Million

Since 2002, the Institute has generated 8% of the UCI technology transfer portfolio, 37% of the campus patent royalty income and more than \$59 million in research, licensing and clinical revenue.

53 Patents

The Photonic Incubator currently manages 53 patents, 40 licenses and 14 companies. Incubating companies and Institute-affiliated researchers have collectively raised more than \$25.2 million in Small Business Innovation Research (SBIR) funding.



At a Glance

Biomedical: relating to both biology and medicine

Biomedical optics: the interaction of biological tissue and light and how this can be exploited for sensing, imaging and treatment

Biophotonics: a combination of biology and photonics

Optics: the branch of physics that studies the behavior and properties of light, including its interactions with matter and the construction of instruments that use or detect it

Photonics: the branch of technology concerned with the properties and transmission of photons











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