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Summer 1997

Board Elects New Officers

This year has seen significant changes in the Beckman Laser Institute's Board of Directors.

During its first meeting of the year, the Board selected a new chairman, Brian R. Demsey, to succeed Gavin S. Herbert who will remain on the Board.

"Gavin's support and leadership have been appreciated this past year," said Institute Director Michael W. Berns, Ph.D. "He admirably filled a void that was created when we lost our former chairman, Charley Hester, last year."



Clockwise from top left, Vice Chairman Richard P. Kratz, Secretary/Treasurer George E. Hewitt, Chairman Brian M. Demsey and President and CEO Michael W. Berns.

Dr. Berns added that he looks forward to Demsey's chairmanship. "It is fitting that Brian is our chairman because he and I initially approached Dr. Beckman in 1982 about establishing a laser institute."

Board members also voted in a new roster of officers: Dr. Richard P. Kratz succeeded Demsey as vice chairman, and George E. Hewitt was named secretary/treasurer.

At its meeting in May, the Board welcomed a new member, David S. Tappan, Jr., former chairman of Fluor Corporation. He is profiled on page 7.

Chairman Emeritus Arnold O. Beckman, Ph.D., said that he is pleased with the diversity and strength of the Board. "I continue to be proud of the Beckman Laser Institute and its ability to attract high-caliber individuals from the corporate sector."

Other Board members include: George Argyros, president of Arnel and Affiliates; Patricia Beckman, a Beckman Foundation Board member; Michael W. Berns, Ph.D., Board president; Linda Cahill, a health care consultant; Dr. Thomas C. Cesario, dean of UC Irvine's College of Medicine; Harry Gray, Ph.D., director of the Beckman Institute at CalTech; and Richard A. Nesbit, Ph.D., vice president of advanced technology for Beckman Instruments, Inc. ■

Newsbriefs

INSTITUTE WELCOMES STUDENTS

This summer, the Institute welcomes eight students from Harvey Mudd College (HMC) in Claremont, Calif., and one student from Brigham Young University in Salt Lake City, Utah.

The students are working with Institute researchers on engineering projects dealing with laser heating and imaging in tissue.

Sam Tanenbaum, Ph.D., professor of engineering and former dean of faculty at HMC, says that spending the summer at the Institute provides the students with valuable research experience. "This gives students an idea of what to expect if they continue on to graduate school," he explains.

The students are: Bibianna Cha, Eliot Gerstner, Travis Klein, Margo Maddux,
(Continued on page 8)

Meeting the Challenge

by Michael W. Berns, Ph.D.

Arnold and Mabel Beckman Professor
President and CEO

Six months ago, the Beckman family offered the Institute a challenge grant. They would give us \$400,000 if we could raise an additional \$400,000.

If we met their challenge, these funds would contribute to our \$2.8 million campaign to fund construction of the Photonics Incubator, a project sponsored by the U.S. Department of Commerce, the California Trade and Commerce Agency and UC Irvine.

For those of you unfamiliar with the project, the Photonics Incubator is a 12,000 square foot expansion that will result in the construction of four labs to engineer new medical devices, and a clinical operating room complex with patient recovery facilities. These

additional areas will allow us to work with corporate partners on developing new medical devices for the delivery of high-tech and cost-effective health care for the next century. In addition, the Incubator will provide a unique vehicle for Institute researchers to take their scientific concepts from the laboratory to the clinic.

Thank You To Our Donors

Much to our surprise, the Institute's past supporters rose to the challenge. We are grateful to these supporters, especially to Nora Hester and Marilyn Hester Gianulias (Hester Family Foundation) for helping us meet 50 percent of the challenge with their \$200,000 contribution.

With the Hester Foundation's contribution serving as the "lead gift," our other friends jumped in to meet the challenge. Our many thanks go to:

Gavin and Ninetta Herbert, Albert and Tricia Nichols, Michel and Roberta Prunieras, James and Janice Rosse, Audrey Schneiderman, Paul and Nancy Silverman, Thomas and Elizabeth Tierney, Beckman Instruments, Bio-Safe America, the Kratz Foundation, Olympus, Peat Marwick and the Rosenthal Foundation.

The Beckmans' Generosity

Recently, I was going through my old correspondence in an attempt to calculate the enormous generosity of Dr. Beckman and his family. Clearly, the Beckmans' contributions to this Institute are incalculable, but in terms of dollars, their contributions total over \$14 million.

While doing this search, I found a touching and wise letter from Dr. Beckman regarding contributors and contributions. In it, he said that "one thing faculty do not understand is that when they approach donors, they must recognize that donors are under no obligation to give and it is wrong to expect that they will."

In reflecting upon this statement, I am even more gratified and thankful for the generosity of the Orange County friends of the Institute. On behalf of the Institute's faculty and staff, thank you Dr. Beckman and Patricia Beckman for your continued generosity.

In addition, I would like to thank Nora Hester and Marilyn Hester Gianulias and the rest of our generous contributors. Those of you who, during the first ten years, seriously gave of your time or supported us financially have helped us to get where we are today.

Last, but certainly not least, thank you to the Institute's researchers, clinicians and staff. Without the hard work and dedication of this talented group, the Institute would not be able to attract the attention and generosity of our friends and donors. ■

Beckman Laser Institute and Medical Clinic University of California, Irvine

1002 Health Sciences Road East, Irvine, CA 92612
(714) 824-6996 (Administration) (714) 824-7997 (Clinic)
<http://www.bli.uci.edu>

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Beckman Laser Institute News

Nicole Knight, Editor

Lasers Zap Myopia

Michelle Duran, a UC Irvine student working part-time at the Surgery Laser Clinic at the Beckman Laser Institute, had worn contacts to correct her nearsightedness since junior high school. "I was 20/400 in both eyes," Duran says.

Initially excited about her contacts, Duran explains that over the years she had noticed her eyes would burn and tire easily from the contacts. "Frankly, I was tired of wearing them."

Photorefractive Keratectomy

That explains why Duran opted for photorefractive keratectomy (PRK), an FDA-approved laser procedure currently available at the Institute. PRK corrects vision by changing the cause of nearsightedness, or myopia: a steep cornea.

Nearsightedness results from a cornea whose steepness, or height, causes images entering the eye to focus in front of, rather than on, the retina.

Here at the Institute, physicians correct myopia by reshaping the cornea using a computer-controlled excimer laser.

The laser emits short pulses of ultraviolet radiation that remove a minute portion of the cornea, typically less than the thickness of a human hair. This process alters the surface of the cornea so that images focus properly on the retina.

The laser is used on the eye often less than 60 seconds, and the entire procedure lasts less than 15 minutes. It is a painless procedure although there may be discomfort afterwards for up to three days.

Art Giebel, M.D., an ophthalmology fellow affiliated with the Institute, performed the procedure on Duran's left eye in August, 1996, and on the right eye in December, 1996. The FDA recommends performing each procedure at least three months apart.

Duran says that the laser procedure

itself was painless.

"About a half hour after the procedure there was a burning sensation in my eye, like a scratch," Duran recalls. "But the pain was minor and was gone about 12 hours later."

Most patients' vision usually stabilizes within a couple of weeks, explains Ronald N. Gaster, M.D., adjunct professor of ophthalmology at UC Irvine.

Duran says that she was pleased with how quickly her vision improved. "I was able to see the difference in my vision the next day and drive with no problem," she says. "Within a week or two I had 20/20 vision."

Duran's vision remains 20/20 in both eyes.

Other patients also have experienced excellent results with the excimer laser. During U.S. clinical trials, nearly 95 percent of PRK patients reported that they no longer needed contacts or glasses to see 20/40 or better.

"The patients I've seen have been extremely pleased with the improvement in their vision from this procedure," says Dr. Gaster.

Duran also says that she is very happy with her results.

"I enjoy waking up in the morning and not having to look for my glasses to see the time on the alarm clock," she explains. "I no longer have to worry about my lenses when I go swimming. There is no doubt in my mind that it has changed my life."

Other Procedures

For people with higher levels of myopia, there is laser assisted in-situ



Drs. Ronald Gaster and Art Giebel treat PRK patient Michelle Duran for nearsightedness.

keratomileusis (LASIK) to correct vision.

"LASIK is designed for people whose myopia is -6 to -14, who are legally blind without glasses," Dr. Gaster explains.

LASIK corrects high myopia by taking PRK one step further: the physician first uses a microkeratome, a microsurgical instrument, to cut a flap in the cornea, lifts the flap and then reshapes the underlying cornea with the excimer laser. After the cornea has been reshaped, the physician places the flap in its original position, where it heals without stitches.

Dr. Gaster says the extra step makes LASIK more precise.

"With LASIK, the corneal stroma is shaped with the laser, so a higher degree of correction is possible with less scarring or haze."

For information on laser vision procedures, consult your ophthalmologist or call the Surgery Laser Clinic at the Beckman Laser Institute at (714) 824-7997. ■

Ambassador Anderson

Christine Anderson says that it is not only the people at the Institute that make her job enjoyable: "Because my position has varied responsibilities," she explains, "I'm always faced with new and different challenges."

As the Institute's sole purchasing assistant, Anderson is in charge of all purchasing activities along with overseeing building maintenance and inventory, and processing travel reimbursements. "It keeps me busy!" she says.

Anderson began at the Institute as a receptionist in 1990, and was promoted to her current position in 1995.

"Chris is a great example of a person who came in at one level of job responsibilities and who, through hard work and perseverance, has assumed greater levels of responsibility," says Institute

Director Michael W. Berns, Ph.D. "She also is a great "Ambassador."

In addition to her other activities, Anderson is part of the VISX Ambassador Program. Staff "Ambassadors" have their vision corrected using the VISX excimer laser and are then available to talk with prospective patients about the procedure.

Born and raised in Ohio, Anderson, along with her two daughters, now lives in Rancho Santa Margarita. She calls Nicole, 12, and Danielle, 5, her "other full-time job" and says that her activities outside work revolve around them.

"We enjoy spending time at the pool or park, going to shows, biking and rollerblading," Anderson explains.

Nancy Johnson, Anderson's manager and the Institute's business administrator, says that Anderson's Midwestern roots attracted her atten-



Christine Anderson.

tion. "She and I are from the same part of the country where hard work and loyalty are highly valued. It is wonderful having Chris on the administrative team!" ■

Institute Hosts International Visitors

In keeping with the Institute's mission to promote interdisciplinary research with a global perspective, researchers from a variety of nations populate the labs and corridors at any given time.

"An influx of new ideas is critical to our research," says Institute Director Michael W. Berns, Ph.D. "Over the years, our international visitors have contributed greatly to the broad range of interdisciplinary research being conducted at the Institute."

The international visitors generally stay for a year or two and work with Institute faculty on an array of research projects, including: photodynamic therapy, thermal properties of tissue, dynamic cooling, infrared tomography, and optical coherence tomography.

The Institute currently is hosting researchers from six countries. The visi-

tors are: Rene Hornung, M.D., a gynecologist from the University of Zurich in Switzerland; physicists Tore Lindmo, Ph.D., and Lars Svaasand, Ph.D., visiting from the University of Trondheim, Trondheim, Norway; Derek Smithies, Ph.D., the Beckman Laser Institute Packard Postdoctoral Fellow visiting from the Uni-

versity of Canterbury in Christchurch, New Zealand; Vincent Wallace, Ph.D., a postdoctoral scientist from the Institute of Cancer Research in London, England; Sol Kimel, Ph.D., a physicist visiting from the Technion Israel Institute of Technology in Haifa, Israel; and



From left, Rene Hornung, M.D., Michael Berns, Ph.D., Yona Tadir, M.D., and, from the University of Zurich, Heinrich Walt, Ph.D.

Johannes de Boer, Ph.D., a postdoctoral scientist from the Academic Medical Centre in Amsterdam, the Netherlands.

Dr. Berns says the Institute plans to continue the collaborations. "Such a global perspective is enlightening and rewarding." ■

New Model Aids Cancer Research

To better understand the effect of lasers on tumors, Institute researchers have developed a model that permits the controlled growth of malignant tumors.

The CAM Model

The model, a chicken chorioallantoic membrane (CAM), allows researchers to grow on a chicken egg tumors that resemble ovarian and other cancers. Next, researchers plan to test photodynamic therapy (PDT) and certain drug therapies on these cancers.

Institute Director Michael W. Berns, Ph.D., says the new model should enhance the Institute's basic and applied research capabilities.

"The ability to take a patient's biopsy tissue or a cancerous cell and grow it into a malignant tumor in a controlled environment provides a unique approach to study the impact that lasers and other therapies have on tumors," he explains. "Our work with the CAM should help us to understand how to eliminate tumors more effectively."

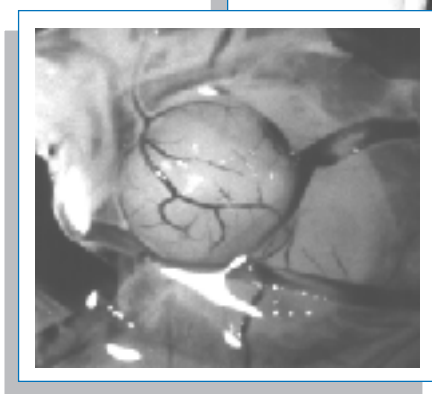
Institute Modifications to the CAM

Working in conjunction with the Institute's Director of Clinical Research Yona Tadir, M.D., researchers Lih-Huei L. Liaw, M.S., Marie Wilson, M.S., and Chung-Ho Sun, Ph.D., modified the CAM model using a novel surgical approach. The CAM was originally introduced to Institute researchers by Sol Kimel, Ph.D., a physicist from the Technion Israel Institute of Technology in Haifa, Israel.

Previous approaches either had dropped the tumor cells on top of the CAM or had injected them just under the CAM's surface. However, such approaches were not enabling Institute researchers to grow healthy tumors, according to Liaw, who developed the new technique over the past

six months.

The new approach involves piercing the CAM's epithelium, or outer membrane, and removing some of the fluid from deep within the membrane. Researchers then replace the fluid with tumorous



cells, cap off the egg, and house it in an incubator. Tumors usually appear after four or five days and are very similar to tumors that grow in humans.

The CAM and PDT

Dr. Berns notes that the CAM model will further researchers' current understanding of PDT's impact on tumors. "After laser treatment, we will be able to see what happens to the surrounding blood vessels and evaluate the condition of nearby cells and tissues."

PDT is a non-invasive treatment that involves the use of a photosensitive, or light-sensitive, drug in combination with laser treatment. When the laser shines on the drug-treated tissue, it produces a chemical reaction that kills only the targeted cells,



Above, researchers Marie Wilson, M.S. (left), and Lih-Huei Liaw, M.S., view an experimental tumor's pathology. At left, a tumor grown on the CAM.

leaving the healthy tissue relatively unaffected.

Thus far, clinical trials at the Institute have found PDT to be a potential treatment of cervical intraepithelial neoplasia. Dr. Tadir and his team hope that research on tumors grown in the CAM will help them understand how gynecological tumors grow and how best to treat them.

Dr. Tadir also envisions other uses for the CAM. "Using new fluorescence techniques on the CAM model may help in detecting small ovarian cancers," Dr. Tadir suggests.

Dr. Berns says that the Institute intends to continue pursuing such research on both the basic and clinical levels. "The Institute's cancer treatment and detection program has made major advances over the past two years particularly because of the close collaboration between the basic and clinical researchers," he says.

"I hope that eventually we can take small biopsies from individual patients, grow tumors in the CAM and then determine the most effective treatment for that patient." ■

Collaboration Targets Feline Skin Cancer

In yet another application of photodynamic therapy, researchers from the Beckman Laser Institute and the Center for Companion Animal Health at the UC Davis School of Veterinary Medicine are treating cats' skin cancer with a photosensitizer, or light-activated drug, that is currently under investigation for use in humans.

"Creams containing the photosensitizer ALA are being used experimentally to treat some human sunlight-induced carcinomas," explains Institute Veterinary Director George Peavy, D.V.M. "We're using ALA for photodynamic therapy (PDT) in order to treat skin cancer in cats."

The two-step PDT process begins when clinicians introduce a photoactive compound, in this case ALA, to the cancerous area. The ALA may be applied topically or injected intravenously. Once ALA enters the cells, enzymes convert it to protoporphyrin 9 (PpIX), a

chemical product of hemoglobin metabolism. Next, clinicians use laser light to illuminate the area to be treated. The laser stimulates the PpIX, generating a chemical reaction that kills the cancerous cells and leaves the healthy tissue relatively unaffected.

This treatment is experimental, and Dr. Peavy explains that the initial feline patients will serve as a model from which the researchers can evaluate ALA's potential as a treatment for both human and animal skin cancer. The next step is animal clinical trials.

"The initial studies will determine the most effective way to administer the ALA, and at what point in time after administration the greatest levels of PpIX accumulate in patient cancer cells," says Dr. Peavy. "Using that information, we will begin clinical trials to evaluate the treatment's effectiveness."

If proven effective for widespread clinical application, Michael Lucroy,

D.V.M, from UC Davis says it would be a boon for cats and their owners. "It would be less traumatic than a long course of radiation therapy," he explains.

The current collaboration with UC Davis is one of several promising projects in which the Institute's Veterinary Program is involved. Since 1991, drawing upon a grant from the Office of Naval Research, the Institute's Veterinary Outreach Program has worked with such schools as the College of Veterinary Medicine at the University of Missouri-Columbia and the School of Veterinary Medicine at the University of Wisconsin at Madison.

Projects have been directed toward investigations with application in human and veterinary medicine, including studies in photodynamic therapy, laser tissue welding, joint surgery, endoscopic soft tissue surgery, bone cutting and infection control. ■

Institute Contributors and Partners

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PUBLICATIONS

Petra Wilder-Smith, D.D.S., Ph.D., published "Investigating the Range of Surgical Effects on Soft Tissue Produced by a CO₂ Laser" in the *Journal of the American Dental Association*.

Zhongping Chen, Ph.D., published "Non-invasive Imaging of *in vivo* Blood Flow Velocity Using Optical Doppler Tomography" in *Optics Letters*.

Vickie J. LaMorte, Ph.D., co-published the chapter "Preparation of Polyclonal Antibodies to Retinoid Receptors" in *Methods in Molecular Biology: Retinoids*.

Martin J.C. van Gemert, Ph.D., published "Non-invasive Determination of Port Wine Stain Anatomy and Physiology for Optimal Laser Treatment Strategies" in *Physics in Medicine and Biology*.

Johannes F. de Boer, Ph.D., published "Two-dimensional Birefringence Imaging in Biological Tissue Using Polarization-sensitive Optical Coherence Tomography" in *Optics Letters*.

Lynda L. Schiebert, R.N., published "Laser-assisted Uvulopalatoplasty: Evaluation of Postoperative Discomfort and the Effectiveness of This Procedure" in *Lasers in Surgery and Medicine*.

Xunbin Wei published "Laser Trapping Microscopy as a Diagnostic Technique for the Study of Cellular Response and Laser-cell Interactions" in *Proceedings of the International Society of Photo-optical Engineers*.

PRESENTATIONS

Yona Tadir, M.D., presented "The Role of Lasers in Assisted Hatching" to the *In Vitro* Fertilization World Congress in Vancouver, Canada. He also addressed "Clinical Research at the Beckman Laser Institute" to the annual staff meeting of UC Irvine's College of Medicine.

Bruce J. Tromberg, Ph.D., presented "Non-invasive Optical Detection of Breast Cancer" to the National Center for Research Resources at the National Institutes of Health.

Petra Wilder-Smith, D.D.S., Ph.D., pre-

David S. Tappan, Jr., is the newest member of the Beckman Laser Institute's Board of Directors. He is the retired chairman of Fluor Corporation, an international engineering, construction and technical services company with headquarters in Irvine, Calif.

Tappan joined Fluor in 1952, and became vice president for Fluor's sales operations in 1962. In 1971, he organized Fluor Engineers & Constructors, Inc., and became its first president.

A member of Fluor's Board since 1965, Tappan was named president and chief operating officer in 1982, and chairman and chief executive officer in 1984. He later retired but remained on Fluor's Board until December 1994.

Tappan is director of Genetech, Inc., Allianz Insurance Company and Advanced Tissue Sciences, Inc. He is a member of the Board of Trustees for the University of Southern California and the Scripps Research Institute. In addition, he is founder-chairman of



David S. Tappan, Jr.

the Orange County Business Committee for the Arts.

"David Tappan is a welcome addition to the Beckman Laser Institute Board of Directors," says Past Chairman Gavin S. Herbert. "His business and technical expertise will be particularly valuable as we embark on the Photonics Incubator project."

sented "Laser Pulp Surgery: Defining Criteria," "A Novel Laser Doppler Technique for Pulpal Blood Flow Measurement" and "An Analysis of Thermal Events During Ho:YAG Laser Irradiation of Pulp and of Clinically Relevant Thermographic Techniques." She also co-presented posters on "Optimization of Laser Effects at 9.3 μm for Intra-oral Surgery" and "IR Thermography of Laser Irradiation at 2.1 μm and 10.6 μm in Pulp Tissue and Model" to the American Society for Laser Medicine and Surgery (ASLMS) in Phoenix, Ariz.

Bruce M. Achauer, M.D., presented "Intralesional Bare Fiber Laser Treatment of Hemangioma" to the ASLMS.

Bahman Anvari, Ph.D., presented "Cryogen Spray Cooling for Epidermal Protection During Pulsed Laser Treatment of Port Wine Stains" to the ASLMS.

Zhongping Chen, Ph.D., presented "*In vivo* Blood Flow Imaging Using Coherence Optical Doppler Tomography" at the Conference on Laser and Electro-optics in Baltimore, Maryland.

Jeffrey D. Gross, M.D., presented the poster "Optical Contrast of Normal and Abnormal Neurological Tissues" to the Fourth Annual UC Irvine College of Medicine Faculty Research Poster Session.

NOTABLES

Arnold O. Beckman, Ph.D., was honored with the Master Entrepreneur award by Ernst & Young's Orange County Entrepreneur of the Year program. The award recognizes Dr. Beckman's long-time business and philanthropic contributions to Orange County.

Matthew Brenner, M.D., was awarded a three-year grant by the State of California Tobacco Related Disease Research Program to study emphysema treatment.

Joshua B. Fishkin, Ph.D., was awarded a Training Program in Carcinogenesis Postdoctoral Traineeship at UC Irvine.

ARRIVALS

Andrea Giancarli
Financial/Billing Coordinator

Sergey Telenkov, Ph.D.
Whitaker Postdoctoral Fellow

Vincent Wallace, Ph.D.
Postdoctoral Fellow

NEWSBRIEFS

(continued from page 1)

Randy Saaf, Adrian Urias, Ben VerSteege, and Lisa Walter, all from HMC, and Sam Carter from BYU.

"It is a pleasure to host such talented students," said Institute Associate Director J. Stuart Nelson, M.D., Ph.D.

MORE EDUCATIONAL PROGRAMS

As part of the Institute's commitment to providing physician training and education, it recently hosted two courses focused on ophthalmology.

The first course, a clinical update on neuro-ophthalmology, offered sessions on April 30, May 7, and May 21, 1997.

Sponsored by the UC Irvine Ophthalmology Department and Allergan, Inc., the program focused on clinical evaluation, diagnostic procedures and management practices for patients with neuro-ophthalmic disease. Ophthalmologists, neurologists and primary care physicians, among others, attended.

Another educational program, a VISX Physician Training and Certification Course, was held for eight ophthalmologists on May 14 and 15, 1997.

Participating physicians learned how to use the VISX laser for such refractive procedures as photorefractive keratectomy (PRK) and, under supervision, treated patients.



Dr. Ronald Gaster leads VISX excimer training for UC Irvine ophthalmology residents.

The two-day program was taught by Ronald Gaster, M.D., adjunct professor of ophthalmology at UC Irvine, who taught a previous VISX course in November. "Additional courses are scheduled for July 31 and August 1," he notes.

The Institute intends to continue with such educational programs for both the professional and student communities.

TROMBERG HONORED

Bruce J. Tromberg, Ph.D., director of the Institute's Laser Microbeam and Medical Program, recently addressed "Non-invasive Optical Detection of Breast Cancer" at a National Institutes

of Health (NIH) meeting in Bethesda, Md. Dr. Tromberg was one of three researchers invited to give a presentation to the National Advisory Research Resources Council, a major external advisory board to the NIH.

SUPPORT GROUP ADDS MEMBER

Wallace Landholm, M.D., is the newest member of the Institute's Support Group, a philanthropic group with almost 50 members. His donation will help the Institute's Surgery Laser Clinic purchase state-of-the-art equipment.

Dr. Landholm is an ophthalmologist affiliated with the Surgery Laser Clinic and practices out of his Newport Beach office. ■



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