Dear Friends and Colleagues,

The Department of Radiation Oncology has concluded another successful winter quarter. As always, we continue to strive towards achieving excellence in patient care, education, and research.

Our clinical faculty, Dr. Jeffrey Kuo, Dr. Hanako Farol, and Dr. Warren Inouye (LBVA) participated in the 4th Annual UCLA-UCSD Mock Oral Exam at UCLA on February 11th. The event was well-attended by first-year attendings and senior residents. In addition, Dr. Varun Sehgal has been invited by the American Board of Radiology to serve as an Examiner for the 2017 Oral Board Exam in Therapeutic Medical Physics to be held in Louisville, KY from May 21-24th, 2017.

Other highlights from this quarter include our ongoing work with the Beckman Laser Institute (BLI) and the Residency Biennial Meeting, which took place on December 14th. Faculty from our training sites at Long Beach Veterans’ Affairs and Long Beach Memorial Hospital were in attendance, where Dr. Huan Giap of the Scripps Proton Therapy Center discussed the growing role of intensity modulated proton therapy (IMPT). Our adjunct faculty have always been a source of educational enrichment for our residents.

We hope you enjoy reading this newsletter and we welcome your comments. We thank our patients, colleagues, and alumni for supporting us in our long term goal of providing Orange County and Southern California with the most advanced radiation therapy technology and world class care.

Sincerely,

Nilam S. Ramsinghani, M.D.
Chair and Clinical Professor
Department of Radiation Oncology
Dr. Sehgal Selected to Serve as Oral Board Examiner

Dr. Varun Sehgal will serve as an Examiner for the American Board of Radiology for the 2017 Oral Board Exam in Therapeutic Medical Physics to be held in Louisville, KY from May 21-24th, 2017. Dr. Sehgal also serves on the ABR Therapeutic Medical Physics Maintenance of Certification Exam Committee. Founded in 1934, the ABR is a not-for-profit organization and is one of 24 independent national boards that are members of the American Board of Medical Specialties.

Dr. Daroui Appointed to NRG New Investigator Committee

Dr. Parima Daroui was recently appointed to the NRG New Investigators Committee. Her work in this role commenced at the NRG semi-annual meeting in Houston, Texas on February 9th, 2017. The committee focuses on clinical trial design and development in the cooperative group.

UC Irvine Radiation Oncology Collaborates with Beckman Laser Institute

For the past year, the Department of Radiation Oncology has been working with the Beckman Laser Institute on a pilot study to use spatial frequency domain imaging (SFDI) to measure radiation changes of the skin during whole breast or chest wall radiation. During radiation therapy, patients develop varying degrees of erythema, with some developing dry or moist desquamation. Additionally, patients can develop permanent discoloration of the skin and thickening of the breast tissue. Quantifying radiation-induced skin changes during and after radiation is challenging, since standardized scoring systems (RTOG Radiation Morbidity Scoring Scheme and CTCAE v.4) are subjective. Our preliminary data in 10 subjects have validated the feasibility and reproducibility of SFDI to measure spatial and temporal changes in the skin during and after radiation therapy. More work is required to collect a large data set for further validation towards a clinical trial. For more details about our research with BLI, please see Page 7.

Dr. Wei Speaks at ASCO/ASTRO Palliative Care in Oncology Symposium

Resident Randy Wei, PGY-5, gave a presentation at the ASCO/ASTRO/AAHPM Palliative Care in Oncology Symposium on September 10th, 2016 and was presented the Cancer Foundation Merit Award. He worked with the American Society for Radiation Oncology to survey radiation oncologists in the United States on their confidence in providing palliative and supportive care, including pain, non-pain, depression, anxiety, and psychosocial distress. The survey found that radiation oncologists were more confident in opioid management of pain, but less confident in managing depression, anorexia, fatigue, and anxiety, which are common symptoms during cancer treatment. Additionally, 42% of respondents said they did not receive continuing medical education in palliative and supportive care.

Dr. Limoli Receives Stem Cell Pilot Grant

Dr. Charles Limoli and Dr. Robert Spitale, Assistant Professor of Pharmaceutical Sciences and Chemistry, have received a $25,000 seed grant from the Stem Cell Research Center for their proposal, “Constructing the in-brain transcriptionsal landscape of transplanted stem cells during rescue of cognitive impairment due to radiotherapy damage” for the 2017 Special Pilot: Rehabilitation & Regenerative Medicine.

Thank you Dr. Tromberg

The Department welcomed Dr. Bruce Tromberg, Director of UCI’s Beckman Laser Institute, to speak at our Grand Rounds seminar on October 27th. Thank you for your informative talk!
ASTRO 2016

The 2016 ASTRO annual meeting took place in Boston, Massachusetts from September 25-28th. UC Irvine was well-represented at the meeting.

Resident Daniel Bourgeois, PGY-5, displayed a poster presentation on reducing cardiac toxicity during radiation for breast cancer with deep inspiration breath hold. Resident Randy Wei, PGY-5, gave an oral presentation on his Radiation Oncology Residency Program Director survey results, which assessed the quantity and breadth of palliative and supportive care education taught to residents. Dr. Wei also presented a poster on lumbar and thoracic vertebral osteopenia and compression fractures after radiation therapy for hepatobiliary and gastrointestinal cancers. Additionally, Dr. Wei was a faculty moderator for an educational session on “Integration of Palliative Care in Radiation Oncology”.

Alumni Reception

Current faculty, residents, and alumni gathered together on September 25th at the Seaport Hotel in Boston during the ASTRO meeting to convene yet again for the 2nd annual UC Irvine Alumni Reception.

Thank you to Dr. Martin Colman, Dr. Nisar Syed, Dr. Behrooz Hakimian, Dr. Bouchaib Rabbani, Dr. Muthana Al-Ghazi, and Dr. Anil Sharma for attending the reception. Both Dr. Colman and Dr. Syed gave insightful talks regarding the celebratory history of the residency program at UC Irvine.

See you this year at ASTRO in San Diego!
Dr. Javier Torres-Roca (class of 2002), Associate Member and Director of Research in the Department of Radiation Oncology at Moffitt Cancer Center in Tampa, FL, recently published “A Genome-based model for adjusting radiotherapy dose: a retrospective, cohort-based study” in *Lancet Oncology*, December 2016.

“Depending on the cancer, radiation therapy can be curative. In some cases, it’s considered equal to or better than surgery because generally it has better functional outcomes. For example, before a treatment plan is devised, a patient might be told he has an equal chance of doing well with surgery or radiation. But that’s just based on the average. Not the individual. What our test does is help to identify the patients most likely to be cured with radiation.”

Dr. Torres-Roca also co-founded CvergenX with Steven A. Eschrich, Ph.D., to market a game-changing molecular diagnostics test the two are developing. Using a proprietary algorithm to generate a radiosensitivity index derived from the expression of 10 specific genes, the test will enable oncologists to predict patient response to radiation therapy. In other words, says Dr. Torres-Roca, we will soon be able “to identify the patients most likely to be cured with radiation.”
Achieving Precision Radiotherapy

Dante Roa, Ph.D.
Clinical Professor

The TrueBeam STX linear accelerator (linac) entered clinical service in April 2014 and propelled the UC Irvine Radiation Oncology Department to the forefront in radiation therapy technology in Orange County (Fig. 1). It can produce x-ray beams that can treat tumors with dose rates as high as 24 Gy/min which makes it ideal for stereotactic radiosurgery (SRS) and stereotactic-body radiotherapy (SBRT) where doses ranging from 16 to 50 Gy are delivered in 1 or, at most, 5 treatment sessions, and can take a long time with a conventional linac.

The TrueBeam is equipped with very thin (<2.5 mm width) computer-controlled collimator sheets that move in and out of the x-ray beam path resulting in a high-precision dose sculpting that match the tumor (or tumors) volumetric shape. Moreover, the small width of these collimators can shape the treatment dose to tumors as small as a fraction of a cubic centimeter often times seen in intracranial SRS cases (Fig. 2 & 3).

Since accuracy in patient positioning is paramount in a SRS or SBRT treatment, the TrueBeam utilizes three-dimensional (3D) patient body surface imaging that monitors the patient position in real-time with submillimeter accuracy and stops the treatment if the patient moves out of tolerance (Fig. 4). The patient receives no additional radiation since it is a 3D optical video imaging.

A Volumetric-Modulated Arc Therapy (VMAT) technique is used to treat SRS and/or SBRT patients. In a VMAT treatment, the C-shape section of the linac where the x-ray beam exits rotates around the patient irradiating the tumor(s) from different angles.

If a tumor is in the beam’s crosshairs with no healthy organs blocking its path, that tumor is irradiated with the highest dose rate and with the beam tailored to the tumor’s shape by the computer-controlled collimator sheets. The end result is a highest concentration of radiation dose to that tumor volume and minimal dose to surrounding organs.

Please stop by to learn about our TrueBeam STX linac.
Long Beach Memorial Hosts Tri-Institutional Residency Biennial

The faculty and residents from our three teaching institutions: UC Irvine Medical Center, Long Beach Memorial Medical Center, and Long Beach Veterans’ Affairs, convene twice a year during the Residency Biennial Meeting to share accomplishments and updates pertaining to the residency programs. The most recent tri-institutional Biennial Meeting was held on December 14th, 2016, hosted by Long Beach Memorial Medical Center. Huan Giap, M.D., Ph.D., of the Scripps Proton Center in San Diego, was the invited guest speaker. Dr. Giap discussed the application of proton therapy and the future of particle therapy. UC Irvine Residency Program Director, Dr. Jeffrey Kuo, led a faculty development session and provided an informative overview of the ACGME Milestone requirements for Radiation Oncology, and also discussed the upcoming ACGME Self-Study requirements.

The next Biennial Meeting will be held at our third rotation site, Long Beach Veterans’ Affairs, in Spring 2017.

Physics Update

Muthana Al-Ghazi, Ph.D.
Clinical Professor & Director of Medical Physics

The New Year is nearing the end of its second month as you read this newsletter. With it come new hopes and opportunities. I trust all had an enjoyable festive season.

On November 11th, 2016, Veterans Day!, Dr. Samir Laoui (physics resident) and Dr. Anais Leproux (Beckman Laser Institute, BLI) and I attended the Cancer Center Retreat. It was a change from Palm Springs where it used to be held over a weekend. The easier drive was most welcome and the meeting held over one day. We presented two posters, one on high dose rate brachytherapy planning, and one on a novel optical method to quantitatively evaluate breast skin reaction associated with radiotherapy. This latter project is in collaboration with the BLI who are providing the technology and optical expertise. This project is also being submitted to the upcoming ASTRO meeting in San Diego.

We are preparing for our Dosimetry Training Program accreditation by the Joint Review Committee on Education in Radiation Technology (JRCERT). The site visit is scheduled for the end of February. Dr. Dante Roa, program co-director, was a great help in preparing the submission. Our dosimetry student, Alfredo Banda, is progressing well in his training program and hopes to graduate in late June.

Jonathan Gonzalez joined us our dosimetry staff late last year after completing his training at the University of Michigan.

This year we are recruiting for a physics resident to start July 1st. We received applications from highly qualified candidates. We will have a ranking meeting in early March which will be sent to the Medical Physics Match. This is our second time participating in the physics residency match.

It is hard to believe that the Physics Residency Program is coming up for its 10th year accreditation by the Commission on Accreditation of Medical Physics Education Programs (CAMPEP). Dr. Varun Sehgal, program co-director, is helping with the process of re-application for accreditation. This is a key juncture in the history of the program. It involves a comprehensive evaluation by CAMPEP as well as a site visit anticipated later in the year.

Our current resident, Dr. Samir Laoui, is nearing the end of his residency training. He is already interviewing for positions. Hopefully he will land a placement of his choice. Former resident, Dr. Suhong Yu, will be re-locating from the University of Rochester to Boston University Medical Center to be re-united with her husband who is a scientist at MIT in early March.

Should your travel plans include Southern California, please visit. You will always have a warm welcome. I wish you all a happy spring and a successful year ahead.
Quantifying Radiation Changes During Radiation Therapy for Breast Cancer

Randy Wei, M.D., Ph.D, PGY-5
Anais Leproux, Ph.D.

Since 2016, the UC Irvine Department of Radiation Oncology has been collaborating with the Beckman Laser Institute on Spatial Frequency Domain Imaging (SFDI).

Using this new imaging technique, the project is aimed at using precision measurements to characterize skin toxicity of tissue exposed to radiation. By tracking these measurements throughout treatment, Dr. Leproux and her team hope to better understand the factors involved in skin damage and predict acute and late toxicities.

SFDI is a non-invasive and rapid functional imaging technique. It uses spatially-structured light at 8 wavelengths (from 470 to 850 nm) to quantitatively map superficial tissue absorption and scattering in a wide-field, non-contact imaging geometry. Tissue oxygen saturation, oxyhemoglobin, deoxyhemoglobin, and melanin content can be calculated from the SFDI absorption data. Ten female breast cancer patients were enrolled in this study under a clinical protocol approved by the Institutional Review Board at the University of California, Irvine. SFDI measurements were performed before the start of treatment, weekly during radiation treatment and 2 weeks, 1.5 months and 3 months after completion of treatment. The contralateral, untreated breast was also measured and used as an internal control.

The study was able to observe increased melanin content over the treated area, correlating with hyperpigmentation. Subsequent decrease in melanin content was observed in 3 patients who experienced skin discoloration. Increase in total hemoglobin was consistently observed over the treated area, correlating with erythema. A drastic drop in tissue oxygen saturation was observed in all patients at about 4 or 5 weeks of treatment, probably resulting from radiation-induced damage of the microvasculature. This drop was preceded by a steady increase in oxygen saturation in a few patients. The figure above presents an example of these effects in a 49-year-old female treated with radiation. Increase in melanin content is observed as early as 14 Gy. Increase in total hemoglobin is observed later between 20 and 30 Gy. Oxygen saturation increases from about 10 Gy to 52 Gy, and suddenly drops at 58 Gy. The last 2 study time-points correspond to 2 weeks and 1.5 months after the completion of radiation.

Decreases in total hemoglobin and melanin observed at these 2 post-radiation time-points suggest healing of the skin.

Our preliminary data in ten (10) subjects have validated the feasibility and reproducibility of SFDI to measure spatial and temporal changes in the skin during and after radiation therapy. Potentially, SFDI could be used to measure different prophylactic creams during radiation treatment, or predict severity of radiation skin changes from pre-treatment SFDI measurements.

The research was accepted to the 2017 Biophotonics Congress and was highlighted in a special press release by the American Institute of Physics.
Faculty Spotlight:
Dr. A.M. Nisar Syed

In each newsletter, we introduce one of our faculty from our three training sites: UC Irvine, Long Beach Memorial Medical Center, and Long Beach Veterans’ Affairs. In this edition, we highlight Dr. A.M. Nisar Syed from Long Beach Memorial Medical Center.

A.M. Nisar Syed, M.D., has been the Director of Radiation Oncology and Endocurietherapy at the Malcolm C. Todd, MD Cancer Institute at Long Beach Memorial Medical Center since 1979. He has been part of the UC Irvine Radiation Oncology residency as a volunteer clinical faculty member since 1982. Dr. Syed is one of the world’s pioneers in endocurietherapy, a radiation treatment implanting interstitial isotopes which isolate radiation exposure to tumors and preserves healthy cells. He has devoted much of his time to refining interstitial brachytherapy techniques and training the next generation of brachytherapists including UC Irvine residents who rotate through Long Beach Memorial Medical Center.

Dr. Syed performs brachytherapy procedures for GYN, prostate, breast, and head and neck cancers. Among his numerous achievements and awards, he is also Founder of the American Brachytherapy Society (formerly the American Endocurietherapy Society), and has served as Secretary, Program Chair, Lecturer, and President. He is a member of eight professional societies and is the Founding Editor for the “Journal of Brachytherapy International”. Most recently, he was awarded the American Muslim Achievement Award, the Founders’ Award from the American Brachytherapy Society at the World Congress of Brachytherapy, and the Lifetime Achievement Award from the Global Association of Physicians of Indian Origin.

When Dr. Syed is not practicing radiation oncology, one can find him in India where he sees patients at several Comprehensive Cancer Centers, or spending time with his family and grandchildren in Southern California.

Staff Spotlight:
Michelle Leung

Residency Coordinator Michelle Leung joined our department in December 2014 and has been an integral help to our four education and training programs (clinical residency program, medical physics residency program, dosimetry training program, and medical student electives). She also provides administrative support for the department’s faculty and staff.

Michelle has worked in conjunction with chief resident Randy Wei, PGY-5, to jumpstart the department newsletters and alumni association to strengthen departmental relationships with resident alumni and the medical community.

Michelle earned her Bachelors’ Degree from UC Santa Barbara and is currently pursuing her Master’s in Communication Management at the University of Southern California. She is avid Disneyland visitor and enjoys traveling to new destinations.
Notable works

PUBLICATIONS


Vuong, W., Lin, J., & Wei, R. Palliative radiotherapy for skin malignancies. Annals of Palliative Medicine, doi:10.21037/apm.2016.11.10 (2016).


BOOK CHAPTERS

