Spring 2022

UCSF Department of Radiation Oncology

The UCSF RadOnc Beam

News & Ideas from the UCSF Radiation Oncology Team

Message From The Chair

Catherine C. Park, MD, FASTRO
Professor and Chair

We remain in unprecedented times at a global scale. Uncertainties in the pandemic, war, and changes in climate will continue to impact our societies and cultures as we navigate paths forward. During these times, we have demonstrated resilience and hope through our commitment to excellence in patient care, empathy towards one another, and leaning in to our work and supporting one another. We have responded with our core values, and made progress on the DEI work that reframes our culture and communities in more constructive and positive terms.

The following newsletter highlights areas of focus and work together—please take note of the theme of ***collaborative work in our collective progress***! We have made important progress that we can all be proud of. Here, we highlight a breadth of this work that covers all of our missions: academic/research, education, and clinical quality care.

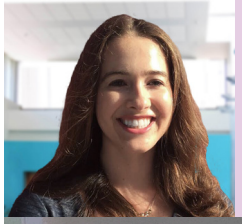
Thank you to our contributors, and enjoy reading!

Cathy

Spotlight On Research:

New Horizons for MRI Simulation in Radiation Oncology

Jessica Scholey, PhD
Lisa Singer, MD, PhD



Pictured above: Dr. Jess Scholey, Physics Resident Dr. Phillip Wall, and MR Technologist Christina Calvin seen optimizing MR protocols.

Magnetic resonance imaging (MRI) is a powerful and noninvasive imaging modality that can provide excellent soft tissue contrast and physiological and/or functional information about tumors and healthy tissues. Due to the potential of MRI in radiation oncology, our department installed a 3 Tesla Siemens VIDA MRI simulator in late-2019 and we have been using it for clinical MRI simulation since early-2020. Since then, both the research and clinical potential of MRI simulation at UCSF continues to grow as we develop techniques for integrating different sequences, protocols, and reconstruction algorithms into radiotherapy. Four primary areas of research focus include data-driven contouring, treatment response assessment, MRI-derived synthetic CT, and motion-resolved MRI (four-dimensional, or 4D-MRI).

Data-driven contouring: Due to the superior soft tissue contrast of MRI relative to CT, we have been exploring new opportunities for MRI-derived, data-driven contouring. For example, our head and neck cancer group has acquired over 130 MRI simulation datasets which will be used to develop models for auto-segmentation and CT synthesis for MRI-only planning. For prostate cancer, our group is developing deep learning methods to predict high-risk prostate cancer maps from T2-weighted MRI and integrate these maps into radiotherapy treatment plans to deliver more targeted therapy. Ultimately, we hope this strategy will allow for patient-individualized treatment using AI-driven technology that can provide uniformity of care accessible to both academic institutions and community hospitals. Use of MRI for dose painting is currently being studied in prostate cancer on the prospective protocol, JUMP, and we are working to implement these approaches at UCSF in additional disease sites. For breast cancer, our research group is collaborating with Siemens to optimize diffusion-weighted imaging for use in supine breast MRI simulation to assist with tumor cavity delineation.

Treatment response assessment: MRI has demonstrated value for providing functional tumor information and predicting tumor response to radiation. For example, we are investigating T1/T2 mapping for functional liver assessment in patients treated for liver cancer. The value of serial MRI scans acquired before, during, and after MRI is currently being studied on the prospective clinical trial, RELAY.

MRI-derived synthetic CT: While MRI provides superior soft tissue contrast relative to CT, a primary limitation is its inability to provide electron density information necessary for radiotherapy dose calculation. Consequently, both CT and MRI are routinely acquired to provide electron density and tissue contrast, respectively. To remove the need for CT and transition to an MRI-only workflow, our group focuses on using advanced MR imaging methods to improve dose calculation accuracy through improved estimations of electron density (for photon radiotherapy) and stopping power ratio (for proton radiotherapy). Future work includes studying the feasibility, accuracy, and safety of synthetic CT on a prospective imaging protocol, co-developed with multiple investigators in the department. Synthetic CT is currently being studied on the JUMP protocol for head and neck cancer and we are working to study this approach at UCSF in additional disease sites.

4D-MRI: Accurately accounting for motion is critical when treating tumors that move with respiration and is often performed using 4D-CT. However, abdominal tumors such as those in the liver and pancreas are difficult to visualize on 4D-CT due to poor contrast and rapid contrast clearance. Together with Siemens, our group has developed a contrast-enhanced 4D-MRI protocol using a novel reconstruction algorithm for patients with abdominal tumors.

The growth of our MRI simulation program is made possible due to the interest and participation across the department. We are grateful for the collaborations described in this newsletter, as well as the many people involved in additional projects. If you are interested in working with our MRI simulation team, please email Lisa or Jess!

Pictured below: Drs. Jess Scholey and Tony Wong at the MR console setting up pork to test a MRI-HDR protocol.

Spotlight On Research:

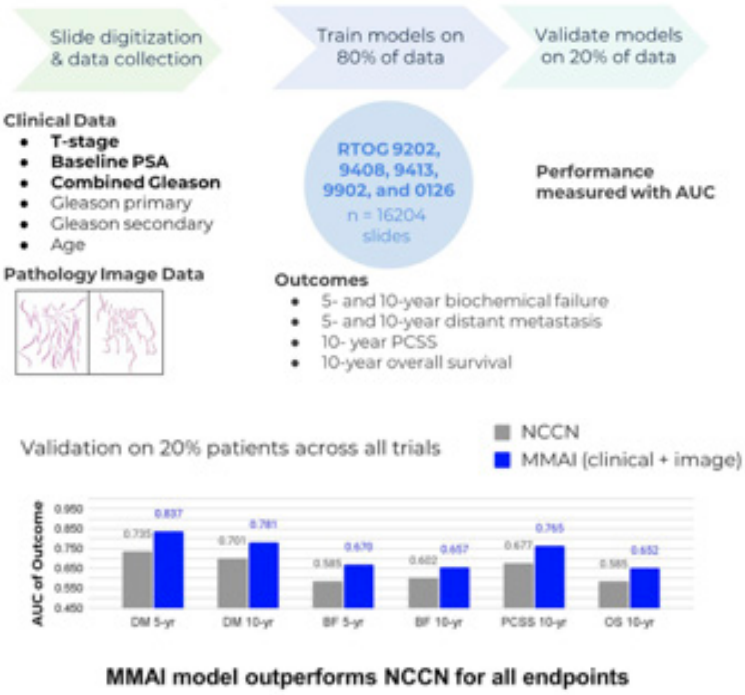
Development and Validation of a Prognostic AI Biomarker Using Deep Learning on Digital Histopathology in Localized Prostate Cancer

Osama Mohamed, MD, PhD

The most common system used to risk stratify patients with localized prostate cancer is the three-tier NCCN risk grouping tool which is based on digital rectal exam (DRE), PSA level, and Gleason score of tumor biopsy. This three-tier system forms the basis of treatment recommendations for localized prostate cancer but has repeatedly been shown to have suboptimal prognostic and discriminatory performance. More recently, tissue-based assays including genomic signatures have improved our prognostic abilities, but they remain slow, expensive, and have yet to be validated prospectively, which significantly hinder their adoption in the US and globally. One way to improve prognostication for prostate cancer is using artificial intelligence (AI). AI tools can perform across different needs, they are fast and low-cost, are trained on thousands of patients, do not consume tissue, and thus are scalable and can improve over time through continued learning to optimize test performance and health care value.

With approval from NRG, we assembled a unique dataset of digital slides from pretreatment biopsies from five randomized phase III clinical trials of men with localized prostate cancer (NRG/RTOG 9202, 9408, 9413, 9910, and 0126) treated with radiation +/- androgen deprivation therapy (ADT), different durations of ADT, and different doses or volumes of radiation fields. Of these five trials, data from 5,654 of 7,957 eligible patients (71.1%), 16.1 TB from 16,204 histopathology slides, were utilized. By utilizing data from large clinical trials with long-term follow-up and treatment information that is standardized and less subject to bias, our model is trained on some of the most accurate clinical and outcome data available globally. The patients were randomly split into training (80%) and validation (20%) cohorts. A multi-modal AI architecture was developed to take clinicopathologic and image-based data as input to predict outcomes. Using this architecture, various AI models were trained to predict different clinical endpoints including biochemical recurrence (BCR), distant metastasis (DM), prostate cancer-specific survival, and overall survival (OS). These models were then validated for prognostic discrimination using the area under the curve (AUC) as a performance measure (Figure 1). After training, the models were locked and tested on the validation cohort. On validation, the AI model had better performance compared to the NCCN model for all tested end points as shown in Figure 2.

In conclusion, this represents the first ever development and validation of prognostic biomarkers in localized prostate cancer using NRG phase III clinical trials. AI tools are scalable and can help personalize the management of patients with prostate cancer. It is prudent to test how such tools could integrate in clinical workflow when deployed.



Spotlight On Research:

Addressing Taste Dysfunction with Miraculin in Head and Neck Cancer Patients Receiving Radiation Therapy

Jessica Chew, MD, and Sue Yom, MD, PhD

Patients with head and neck cancer undergoing radiation therapy experience many side effects that lead to changes in oral intake over the course of treatment, which typically results in decreased caloric intake, dehydration, lack of nutrition, and weight loss. In the most severe cases, this can lead to treatment breaks that negatively influence treatment outcomes. The majority of the expected radiation-related side effects are readily managed with commercially available products, medications, or interventions. However, taste alteration which has an early onset during treatment is a more difficult symptom to readily address and intervene upon. There are no effective established interventions for ageusia or dysgeusia. Therefore, we set out to develop a study that investigates whether the intake of miracle fruit by patients with head and neck cancer receiving radiation therapy improves dietary intake affected by treatment-related dysgeusia.

Miracle fruit (Synsepalum dulcificum) is a native West African plant that contains a glycoprotein called miraculin, which alters the perceived taste of sour and acidic foods such that the consumer instead senses a sweet taste. Miraculin binds to the sweet taste receptors in the tongue and activates the receptor in acidic environments to cause this effect, which lasts around thirty minutes to one hour after consumption. Miracle fruit is currently commercially available in its natural fruit form and a variety of tablet and cube forms in the United States. Miracle fruit preparations have been shown in a few uncontrolled studies to have positive effects in patients experiencing taste dysfunction from chemotherapy but have not been previously tested in patients receiving radiation.

This study is a phase III, double-blinded, placebo-controlled, randomized controlled trial. Patients receiving definitive or post-operative radiation therapy for head and neck cancer with no pre-existing taste dysfunction will be randomized in a one-to-one ratio to receive miracle fruit cube or a fruit-flavored placebo cube, which are dissolved on the tongue prior to meals, for the duration of radiation treatment. The primary endpoint is the change in perceived interference of subjective taste alteration with dietary intake score during week three of radiation treatment compared to baseline prior to radiation treatment. Our hypothesis is that miracle fruit would yield the greatest benefit to improve taste dysfunction in the beginning half of radiation treatment when taste function is decreased but not absent, therefore the primary endpoint will be measured during the third week of treatment. Additionally, dysgeusia and taste-related quality of life associated with head and neck radiotherapy are not well characterized in the medical literature, and therefore the secondary endpoints will serve to provide a comprehensive prospective characterization of radiation therapy-associated taste effects in head and neck cancer patients. These will include patient-reported taste dysfunction, taste-related quality of life, and quantitative assessment of dietary diversity, all of which will be assessed weekly during radiation treatment and at three and six months post-treatment. Additionally, oral cavity and taste-bearing mucosa dosimetric data will be collected to evaluate for their association with patient-reported taste dysfunction. These multiple complementary data inventories will provide important baseline information for designing other pharmacologic or technological interventions in the future. For instance, a major impact of proton therapy is the improvement of taste dysfunction. The anticipated enrollment for this study is forty patients and the study is expected to open for accrual in Spring 2022.

The miracle fruit and placebo cubes are graciously donated by Miracle Fruit Farm and funding to support distribution to patients is provided by the Mount Zion Health Fund. This study is IRB and FDA approved.

Pictured above: Miracle fruit (Synsepalum dulcificum) is a native West African plant that contains a glycoprotein called miraculin.

Educational Programs: Resident Research Focus

We are pleased to share brief overviews of the research conducted by our graduating Medical and Physics residents:

Medical Residents:

Dr. Jessica Chew, MD

Jessica is investigating strategies to improve the tolerability of radiation treatment and decreasing treatment-related toxicity. She is currently opening a prospective randomized clinical trial under the mentorship of Dr. Sue Yom to investigate whether use of miracle fruit in patients with head and neck cancer receiving radiation therapy can improve treatment-related taste alteration and quality of life, which will open for accrual this year.

Dr. Nam Woo Cho, MD, PhD

Nam Woo is studying the process by which cancer mutations induced by genome instability are detected and handled by the immune system during cancer therapy. His current focus is to achieve a mechanistic understanding of a surprising finding that tumor infiltrating T cells can paradoxically drive an immune-suppressive tumor microenvironment. One of Nam Woo's future directions is to investigate whether T cells recruited by radiation therapy can trigger this pro-tumor response and evaluate therapies that perturb this program.

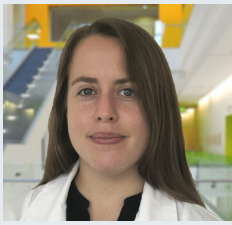
Dr. Sumi Sinha, MD

Sumi's recent research has focused on data science applications for workforce quality improvement in the cancer center setting. As a member of the Hong lab, Sumi completed analyses of patient usage of patient portals and oncology provider interactions with the electronic health records. Her upcoming work includes analysis of work from home practices specific to women in Radiation Oncology. Sumi looks forward to applying these results to real world practice.

Dr. Harish Vasudevan, MD, PhD

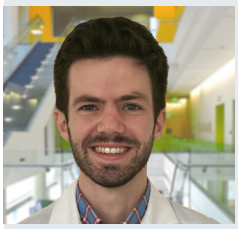
Harish's research focuses on elucidating the molecular mechanisms underlying oncogenic growth factor signaling through receptor tyrosine kinases and the Ras pathway with a focus on neurofibromatosis type I (NF1). As a resident at UCSF, he has developed and applied cutting edge genetic, genomic and biochemical approaches to design novel diagnostic and therapeutic strategies for patients with cancer.

Medical Physics Residents:



Dianne Ferguson, PhD

Dianne completed her PhD in experimental particle physics at the University of Edinburgh before transitioning into medical physics via a Post-doctoral position at Dana-Farber Cancer Institute and finally joining our department at UCSF as a Medical Physics resident. Over this time, her research interests have included markerless tumor tracking with in-vivo MV images, investigating correlations between biologically effective dose calculations and patient outcomes for HDR treatments, and developing computational tools to aid clinical tasks. Outside of work, Dianne enjoys hiking, climbing, and knitting.



Phillip Wall, PhD

Phillip's research has focused on the implementation and prospective validation of virtual patient-specific quality assurance of VMAT radiation treatment plans into our clinic at UCSF. Building upon the work inspired by Drs. Gilmer Valdes and Alon Witztum, the team has successfully deployed a web application within the department containing a machine learning model that gives real-time predictions of delivery accuracy of clinical plans based on their specific complexity characteristics. Prospective testing has demonstrated that all plans can be predicted to within 3% error, with a potential to reduce QA workload by 69%.

Clinical Trials

Studies open in 2021

PI	Protocol#	Study Title	Funding	Annual Accrual (March 2021-2022)	Study Status
Catherine Park	187513	Hypofractionation after breast reconstruction for breast cancer (FABREC)	DFCI/PCORI	5	Closed
Sue Yom	162010	Nivolumab + chemoRT for patients with nasopharyngeal cancer	IIT/BMS	10	Open
Sue Yom	166520	PembroX: Pembrolizumab +/- SBRT prior to surgery for NSCLC (PembroX)	IIT/Merck	12	Closed
Sue Yom	18201	Phase 1/2 trial of concurrent RT, cisplatin, and BMX-001 in locally advanced H&N cancer	BioMimetix	0	Closed
Sue Yom	NRG-HN001	Phase II/III studies of individualized treatment for nasopharyngeal cancer based on biomarker EBV DNA (HN 001)	NRG	0	Open
Sue Yom	NRG-HN004	Phase II/III trial of RT and concurrent durvalumab vs. RT and concurrent cetuximab in H&N cancer pts with a contraindication to cisplatin (HN 004)	NRG	0	Open
Sue Yom	NRG-HN005	Phase II/III trial of deintensified RT for favorable oropharyngeal cancer (HN 005)	NRG	0	Open
Chan	RTOG 1216	Phase II/III Trial of adjuvant RT with cisplatin, docetaxel-cetuximab, or cisplatin-atezolizumab in pathologic high-risk squamous cell cancer of the head and neck (RTOG 1216)	NRG	5	Open
Tony Wong	CC#20727	STEEL: Phase II trial of salvage RT with standard or enhanced ADT for post-op PSA recurrences with aggressive disease features (RTOG 3506 STEEL)	RTOG Foundation	6	Open
Osama Mohamad	GU008	Phase III trial of abiraterone acetate with prednisone and apalutamide and advanced imaging in salvage treatment for node-positive prostate cancer after prostatectomy (GU-008)	NRG	1	Open
Mary Feng	CC# 19721	Phase II study of hypofractionated RT to augment immune response in metastatic GI cancers progressing on immune therapy (ARM-GI)	IIT/Varian	1	Open

Newly Opened Studies

PI	Protocol#	Study Title	Funding	Current Status	Study Status
Mary Feng	CC# 194522	Phase II trial of palliative hypofractionated RT followed by durvalumab +/- tremelimumab for advanced HCC	IIT/AstraZeneca	0	Open
Mary Feng	CC#21721	Optimization of MRI for liver RT (Liver MRI)	UCSF-IIT	0	Open
Osama Mohamad	CC#21726	Phase II randomized trial of SAbR with or without neurovascular sparing for erectile function preservation in localized prostate cancer (POTEN-C)	UTSW	0	Open
Sue Yom (written by Jessica Chew)	CC#22721	Phase III trial addressing taste dysfunction with miraculin in head and neck cancer patients receiving radiation therapy	UCSF- IIT	0	Open

Pending Studies

6 new trials are anticipated to open in 2022, including 3 investigator initiated (IITs) and 3 cooperative group

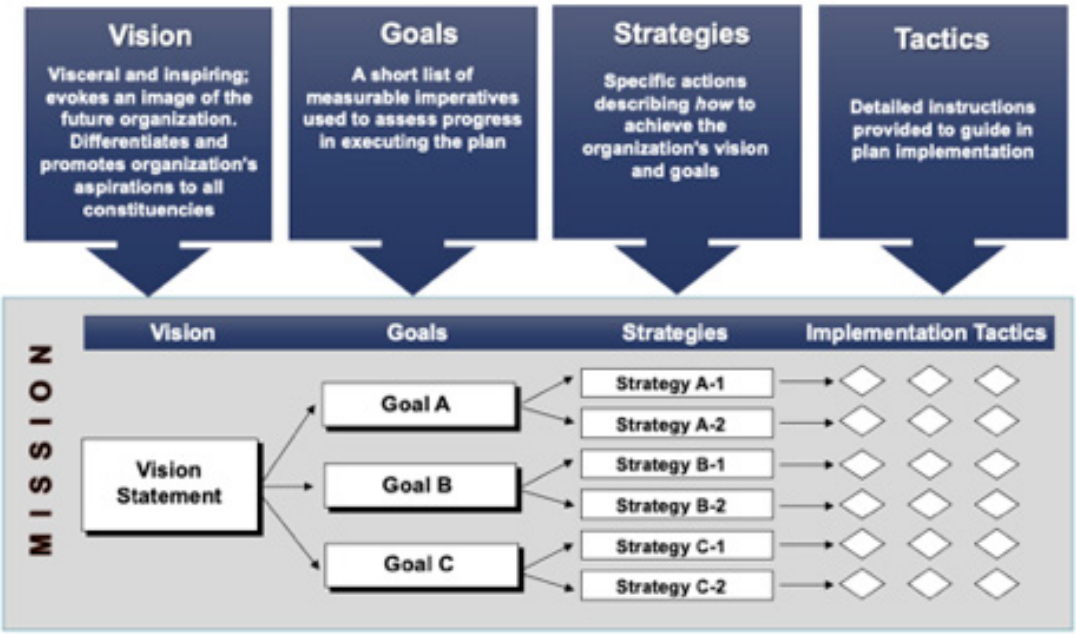
An Update from the Strategic Advisory Committee

Sue S. Yom, MD, PhD, FASTRO, FACR, FAAWR

The Strategic Advisory Committee (SAC) was established in June 2020 with the charge of prioritizing areas of focus towards the goals of the department's strategic plan. The specific function of the SAC is to identify and characterize areas of strategic growth for clinical expansion and research, and to advise on departmental support of short-term and long-term projects.

I was interested in leading this initiative as I had recently become interested in organizational strategy development and it aligned with my belief that the department could benefit from more of a focus on organization, communication, and long-term strategic planning. We assembled a small group of stakeholders from across the department who were willing to commit to the work of this committee and who expressed genuine interest in analyzing and implementing the strategic plan. However, a large number of persons within and external to the department have been invited to present or participate in subprojects of the committee.

The department's strategic plan was first organized and developed in mid-to-late 2017. The pillars of the original research development plan included: Immunotherapy/Tumor Microenvironment; Genomics; Particle Therapy; Data Science; Imaging; and Combined Modality Therapy. While the department has evolved considerably since 2017, these pillars remain relevant. Therefore, some of the first acts of the SAC were to support development of data science within the department through salary and hardware support for the UC Learns program, and furthermore, to advise extensively on conception and development of the Translational Immunology and Oncology (TIO) program being developed at the Mount Zion campus.



As a result of this process, it was realized that there were two challenges that needed to be addressed in order to enhance implementation of the strategic plan: 1) messaging strategic plan priorities as a shared vision and 2) communicating in a transparent, department-wide manner. Therefore, the SAC began developing roundtables as a means to assess our research standing and encourage free-flowing discussions and collaborations.

The first SAC roundtable, Intersection of Radiation Oncology and Immuno-Oncology, was hosted by Dr. Barcellos-Hoff at the Mount Zion campus on Tuesday, October 5, 2021. This two-hour session featured concept talks by Drs. Mary Feng, Sue Yom, and Paola Betancur, as well as flash talks by Drs. Nam Woo Cho and Mary Helen Barcellos-Hoff. The focus was on basic science being conducted by members of the department as well as clinical trial activities related to immuno-oncology. The second SAC roundtable, Imaging Research, was hosted by Dr. David Raleigh and held in two parts. The first took place at Parnassus campus on November 4, 2021, featuring concept talks from Drs. Michael Ohliger, Lisa Singer, and Olivier Morin and flash talks by Drs. Dante Capaldi and Will Chen. Because of the large scale of the a topic, a second follow-up roundtable was held on December 2, 2021 including concept talks by Drs. Jess Scholey and Javier Villanueva-Meyer, and flash talks by Drs. Abhe Rajagopal, Tomi Nano, and Xin Miao. The imaging roundtables provided a very wide-ranging view of imaging research from perspectives inside and outside the department.

An additional SAC roundtable on Data Science was led by Dr. Osama Mohamad on April 4th and another SAC roundtable focused on Thermal Therapy and Brachytherapy to be led by Dr. Mekhail Anwar is currently being scheduled. Genomics, particle therapy, and combined modality therapy remain of interest.

The SAC roundtables have succeeded in bringing together interested parties and establishing contact lists for these areas, but the question has now become how to sustain and nurture persons interested in growing these programs? Therefore, the SAC has begun to investigate possible investments in initiatives that engage large sectors of the department as well as structured training programs designed to facilitate and encourage mentorship and collaboration.

We welcome any and all feedback from the department and hope these initiatives are helping people to visualize and connect with our strategic goals and vision for growth.

The Strategic Advisory Committee consists of: Dr. Mekhail Anwar, Dr. Mary Helen Barcellos-Hoff, Mounira Kenaani, Dr. Osama Mohamad, Dr. Olivier Morin, Dr. David Raleigh, and Dr. Sue Yom (Chair).

Physics Division

We have important Physics Division news along the clinical, education, and research pillars of our shared Radiation Medicine mission at UCSF.

Clinical Matters

It has been quite the time for inspections and surveys for the Physics Division! Back in November, the State of California Radiological Health Branch (RHB) performed an inspection of all our x-ray producing machines. Then in March, we had our American College of Radiology (ACR) Accreditation Survey. We passed both reviews with high regards for our program.

In addition to a successful season of inspections and surveys, we are happy to celebrate several exciting updates on the clinical physics front:

- Launch of deep inspiration breath hold (DIBH) for breast radiotherapy at Mount Zion: Led by **Tomi Nano**, we are utilizing the Varian RGSC system with the go. Sim for CT Simulation, and the AlignRT system in the Elekta VersaHD vault for daily patient setup and breath-hold monitoring during treatment.

- RayStation v11A: We are excited to finalize the testing and evaluation of RayStation v11A. Huge shout-outs to **Junhan Pan, Katelyn Hasse, Monica Hira, Benjamin Ziemer, Adam Cunha, Mareike Held, Alon Witztum, Zeke Ramirez, Madeleine Bogdanov, and Pamela Holliday** for their time and effort in validating this next version of RayStation. More to come on the exciting new features with RSv11A!

- Gamma Knife Program updates: The much anticipated GK source reload is being planned and slated for this year. In addition, we welcome Dante Capaldi to the GK Physics Planning team upon successful completion of training and onboarding in the GK service.

- MR Sim Disease Sites: The MR Sim team lead by **Jessica Scholey, PhD** (newly appointed Physics Director of the MR-Sim program) has been busy with bringing on protocols for new disease sites. Recently added are rectum, GYN, and breast, and coming up are sarcoma and spine!

Graduate Medical Physics Program

(Dr. Adam Cunha, PhD)

We are really excited to be offering the graduate-level medical physics course again this year. The three-quarter course (RadOnc 235A, 235B, and 235C) covers the fundamentals of medical physics in the first quarter, in-depth advanced topics in the second quarter, and the third quarter is designed to allow students to shadow clinical operations.

This year we offered 235A in the Winter 2022 quarter taught by Dr. Katelyn Hasse and myself. The seminal offering of 235B is happening now as Spring Quarter 2022 just started; and we are excited to be able to bring in a number of physics faculty to each cover two to four lectures on topics that relate to their expertise: Dr. Alon Witztum will cover QA; our resident Monte Carlo expert Dr. Jose Ramos will cover Monte Carlo analysis; Dr. Ben Ziemer will cover TBI, Small fields, and Gamma Knife; Dr. Martina Descovich will discuss CyberKnife and motion management. The second half of the quarter will have Dr. Jess Scholey going in-depth on Protons; Drs. Olivier Morin and Gilmer Valdes covering Quantitative RadOnc; Dr. Chris Diederich covering thermal therapy; Dr. Emily Hirata covering Professionalism; and myself covering Brachytherapy.

In the summer, we will also offer 235C for the first time. This course will allow the students to experience clinical operations including treatment planning and machine QA. We are still finalizing the details of the syllabus and we encourage any faculty who want to be involved to reach out. This is a great endeavor to offer these courses and it has truly been a group effort that will support our application to CAMPEP with UCBerkeley's BioEngineering Department.

New Research And Development Initiative (SPARK Steering Committee)

The pace of scientific development in medical physics has accelerated in recent years with the synergistic effects of new research opportunities in data science, imaging, biological simulation/optimization, particle therapy, adaptive treatment, automation, tumor sensitization and many others. The Physics division is introducing a new initiative—the ***Special Physics & Advanced Research Club***—also known as SPARK! The vision of SPARK is to create a venue for discussion of technologies and international research efforts, which will lead to new projects at the forefront of our discipline. SPARK is for anyone interested in medical physics innovation for Radiation Medicine.

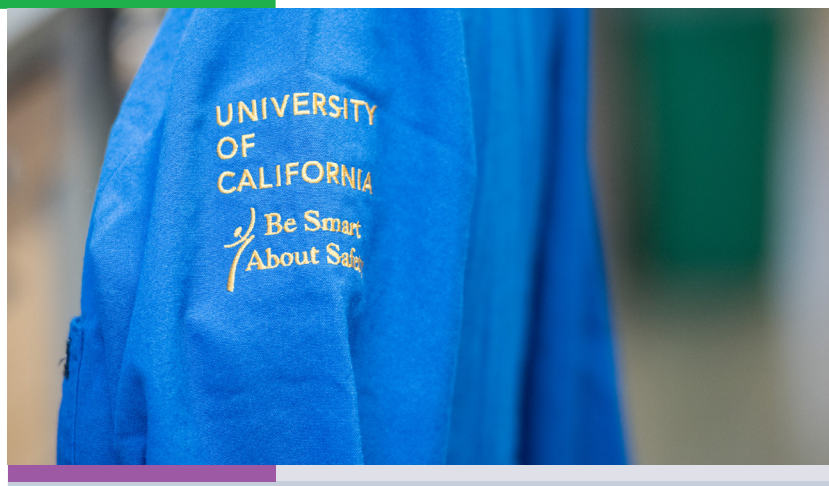
The goal of this initiative is to spark ideas, innovation, and collaboration within the physics group and beyond through the use of monthly sessions featuring:

- Point-Counterpoint discussions
- Journal clubs
- Invited speakers
- Conference preparation workshops

SPARK
UCSF RADONC PHYSICS

We look forward to coming together and discussing state-of-the-art research ideas! Keep an eye out for regular emails on events and updates from the SPARK Committee. Please contact RadOnc IT if you would like to be added to the spark@ucsf.edu email list.

Quality and Safety



Quality and safety are bedrocks of the care we deliver. There have been numerous impressive contributions towards continuous improvement from every member of our department. Each achievement and milestone represents months, if not years, of work and collaboration across our team. Here are some highlights of our achievements in the last six months:

- In November 2021, the State of California Radiologic Health Branch (RHB) visited our department and performed X-Ray Machine and Radioactive Materials surveys, which our team completed with stellar reviews! The inspectors visited each of the three campus locations to inspect every single x-ray machine vault for proper signage and safety mechanisms. They reviewed physics reports for each machine, as well as credentialing and training records

- In February 2022, we presented many of our continuous process improvement projects at the UCSF Health Continuous Process Improvement Committee (CPIC) annual review and received overwhelmingly positive feedback. Particular recognition was given to the Patient Transportation Program team for the work focused on reducing health disparities by addressing inequity in access to treatment and avoiding the risk of treatment breaks that disproportionately affect disadvantaged patients

- In March 2022, Physician and Physicist surveyors from the American College of Radiology (ACR) virtually reviewed our practice for re-accreditation. They were extremely impressed by the department-wide efforts that have led to consistent, high quality care; of the 27 previously identified opportunities for improvement, all 27 were addressed at this evaluation, and a full 3-year accreditation was granted

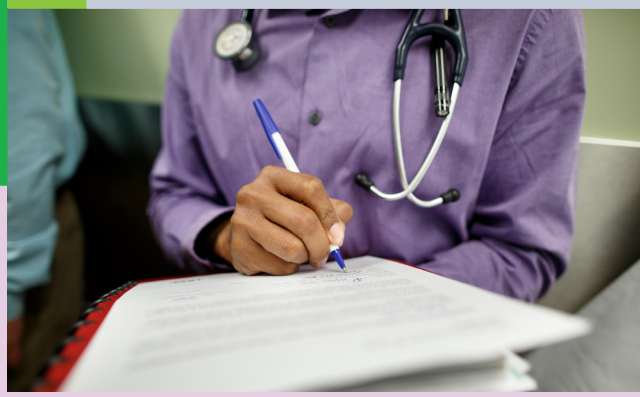
- Coming up, we expect a visit from the Joint Commission and look forward to showcasing the high-quality care that we provide!

Beyond inspections and surveys, quality is really about how we practice day-to-day and how we nurture and grow a culture of safety. Our robust use of the incident reporting system helps guide improvement efforts and routine participation in True North Leader Rounds communicates key project updates. Aligned with the Patient Experience and Quality & Safety pillars, we continue to see extremely high patient satisfaction scores, improved access to care through timely scheduling of consultations, and improving consistency of medical documentation completion. Our medical residents received high remarks from Hospital and School of Medicine Quality leadership for their work standardizing on-call team hand-off communication to reduce errors and misses.

As we look forward, we are committed to continue the aforementioned quality projects and several significant department-wide initiatives aimed to further strengthen our culture of quality and safety. We continue to learn from a detailed analysis of our simulation to treatment workflow and aim to enact safety guardrails that guide patient cases through our process, ensuring timely treatment delivery with appropriately protected time for safety checks. These efforts synergize with the transition to a new Oncology Information System (ARIA, Varian Inc). The ARIA platform offers new opportunities for consistent communication of planning tasks, optimized treatment workflows, and streamlined completion of medical documentation amongst a myriad of other features. Congratulations to all for the incredible work we achieve together! We look forward to all the exciting improvements ahead.

—UCSF Radiation Oncology Quality and Safety Team:
Dr. Lauren Boreta, MD
Dr. Nicolas Prionas, MD, PhD
Dr. Emily Hirata, PhD
Dr. Olivier Morin, PhD
Nina Pitts
Lindsay Williams

QA Guardrails: Enhancing Quality & Safety



Drs. Alon Witztum, Nicolas Prionas, Emily Hirata, and Olivier Morin
with special acknowledgements to Zeke Ramirez, Nicki Sawicki, Pam Holliday, and Annette Villa for the enormous effort in the QA Guardrails data collection

The workflow from simulation-to-treatment is complex and is touched by most teams in our department including physicians, physicists, dosimetrists, and therapists. To maintain safety in the delivery of high-quality treatments, we must allow sufficient time for clear-headed treatment preparation and quality assurance. The overall mission of the QA guardrails project is to find where and how this time can be protected.

The initial project effort was targeted at using existing QCL data to define the current state of our workflow timings. Our QCLs provided insight into the time taken for: i) contouring, ii) planning, iii) physicist initial chart check (ICC), and iv) radiation therapist (RTT) check. Here we found that about 50% of our plans were submitted for final RTT check on the treatment start day (or after 3pm the day before). Additionally, nearly 80% of contours (i) and just over 70% of plans (ii) were completed within three business days. However, the data reported directly from the QCL completion time has two major flaws. First, the QCL completion time does not necessarily represent the actual task completion time. Second, the planning (ii) workflow step really contains two sub-steps, where a more accurate representation of our workflow would be: ii.a) planning, ii.b) physician review.

This led us to the next phase involving a deeper dive into the causes of rushed QA and delayed treatment. To address the limitations seen with automated QCL data analysis, this phase included manual data collection. Within the planning QCL dosimetrists began noting the date planning started, planning was completed, and the plan was approved. While a huge manual undertaking, this data allowed us to better identify and understand cases that had delays in planning.

Using our results from the initial phases, we could define appropriate planning timelines by using a tiered stratification system that incorporates technical complexity as well as clinical urgency. While technical complexity can be defined by 3D, IMRT/VMAT, SRS/SBRT types, clinical urgency is harder to define and a guidance document will be distributed detailing how to categorize cases as routine, expedited, urgent, and emergent. This urgency will be noted electronically by utilizing the Apex order priority values. Each combination of complexity and urgency has a corresponding recommended **minimum** simulation to treatment time (Figure 1). The reason this is set as a minimum is that additional external factors such as authorization and dose composites should also be considered when setting treatment start dates.

Clinical Urgency	Technological Complexity	Overall Time (sim to treat)
Routine (Non-emergent/urgent)	Complex 3D/IMRT/SBRT	11
	Simple 3D	8
Expedited	SRS/SBRT	8
	IMRT/VMAT	8
	3D	6
Urgent	SRS/SBRT	6
	IMRT/VMAT	5
	3D	4
Emergent	3D	0 (same day)

Figure 1. Initial recommendation for minimum simulation-to-treatment time based on clinical urgency and technological complexity.

For the first prospective implementation of the QA guardrails recommendations, we will now begin to label plan priority in Apex and create new labelled QCLs to match the treatment planning tiers. These QCLs will contain the time assigned for task completion and these will be tracked. Automated QCL performance reporting will be built out to assess the suitability of the proposed timelines and these will ultimately be transferred to the ARIA Care Paths.

Operations

Thank you all for your amazing efforts this year. Below we share just a few highlights from the past nine months. We hope that in reading these bullets, you take the opportunity to reflect on all the successes, listed and unlisted, and in that reflection feel recharged for our next big adventure, ARIA, which is going live in September 2022!

—Nina Pitts, Dr. Hirata, Dr. Boreta, Dr. Prionas, and Alan Taniguchi

Mission Bay:

- Successfully implemented overnight in-patient stays for HDR patients from our procedure suite
- Increased HDR procedure room use from 1 to 2 days per week
- Transitioned HDR procedure scheduling from RTTs to our new Practice Coordinator, Ket Nguyen

This next year will bring:

- MR Sim scheduling in APeX by Practice Coordinators (able to be seen in MyChart!)
- HDR procedures increasing to 3 days/week in our procedure room

Parnassus

- Maintained an average 'Likelihood to Recommend' score of 98.2% for the entire year!
- Improved workflow for sim scheduling for urgent/emergent outpatient cases
- Managed and treated a significant influx of inpatient cases in 2021, generating a 66.5% increase in revenue from 2020! This is more than any of the previous years, which is noteworthy because inpatient cases require exemplary teamwork across all positions due to their medically urgent nature and complex logistics.

Mount Zion:

- DIBH at MTZ is now live!
- New CT-Sim machine at Mount Zion is now live with IV contrast.
- Maintained an average 'Likelihood to Recommend' score of 96% for all of FY21.
- Developed and implemented a workflow to secure authorizations for consults for certain payors to save back and forth time with referring practices. This resulted in authorizations 3-5 business days earlier than if we left it up to the referring office. **Thank you to Krshna Munoz** for all her hard work on this project!
- Rad Onc MTZ and PCMB started piloting using Scribe services which provide direct support to physicians in APeX documentation.

Diversity, Equity, & Inclusion

Despite the challenges of the last two years, the Diversity Committee continued to make strides in the realm of diversity, equity, and inclusion (DEI) through outreach, mentorship, curriculum, hiring, research, health inequities projects, and data collection and analysis.

In 2022, the committee will continue to encourage and support incorporating DEI into curriculum, interviewing and onboarding, staff development, and more. Committee members will continue to engage in mentorship programs such as PROPEL, SF Build, CURES, HERO Project, and Emmerson Collective (First Gen and Health Research Scholars). Through these programs, we are aiming to provide early biomedical and clinical exposure to students from underrepresented backgrounds in science or who are first generation college students. There will be committee-sponsored talks from speakers such as Dr. Bridget Keenan on topics such as gender equity.

The School of Medicine Dean's office assessed our Department DEI Committee work as **Exemplary** for FY22.

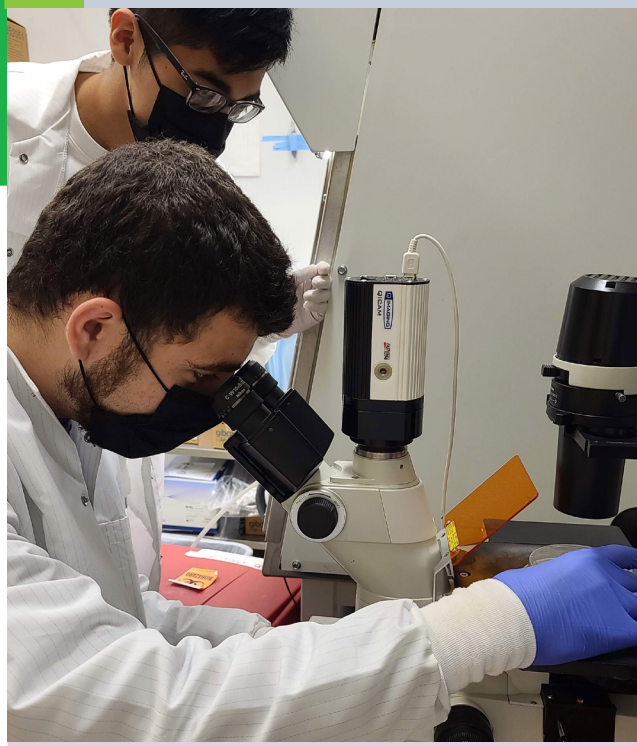
Report Assessment: Exemplary Strengths

- Exceptional commitment to community outreach to bring in more UIM/women into RadOnc and physics
- Unique staff development program rolled out to foster professional growth
- UIM/women resident recruitment
- COVID impacted many departments in their DEI efforts, however, RadOnc continued to make gains with particular focus on staff inclusion!

The Diversity Committee is open to all Radiation Oncology faculty and staff. Please reach out to any or all the committee Co-chairs if you are interested in joining or starting any diversity initiatives.

Sincerely,

Lauren Boreta, MD (Lauren.Boreta@ucsf.edu)
Paola Betancur, PhD (Paola.Betancur@ucsf.edu)
Lindsay Williams (Lindsay.Williams@ucsf.edu)



Pictured above: PROPEL Scholar, Anthony Rodriguez Lemus, (on the left) and California Breast Cancer Research Program First Generation to Go to College Scholar, Mustapha El Zeini (on the right) examine cancer cells prior to treating them with pharmacological compounds at the Betancur Lab.

Welcome

Please join us in welcoming the following new staff members to UCSF Radiation Oncology:

Anitra Busby was hired at the end of December as a Front Desk Coordinator at Mount Zion.

Rachel Cassan was has joined us as an MA at Parnassus.

Chris Ganir and Lena Jew have both promoted to Senior RTTs at Parnassus.

Hewitt Chang joined our department in February as our newest Clinical Research Coordinator and is located at Mission Bay.

Cherisse Jones has joined us in January as a Front Desk Coordinator at Parnassus.

DaNesha McCoy transitioned from Practice Coordinator to Authorization Coordinator in early May and is based at Mount Zion.

Sam Roemer joined our department in March as a School of Medicine Academic Operations Analyst. He will be our website manager, procurement liaison, and provide academic support to faculty. He will be primarily located at Mount Zion with a presence at Mission Bay.

Billy Wages has joined us as a RTT at Parnassus.

Accolades

Christina Calvin, who has served as MRSO is radiation oncology, is serving as MRSO/MRI Supervisor across UCSF Radiology and Biomedical Imaging.

Chris Ganir and **Lena Jew** were both promoted to Senior RTTs at Parnassus.

Drs. William Chen, MD, and **John Liu, MD, PhD,** both recently received ASCO Young Investigator Awards and will be attending the awards ceremony and ASCO Annual Meeting in June.

Lennie Garcia was promoted from Medical Assistant to our first MA Supervisor position at PCMB.

Jiana Fontenot, Michelle Gomez and **Brittany Robertson**, Practice Coordinators at PCMB, were accepted into the Ambulatory ELEVATE Program after being nominated (a 6-month leadership skill building pro-gram).

Dr. Ben Li, MD, MBA, was awarded an individual AMA Health Systems Science Impact Award for his efforts with Rayos Contra Cancer during the pandemic. As an organization, Rayos Contra Cancer has been chosen as a partner of the newly established Elekta Foundation which supports RCC's vendor-neutral vision for global education and training to improve patient care. Ben is very excited and honored by the work of all involved supporters! In addition to this good news, Ben represented UCSF as the top male finisher in the 5K Run for Cancer Research for a 5th year in a row with a finish time of 16:31 for the 2021 ASTRO Annual Meeting.

Dr. Katie Lichter, radiation oncology resident, presented an invited talk at the Multidisciplinary Thoracic Cancers Symposium in Scottsdale, Arizona, on December 4, 2021, entitled "Wildfires and Climate Change: Effects on Lung Cancer." Dr. Lichter was also recently awarded $40,000 from the Mount Zion Health Fund to investigate environmental impacts of prostate cancer and is working with **Dr. Osama Mohamad, Dr. Lisa Singer, Dr. I-Chow Hsu, Dr. Alexander Gottschalk, Dr. Felix Feng, Gail Lee, Dr. Seema Gandhi,** and **Dr. Catherine Park**.

Dr. David Raleigh, MD, PhD, and members of his lab recently had a paper entitled "Meningioma DNA methylation profiling identifies biological drivers and therapeutic vulnerabilities" accepted at Nature Genetics. Here is the abstract: "Meningiomas are the most common primary intracranial tumors. There are no effective medical therapies for meningioma patients, and new treatments have been encumbered by limited understanding of meningioma biology. Here we use DNA methylation profiling on 565 meningiomas integrated with genetic, transcriptomic, biochemical, proteomic, and single-cell approaches to show meningiomas are comprised of 3 DNA methylation groups with distinct clinical outcomes, biological drivers, and therapeutic vulnerabilities. Merlin-intact meningiomas (34%) have the best outcomes and are distinguished by *NF2*/Merlin regulation of susceptibility to cytotoxic therapy. Immune-enriched meningiomas (38%) have intermediate outcomes and are distinguished by immune infiltration, *HLA* expression, and lymphatic vessels. Hypermitotic meningiomas (28%) have the worst outcomes and are distinguished by convergent genetic and epigenetic mechanisms driving the cell cycle and resistance to cytotoxic therapy. To translate these findings into clinical practice, we show cytostatic cell cycle inhibitors attenuate meningioma growth in cell culture, organoids, xenografts, and patients."

Dr. Jess Scholey completed her PhD in the joint UC Berkeley/UCSF Bioengineering Program in December 2021. Jess's research was performed under the supervision of Dr. Peder Larson in the Departments of Radiation Oncology and Radiology and Biomedical Imaging. Her dissertation work focused on using advanced CT and MR imaging methods to improve dose calculation accuracy through improved estimations of electron density (for photon radiotherapy) and stopping power ratio (for proton radiotherapy). Jess is excited to continue building her research programs within the UCSF RadOnc MR Sim and Proton Ocular programs. The title of Jess' dissertation is "Multimodal imaging and deep learning-based methods for improved dose calculation accuracy in photon and proton radiotherapy."

Dr. Lisa Singer, Dr. Nicolas Prionas, Florence Yuen, Dr. Steve Braunstein, and **Zeke Ramirez** received funding from the UCSF PIPE Inter-professional Clinical Grant Program to develop an inter-professional simulation-based breast cancer training program. The group is fortunate to be working with **Dr. Jane Chen** on this project.

Lindsay Williams, our Administrative Director at Parnassus, has been awarded the Q4 UCSF Health PRIDE Experience award in the management category. A full list of all of the Q4 2021 PRIDE Experience Award winners can be found here: https://healthrecognition.ucsf.edu/pride-experience-award-winners.

Coffee Talk

With Florence Yuen, MSN, AOCNP, CWCN-AP

Nurse Practitioner
Department of Radiation Oncology

Q What was your path to becoming a Nurse Practitioner?

I received my initial nursing BSN and MSN through the School of Nursing at the University of Hawaii at Manoa. The University of Hawaii did not offer an NP track which I wanted at that time. I obtained my NP training and degree thru the UCSF School of Nursing Post Master's Program.

Q What is the most interesting part of your job?

Reducing and managing acute skin reactions in patients undergoing radiation.

Q What drew you to the field of Radiation Oncology?

Serendipity and a desire to increase my oncology experiences. I was a very experienced medical pediatric oncology APN, with limited radiation knowledge. I left and had returned to the Bay Area and was looking to get back into clinical practice. I found out about an open breast NP position while playing tennis with a former staff member. I saw it as a challenge and a way to round out my oncology knowledge. That was in 2011. I have learned so much and am so happy to be here!

Q What's the best spot for lunch on campus?

SF Kebab, good food and great location.

Q What do you do to unwind?

Garden, hike, go up to wine country, and listen to music.

We Want To Showcase You!

If you or your team is doing something newsworthy, we want to know. To share your story ideas or successes in this newsletter, please contact Eric.Breedon@ucsf.edu