

Department of Radiation Oncology

Monthly Research Update: June 2024

UM Radiation Oncology at AAPM 2024

JUNE AT A GLANCE TOTALS

Clinical trials

Total enrolled	35
GCC, other	3
NRG, NCI, co-ops	6
PCG, other registries	26

Grants and contracts

New awards	0
Submitted	2

Articles published

12

Department of Radiation Oncology members will present their research in a broad range of educational and other forums at the 66th annual meeting of the American Association of Physicists in Medicine (AAPM), July 21–25, in Los Angeles, CA. With more than 50 presentations and additional service on panels, committees, and as moderators, the department will be well represented across its many areas of research and practice. The theme of this year's meeting is "Embracing change. Impacting patient care." The AAPM annual meeting is the world's largest program of scientific, educational, and professional presentations in the medical physics field, drawing thousands of attendees. This year's program highlights multiple special sessions on artificial intelligence and data science innovations in clinical and research aspects of medical physics.

Several department members have been asked to serve as moderators, including: **Yufeng Cao, PhD**, for a session on "Establishing ground truth in artificial intelligence"; **Lei Ren, PhD**, for a session titled "Road to trustworthy AI: Uncertainty management, interpretability and beyond"; **Kai Huang, PhD**, for the AAPM Medical Physics Student Meeting, titled "Navigating the future: Staying current in medical physics"; **Junliang Xu, PhD**, for a SNAP Oral session on "Brachytherapy"; and **Amit Sawant, PhD**, for a session on "Motion management and tumor tracking." **Dr. Sawant** will also be featured in a "Meet the Expert" talk on "TrueBeam with Hypersight," sponsored by Varian. Department members who will be giving additional oral presentations include **Mariana Guerrero, PhD**, **Kevin Byrne, MSc**, **Sina Mossahebi, PhD**, **Lei Ren, PhD**, **Mumtaz Soomro, PhD**, **Junliang Xu, PhD**, and **Yufeng Cao, PhD**.

See the AAPM 2024 UM participation list attached to this issue of the *Monthly Research Update*.

Information for this monthly update should be provided no later than the second Wednesday of each month to Miek Segers at msegers@som.umaryland.edu. The update will be published on the second Friday of each month.

Have questions about identifying a funding source? Finding research partners across the UMB/UM campuses or at another university? Defining future research strategies? Or organizing your thoughts on (virtual) paper? Contact Nancy Knight, PhD, Director of Academic and Professional Development for the department, at nknight@umm.edu

Clinical Trial Enrollment

- 26 patients at MPTC on the **Proton Collaborative Group Registry**
- 1 patient at UMMC on **GCC 2380**: A single arm phase II trial evaluating selective adjuvant therapy for HPV-mediated oropharynx SCCs based on residual circulating tumor DNA levels (SAVAL)
- 3 patients at Shore and 2 at BWMC on **NRG GU010**: Parallel phase III randomized trials of genomic risk stratified unfavorable intermediate risk prostate cancer: De-intensification and intensification clinical trial evaluation (guidance)
- 1 patient at CMRO on **GCC 21136**: Phase 2 randomized total eradication of metastatic lesions following definitive radiation to the prostate in de novo oligometastatic prostate cancer (TERPS) trial
- 1 patient at CMRO on **NRG BR007**: A phase III clinical trial evaluating de-escalation of breast radiation for conservative treatment of stage I, hormone sensitive, HER-2 negative, oncotype recurrence score less than or equal to 18 breast cancer
- 1 patient at UMMC on **GCC 1926**: Phase Ib dose escalation of single-fraction preoperative stereotactic partial-breast irradiation for early-stage breast cancer

Grants and Contracts

Submitted

- **Hem Shukla, PhD**, co-PI, to the UMGCCC FY25 Pilot Grant Program, for “Patient derived pancreatic tumor organoids as a surrogate model to examine chemotherapy and radiation treatment response in patients” (\$50,000).
- **Dario Rodrigues, PhD**, lead, and **Lei Ren, PhD**, PI/PD, to National Institutes of Health PAR-21-166: Academic-Industrial Partnerships for Translation of Technologies for Diagnosis, and Treatment (R01) for “A non-invasive MR-compatible hyperthermia system for brain tumor treatment” (\$2,997,119).

Articles Published

Entered into PubMed June 14-July 11. Titles link to PubMed abstracts, many of which contain full-text links.

1. **Cammin J.** [A robust index for metal artifact quantification in computed tomography.](#) *J Appl Clin Med Phys.* 2024 Jun 25:e14453. Online ahead of print.
2. Kolosky T, Goldstein Shipper A, Sun K, Tozduman B, **Bentzen S**, Moosa AN, Erdemir G. [Epilepsy surgery for children with epileptic spasms: A systematic review and meta-analysis with focus on predictors and outcomes.](#) *Epilepsia Open.* 2024 Jul 2. Online ahead of print.
3. Lang Y, Jiang Z, Sun L, **Tran P**, **Mossahebi S**, Xiang L, **Ren L.** [Patient-specific deep learning for 3D protoacoustic image reconstruction and dose verification in proton therapy.](#) *Med Phys.* 2024 Jul 9. Online ahead of print.
4. **Mossahebi S**, **Byrne K**, **Jiang K**, Gerry A, **Deng W**, **Repetto C**, Jackson IL, **Sawant A**, **Poirier Y.** [A high-throughput focused collimator for OAR-sparing preclinical proton FLASH studies: commissioning and validation.](#) *Phys Med Biol.* 2024 Jul 3;69(14).
5. **Mossahebi S**, **Molitoris JK**, **Poirier Y**, **Jatczak J**, **Zhang B**, **Mohindra P**, **Ferris M**, **Regine WF**, **Yi B.** [Clinical implementation and dosimetric evaluation of a robust proton lattice planning strategy using primary and robust complementary beams.](#) *Int J Radiat Oncol Biol Phys.* 2024 Jun 25:S0360-3016(24)00742-9. Online ahead of print.
6. **Rahimi R**, Emert F; PTCOG Treatment Efficiency Subcommittee. [Introducing the good clinical proton practice \(GCPP\) initiative for enhancing proton therapy standards.](#) *J Appl Clin Med Phys.* 2024 Jun 18:e14436. Online ahead of print.
7. **Rahimi R**, Taylor M, Li X, Chen KL, MacLennan G, Murdoch E, Chang L, Parniani A, Wang P, Chawla A, Fan J, Kim D. [Fetal dose assessment in a pregnant patient with brain tumor: A comparative study of proton PBS and 3DCRT/VMAT radiation therapy techniques.](#) *J Appl Clin Med Phys.* 2024 Jun 17:e14394. Online ahead of print.
8. Sutura P, **Song Y**, Shetty AC, English K, Van der Eecken K, Guler OC, Wang J, **Cao Y**, **Bazyar S**, Verbeke S, Van Dorpe J, Fonteyne V, De Laere B, **Mishra M**, **Rana Z**, **Molitoris J**, **Ferris M**, Kiess A, Song DY, DeWeese T, Pienta KJ, Barbieri C, Marchionni L, **Ren L**, **Sawant A**, Simone N, Berlin A, Onal C, **Tran PT**, Ost P, Deek MP. [Genomic determinants associated with modes of progression and patterns of failure in metachronous oligometastatic castration-sensitive prostate cancer.](#) *Eur Urol Oncol.* 2024 Jun 10:S2588-9311(24)00142-1.
9. Theofilou VI, Ghita I, Elnaggar M, Chaisuparat R, Papadimitriou JC, **Bentzen SM**, Dyalram D, Lubek JE, Ord RA, Younis RH. [Histological pattern of tumor inflammation and stromal density correlate with patient demographics and immuno-oncologic transcriptional profile in oral squamous cell carcinoma.](#) *Front Oral Health.* 2024 Jun 6;5:1408072.
10. Türker E, Andrade Mier MS, Faber J, Padilla Padilla SJ, Murenu N, Stahlhut P, Lang G, Lamberger Z, Weigelt J, Schaefer N, Tessmar J, **Strissel PL**, Blunk T, Budday S, Strick R, Villmann C. [Breast tumor cell survival and morphology in a brain-like extracellular matrix depends on matrix composition and mechanical properties.](#) *Adv Biol (Weinh).* 2024 Jul 6:e2400184. Online ahead of print.
11. **Yi B**, **Mossahebi S**, **Jatczak J**, **Mundis M**, **Houser T**, **Alicia D**, **Han D**, **Gonzalez R**, **Olis S**, **Zakhary M.** [Optimal minimum MU for intensity-modulated proton therapy with pencil-beam scanning proton beams.](#) *J Appl Clin Med Phys.* 2024 Jun 23:e14435. Online ahead of print.
12. Zhang Y, Jiang Z, Zhang Y, **Ren L.** [A review on 4D cone-beam CT \(4D-CBCT\) in radiation therapy: Technical advances and clinical applications.](#) *Med Phys.* 2024 Jun 23. Online ahead of print.

Important Dates for Upcoming Funding Submissions

Below is an updated calendar with firm due dates for upcoming major standard NIH deadlines (RFA/PA dates may differ). **Contact the Department Office of Research Administration (msegers@som.umaryland.edu) ASAP if you plan to submit any funding proposal, regardless of funder.**

NIH deadline	DORA budget, prelim materials	Dean/SOM prelim materials	FINAL Dean/SOM/SPA
R01/U01 New Oct 5	09/24/24	09/26/24	09/30/24
R21 New Oct 16	10/03/24	10/07/24	10/09/24
R01/U01 Resub Nov 5	10/23/24	10/25/24	10/29/24
R21 Resub Nov 16	11/05/24	11/07/24	11/11/24

American Association of Physicists in Medicine
July 21-25, 2024; Los Angeles, Ca
Department of Radiation Oncology
University of Maryland School of Medicine

Bamberger C, Xing L, Rahimi R	Troubleshooting methods for failed patient-specific quality assurance in proton therapy: Insights from case studies	Poster
Cao Y, Chern H-RR, Kunaprayoon D, Mishra M, Ren L	Interpretable AI-assisted clinical decision making for treatment selection of brain metastases in radiation therapy	SNAP oral
Cao Y, Qi XS	Establishing ground truth in AI	Moderators
Cao Y, Sutera P, Mendes WS, Yousefi B, Hrinivich WT, Deek M, Phillips R, Song D, Kiess A, Guler OC, Torun N, Reyhan M, Sawant A, Marchionni L, Simone NL, Tran P, Onal C, Ren L	Machine learning predicts conventional imaging metastasis-free survival for oligometastatic castration-sensitive prostate cancer using multimodality imaging prostate-specific membrane antigen PET and CT radiomics	Poster
Ding J, Gopal A, Guerro M, Cammin J, Kalavagunta C, Zhang B, Chen S, Zhou J, Xu H	Decoding mysteries: How electron density phantom choice impacts CT and CBCT HU measurements	Poster
Ding J, Kalavagunta C, Lasio G, Gopal A	Evaluation of robust optimization techniques in deep inspiration breath-hold breast radiotherapy for enhanced cardiac dose sparing	Poster
Ding J, Vicente EM, Modiri A, Sawant A, Gopal A	Improving post-RT preservation of lung function through sparing airways and functional lung: Clinical validation of deliverability and dosimetric accuracy	Poster
Eckrich C, Huang K	AAPM Medical Physics Student Meeting: Navigating the future: Staying current in medical physics	Moderators
Guerrero M	Principles of hyperthermia physics and clinical applications	Oral, invited program
Guerrero M, Cammin J, Molitoris JK, Rodrigues D	Comparison of the biological effect of different hyperthermia treatment schedules using HT-EQD2	Poster
Han D, Qi H, Yao W, Lee NY, Youssef I, Simone C, Lin H	Validation of LET-weighted dose and its application in reducing biological uncertainties for head and neck proton therapy	Poster
Huang K, Byrne KE, Bazyar S, Tran P, Sawant A, Jiang K	A novel collimator for high throughput murine hemi- and whole thoracic lung irradiation using ultra-high dose rate electron beams	Poster
Huang K, Wang K, Gopal A, Hendershot J, Kusmaul E, Steinberg M, Chen S, Guerrero M	Auto-planning using multicriteria optimization for prostate cancer radiotherapy	Poster

Jackson J, Su F-CF, Suneja G, Rahimi R , Nie W, Li X	Evaluating two novel materials for 3D printed boluses in head and neck external beam radiation therapy	Poster
Jiang K , Byrne KE, Poirier YP, Mossahebi S , Griffiths L, Boivin G, Sharma R, Sawant A , Jackson IL, Balcer-Kubiczek E , Vilalta M, Carrier F	UHDR pencil beam scanning protons at 60 Gy/2 spare skin but not lung in mice with hemithoracic lung irradiation	Oral
Jiang Z, Lang Y , Wu QJ, Xiang L, Ren L	Towards general deformable medical image registration using large models: A preliminary study	Poster
Jiang Z, Sharma VR, Cham M, Peterson SW, Mossahebi S , Gobbert MK, Polf JC, Ren L	Deep learning-based prompt gamma imaging for proton range verification: A Monte Carlo simulation study on patient data	Poster
Lang Y , Jiang Z, Surr L, Xiang L, Ren L	Enhancing image quality in acoustic imaging using the Segment Anything Model	Poster
Lang Y , Rodrigues D, Ren L	Automatic specific absorption rate prediction for hyperthermia treatment planning using deep learning method	Poster
Li X, Chen KL, Xu J, Su F-CF, Rahimi R	Detector-specific output baselining for proton pencil beam scanning systems	Poster
Ling X , Alexander G, Molitoris JK , Choi J, Schumaker L, Mehra R, Gaykalova D, Ren L	Radiomic biomarkers of locoregional recurrence: Prognostic insights from oral cavity squamous cell carcinoma preoperative CT scans	Poster
Mossahebi S	Reporting early clinical outcomes of photons & proton beam SFRT for large & bulky tumors – University of Maryland experience	Oral Invited program
Mossahebi S , Banskota A, O'Neil M, Gonzalez RM , Olis S , MacFarlane MJ , Yi BY	Effect of energy layer spacing on plan quality and treatment delivery time of intensity modulated proton therapy of breast patients	Poster
Nasehi Tehrani J	Optimizing curve-fitting algorithms for GafChromic dosimetry analysis: A comparative evaluation	Poster
Oh K, Palmiero AN, Cetnar A, Jiang K , Byrne KE , Rafael K, Gallagher KJ, Praestegaard LH, Hoffman L, Bello RD, Jain S, Tanadini-Lang S, Zhou S-M, Smith W, Poirier YP , McNeur J	Flashforward Consortium: Multi-institutional evaluation of dosimetry systems using the electron flash research extensions	Poster
Olaizola J , Gutierrez NG, Oakes JM, Sawant A , Vicente EM	Understanding the impact of radiation-induced airway injury on post-radiotherapy lung ventilation: Insights from computational fluid dynamics modeling	Poster
Qiao Z, Yu B, Zhang Z, Jiang Z, Lee J, Lai Y, Fang R, Gong K, Wu D, Ren L , Huang M	Radiomics features-driven implementation for the enhancement of CBCT images via multiple 2D and 3D optimal generative adversarial networks	Poster

Rahimi R , Bamberger C, Castro J, D'Souza G, Chen KL, Nie W, Fan J, Li X	Advancing proton therapy with customized 3D printed bolus solutions	Poster
Rahimi R , Chen KL, Fan J, Khan R	Radiochromic film models for proton beam therapy: EBT3 vs EBT4	Poster
Ren L	Interpretable AI in radiation therapy	Oral, invited program
Ren L , Whitney HM	Road to trustworthy AI: Uncertainty management, interpretability and beyond	Moderators
Rodriguez Gonzales L, Kim K, Jiang Z, Ren L , Xiang L	Towards 3D volumetric ultrasound imaging for radiotherapy monitoring	Poster
Sabouri P, Wohlfahrt P, Shah J, Koroulakis A, Molitoris JK , Mossahebi S	Assessing dual-energy and single-energy CT discrepancies in proton stopping-power prediction: Implications for treatment planning	Poster
Sangal A, Choi J , Chang Y, Zhong H, Ren L	Development of a digital twin Xman phantom using deep learning-based diffusion model for imaging and treatment optimization in liver cancer radiation therapy	Poster
Sawant A , Hindley N	Motion management and tumor tracking I	Moderators
Sawant A	TrueBeam with HyperSight	Oral (Varian presentation)
Soomro MH , Xu J, Ding J, Cammin J , Van Slyke A, Liang X , Roys S, Zhuo J, Ernst T, Gullapalli RP, Nevo E, Sawant A	Feasibility of real-time electromagnetic surface tracking inside the treatment room	Oral
Vicente EM , Abadi E	Lung functional imaging and analysis	Moderators
Wang K , Vyfhuis M , Singh G, Lejano D, Nichols E	Challenge in machine learning based progression free survival for predicting for breast cancer patients undergoing adjuvant IMPT: Insights from a CPH model with iterative feature selection	Poster
Xu J , Ding J, Jiang K, MacFarlane MJ , Poirier YP , Lamichhane N, Huang K, Wang K , Chang Y, Chen S	Can VMAT be used for SRS treatment of small lesions <1 cm?	Poster
Xu J , Tien CJ	Brachytherapy	Moderators
Xu J, Wang K , Huang K, Ding J, Chang Y , Cammin J, Zhang B, Zhou J, Chen S	An efficient protocol for in vivo dose verification with EBT3 films	Poster
Yao W , Biswal N , Deng W , MacFarlane MJ , Mossahebi S , Poirier Y , Zakhary MJ , Zhang B, Yi BY	Raystation LET commissioning and LET patient-specific QA with measured IDD	Poster
Yao W , Zhang B, Yi BY	Plan specific robustness and its application in adaptive plan strategy based on daily CBCT in intensity modulated proton therapy: Pelvis cases	Poster
Yi BY , Mossahebi S , Biswal N , Polf J	Macrospot filter for generating spread-out Bragg peak from single-energy proton beams	Poster

Zakhary MJ, Redell D, Alicia D, Jatczak J, Bark R, Biswal NC, Mossahebi S, Sun K, Molitoris JK, Yi BY.	It's not always anatomical change: Nominal plan robustness can predict plan degradation in proton therapy for oropharyngeal head and neck cancer	Poster
Zhang B, Yao W, Xu H, Xu J, Zhou J, Biswal N, Zhang H, Lee S-W, Chen S, Yi BY	Feasibility of using CBCT as a dosimetric monitoring tool for IMPT	Poster
Zhang H, Ding GX, Zhang B , Homann KL	Comparison of Fif, Ecomp and VMAT plans for robustness for left breast radiotherapy	Poster
Zhou J, Benda R, Xu H, Zhang B, Chen Q, Lasio G, Xu J, Gopal A, Chen S	Evaluation of patient setup differences between Alignrt and fiducial matching on Kv-Kv orthogonal pair in accelerated partial breast irradiation	Poster