University of Maryland School of Medicine

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Department of Radiation Oncology Monthly Research Update: July 2023

JULY AT A GLANCE TOTALS

Clinical trials	
Total enrolled	--
GCC, other	--
NRG, NCI, co-ops	--
PCG Registry	--
Grants and contracts	
New awards	0
Submitted	2
Articles published	4

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.ed

UM Radiation Oncology at AAPM 2023

Department of Radiation Oncology members presented their research in a broad range of educational and other forums at the 65th annual meeting of the American Association of Physicists in Medicine (AAPM), July 23–27 in Houston, TX. With more than 50 presentations and additional service on panels and in other sessions, the department was well represented across its many areas of research and practice. The theme of this year's meeting was "The art of science, the science of care."

"Dr. Regine joins me in congratulating all the department members who contributed to this strong showing at our field's premier medical physics meeting," said **Amit Sawant, PhD**, Vice Chair for Medical Physics. "Our abstracts included 16 oral and snap oral presentations, an indicator of our faculty and trainees' innovative research and discipline-leading clinical implementation. Of particular note were the scientific and educational sessions for which our faculty members were asked to serve as moderators. **Elizabeth Vicente, PhD**, **Sina Mossahebi, PhD**, **Shifeng Chen, PhD**, **Lei Ren, PhD**, **Junliang Xu, PhD**, and I moderated or co-moderated 10 sessions that addressed leading-edge topics." Dr. Ren served as the 2023 director of the Therapy Science Track, responsible for invited and proffered sessions in a track now forms a major portion of the scientific component of the AAPM meeting. Dr. Sawant's presentation on the potential of quantum computing in radiation therapy will be highlighted in an upcoming issue of *Physics World.*

See the AAPM 2023 participation list attached to this issue of the *Monthly Research Update*.

Clinical Trial Enrollment

No clinical trial enrollments reported to the Monthly Research Update for July 2023.

Radiation Oncology: Monthly Research Update: July 2023

Grants and Contracts

Submitted

- **Hem Shukla, PhD**, PI, NIH/NCI. PAR-20-313: Assay Validation of High Quality Markers for Clinical Studies in Cancer program (UH2/UH3), "Optimization and clinical validation of caveolin-1 as a prognostic biomarker for radiation resistance and tumor aggression in lung cancer patients" ($1,221,376).
- **Arezoo Modiri, PhD, MPI/Ren**, NIH/NCI. PAR-21-329 Clinical Characterization of Cancer Therapy-induced Adverse Sequelae and Mechanism-Based Interventional Strategies program (R01) for "Pericardial texture changes on imaging as early surrogates for major cardiotoxicity caused by thoracic radiotherapy" ($2,905,700).

Articles Published

Entered into PubMed July 13–August 10. Titles link to PubMed abstracts, with full-text links.

1. **Cao Y, Kunaprayoon D, Ren L**. Interpretable AI-assisted clinical decision making (CDM) for dose prescription in radiosurgery of brain metastases. *Radiother Oncol.* 2023 Aug 3:109842. Online ahead of print.
2. Pollock AE, Risher H, Berger M, Roque DM, Rao G, **Nichols EM**, Mohindra P. Clinical outcomes of intensity modulated proton therapy reirradiation for gynecologic malignancies. *Adv Radiat Oncol.* eCollection 2023 Jul-Aug.
3. So EC, Zhou H, Greenwell A, Burch EE, Ji Y, Mérigeon EY, Olsen HS, **Bentzen SM**, Block DS, Zhang X, Strome SE. Complement component C1q is an immunological rheostat that regulates Fc:Fc[Formula: see text]R interactions. *Immunogenetics.* 2023 Aug;75(4):369–383.
4. Sutera P, Shetty AC, Song Y, Hodges T, Hoang T, **Rana Z,** Pienta K, Feng F, Song DY, DeWeese T, Gillessen S, Sweeney C, James N, Attard G, Deek M, **Tran PT.** Identification of a predictive genomic biomarker for prostate-directed therapy in synchronous low-volume metastatic castration-sensitive prostate cancer. *Eur Urol Oncol.* 2023 Aug 8:S2588-9311(23)00156-6. Online ahead of print.

Important Dates for Upcoming Funding Submissions

Below is an updated calendar with firm due dates for upcoming major NIH deadlines (individual RFA/PA dates may differ). Contact the Department Office of Research Administration (DORA) (msegers@som.umaryland.edu) ASAP if you plan to submit any funding proposal, regardless of funder. Failure to meet these deadlines may result in delaying your submission until the next cycle (if available).

NIH deadline		DORA budget, prelim materials	Dean/SOM prelim materials	FINAL Dean/SOM/SPA
R01	10/05/23	09/22/23	09/26/23	09/28/23
R21	10/16/23	10/03/23	10/05/23	10/09/23
R01 Resub.	11/05/23	10/24/23	10/26/23	10/30/23
R21 Resub.	11/16/23	11/03/23	11/07/23	11/09/23

American Association of Physicists in Medicine
July 23-27, 2023; Houston, TX
Department of Radiation Oncology
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Becker SJ, Smith RE, Culberson WS, Stump KE, **Nichols E**	Testing PLA 3D printed material to simulate breast density for Gammapod QA	ePoster
Biswal NC, Jatczak J, Zhang B, Vasan S, Nichols E, Yao W	LET-dependent RBE dose as predictor for acute skin toxicity in breast cancer patients undergoing proton beam therapy	ePoster
Biswal NC, Zhang B, Zakhary MJ, Olis S, Gonzales RM, Polf JC, Yao W, Mossahebi S, Yi BY	Verification of planning dose calculation and its effect of spot position uncertainty towards calculation based patient specific QA using a commercially available Monte Carlo code (myQA iON)	ePoster
Byrne HL, **Vicente EM**	Functional lung sparing radiotherapy clinical trials: outcomes and future concepts	Moderators
Cammin J, Zhang B, Zhang H, Rana Z, Chen S	Evaluation of an unmodified treatment planning system for dose calculations at extended distances with applications in bilateral total-body irradiation	ePoster
Cao Y, Kunaprayoon D, Ren L	Interpretable AI-assisted clinical decision making (CDM) for dose prescription in radio-surgery of brain metastases	SNAP oral
Cao Y, Sutera P, **Silva Mendes W**, Yousefi B, Hrinivich WT, Deek M, Phillips R, Song D, Kiess A, Guler OC, Torun N, Reyhan M, **Tran P,** Onal C, **Ren L**	Automatic prediction of metastasis-free survival (MFS) using prostate-specific membrane antigen (PSMA) PET for oligometastatic castration-sensitive prostate cancer (omCSPC)	SNAP oral
Daartz J, **Mossahebi S**	Advances in proton therapy	Moderators
Deng W, Han D, **Byrne K, Jiang K, Mossahebi S, Bhandary B, Shukla H, Poirier Y, Xu J, Sawant A**	Achieving sub 1-mm accuracy in proton flash studies using a stand-alone small-animal image-guided irradiator	Poster
Dhanesar S, **Chen S**	Dose measurement and QA	Moderators
Ding J, Zhang B, Moody C, Gopal A, Molitoris JK, Regine W, Chen S, Xu J	Evaluation of the necessity of using non-coplanar arcs in single vocal cord irradiation	ePoster
Francis G, **Gopal A, Guerrero M,**	Composite dose for HDR brachytherapy treatment of GYN patients with different bladder fillings	ePoster
***G*onzales RM, Olis S, Mossahebi S, Yao W**	Measurement of stopping power ratio of chemo-ports using energy spectrum extracted from integral depth dose	ePoster
Guerrero M, Rodrigues D	Linear-quadratic model for hyperthermia biological effect derived from kinetic equations of DNA damage production and repair	ePoster
Qiao Z, Zhang Z, Jiang Z, Lai Y, Lee J, Wu DO, Beltran C, Fang R, **Ren L,** Huang M	Attention module embedded generative adversarial network for enhancing 3D CBCT image quality for radiomics analysis	SNAP oral

Jiang K, Byrne K, Poirier YP, Mossahebi S	A high-throughput collimator for murine subcutaneous tumor model irradiation with electron flash radiotherapy	Oral
Jiang K, Lamichhane N, Nichols E, Marter E, Krudys K, Moody C, Chen S, Mohindra P, **Yi BY**	Dosimetric impact of false reconstruction of abutting needles in interstitial HDR brachytherapy. AAPM 2023	ePoster
Jiang Z, Polf JC, Barajas CA, Gobbert MK, **Ren L**	Enhanced prompt gamma imaging using deep learning for proton range verification	Oral
Jiang Z, Wang S, Xu Y, Sun L, Gonzalez G, Chen Y, Wu Q-R J, Xiang L, **Ren L**	Radiation-induced acoustic signal denoising using a supervised deep learning framework for therapy imaging and monitoring	Oral
Jung JW, Bhandari S, Yoon J, Yeo I, **Yi BY**	Real-time on-beam CT image reconstruction by amplitude scaling of deformation vector fields using patient's planning 4DCT	ePoster
Kalavagunta C, Gopal A	Chatting with ChatGPT about the future of medical physics	ePoster
Kalavagunta C, Vaish I, **Cammin J, Guerrero M, McAvoy W, Vyfhuis M, Van Slyke A, Mashayekhi M, Ding J, Gopal A**	Assessing the prevalence of diversity, equity and inclusion information in CAMPEP accredited medical physics residency program webpages in the United States	ePoster
Lang Y, Jiang Z, Sun L, Xiang L, **Ren L**	Hybrid-supervised deep learning for protoacoustic image reconstruction for in vivo proton dose verification in 3D	Oral
Lee S-W, Mundis M, Vadnais P, Mossahebi S, Xu H, Gopal A, Mille M, Lee C, Saha M, **Cheston S**	Dosimetric evaluation of critical organ doses in breast radiotherapy based on patient Positioning and treatment modality: Photon (supine and prone) vs. proton supine	ePoster
Ling X, **Alexander G, Molitoris JK,** Choi J, Yousefi B, Schumaker L, Mehra R, **Gaykalova D**, **Ren L**	CT-based imaging biomarkers for survival disparities prediction in oral cavity squamous cell carcinoma (OSCC)	ePoster
Lu K, Zhang Z, **Ren L,** Y F-F	Deep learning projection interpolation for 4D-CBCT reconstruction	SNAP oral
MacFarlane MJ, Kalavagunta C, Gopal A, Xu H, Tehrani JN, Zhou J, Chen S	Clinical robustness of multi-isocentric volumetric modulated arc based craniospinal irradiation	ePoster
Mashayekhi M, Guerrero M, Gopal A, Cammin J	Investigating the accuracy of heterogeneity corrections for RayStation and Mobius in lung SBRT	ePoster
Mossahebi S	Spatially-fractionated proton GRID therapy	Oral
Mossahebi S, Sabouri P, Koroulakis A, **Cusatis D, Lehman K,** Wohlfahrt P, Shah J, **Nichols E, Molitoris JK**	Dosimetric comparison of breast proton treatment plans using single energy and dual energy computed tomography simulation methods presenting author	ePoster
Poirier Y	DNA dosimetry for FLASH	Oral
Mossahebi S, Byrne K, Jiang K, Therriault-Proulx F, **Sawant A, Poirier YP**	Direct dose rate measurements of ultra-high dose rate proton beams in the Bragg peak show the Bragg peak may undermine the Flash effect	ePoster

Pratx G, **Ren L**	Path to independence: How to secure your first grant as an early-stage investigator	Moderator
Rahman SU, Milman K, Mogilnay R, **Lee T-S**	E-Variance: An application to assure clinical data integrity and improve patient safety and workflows in EMR	ePoster
Rana Z, Cherng H-RR, Alicia D, Manuel E, Hamza MA, Zhang B, Mogilnay R, Sun K, Yi BY, Mohindra P, Ferris MJ, Biswal NC	Treatment planning parameters as predictors for adaptive re-planning for thoracic cancer patients undergoing proton therapy	ePoster
Ren L	AI for clinical decision support: Current & future	Oral
Ren L	AI for clinical decision making in radiation therapy	Moderator
Ren L, Xiao Y	Innovation in imaging & treatment techniques	Moderators
Sabouri P, Koroulakis A, **Cusatis D, Lehman K,** Wohlfahrt P, Shah J, **Nichols E, Molitoris JK, Mossahebi S**	Dosimetric comparison of breast proton treatment plans using single energy and dual energy computed tomography simulation methods	ePoster
Sabouri P, Koroulakis A, **Cusatis D, Lehman K,** Wohlfahrt P, Shah J, **Mishra M, Regine W, Molitoris JK, Mossahebi S**	Evaluation of treatment plan dose differences of single energy and dual energy computed tomography simulation methods for proton therapy of intracranial patients	ePoster
Salzillo TC, Highes N, **Vedam S,** Lim TY, Wang X, Wang HC, Mohammedsaid M, Fuller C, Wang J, Yang J	Clinical development of CT simulations for MR-linac patients without the use of a CT table overlay	ePoster
Sarosiek CM, Zhang Y, Amjad A, Dang NP, **Ding J,** Zarenia M, Conlin R, Li XA	A deep learning-based automatic contour correction of inaccurate auto-segmented stomach contours for MR-guided adaptive radiotherapy	
Sawant A	Tackling the intractable – potential applications of quantum computing in radiation therapy	Oral
Sawant A, Lacombe S	Small animal study and novel systems	Moderators
Sawant A, Zhang R	FLASH therapy delivery, motion management and dosimetry	Moderators
Tehrani JN, Zhong H, Zhang V, Lasio G, Chen S	Evaluation of structural similarity (SSIM) Index for the weekly quality assurance of multi-leaf collimator (MLC)	ePoster
Van Slyke A, Lehman K, Mashayekhi M, Molitoris JK, Regine W, Zhang B, Yi BY, Chen S	Investigating the effect of respiratory motion on the delivered dose distribution in lattice radiation therapy using simulation and phantom measurements	ePoster
Vicente EM	Future clinical implementations of FLA-RT	Oral
Vicente EM, Grande Gutierrez N, Oakes JM, **Cammin J, Gopal A, Modiri A, Mossahebi S,** Mohindra P, **Citron WK,** Matuszak MM, Timmerman R, **Sawant A**	Radiation-induced lung injury (RILI) modeling integrating local and distant damage: Development and validation of a predictive model for ventilation loss	Oral
Vicente EM, Subashi ED	MRI and functional guided radiation therapy	Moderators

Xu J, Mashayekhi M, Van Slyke A, Mishra M, Chen S	Evaluation of setup uncertainties in linac-based SRS for trigeminal neuralgia	ePoster
Xu J, Rong Y	Brachytherapy and radiopharmaceuticals	Moderators
Ding J, Xu J, Van Slyke A, Mashayekhi M, Jiang K, MacFarlane MJ, Poirier YP, Lamicchane N, Mishra M, Chen S	Retrospective analysis of patient-specific quality assurance of SRS plans	ePoster
Yao W, Zhang B, Yi BY	Correlation of proton beam range changes calculated from CT and cone beam CT: Prostate and pelvis cases	ePoster
Yi B, Jatczak J, Houser T, Mundis M, Han D, **Biswal N, Yao W, Mossahebi S**	A practical guideline for minimum monitor units (mMU) for pencil beam proton treatments	ePoster
Zhang H, Xu H, Xu J, Poirier YP, Zhou J, Yi BY, Chen S, Zhang B	Robustness analysis of Hyperarc VMAT plans for stereotactic radiosurgery patients with multiple brain metastases	ePoster
Zhang Z, Chen M, Lu K, Jiang Z, Zhong H, Yin F-F, **Ren L**	Hybrid virtual MRI/CBCT generation to improve liver stereotactic body radiation therapy (SBRT) target localization accuracy	Oral
Zhong H, Zhang Z, Ren L	On the benchmark assessment of three voxel-level evaluation metrics for deformable dose accumulation	ePoster
Zhou J, Zakhary MJ, Lasio G, Zhang B, MacFarlane MH, Manuel E, Steinberg M, Larrimore P, Fisler E, **Chen S**	Evaluation of clinical implementation of two commercial deep-learning based automatic contouring software in prostate radiotherapy	ePoster
Zolghadr M, Dizajii DN, Etamadjoo E, **Nasehi Tehrani J,** Zarifi E	Developing an accurate and cost-effective dosimeter for developing countries	SNAP oral