Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

were categorized based on whether they met (+DC) or did not meet (-DC) diagnostic imaging-based criteria to classify them as metastases. Prospectively identified and treated metastases (PIMs) from these patients were also included, as were PIMs from patients who received a single SRS course and exhibited no "new" metastases for at least one year post SRS. Patients were randomized into 5 groups: 4 training/validation, 1 test. A modified open-source CNN, DeepMedic (DM), was optimized and trained using data augmentation and 4-fold cross-validation. Our final CAD solution employs ensembling, discrimination via a 3D conditional random field algorithm, and thresholding strategies. CAD performance was evaluated on the test set.

Results: 135 patients with 563 metastases were included: 72 RIMs (45 +DC, 27 -DC) and 491 PIMs, with median diameters of 2.7mm (0.9, 11.0) and 6.7mm (0.9, 37.9), respectively. CAD results are summarized in Table 1. High sensitivity was achieved for all prospectively-treatable BMs (PIMs and +DC RIMs): 93% overall, 79% < 3mm. 80% of all +DC RIMs were identified. A median of only 2 false positives were generated per patient, and the mean Dice similarity coefficient was 0.79.

Conclusion: A novel BM CAD system has been developed and trained using a unique MRI dataset including many RIMs. The algorithm demonstrates excellent sensitivity, even for RIMs, along with high specificity. These results outperform published works, especially for small BMs < 3mm. Study limitations include the modest number of patients from a single institution, retrospective nature, and selective inclusion criteria. Prospective, multi-institutional validation of the approach is warranted.

Abstract 1009 — Table 1: CAD sensitivity in test group

	Total		PIMs		RIMs		Only ± DC RIMs		PIMs & ± DC RIMs	
Median Diameter	5.6 mm		6.7 mm		2.4 mm		2.6 mm		6.2 mm	
Mean Diameter	7.6 mm		8.5 mm		2.6 mm		2.8 mm		8.0 mm	
	#	%	#	%	#	%	#	%	#	%
Overall Sensitivity	105/118	89%	95/101	94%	10/17	59%	8/10	80%	103/111	93%
Diameter < 3mm	21/30	70%	14/17	82%	7/13	54%	5/7	71%	19/24	79%
3mm >= Diameter < 6mm	27/31	87%	24/27	89%	3/4	75%	3/3	100%	27/30	90%
Diameter >= 6mm	57/57	100%	57/57	100%	0/0	N/A	0/0	N/A	57/57	100%

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1010

Interpretable Predictive Modeling for Major Adverse Cardiac Events Following Lung Cancer Radiotherapy

E.M. Qiao,[1] J. He,[2] D.S. Bitterman,[3] C.V. Guthier,[4] A. Nikolova,[5] A. Nohria,[6] K.M. Atkins,[7] and R.H. Mak[8]; [1]*Department of Radiation Medicine and Applied Sciences, University of California San Diego, La Jolla, CA,* [2]*Brigham Womens Hospital/Dana Farber Cancer Institute, Boston, MA,* [3]*Harvard Radiation Oncology Program, Boston, MA,* [4]*Department of Radiation Oncology, Brigham and Women's Hospital, Dana-Farber Cancer Institute, and Harvard Medical School, Boston, MA,* [5]*Smidt Heart Institute, Cedars-Sinai Medical Center, Los Angeles, CA,* [6]*Department of Cardiovascular Medicine, Dana-Farber Cancer Institute and Brigham and Women's Hospital, Boston, MA,* [7]*Harvard Radiation Oncology Program, Dana-Farber Cancer Institute and Brigham and Women's Hospital, Boston, MA,* [8]*Department of Radiation Oncology, Brigham and Women's Hospital and Dana-Farber Cancer Institute, Harvard Medical School, Boston, MA*

Purpose/Objective(s): Patients with locally advanced non-small cell lung cancer (NSCLC) are at increased risk of developing major adverse cardiac events (MACE) following radiotherapy. Our group previously identified cardiac substructure dose constraints associated with increased risk of MACE. We employ a machine learning (ML) approach to further identify predictors of MACE and evaluate ML capacity for personalized MACE risk-stratification.

Materials/Methods: Retrospective analysis of 701 patients with locally advanced NSCLC treated with thoracic radiotherapy between 2003-2014. MACE included unstable angina, heart failure, myocardial infarction, coronary revascularization, and cardiac death. We used extreme gradient boosting for MACE prediction. Input features included 195 demographic and 240 radiation dose and/or anatomic. Cardiac substructures were manually delineated; heart and chamber volumes were indexed to body surface area (BSA). We split data 70/30 into training/testing, balanced by MACE. Hyperparameters were bootstrap-tuned with 50-round grid search. Area under the receiver operator characteristic curve (AUC) evaluated model performance. We trained our model on any MACE regardless of timeframe and tested performance at varying timepoints (90-day, 180-day, etc.). Shapley values measured feature importance and were used to construct personalized risk profiles for each patient.

Results: Among 701 patients, 70 developed ≥1 MACE. The median age was 65 and median time to first MACE was 20.6 months. Training AUC for any MACE: 0.67; testing AUC: 0.73. Our model displayed time dependent performance improvement, with high accuracy for MACE closer to radiation start. Testing AUC for 90-day MACE: 0.97; 180-day MACE: 0.94. Table 1 displays additional AUCs. The top 10 predictive features for MACE were coronary heart disease history, right atrial volume, left circumflex coronary artery (CA) volume (V) receiving 15 Gy (V15Gy), heart volume, lung V55Gy and V70Gy, hypertension, left ventricle V15Gy, left main CA volume, and left anterior descending CA V15Gy. Based on patients' Shapley-derived risk profile, radiation dose variables generally became less predictive of MACE as time from radiation increased, while demographics remained generally predictive.

Conclusion: ML modeling enabled high precision for predicting short-term MACE in locally advanced NSCLC patients who received radiotherapy, though long-term MACE was less accurate. ML techniques show promise for identifying patients at high risk of short-term MACE. Our Shapley-derived individual risk profiles may assist with baseline cardiac risk assessment and identify opportunities for risk mitigation. Prospective validation may help implement these tools into clinical practice.

Abstract 1010 — Table 1: AUC: Area under the receiver operator characteristic curve

Time Cutoff	Testing AUC
1 Year	0.86
2 Year	0.84
3 Year	0.77
4 Year	0.75
5 Year	0.71

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1011

Integration of Telemedicine Consultations into a Tertiary Radiation Oncology Department: Predictors of Treatment Yield and Changes in Patient Population Compared to the Pre-Pandemic Era

Y. Sharifzadeh,[1] W. Breen,[1] W.S. Harmsen,[2] D.M. Routman,[1] M.R. Waddle,[1] K.W. Merrell,[1] C.L. Hallemeier,[1] N.N. Laack, II[1] L. Uthke,[1] and K.S. Corbin[1]; [1]*Department of Radiation Oncology, Mayo*

Clinic, Rochester, MN, [2]Department of Biostatistics and Health Sciences Research, Mayo Clinic, Rochester, MN

Purpose/Objective(s): The COVID-19 pandemic has proven telemedicine to be an efficient and safe method of healthcare delivery with the potential to increase accessibility for underrepresented groups. Given the anticipated permanence of telemedicine in radiation oncology practice, we aimed to understand the demographic and treatment characteristics of patients presenting for consultation via telemedicine, the predictors of patients opting to receive radiation therapy (RT) at our center, and the differences in patient and treatment characteristics compared to 2019, when consultations were exclusively in person.

Materials/Methods: We included all patients who had telemedicine consultations from March 2020 to February 2021. Treatment yield was calculated by dividing the number of patients who ultimately received RT by the total number of consults. New consultations seen in 2019 were reviewed and compared to the telemedicine cohort. Chi-square tests were used to identify differences.

Results: From 2020 to 2021, a total of 1,069 patients had telemedicine consultations (86% video, 14% phone). Most (64%) were male. Median age was 63 years. The most common disease sites included genitourinary (GU) (41%), breast (14%), and CNS (9%). Six-hundred forty-five (60%) had private insurance, while 424 (40%) had Medicare/Medicaid. Patients lived a median of 241 miles (IQR 96-481 miles) from the radiation oncology center. Forty-four percent of telemedicine patients ultimately received RT. These patients underwent photon RT (54%), proton RT (35%), brachytherapy (7%), stereotactic radiosurgery (3%), or intraoperative RT (1%). No differences were noted in age, sex, race/ethnicity, or insurance type between patients who did and did not receive RT. Patients who received RT lived closer to the center (median 287 vs. 189 miles, $p<0.001$). For patients within 100 miles of our center, 58% received RT, compared to only 32% of those who lived at least 500 miles away. Patients with gynecologic (76%) and hematologic (72%) malignancies were most likely to receive RT. Compared to 2019 when all 6,116 patients were seen in person, treatment yield was lower with telemedicine (67% vs. 44%, $p<0.001$). Telemedicine patients were more likely to be male (56% vs. 64%, $P<0.001$), white (93% vs. 95.0%, $p=0.024$), have private insurance (55% vs. 60%, $p=0.0053$), have a GU malignancy (24% vs. 41%, $p<0.001$), and live further from the center (median 241 vs. 139 miles, $p<0.001$).

Conclusion: Patients seen in telemedicine consultations lived further away and were less likely to receive RT at our tertiary care radiation oncology center. Telemedicine visits did not appear to improve healthcare access for underrepresented groups. Further analysis is warranted to identify gaps and opportunities in remote care.

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1012

Importance of Radiographic Tumor Regression during Radiotherapy in Squamous Cell vs. Adenocarcinoma of the Uterine Cervix as Assessed by MRI, CT and Conebeam CT

F. Haroun,[1] C.R. Weil,[2] K. Guo,[3] H. Zhao,[2] L.M. Burt Jr,[2] G. Suneja,[2] C. DeCesaris,[2] Y.J. Huang,[2] and D.K. Gaffney[2]; *[1]University of Utah School of Medicine, Salt Lake City, UT, [2]Department of Radiation Oncology, Huntsman Cancer Institute, University of Utah, Salt Lake City, UT, [3]University of Michigan, Ann Arbor, MI*

Purpose/Objective(s): The purpose of this study was to evaluate the kinetics of tumor regression in cervical SCC and AC across the different imaging modalities used for patients undergoing radiotherapy, and to evaluate locoregional relapse (LRR), progression-free survival (PFS) and overall survival (OS) of each cohort and correlate these data with rate of regression of the primary tumor during treatment, and the percent of residual tumor after external beam.

Materials/Methods: Thirty-two patients with stage IB2-IVA cervical cancer were selected with all 3 imaging modalities from an institutional database with a 2:1 ratio of squamous cell carcinoma to adenocarcinoma. All available CT (113 scans), on-treatment weekly conebeam CT (CBCT; 100 scans) and MRIs (MRI_1 at diagnosis and MRI_2 prior to brachytherapy; 48 scans) were imported into planning software and tumor GTV volumes contoured (CT and MRI), or largest two-dimensional area of tumor delineated (CBCT). Volume regression over time curves were generated, and size and rate of regression, and the percent of residual tumor were correlated to disease progression and disease-specific survival (DSS), with receiver-operator curves and machine learning algorithms used to identify thresholds. Kaplan-Meier estimators were used for survival analysis. Fine-Grey analysis was used to estimate cumulative incidence of progression, using a competing risk of death.

Results: With a median follow-up of 2.9 years (yrs), 32 patients were included, 22 (69%) with SCC and 10 (31%) with AC. All were treated with concurrent chemoradiation with 45 Gy in 25 fractions with weekly cisplatin, followed by brachytherapy. The majority received 5 brachytherapy fractions (59%). 2/22 (9%) with SCC and 1/10 (10%) with AC had local progression. The 1- and 2-yr cumulative incidence (CI) of local progression for both SCC and AC was 10% at both time points. Distant progression was higher in AC (60%, 6/10) compared with SCC (9%, 2/22) For SCC vs AC, the 2-yr CI of distant progression was 9% vs 57% ($p=0.02$). Ten of 32 patients died (31%), 3/22 (14%) with SCC and 7/10 (70%) with AC. For SCC patients, 2-yr DSS was 90%, versus 60 % for AC. Extent and rate of regression on CT and CBCT data were not correlated with progression or survival in this cohort; however, these data showed consistent rates of tumor regression. A threshold of >20% residual on MRI_2 was identified and was correlated with worse 2-yr PFS (50% vs 90%, $p=0.013$) and 1-yr DSS (83% vs 100%, $p<0.001$). Median residual volume on MRI_2 trended toward significant between SCC and AC (55% vs 16%, $p=0.052$).

Conclusion: This study showed cervical AC is associated with higher rates of distant progression and worse overall survival than SCC. Cervical AC tends to have a higher residual tumor burden. Our identified threshold of >20% residual tumor on MRI_2 correlating with worse PFS and distant progression may help identify escalation of systemic therapy in select patients.

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Assessment of Tumor Burden and Response by RECIST vs. Volume Change in HPV+ Oropharyngeal Cancer – An Exploratory Analysis of Prospective Trials

M. Arshad,[1] J. Hara,[1] A.J. Rosenberg,[2] D. Ginat,[3] A. Pearson,[2] Z. Iftekaruddin,[4] E. Izumchenko,[2] Z. Gooi,[5] E.A. Blair,[5] N. Agrawal,[5] E.E. Vokes,[2] D.J. Haraf,[4] and A. Juloori[1]; *[1]Department of Radiation and Cellular Oncology, University of Chicago Medical Center, Chicago, IL, [2]Department of Medicine, Section of Hematology/Oncology, University of Chicago, Chicago, IL, [3]Department of Radiology, University of Chicago Medicine, Chicago, IL, [4]Department of Radiation and Cellular Oncology, University of Chicago, Chicago, IL, [5]Section of Otolaryngology-Head and Neck Surgery, Department of Surgery, University of Chicago, Chicago, IL*

Purpose/Objective(s): Tumor burden and response to therapy are commonly assessed using RECIST, however, unidimensional evaluation may not fully characterize disease dynamics. Using HPV+ oropharyngeal carcinoma as a tumor model, here we report a comparison of RECIST and